Recommended Practice for Basic Inspection Requirements—New Pipeline Construction

API RECOMMENDED PRACTICE 1169
FIRST EDITION, JULY 2013

AMERICAN PETROLEUM INSTITUTE

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1 Scope

This recommended practice (RP) covers the basic requirements and their associated references needed to perform inspection activities safely and effectively during construction of new onshore pipelines. Use of this document will provide the basis for what construction inspectors need to have a basic knowledge of and where to find detailed information related to each facet of new pipeline construction inspection activities.

The requirements are organized into the following major sections:

— inspector responsibilities,

— personnel and general pipeline safety,

— environmental and pollution control,

— general pipeline construction inspection.

Users of this document include those individuals either engaged in pipeline construction inspection or seeking to become certified inspectors. Pipeline owner/operators and pipeline inspection service companies may also use this document to aid and enhance their inspector training programs.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Specification 5L, *Specification for Line Pipe*

API Recommended Practice 5L1, *Recommended Practice for Railroad Transportation of Line Pipe*

API Recommended Practice 5LT, *Recommended Practice for Truck Transportation of Line Pipe*

API Recommended Practice 5LW, *Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels*

API Specification 6D, *Specification for Pipeline Valves*

API Recommended Practice 1102, *Steel Pipelines Crossing Railroads and Highways*, 2007

API Standard 1104, *Welding of Pipelines and Related Facilities*

API Recommended Practice 1109, *Marking Liquid Petroleum Pipeline Facilities*

API Recommended Practice 1110, *Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide*

Options for Liquid Pipeline Systems

API Recommended Practice 1166, *Excavation Monitoring and Observation*

ANSI B16.5 [1], *Pipe Flanges and Flanged Fittings*

ANSI B16.9, *Factory-made Steel Buttwelding Fittings*

ANSI B16.20, *Metallic Gaskets for Pipe Flanges*

ANSI B16.21, *Nonmetallic Gaskets for Pipe Flanges*

ANSI B16.47, *Large Diameter Steel Flanges*

ANSI/ASNT SNT-TC-1A [2], *Personnel Qualification and Certification for Nondestructive Testing Personnel*

ASME B31.3 [3], *Process Piping*

ASME B31.4, *Pipeline Transportation Systems for Liquids and Slurries*, 2012

ASME B31.8, *Gas Transmission and Distribution Piping Systems*, 2012

CGA [4], *Best Practices*, 2013

NACE RP0169-06 [5], *Control of Corrosion in Underground or Submerged Metallic Pipeline Systems*

NFPA 30 [6], *Flammable and Combustible Liquids Code*

OSHA Title 29, *CFR* Part 1910 [7], *Occupational Safety and Health Standards*

OSHA Title 29 *CFR* Part 1926, *Safety and Health Regulations for Construction*

Peabody, A. W., *Control of Pipeline Corrosion*, National Association of Corrosion, Second Edition, January 2001

SSPC [8], *Good Painting Practices, Volume 1*

U.S. DOT Title 49, *CFR* Part 177 [9], *Carriage by Public Highway*

U.S. DOT Title 49, *CFR* Part 192, *Transportation of Natural and Other Gas by Pipeline*

U.S. DOT Title 49, *CFR* Part 195, *Transportation of Hazardous Liquids by Pipeline*

U.S. DOT Title 49, *CFR* Part 199, *Drug and Alcohol Testing*

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1 American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, New York 10036, www.ansi.org.
2 American Society for Nondestructive Testing, 1711 Arlingate Lane, P.O. Box 28518, Columbus, Ohio 43228, www.asnt.org.
3 ASME International, 3 Park Avenue, New York, New York 10016-5990, www.asme.org.
4 Common Ground Alliance, 2300 Wilson Boulevard, Suite 400, Arlington, Virginia 22201, www.commongroundalliance.com.
5 NACE International (formerly the National Association of Corrosion Engineers), 1440 South Creek Drive, Houston, Texas 77218-8340, www.nace.org.
6 National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02169-7471, www.nfpa.org.
7 U.S. Department of Labor, Occupational Safety and Health Administration, 200 Constitution Avenue, NW, Washington, DC 20210, www.osha.gov.
8 The Society for Protective Coatings, 40 24th Street, Sixth Floor, Pittsburg, Pennsylvania 15222, www.sspc.org.
9 U.S. Department of Transportation, 1200 New Jersey Avenue, SE, Washington, DC 20590, www.dot.gov.

3 Terms, Definitions, and Abbreviations

For the purposes of this document, the following definitions apply.

3.1 Terms and Definitions

3.1.1
contractor
An entity that includes the primary organization and any subcontractors engaged in pipeline construction covered by this RP.

3.1.2
inspector
An individual qualified to monitor, assess, evaluate, verify, discuss, decide, resolve, report, and document pipeline construction activities to ensure the requirements of the design, drawings, specifications, regulations, and industry practices are being met safely, efficiently, and in an environmentally sound manner.

NOTE There may be numerous types of inspectors, such as utility, coating, welding, and chief inspectors with employment arrangements including owner/operator employees, inspection service company supplied inspectors, or freelance contract inspectors (see annexes for details on other inspector classifications).

3.1.3
owner/operator

An entity, usually a pipeline company, who owns and/or operates and is responsible for pipeline or other utility assets.

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply:

ACI	American Concrete Institute
BMP	best management practices
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	*Code of Federal Regulations*
CP	cathodic protection
dbA	decibels measured on A scale
FWPCA	Federal Water Pollution Control Act, aka Clean Water Act
HAZCOM	hazard communication
HAZMAT	hazardous material
HDD	horizontal directional drilling
HVAC	high voltage alternating current
GPS	global positioning system
IDLH	immediately dangerous to life and health
JSA	job safety analysis
LFL	lower flammable limit
LOTO	lockout/tagout
MARSEC	Marine Security
MOC	management of change
MSDS	material safety data sheet

NDE	nondestructive examination
NDT	nondestructive testing
NORM	naturally occurring radioactive material
NPDES	National Pollution Discharge Elimination System
OQ	operator qualification
PE	professional engineer
PEL	permissible exposure limit
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
RP	recommended practice
SCBA	self-contained breathing apparatus
SPCC	spill prevention, control, and containment
SWP3	storm water pollution prevention plans
TWIC	Transportation Worker Identification Card

4 Pipeline Construction Inspector Responsibilities

4.1 Scope

This section outlines the responsibilities, personal conduct, and job performance expectations for pipeline construction inspectors that enable them to effectively carry out their duties using the knowledge and skills covered in the following sections on inspector requirements.

An inspector is an individual qualified to monitor, assess, evaluate, verify, discuss, decide, resolve, report, and document pipeline construction activities to ensure the requirements of the design, drawings, specifications, regulations, and industry practices are being met safely, efficiently, and in an environmentally sound manner. Inspector or inspection team authority is backed up by contractual provisions that state all work done, as well as material provided, shall be subject, at all times, to inspection by the company in charge of the project.

4.2 Owner/Operator Representative

Inspectors are expected to function at all times as representatives of the pipeline company (or other entity) owning and/or managing the project. In most cases, the inspector works for or represents a pipeline company, where strict procedures and/or contract provisions are in place that spell out the expectations and obligations of the inspector's performance.

4.3 Quality Assurance

Quality assurance includes those activities focused on providing confidence that quality requirements are consistently fulfilled. Inspectors are expected to be the principal means of assuring work and material quality during field construction. Early insistence that work is not to be performed without an inspector present strengthens quality assurance. Any questions that may arise regarding quality and acceptability of work, materials furnished, and services provided are decided upon by the inspector, inspection team, and/or owner/operator. Inspectors are required to reject work, materials, and services that do not meet the standards, contract terms, specifications, drawings, or other requirements of the project. Decisions by the inspector, inspection team, and/or owner/operator regarding quality, acceptability, and materials provided are final and conclusive.

4.4 Relationship with Contractors, Suppliers, and Vendors

Inspectors are expected to establish a professional business relationship with the contractor, suppliers, and vendors. These relationships should be based on interactions that are characterized by a reasonable, prudent, and forthright attitude and grounded in the highest degree of integrity. Inspectors must remember that contractors are to function as independent contractors with the power and authority to select the means, methods, and manner to perform the contracted work. Inspectors must respect this position and not direct nor supervise the contractor's work. However, in some cases, inspectors are required to implement cost control measures.

4.5 Planning Activities

Inspectors should mutually plan upcoming tasks with their contractor counterparts and owner/operator representatives, which will aid in smoother job performance and work completion. This should solidify a team approach in tackling each day's work and lessen the threat of potential problems.

4.6 Authority to Stop Work

Inspectors are empowered and expected to shut down any work on the basis of, but not limited to, conditions, situations, or activities that have occurred, are occurring, or may occur that could result in:

— imminent danger to any person, including contractor or owner/operator personnel;

— imminent danger to owner/operator or other property or the environment;

— substandard quality/work techniques that do not meet owner/operator specifications.

4.7 Reporting

Inspectors are expected to report deficiencies, unsatisfactory work, thefts, vandalism, missing materials/property, or suspicious activities/occurrences and other concerns in a timely, complete, and accurate manner to the chief inspector (Annex A), project manager, or designated owner/operator personnel depending on the project team organization.

4.8 Documentation

Inspectors should complete required documentation in a timely, concise, and accurate manner, including daily inspection reports, pipe tallies, red line drawing markups (showing physical changes) for as-built, extra work authorizations (if allowed by owner), and other reports/forms as directed in a format acceptable to the owner/operator.

4.9 Public Relations

Landowners, residents, and the general public with whom the inspector comes in contact typically consider the inspector to be a representative of the company. In dealing with these individuals or groups, the inspector should always conform to owner/operator expectations. Unfavorable publicity from inappropriate behavior could reflect adversely on all parties involved in the construction of the pipeline. Each inspector should ensure that complaints, misunderstandings, and other concerns expressed by landowners, residents, and the public are reported to the appropriate owner/operator representative for investigation and resolution.

4.10 Media Relations

Inspection personnel do not interact with representatives of newspapers, TV, or other media seeking information, unless expressly allowed to do so by the owner/operator. Inquiries from the media should be received in an open, honest way but referred to project management, public relations staff, or others designated by the owner/operator to handle these situations.

4.11 Safety

Each inspector is responsible for their personal safety and share responsibility for those personnel around them. Attentiveness, caution, and awareness of hazards (outlined in Section 5) should be a continuous and integral part of each inspector's behavior. If required by the owner/operator, inspectors are expected to pass a standard drug/alcohol test (see 49 *CFR* 199) and a background check.

4.12 Work Ethics

Inspectors should be aware of owner/operator policies regarding work ethics and behavior and understand the consequences of taking part in any activity that would not withstand the scrutiny of pipeline owner/operator management or other observers due to the appearance of the activity. These activities include offers of gifts, entertainment, trips, excursions, etc. offered by contractors, vendors, or suppliers.

5 Personnel and General Pipeline Safety Requirements

5.1 Scope

The requirements set forth in this section should be used to establish pipeline construction inspector knowledge and awareness of hazards inherent to new pipeline construction and the safety regulations, practices, and responses needed to address these hazards. This section highlights many of the basic OSHA requirements, specifically 29 *CFR* 1910 and 29 *CFR* 1926, that apply to construction safety and general requirements that may go beyond those spelled out in the regulations.

It is the duty of pipeline owner/operators and their contractors to be aware of, and comply with, all applicable federal, state, and local laws/regulations and manufacturer's requirements that apply to specific work activities being performed and materials used. Inspectors must report any unacceptable practices.

5.2 Job Safety Analysis (JSA)

5.2.1 General

Job safety analysis (JSA) should be conducted per owner/operator requirements, and inspectors are required to participate. This analysis determines potential hazards and the plans and mitigative measures needed to address these hazards. Pipeline owner/operator documents will supplement these safety awareness concepts.

The practice of analyzing and planning hazardous jobs, use of written procedures or permits, job review and discussion among key personnel, and walk through inspections ensure personnel understand potential hazards and the precautions needed to address them.

5.2.2 Hazard Recognition

Inspectors should evaluate the following areas to avoid incidents and raise awareness of hazards.

a) *Job Site*—Job site incidents, including, but not limited to: slips, trips and falls, pinch points, elevated work surfaces, planned lifts, etc.

b) *Environmental*—Changing environmental conditions, such as flooding, wind, dust, fires, and other potential conditions that could affect personnel and their work performance.

c) *Site-specific Hazards*—Physical features, such as terrain, waterway crossings, utilities, general right-of-way (ROW) conditions, and other features the pipeline construction will encounter as it traverses its selected route.

d) *Climatic and Other Work Condition Hazards*—The impact of adverse conditions, such as extremely hot weather (which could cause heat exhaustion and heat stroke) and cold weather (frostbite, hypothermia, encumbrance from extra clothing, etc.) on personnel.

e) *Materials and Material Handling*—Materials, including but not limited to their use, movement, and handling within the job site to consider adverse exposure and potential handling incidents. This may include but not be limited to pipe, valves, fittings, equipment, and materials such as asbestos-containing material, petroleum solvents, and heated materials. Use of material safety data sheets (MSSs) should be included along with hazard communication (HAZCOM) principles to inform workers of potential hazards and protective measures to be followed. Also be aware of hazardous materials (HAZMAT) exposed during construction. (See OSHA 1910.100 to 1910.119, 1910.1000 to 1910.1028, 1910.1200, and 1926 Subpart Z.)

f) *Work Task Review*—An overall review of all major tasks to be performed since most construction activity involves moving equipment and lifting and carrying heavy loads in the proximity of personnel, trenches, holes, welding, metal sparks, and other hazardous activities.

g) *Emergency Conditions*—Preparation for response to safety-related incidents. Inspectors should be familiar with the emergency response plan, including but not limited to emergency phone numbers and locations of response equipment, such as water, fire extinguishers, first-aid supplies, etc. (see OSHA 1910.151, 1910.157, 1926.23, and 1926.24).

5.2.3 Contractor Requirements

Inspectors should be familiar with the contract provisions regarding contractor(s) and their safety procedures (i.e. the contractor's safety program and owner/operator expectations). The contractor is responsible for all safety on the work site.

5.3 Personal Protective Equipment (PPE)

5.3.1 General

The JSA (5.2) identifies hazards that necessitate the use of PPE. Inspection personnel should know when personal protective equipment (PPE) is necessary, what PPE is needed, and how PPE is to be properly used, including its limitations. Typically, PPE for pipeline construction includes but is not limited to approved eye, head, foot, hand, and hearing protection; safety apparel; respiratory devices; and various protective shields. (See OSHA 1910.132 and 1926.95.)

5.3.2 Eye Protection

Eye protection includes safety glasses, safety glasses with side shields, goggles, face shields, and welding goggles and hoods. The type of eye protection required will depend on the hazard encountered. (See OSHA 1910.133 and 1926.102.)

5.3.3 Head Protection

Generally, head protection (approved hard hats) is required when injury could occur from impact or electrical shock. Normally, hard hats are worn at all times on every construction site or when otherwise dictated by owner/operator and contractor requirements. (See OSHA 1910.135 and 1926.100.)

5.3.4 Foot Protection

Approved foot protection is also a standard requirement on construction sites. This protection includes boots or shoes of leather or leather-type construction that cover the entire foot along with safety toes. (See OSHA 1910.136 and 1926.96.)

5.3.5 Hand Protection

Approved gloves should be worn depending on tasks involved (see OSHA 1910.138).

5.3.6 Hearing Protection

Hearing protection is used when the work environment noise level exceeds 85 dbA over an 8-hour period based a noise level survey. This protection includes ear plugs or ear covers with suitable noise reduction factors. (See OSHA 1910.95, 1926.52, and 1926.101.)

5.3.7 Wearing Apparel

Approved clothing identified in the JSA or depending on the tasks involved that protects against work hazards and the environment are required. For example, apparel could minimally include: fire retardant clothing, chemical resistant suits, leather for metal spark protection, etc.

5.3.8 Respiratory Protection

This protection involves proper use of air-purifying respirators, air-supplied respirators, or self-contained breathing apparatus (SCBA). The type of respirator depends on the type of hazard encountered. Users of this equipment should have knowledge of owner/operator and contractor requirements and be trained in its use, especially mask fit test and the operation of the devices. (See OSHA 1910.134 and 1926.103.)

5.4 Loss Prevention Systems

5.4.1 General

Inspectors should have a basic knowledge of general loss prevention systems and require additional training in owner/operator-specific processes. Inspectors should be familiar with these systems, which are designed to aid in observation, analysis, and reporting with easy to use forms for occurrences or actions that could harm/damage property, equipment, or materials. Examples include: lifting/hoisting pipe and equipment, excavation near pipelines or other utilities, marking/labeling, and other programs to increase awareness.

5.4.2 Near Misses

Inspectors should be familiar with these programs, which formalize observation, analysis, reporting, and communication of occurrences that have happened, but did not lead to injury or damage. These programs can improve awareness and avoid future reoccurrences. Near misses should be discussed and communicated with everyone on the job site because some may not have known the event was a near miss.

5.4.3 Safety Meetings

Inspectors should be capable of organizing and conducting daily safety meetings, prior to beginning work, to cover such topics as potential hazards likely to be encountered, precautions necessary to lessen their threat, use of PPE, lessons learned, near misses, and other topics relevant to the safety of workers, the general public, and the inspection team and potential property damage.

5.5 Protective Measures for Radiation

Inspectors should be aware of valid certification and licensing of nondestructive testing (NDT) personnel handling radioactive sources. Inspectors should also be aware of signage and safety monitoring rules and requirements. NDT inspectors also should know the rules and regulations for the state that they are working in; all state rules and regulations differ.

Inspectors should be familiar with NRC radiation exposure dosage limits, monitoring methods, precautions needed, and documentation of radiation exposure (see 10 *CFR* 20.1301 and 20.1302 and NORM conditions).

5.6 Job Site and Facility Security

Inspectors should have knowledge of the measures needed to ensure public and worker safety as well as safeguards for equipment, property, and materials such as the following.

— Procedures for site security and other safekeeping procedures, including use of surveillance and monitoring devices, security personnel, barriers, locking devices/systems, fencing, and other methods to deny access to materials, supplies, and equipment.

— Traffic control, barrier, and marking procedures, including familiarization with the *Manual of Uniform Traffic Control Devices (MUTCD)*.

— Familiarity with and requirements for transportation worker identification credentials (TWIC) and maritime levels of security (MARSEC). This is only necessary when working in facilities covered by these requirements. Owner/operator provide training on the pertinent requirements.

5.7 Required Work Permits

5.7.1 General

Inspectors should have knowledge of work situations that require work permits and the permit limitations and restrictions. Required permitting is specific to owner/operator requirements, and inspectors should have general knowledge of all identified areas, including but not limited to the following:

— confined space entry (see OSHA 1910.146);

— isolation of hazardous energy sources (see OSHA 1910.147);

— hot work [see OSHA 1910.119(k)];

— excavation (see OSHA 1926.650 and 1926.651);

— explosive blasting (see OSHA 1910.109 and OSHA 1926.900 to 1926.914).

5.7.2 Road and Highway Use

Inspectors should have knowledge of permit requirements and restrictions for heavy equipment, stringing trucks, and tracked equipment (either its movement or hauling from one location to another) as to any size and weight restrictions relative to the roads and bridges being used by these types of vehicles.

5.8 Rigging and Lifting Safety

Rigging and lifting requirements are owner/operator-specific programs. Inspectors should have general knowledge of OSHA 1910.180 and 1910.184, including the following:

— rigging techniques, terminology, labeling, tagging, and inspection prior to use;

— lifting devices and types, terminology, locating and observing condition of equipment, extension and boom height limits, device inspection requirements, hand signals, proficiency of personnel involved in rigging and machine operation, suspended loads over personnel, and reporting unacceptable practices (see OSHA 1926.250 and 1926.251).

5.9 Isolation of Hazardous Energy Sources

5.9.1 General

Inspectors should have an understanding of when and how electrical, mechanical equipment or pressure in the system is deenergized and isolated to prevent unexpected startup or release of stored energy that may cause a hazard. (See OSHA 1910.147.)

5.9.2 Electrical Energy Sources

Inspectors should recognize energy sources, deenergized and energized, requiring lockout/tagout (LOTO) or other practices to prevent exposure to electrical hazards.

5.9.3 Other Energy Sources

Inspectors should recognize equipment and piping, valves, etc. requiring LOTO or other precautions to prevent exposure to machinery operation or pressure release.

5.10 Excavation, Trenching, and Boring Safety

5.10.1 General

Inspectors should be knowledgeable about excavation safety. New pipeline construction involves an extensive amount of excavation and trenching work in one form or another. As a result, the existence of and exposure to potential hazards related to this activity is widespread. Because of the magnitude of this activity and its associated hazards, pipeline inspectors are required to know what facets to observe, how to take corrective action, and what protective systems and procedures should be employed. (See OSHA 1926 Subpart P.)

5.10.2 One Call

One call is a telephonic excavation notification system set up to coordinate excavators' activities with utility owner/operators to prevent damage to underground facilities. Inspectors should have an understanding of these systems, know the appropriate contact information for the area of pipeline construction activity, and assure the work can proceed safely after utilities are located and marked by the one call responder(s). (See CGA's *Best Practices*—Chapter 3, One Call Center and/or applicable state one call provisions/requirements.)

5.10.3 Excavation Regulations and Requirements

The provisions included in OSHA 1926 Subpart P should be part of pipeline inspectors knowledge. These provisions are often supplemented by pipeline owner/operator requirements. Qualified inspectors should know pertinent definitions such as competent person, benching, sloping, and shields as well as hazardous conditions that could be present and precautionary measures to be considered prior to and during trenching/excavations (competent person). It is also important to know about spoil placement, soil classification, soil testing procedures, and the soil types along with the use of test equipment, protective measures needed, documentation requirements, and the potential impact of other factors, such as weather conditions, traffic, groundwater, and machinery operating near excavations. Additionally it is important to know the plans for handling and disposal of previously existing contaminated materials.

5.10.4 Use of Explosive for Excavation

Inspectors should have a basic understanding of blasting plans, how explosives are used, the hazards associated with their use, and precautionary measures to be taken to ensure the safety of workers and the general public (see OSHA 1910.109, OSHA 1926.900 to 1926.914, and 49 *CFR* 177.835). Inspectors should know the owner/operator procedures for blasting and have procedures for dealing with foreign utilities in the area.

5.10.5 Foreign Crossings (Other Utilities)

Inspectors should be familiar with location methods for other utilities, such as other pipelines, telephone lines, television cables, sewers, fiber optic cables, electric lines, water pipes, and other underground (or overhead) structures, marking such structures, and communicating with third-party utility owner/operators to prevent damage due to mechanized excavation activities. Inspectors should also be familiar with how to monitor and assess hand digging, hydro-vacuum, dry air techniques, and other nonmechanized means to uncover these utilities when working near underground structures as well as how to support exposed lines once they are uncovered. (See CGA's *Best Practices*—Chapters 3, 4, and 5 and Appendices A and B.)

5.11 Confined Space Entry Requirements

5.11.1 General

Inspectors should be familiar with the confined space requirements for pipeline construction. Confined space is a space that can be bodily entered by an individual but is not designed for continuous occupancy and has a limited and restricted means of entrance or exit (egress). Inspectors should also be aware that areas may contain an atmosphere that is hazardous (toxic, explosive, oxygen deficient, or otherwise harmful to personnel). Inspectors should be aware that permits are required for confined space entry when either a hazardous atmosphere exists, it contains material where an occupant could be engulfed, or is configured where an occupant could be trapped. (See OSHA 1910.146.)

5.11.2 Rescue and Emergency Services

Inspectors should be familiar with the various responses needed to effectuate a rescue from a confined space, the equipment required, and administration of first aid and/or how to get medical treatment if needed (competent person). Inspectors are required to make sure that a plan is in place for these activities [see OSHA 1910.146(k)].

5.12 Atmospheric Testing

5.12.1 General

Inspectors should be knowledgeable about conditions that would require atmospheric testing. Atmospheric testing, particularly in cases involving confined spaces, hot work, and work in hazardous areas, is required to evaluate the hazards of a work space. A hazardous atmosphere means an atmosphere that may be immediately dangerous to life and health (IDLH) or exceeds permissible exposure limits (PELs). (See OSHA 1910.146 Appendices B and D.) The conditions are classified as follows:

— flammable gas, vapor, mist, or dust in excess of LFL;

— oxygen deficient/excess environments where oxygen levels are below 19.5 % or above 23.5 %;

— PELs (see OSHA 1910.1000);

— other atmospheric conditions or concentrations of toxic contaminants that may be IDLH (see OSHA 1926 Subpart Z).

5.12.2 Other Facets of Atmospheric Testing

Inspectors should have an understanding and knowledge of the following facets of atmospheric testing (see OSHA 1910.146 Appendix B):

— products and materials being used on the job site as well as HAZMAT that could be exposed during construction and create hazards to personnel safety (see OSHA 1926.57);

— physical properties of toxins (lighter/heavier than air, etc.) and PELs, including use of MSS information;

— measurement and monitorfing techniques and use of testing equipment, procedures to calibrate this equipment, the frequency of calibration, and verification of instrument calibration;

— precautionary measures to be taken considering the findings from testing and monitoring both prior to entry into or work episodes within a hazardous atmosphere.

5.13 Respiratory Protection

Inspectors need to be knowledgeable about conditions that may require utilization of SCBA, air-purifying respirators, and OSHA regulations. Inspectors should be aware of the different types of equipment, the availability and accessibility of respirator equipment, including air-purifying, air-supplied, and SCBA respirators, and when respirators may be needed. [See OSHA 1910.134(b), 1910.134(d), and 1910.134(e).]

5.14 Fall Prevention and Protective Systems

5.14.1 General

New pipeline construction work sites commonly have fall and tripping hazards primarily due to extensive excavations, rugged and varied terrain features, and the constant movement of the work (see OSHA 1926.25, 1926.26, and 1926.500 to 1926.503). Inspectors should be aware of owner/operator requirements addressing these hazards.

5.14.2 Fall/Tripping Hazard Measures

Inspectors should be able to observe, recognize, assess, and be prepared to take appropriate action on the following fall hazards:

— the nature and extent of fall hazards;

— fall protective systems such as barricades, fall prevention markers, limitations on access, and other protection systems in place as well as construction personnel awareness of potential fall hazards;

— general housekeeping within the work area and adequacy of work site illumination to minimize fall and tripping hazards.

5.15 Scaffolding and Ladders

Scaffolding and ladders is equipment that is occasionally used in pipeline construction, mostly for aboveground work like valve settings. Inspectors should be familiar with scaffolding as to when it is needed, how it is to be used safely, and proper erection/construction by qualified scaffold erectors. (See OSHA 1910.28 and OSHA 1926.450 to 1926.454.) Inspectors should be aware of owner/operator requirements covering safe use of scaffolding.

Inspectors should be familiar with safe ladder use (e.g. deeper excavations), ladder condition, and design as well as assuring the proper equipment is used for the work situation (see OSHA 1926.1053 and 1926.1060). Inspectors should be aware of owner/operator requirements regarding safe use of ladders.

5.16 Use, Movement, Storage, and Inspection of Tools, Equipment, and Materials

5.16.1 General

It is the contractor’s responsibility to inspect and maintain their equipment. Inspectors should be aware and observant of the use, movement, storage, condition, and inspection of tools, equipment, and materials being used in pipeline construction work, even though these materials may be owned and used by the construction contractor. The

contractor should have an inspection program for equipment, and the inspector ensures that the inspection program is being followed.

5.16.2 Transportation, Use, and Storage of Flammable and Combustible Liquids

Inspectors should observe and ensure the contractor is complying with the requirements for the way flammable and combustible liquids are being moved and handled (see OSHA 1910.106 and 1926.152).

— *Flammable Liquids*—Liquids having a flashpoint below 100 °F (37.8 °C) are known as Class I liquids. The most common is gasoline.

— *Combustible Liquids*—Liquids having a flashpoint at or above 100 °F (37.8 °C) and are known as Class II liquids. The most common are diesel fuel; Class III liquids include jet fuel and motor oil. (See NFPA 30, 49 *CFR* 177, and OSHA 1910.106.)

Inspectors should know how these liquids are used, transported, and stored, which requires ongoing observation and correction action when safety is jeopardized. Fueling practices, condition of equipment, containers, signs, and spillage are additional areas of interest for inspectors.

5.16.3 Transportation, Handling, Labeling, Storage, and Use of Compressed Gases

Inspectors should be aware of proper use, movement, handling, and storage of pressurized gases (see OSHA 1910.101, 1926.153, and 1926.803).

Typical compressed gases used in new pipeline construction include: oxygen and acetylene (welding/cutting operations), nitrogen (purging), LPG (heating/drying), and compressed air (pneumatic tools, grit blasting, tire inflation, painting, etc.). Inspector's knowledge of the properties of these gases will aid in their safe handling, storage, and use.

All compressed gas cylinders and tanks should be properly secured and labeled when transported and stored with valve protective caps in place when cylinders are not in use. Cylinders, safety release devices, and piping should be regularly inspected to ensure the equipment and its appurtenances are in acceptable condition. [See OSHA 1910.101, 1910.102 (acetylene), 1910.104 (oxygen), and 1910.110 (LPG); 49 *CFR* 177.400; and 49 *CFR* 177.844.]

Nitrogen supplied from truck tanks (large cylinders), piping, connections, and appurtenances should be checked for safe design, periodic inspection and testing, installation, and use.

Compressed Air—Compression equipment should be in serviceable condition for the service needed with operable safety devices in place. Hoses, piping, and connections should be checked for suitability for service and safe placement to prevent damage or rupture. Use of compressed air should follow established safety practices. (See OSHA 1926.803.)

5.16.4 Safe Use of Tools, Equipment, and Materials

5.16.4.1 General

Inspectors should monitor the following for both safety and job efficiency purposes.

5.16.4.2 Tools

Pipeline construction requires many different kinds of tools, from hand tools to various power tools (electric and pneumatic), and with the large number and types of tools, numerous hazards exist (see OSHA 1910.180, 1910.184, 1910.215, 1910.241 to 1910.244, 1910.254, and 1926.300 to 1926.303).

Key factors for avoiding these hazards include:

— use the right tool for the job;

— tool condition;

— correct use of the tool;

— safety features such as guards and welding hoods are in place;

— personnel are properly using protective equipment, including but not limited to: hard hats, facial shields, and other PPE as well as suitable clothing for the type of work.

5.16.4.3 Motorized Work Equipment

Work equipment from large trucks to tracked dozers/side booms to trenching equipment and other machinery may be employed from one end of the job site (spread) to the other. The safety issues to be considered with this equipment when working near or around it as they move throughout the spread while carrying and lowering loads include (see OSHA 1926.550 and OSHA 1926.600 to 1926.604):

— operator actions and ability to smoothly and properly operate his/her assigned machine (i.e. an indication of the level of training, operating proficiency, awareness of his/her surroundings, and ability to follow hand signals and safety rules) (see OSHA 1926.600 and 1926.602);

— equipment condition, maintenance level, and protective equipment in place;

— correct equipment and operation for the job (e.g. lifting capacity, boom positions, stabilizer use, and load limitations).

5.17 Facility, Commissioning, and Pre-start-up Review

Inspectors should be familiar with pipeline owner/operator pre-start-up review procedures and checklists.

Inspectors should understand owner/operator management of change (MOC) requirements and why adherence to them can prevent incidents. In the case of construction, MOC concepts recognize, document, and communicate such factors as changes in personnel, organizational makeup, physical configuration/layouts, equipment, site conditions, materials, and procedures, if required.

5.18 Regulatory Agency Inspections

Inspectors should follow pipeline owner/operator procedures in handling outside party inspection of construction activities. These agencies, whether federal, state, or local, have the authority to come on the job site to inspect construction activities and documents/records. Inspectors should be able to determine the agency involved, determine their objectives, check credentials, and know the requirements set forth by the owner/operator on providing information to the agency conducting the inspection. (See PHMSA Form 7 for an example.)

5.19 Vehicle Operation

Inspectors are called on to operate various types of vehicles off and on the pipeline construction ROW, including vehicles that may be company owned, rented/leased, or personal vehicles. Inspectors should understand the owner/operator policies and procedures governing the use of vehicles and be licensed appropriately. (See OSHA 1926.601.)

6 Environmental and Pollution Control Requirements

6.1 Scope

This section outlines the requirements to be used to establish the pipeline construction inspector's knowledge of environmental protection and pollution control aspects in order to ensure compliance with regulations, industry practice, and pipeline owner/operator requirements. Inspectors with basic knowledge of the areas below will have an improved ability to observe, monitor, verify, report, and correct deficiencies involving protection of the environment.

The owner/operator has procedures for compliance in this area, and the inspector should understand where their job function involves covered activities.

6.2 Erosion, Sediment, and Runoff Control on the Pipeline ROW

Inspectors should have an understanding that the extensive excavation work, earthmoving, clearing, and other similar activities associated with pipeline construction have the potential to impact the environment. Inspectors should be observant of these activities to avoid incidents. Familiarization with the key parts of the following regulations and practices will aid in safeguarding the environment (see OSHA 1910.180, 1910.181, and 1926 Subpart P):

— the scope, purpose, and provisions of the Federal Water Pollution and Control Act (FWPCA) of 1972 (especially, Subpart A) as amended, also known as the Clean Water Act (40 *CFR* 110), as well as local, county, and municipal county requirements;

— the installation, uses, and maintenance of erosion, sediment, and runoff controls, such as diversion devices, silt fences, and other equipment for control of surface water;

— familiarity with storm water pollution prevention plans (SWP3), including federal and state plans (where construction is taking place) and NPDES requirements;

— local revegetation requirements and pipeline owner/operator practices consistent with the needs of the ROW, landowners, and local practices should be reviewed by the inspection team.

6.3 Federal, State, and Typical Local Environmental Permits

Inspectors should be aware of the provisions of any applicable federal, state, and local permits, including but not limited to the following:

— different types of permits and which governmental agency has jurisdiction over the permits;

— typical requirements and provisions contained within these permits to aid in ascertaining compliance during construction.

6.4 Major Statutes

6.4.1 General

Inspectors should have a basic understanding of the following major environmental protection statutes and the precautions/actions needed during construction to ensure compliance. A report should be provided by the owner/operator prior to construction that outlines the statutes and the precautions/actions that apply to the project.

NOTE Construction contract provisions generally highlight those statutes that must be considered during the project.

6.4.2 National Historic Preservation Act (1966 as Amended) (36 *CFR* 800)

Inspectors should be familiar with the National Historic Preservation Act as to how it may impact owner/operator operations. This legislation sets up processes to consider the effects on historic properties and the Act seeks to avoid, minimize, or mitigate adverse effects on historic properties. It often sets out the archeological issues relating to economic development and the resultant construction activity.

6.4.3 Endangered Species Act (1973 as Amended) (50 *CFR* 402)

Inspectors should be familiar with the Endangered Species Act as to how it may impact owner/operator operations. This legislation seeks to prevent extinction of selected wildlife and plants, aid recovery/maintenance of endangered populations and critical habitats, and prevent/mitigate harm to the list of species.

6.4.4 Resource Conservation and Recovery Act (RCRA) (1976 as Amended) (40 *CFR* 261)

Inspectors should be familiar with the Resource Conservation and Recovery Act as to how it may impact owner/operator operations. This legislation governs solid and hazardous waste generation, transport, and disposal.

6.4.5 Comprehensive Environmental Recovery, Compensation, and Liability Act (CERCLA) (1980 as Amended) (40 *CFR* 300)

Inspectors should be familiar with the Comprehensive Environmental Recovery, Compensation and Liability Act as to how it may impact owner/operator operations. This legislation covers hazardous substances, site contamination, and cleanup.

6.4.6 Hazardous Materials

Inspectors should have a general understanding of the following:

— designation of HAZMAT (40 *CFR* 116);

— identification and listing of hazardous waste (40 *CFR* 261.3, OSHA 1910.1200, and OSHA 1926.65);

— hazardous waste table, HAZCOM, and emergency response information (49 *CFR* 172, OSHA 1910.120 and OSHA 1910.1200);

— general information and definitions (49 *CFR* 171, 49 *CFR* 171.8, and OSHA 1910.1200).

6.5 Water Crossing Permits

Inspectors should be familiar with environmental requirements for crossings of waterway crossings, water bodies, and wetlands, including the following.

— Inspectors should be familiar with and knowledgeable of types of crossing permits and the governmental agencies overseeing these permits(s).

— Inspectors should have an understanding of different water crossing installation and timing practices to comply with permit provisions.

— Inspectors should have an understanding of requirements for waterway and water body bank restoration, stabilization, and erosion control measures, including facilities to minimize erosion.

— Inspectors should be knowledgeable of owner/operator procedures and expectations for inspections by responsible agencies, including determining the objective of the inspection, checking credentials, and knowing who should handle escorting the inspection personnel and answering their questions.

— Inspectors should have an understanding of permit documentation requirements and closeout procedure, including any deadlines.

6.6 Use of Natural Water Sources

Inspector should understand the rules governing water withdrawal from and discharges to any natural water sources for water used on the ROW including for hydrostatic test medium. Withdrawal/disposal should be planned and executed in accordance with the following.

— Inspectors should have an understanding of withdrawal and/or discharge/disposal requirements within permits, including limitations on amounts of water used or discharged and the measurement of those quantities.

— Inspectors should have an understanding of discharge velocity, turbidity, and other restrictions, including but not limited to sediment and other foreign substances, control and planned treatment, filtration, or other methods needed to meet water quality provisions.

— Inspectors must be familiar with sampling methods, procedures, and protocols to comply with permit and/or regulatory provisions.

6.7 Handling Contamination Issues

Inspectors should strive to prevent any type of environmental contamination. In the event of an incident, inspectors should immediately report the event to the owner/operator and be aware of owner/operator mitigation procedures. Inspectors should have a basic awareness of how to identify contamination and who to contact in an event of an incident. Inspectors should:

— know the procedures to obtain samples, request analytical work, and recognize, handle, and monitor contaminated substances such as: soil, pipe coating, fuels, solvents, and other waste and/or contaminants [e.g. asbestos, chromate, horizontal directional drilling (HDD) mud, and other potentially toxic/hazardous substances] (see OSHA 1910.1200 and 1926.65);

— ensure RCRA provisions are followed, if required, including waste generation and disposal activities related to the pipeline project in accordance with owner operator expectations (see OSHA 1910.120);

— check the plan of action for the remediation of suspected or actual contamination and best practices for remediation, [e.g. fuel and drilling mud spills or other contamination]. Inspectors should have knowledge of who to contact and what response, if any, the inspector may need to take in the event of an incident (see OSHA 1926.65);

— monitor good housekeeping practices to collect and remove waste, including those classified as hazardous, from the work site at regular intervals (see OSHA 1926.25);

— have knowledge of the requirements in SPCC plans developed by or for pipeline owner/operators and approved and certified by a PE;

— review key points within prevention and pollution control best management practices (BMP) set forth by the U.S. EPA as they may apply to owner/operator requirements.

7 General Pipeline Construction Requirements

7.1 Scope

The requirements outlined in this section spell out the areas of knowledge that a qualified pipeline construction inspector needs to effectively perform his duties on the ground as the construction progresses through all stages. This section covers construction or construction-related areas that the inspectors are called upon to inspect, evaluate compliance versus requirements, resolve issues, assess and foster job progress, report observations/findings, and complete the documentation necessary to meet the expectations of the pipeline owner/operator or other entity in charge of the construction project.

7.2 Verification of Construction Personnel Qualifications

7.2.1 General

Inspectors should use the following to facilitate their verification process for key personnel performing work on the project.

7.2.2 Operator Qualification (OQ)

Inspectors should understand the concepts of OQ, including but not limited to covered tasks and evaluation of qualifications. Inspectors should know that some tasks within the construction arena are covered tasks (e.g. inspection activities for tie-ins, application and repair of external coating, line locating, excavation of foreign utilities, and backfilling a trench). (See 49 *CFR* 192.801 to 192.807 and 49 *CFR* 195.501 to 195.509.)

7.2.3 Verification Procedures

Assurance of certification and/or qualification is a necessary step in achieving proper performance and project quality objectives. Inspectors should be prepared to check and verify the certifications and/or other qualification documentation of certain crucial pipeline construction personnel and technicians performing specialized work, including quality and materials examination and testing. The key areas to verify certification and qualification include, but are not limited to (see ASME B31.4 Sections 434.1, 434.2, and 434.3; ASME B31.8 Sections 802.2.5, 806, and 841.2.2; 49 *CFR* 192.303, 192.305, and 192.307; 49 *CFR* 195.200, 195.202, 195.204, and 195.206; and ANSI/ASNT SNT-TC-1A):

— welders,

— heavy equipment operators,

— blasting/explosive personnel,

— excavation (competent personnel),

— NDE/NDT technicians,

— coating personnel,

— corrosion control technicians,

— safety professionals,

— environmental specialists,

— qualified pipeline inspectors.

Pipeline regulation, code, standard, and practice references, such as 49 *CFR* 195, ASME B31.4, ASME B31.8, API, ASNT, AWS, and NACE, contain various provisions for use of certified, qualified, and/or competent personnel, including pipeline construction inspectors.

7.3 ROW Inspection Requirements

7.3.1 General

Pipeline inspectors should be familiar with the following ROW-related requirements (see ASME B31.4 Section 434.3; ASME B31.8 Sections 802.2.5, 806, and 841.2.2; 49 *CFR* 195.210; and 49 *CFR* 192).

7.3.2 Pipeline Route Review

Inspectors should know how to observe and report any discovered or any potential pipeline route selection deficiencies or obstacles, such as terrain features; landowner issues; road, railroad, or waterway crossings; environmental features; cultural features; and protected resources (i.e. drinking water and proximity to occupied facilities).

7.3.3 Land Surveying Aspects

Inspectors should be familiar with basic land surveying terminology and definitions, including section, range, and township references, legal property descriptions, metes and bounds descriptions, fee property details, color coding of flagging, and other basic Public Land Surveying System information. (See ASME B31.4 Section 434.33.)

7.3.4 Pipeline Stationing

Inspectors should be familiar with pipeline stationing and equations. Pipeline stationing and equations, including how they are determined, is defined by the owner/operator. Typically, pipeline stationing is the linear survey measurements in feet and shown in hundreds of feet (stations) with additional footage shown as pluses. For example, 10,000 feet would be 100+00. Equations are used to correct the survey stationing when pipe is either added or taken out of the pipeline, necessitated, for example, by pipeline relocation. Inspectors should also understand the difference between and use of construction stationing and as-built stationing.

7.3.5 ROW Agreement Provisions

Inspectors should be knowledgeable of typical ROW agreement provisions and how and where to find the provisions in the following areas.

— Widths specified in the ROW agreement that grants an easement or legal right to work within and use the defined strip of land or area.

— Typical limitations, restrictions, and special conditions spelled out in the ROW agreement that could include temporary work space, special conditions that recognize adjacent property or structures, or access provisions.

— Ingress and egress provisions that facilitate access to and exits from the easement for work equipment and vehicles and surface damage provisions, including types of crops, trees, orchards, other ROW cover, landowner structures such as fences, drain tile, cattle guards, soil compaction, and other potential damage from construction.

— Specific instructions/agreements between the landowner and the pipeline owner regarding the easement and construction activities (i.e. preservation of certain areas, ownership of cleared trees, etc.). These are typically found on “line lists” developed and maintained by the land agents.

7.3.6 Other Defined Land Use

Inspectors should know what to look for in the following areas within and outside the construction spread as to space, dimensions, and location, including but not limited to the following.

— Work areas that may require extra space beyond the ROW to facilitate construction activities, such as waterway and roadway crossings.

— Material storage/staging areas, including pipe yards and lay down areas (e.g. space to weld up pipe for installing a waterway crossing).

— Equipment parking areas where machinery that is not in current use, such as cranes and derricks, dozers, side boom tractors, and equipment hauling tractor/trailers, can be held/staged near the construction spread until needed.

— Fee property needed for the project, which typically includes pump station or compressor station sites, block valve sites, and rectifier/ground bed locations.

7.3.7 Pipeline and Site Staking and Marking Conventions

Inspectors should understand the following as to survey directions for the pipeline route and directives for construction.

— Nomenclature on stakes and markers and its meaning—usually this includes information such as: pipeline stationing, direction changes, additional ditch depth, changes in pipe wall thickness, etc.

— Maintaining these items during construction and how to reestablish destroyed, damaged, or misplaced stakes and/or markers. A surveying contractor typically is ‘called in to reestablish missing markers/stakes.

— Color coding of the survey flagging for common utilities, construction centerline, edge of easement, edge of temporary work space, and extra work space.

7.4 Locating and Marking Requirements

Inspectors should be knowledgeable of procedures for proper location of underground facilities being crossed or near the construction and the temporary marking of them during construction to ensure safety and avoid/minimize damage. Inspectors should also be aware of the OQ covered tasks within this work. (See 49 *CFR* 192 Subpart N, 49 *CFR* 195 Subpart G, CGA’s *Best Practices*, and the state one call systems.) Inspectors need to:

— understand the contractor’s approved foreign utility locating techniques, including probing (if allowed), use of electronic locators, and other equipment/means and procedures used to accurately locate underground utilities or structures;

— understand the one call systems in the area where construction is taking place, including how the systems(s) work, pertinent phone numbers, insisting on third-party response and use of suitable markers, and who is responsible to make one call notifications—typically the contractor is responsible for the work;

— be familiar with the owner/operator specifications as applicable and contractor’s procedures for road and railway crossings, including markers, safety signs, barricades, and other safety features, especially those required by crossing permits and/or governmental authorities;

— know the owner/operator requirements for location of permanent pipeline markers, including warning signs, aerial markers, and waterway crossing signs, for placement during cleanup operations.

7.5 ROW Preparation Requirements

7.5.1 General

Inspectors need to be knowledgeable of owner/operator ROW preparation requirements. After construction begins, the inspectors need to observe, monitor, and verify adherence to specifications and ROW agreements and deal with landowners/tenants or coordinate with the responsible party (i.e. land agent and other interested parties in the following areas).

7.5.2 Clearing, Grubbing, and Grading

Inspectors need to be knowledgeable of owner/operator requirements for clearing, grubbing, and grading. Clearing means removal and disposal of all brush, undergrowth, and timber. Grubbing means removal and disposal of stumps and roots within the specified ROW. Grading involves the flattening, sloping, or other excavation to modify the terrain along the pipeline route to make it safe and accessible for construction. Inspectors need to know what needs to be moved out of the way, including trees, brush, and other vegetation; grass; certain rocks; and other obstacles, and if the preparation work allows the passage of construction equipment and other vehicles to facilitate the safe and satisfactory progress of the construction. In monitoring these activities, inspectors need to consider the following:

— equipment for the job is suitable for the work involved, including sufficient size, power, and operating condition;

— how the equipment is being used to minimize collateral damage and assuring that equipment operators are aware of their surroundings and operate their machines in a competent manner;

— the end result of these operations (i.e. the finished work meets owner/operator specifications, and the prepared ROW allows construction to proceed smoothly and safely);

— that clearing, grubbing, and grading are typically permitted activities and that those activities meet the permit conditions.

7.5.3 Landowner/Tenant Assets

Inspectors need to be aware of landowner requirements, including but not limited to the following: monitoring removal of permanent fencing, installation of temporary fencing and gates, handling cattle guards, construction pathway offsets, and bypassing other man-made facilities will aid in smooth construction progress and minimize landowner/tenant concerns and damage to surrounding property. These requirements are normally found on the construction “line list” typically developed and maintained by the land agents.

7.5.4 Interfacing with Landowners/Tenants

Inspectors need to conduct open and forthright communication with landowner/tenants in communicating construction plans and requesting feedback on concerns and meet with the owner/operator concerning the release of procedures in order to to minimize discontent and misunderstandings. Some owner/operators require that this function be done by the land agents, but there is usually interaction between the landowners and the inspectors.

7.6 Ditching and Excavation Requirements

7.6.1 General

Inspectors must know proper ditching and excavations procedures to ensure correct pipeline alignment, depth, width, slope, and spoil placement to facilitate efficient and safe pipe laying operations. Inspectors must consider the following in overseeing this aspect of the project (see ASME B31.4 Sections 434.3.2 and 434.6 and 49 *CFR* 195.248).

7.6.2 Damage Prevention Practices During Ditching/Excavation Work

7.6.2.1 General

Inspectors must be knowledgeable about damage prevention practices, including but not limited to the following.

7.6.2.2 Underground Utilities

Ensure that one call notification procedures have been followed, that crossed utilities are clearly marked and uncovered by nonmechanized means as per the owner/operator guidelines and foreign utility crossing procedure (i.e. hand digging, hydro-vacuum, or other means to prevent damage to the lines), and that uncovered utilities are properly supported to maintain their integrity (see 49 *CFR* 195.442, 49 *CFR* 192.325, CGA's *Best Practices*, API 1166, and state one call systems).

7.6.2.3 Other Physical Property Near the Excavation

Ensure adequate space is maintained between other structures and ditching/excavation equipment and that placement of spoil does not damage adjacent structures or other assets nor impede traffic and/or other pathways.

7.6.3 Ditch Features

7.6.3.1 General

Inspectors should monitor, measure, where necessary, report, if required, and conduct continual excavation inspections in the following areas related to the ditching operation and in accordance with OSHA 1926.651.

7.6.3.2 Ditch Specifications

Ensure the specifications are followed for: ditch depth and width, bottom of ditch condition (i.e. uniform bearing surface, free of hard objects, free of water, use of dirt pads, and where possible, depth adjustments are made to minimize the need for sags and overbends).

7.6.3.3 Breaks in the Ditch

Verify that breaks are left in the ditch to allow passage of vehicles, livestock, and/or wildlife.

7.6.3.4 Extra Depth Ditch Requirements

Ensure depth specifications are met and observe and measure where extra depth starts and ends and record this information.

7.6.3.5 Multilevel Ditch Requirements

Ensure that the designated levels of soil are properly removed and separated in accordance with specifications [e.g. top soil (higher quality soil) is separated from deeper ditch spoil and/or multiple stratifications].

7.6.3.6 Ditch Breakers

Ensure that ditch breakers are installed as required at the edge of wetlands in accordance with the permits and construction specifications.

7.6.4 Open Ditch Restrictions

Inspectors should monitor the distance between the front end of ditching and the back end (backfill) and the amount of open ditch allowed by construction specifications (e.g. 2 miles or less during daylight hours and $^{1}/_{2}$ mile at night).

7.6.5 Foreign Line and Other Structure Crossings

Inspectors need to ensure that care and attentiveness is used in crossing foreign lines, including pipelines, other utilities, and farmland drainage systems. Inspectors also need to ensure that the space between the new pipeline and other existing structures is in accordance with specifications (usually 12 in. to 24 in.) and that acceptable temporary installations are used and are suitable for the service required. (See 49 *CFR* 192.325 and 195.250.)

7.6.6 Soil Characteristics

7.6.6.1 General

Inspectors should have knowledge of OSHA 1926 Subpart P to ensure ditching/excavation safety and specifically to address the threat of cave-in.

7.6.6.2 Soil Analysis

Inspectors should have an understanding of proper analysis of the types of soil encountered, including moisture content, compaction, angle of repose, and relative stability, and should know who is the project's competent person(s) for soil assessments.

7.6.6.3 Ditch Sloping or Other Ditch Configurations

Inspectors should be aware of ditch depth/width configurations and the ditch proximity to equipment movement/ operation relative to the type of soil involved.

7.6.7 Shoring Requirements

Inspectors should check use of trench boxes, bracing, and other ditch shoring requirements and adequacy of documentation evidencing certification of the devices. Inspectors need to be knowledgeable in the use of and restrictions of shoring and bracing when it is required. (See OSHA 1926.652.)

7.6.8 Rock Excavation Requirements

Inspectors must know proper ditching and excavation procedures in rocky terrain to ensure the safety of personnel and proper placement and protection of the pipeline. Inspectors should check, measure, document, and report, when necessary, rock excavation. In rock excavation, owner/operators typically prefer use of mechanized equipment, such as track mounted rippers, pavement breakers, specially equipped track hoes, or ditching machines to cut through, break up, and remove rock. Inspectors should able to perform the following:

— observe and assess the equipment being used as to size, type, condition and effectiveness, and limitations;

— ensure that depth specifications are met and accurate measurements are performed to ascertain any extra work authorization or to account for any special bid pricing.

7.6.9 Drilling and Blasting

Inspectors should understand the basics of this process, but specialized training and experience is often needed to inspect these activities (see Annex B).

Blasting activities that should be monitored include (see OSHA 1926.900 to 1926.914):

— checking permits, notifications, and warning signage;

— competency of personnel;

— charge placement procedures;

— amount of explosive used per blast;

— precautions around structures;

— charge padding (soil or blast mats) to avoid excessive heaving or debris scatter;

— adherence to owner/operator specifications;

— presence of a blasting plan.

7.6.10 HDD Requirements

Inspectors should know the basic process and requirements of HDD, but it is advisable to utilize an inspector with specialized training and experience in this facet of construction (see Annex C).

The following HDD activities should be monitored:

— HDD equipment size, type, condition, and suitability for the job;

— competence and proficiency of equipment operators and their supervision;

— drilling follows the specified profile, alignment, tolerances, and entry/exit locations;

— reaming, pull back procedures, and equipment and pipe string layout follow industry practice and specifications;

— use, containment, and disposal of drilling mud follow accepted practices;

— inadvertent returns of the drilling mud to the surface.

7.7 Pipe Handling, Hauling, and Stringing Operations

Inspectors should monitor, assess, and document the condition of the pipe in each phase below (see API 5L1, API 5LT, API 5LW, ASME B31.4 Section 434.5, ASME B31.8 Section 806, and 49 *CFR* 192.309).

Inspectors should be knowledgeable of work activities involved in moving pipe: the type and condition of equipment used, such as fabric slings, padded calipers, soft lift hooks, and other approved lifting devices; boom height versus surrounding structures, such as power lines; stacking procedures (number of tiers and padding); and other precautionary steps to protect the pipe and any coating. (See ASME B31.4 Section 434.4.)

Inspectors should complete pipe tallies; check mill certifications, heat numbers, and mill test reports; and note pipe marking on received pipe at rail heads, docks, or other receipt locations to facilitate proper tracking and documentation and to ensure correct placement by wall thickness, grade, and coating.

Inspectors should observe and note pipe and coating condition, including bevels, presence of dents, gouges, scratches, notches, grooves, or other defects, and report noted damage along with measurements of size and extent of any damage and its location. Reports of damage should be made in accordance with owner/operator procedures.

Inspectors should check locations of required gaps or spaces in strung pipe, where needed, to allow passage of equipment, vehicles, personnel, and livestock and at foreign utility crossings, if required.

Inspectors should check pipe handling and placement during stringing to minimize damage, document any assessed damage, and that ensure strung pipe is not in harm’s way from ongoing construction activities and that stringing enables a smooth pipe laying progress.

7.8 Piping Components, Materials, and Other Mainline Appurtenances

Inspectors should verify materials meet job specifications, including but not limited to bills of materials and drawings, check mill test reports, certification records, and markings; match components with specifications to ensure suitability for the intended service; and know what to look for when visually inspecting these components, marking deficiencies and recording findings. These major components include the following.

— Inspectors should check the condition of flanges, fittings, bolts/nuts, gaskets, and other fittings. Check ANSI ratings, flange bores and transition nipples, component condition, bevels, markings, and adequacy of supplies to ensure they are in accordance with job specifications and drawings (see 49 *CFR* 195.206, ANSI B16.5, ANSI B16.9, ANSI B16.20, ANSI B16.21, and ANSI B16.47).

— Inspectors should check the following for valves: ANSI ratings, overall condition, trim, coating, operability, flange faces and/or bevels, and body condition to ensure they meet specifications and are suitable for installation in the pipeline (see API 6D, ASME B31.4 Section 434.15, 49 *CFR* 195.258, and 49 *CFR* 195.260).

— Inspectors should check the condition of hot bends (manufactured bends): check bend angles, bend radius, markings, ovality, bevels, coating, and overall condition to ensure they meet specifications.

— Inspectors should check condition of other appurtenances, such as scraper traps, pump station mainline fittings and valves, and other components to be installed in the mainline, to ensure acceptability for installation (see ASME B31.4 Section 434.17).

7.9 Pipe Bending Operations

Inspectors should ensure that owner/operator specifications are adhered to and the following areas are checked during field pipe bending: produced bends meet specified angle requirements, meets minimum bend radius requirements, ovality and wall thinning is within specified limits, bends have a smooth contour, pipe seam location restrictions, if any, are correct, and any restrictions due to pipe grade have been met. Inspectors should note damage to coating, pipe wall, and bevels and mark, record, and report any damage or out of specification bends. (See 49 *CFR* 192.313, 49 *CFR* 195.212, and ASME B31.4 Sections 434.7 and 434.7.3.)

7.10 Pipe Alignment and Welding Requirements

7.10.1 General

Since this phase of pipeline construction, both on production and tie-ins, is critically important to the long-term integrity of the pipeline, all inspectors should know the basics of proper lineup and welding and its inspection. Qualified welding inspectors with specialized training and experience would be expected to know more in depth inspection requirements (see Annex D). All mainline pipeline welding, whether manual or automatic, follow the same codes, standards, industry practices, and specification parameters.

7.10.2 Pipe Laying Operation

Inspectors should check the following per specifications and drawings;

— ensure pup joints meet specified minimum length restrictions consistent with pipe diameter and owner/operator requirements;

— for proper installation/placement of transition nipples for changes in pipe wall thickness;

— for proper location/placement of the correct type, grade, and wall thickness of pipe and other mainline appurtenances, such as hot bends, block valves, scraper traps, any pump station piping, and other fabrications per drawings. Mark changes (red line) on drawings to facilitate completion of as-built drawings.

7.10.3 Mainline Component Assembly

Inspectors should be knowledgeable in the following areas of mainline component assembly:

— bolting procedures, including but not limited to: proper bolt/nut size and condition, placement, tightening sequence, torque requirements, and use of correct tools;

— proper gasket material and use;

— installation and isolation testing of any insulating flanges;

— verify that all concrete support structures are constructed in accordance with American Concrete Institute (ACI) standards and owner/operator requirements;

— ensure proper coating and application requirements are met for the component being installed.

7.10.4 Other Pipe Laying Inspections

Inspectors should ensure open pipeline is protected with night caps or other devices to keep debris, water, and wildlife out of the welded up pipeline.

7.11 Roadway, Railroad, and Other Crossings

7.11.1 General

Inspectors should monitor, assess, and verify the activities and requirements in the following sections to ensure compliance with regulations, permits, industry practice, and owner/operator specifications (see API 1102 Sections 4, 5, and 6; ASME B31.4 Sections 434.13, 434.13.1, 434.13.2, 434.13.3, and 434.13.4; and ASME B31.8 Sections 802.2.5, 806, and 841.2.2).

7.11.2 Safety

Inspectors should ensure safety precautions are in place, including markers, signs, traffic control devices, and other related activities, including flagmen, as required, near pipe laying operations, excavations, and other locations, especially where machinery and trucks are operating and other construction activity is taking place.

7.11.3 Permits

Inspectors should be knowledgeable of different types of crossing permits, their provisions, and the governmental agency issuing the permit(s) (e.g. state and county road and city street crossing permits and railroad crossing permits).

7.11.4 Installation Activities

Inspectors should be knowledgeable of installation methods, machinery/equipment condition, and operator performance involved in completing the crossing, including wet or dry boring, HDD, ditching, or other approved method. ensure that the pipe has been surveyed and proper documentation collected prior to installation and that tie-in points had been surveyed after installation.

7.11.5 Cased Crossings

Inspectors should be knowledgeable of cased crossings:

— casing installation methods, equipment used, operator performance, and completeness/acceptability, including the correct pipe, wall thickness, and coating, if any, versus specifications (see 49 *CFR* 192.323 and 49 *CFR* 195);

— mainline welding is inspected and acceptable along with the pipe coating and/or pipe jacketing;

— verify that mainline pipe insertion procedures are followed to ensure that no damage occurs to pipe and its coating, visually inspect spacers/insulators during and after installation, and check installation of seals and vents;

— verification that the completed cased crossing is not electrically shorted and testing methods are correct, that depth profile specifications are met, and the required documentation is completed.

7.11.6 Uncased Crossings

Inspectors should be knowledgeable of uncased crossings:

— method of crossing (boring, HDD, ditching, or other approved methods), equipment used, and operator performance, including use of heavier wall pipe and special coating, if required, is in accordance with drawings, specifications, and permit provisions;

— mainline welding is inspected and acceptable along with coating and/or jacket condition after insertion of the pipe;

— mainline crossing pipe on each side is ready for tie-in.

7.11.7 Documentation

Inspectors must make sure that all required documentation, including permits, owner/operator records and requirements for marked-up drawings as needed, and any special provisions in permits, such as railroad, highway, and local or other permit requirements, are completed.

7.12 Waterway and Water Body Crossings

7.12.1 General

Inspectors should monitor, assess, and verify the following activities and requirements to ensure compliance with codes, regulations, permits, industry practices, and specifications. These crossings may include swamp, wetland, river, lake, and similar water feature crossings. (See ASME B31.4 Section 434.13.4.)

7.12.2 Other Types of Crossings

Inspectors should monitor and inspect overhead crossings, such as spans and bridge attachments that should be inspected to ensure compliance with specifications, drawings, and permit provisions (see ASME B31.4 Sections 434.13.2 and 434.13.3).

7.12.3 Precautions

Inspectors should be knowledgeable of safety and environmental precautions, including equipment used, excavations, markers/signs, waterway traffic, if any, pipe laying operations, and minimization of environment damage.

7.12.4 Permits

Inspectors should be knowledgeable of different types of crossing permits, their provisions, and the governmental authority with oversight over the permit. For example, most major water crossings must be permitted by the U.S. Army Corps of Engineers with their NWP12 permit.

7.12.5 Survey Requirements

Inspectors should ensure compliance with survey requirements as to alignment and depth, including how these requirements are determined, verified, and accepted in accordance with specifications and drawings.

7.12.6 Installation Activities

Inspectors should make sure that the use of accepted/specified pipe installation methods, bank stabilization and restoration methods, extra ROW requirements, buoyancy control, heavy wall thickness pipe, and installation and/or use of concrete jacketed pipe comply with permit provisions and specifications.

7.12.7 Positioning and Buoyancy

Inspectors should verify that crossing pipe position and stability is in accordance with owner operator specifications, especially negative buoyancy requirements to prevent flotation.

7.12.8 Documentation

Inspectors should ensure that all required documentation, including pipe details, permits, and owner/operator records and markup drawings to reflect as-built conditions, are completed.

7.13 Corrosion Control Requirements

7.13.1 General

Inspectors should have a basic knowledge of corrosion control, including pipe coating and cathodic protection (CP). Qualified/certified corrosion control coating inspectors with specialized training and experience would be expected to know more in depth inspection requirements (see Annex E).

7.13.2 Cathodic Protection Test Lead Requirements

Inspectors should make sure that all test leads for CP monitoring are attached to the pipeline with a low temperature welding process, such as cadweld. The welds and bare wires should be properly coated with properly applied, specified coating, and lead wires should have ample slack between the pipe and aboveground test stations to prevent damage. Leads, test station installations, and lead wire terminations should follow job specifications. Adequate testing, usually by a corrosion control specialist, should be performed to ensure these installations are functioning properly.

7.13.3 Aboveground/Belowground Coating Requirements

Inspectors should be aware of the requirements for surface preparation and application methods (see SSPC Volume 1).

7.13.4 Final Coating Inspection

Inspectors should monitor, assess, and take corrective action where necessary for all coated pipe to ensure it is inspected immediately before lowering in with a holiday detector that has an output consistent with NACE recommended voltage for the type of coating and thickness being inspected. Inspectors should verify the detector setting at least twice per day. Inspectors must make certain all coating anomalies or damaged areas are marked and properly repaired per manufacturer's recommendations and job specifications before the pipe is allowed to be lowered into the ditch.

7.14 Lowering in Requirements

7.14.1 General

Inspectors should monitor, assess, and take corrective action where necessary in the following areas prior to and during installation of the pipe in the ditch (see 49 *CFR* 192.319, 49 *CFR* 195.246, and ASME B31.4 Section 434.10).

7.14.2 Condition of Bottom of the Ditch

Inspectors should ensure that there is no water, rocks, hard clods, roots, or other debris in the ditch and that any padding material or rock shield is in place. Lower the line with proper slack in the line so it fits the profile of the ditch (i.e. sags and overbends are properly positioned to prevent pushing the pipeline ahead of the lowering in process).

7.14.3 Lifting and Lower Equipment

Inspectors should monitor, assess, and take corrective action, where necessary, for: slings, padded calipers, rollers, and other pipe carrying devices to prevent coating or pipe damage and assess the suitability of lifting machines as to size, type, and condition. Inspectors should review the design considerations in the lowering in plan and the equipment spacing and maximum lifting height to prevent excessive stresses.

7.14.4 Erosion Control

Inspectors should check that ditch plugs, sack breakers, retards, and water diversion features are in place and built in accordance with specifications to prevent washouts.

7.14.5 Land Drains

Inspectors should check to ensure land drainage reinstallation is correct and in agreement with specifications

7.15 Backfill and Cleanup Requirements

Inspectors should monitor, assess, and take corrective action as needed in the following areas during backfill operations to prevent damage to the pipe and/or its coating and ensure support is provided under the pipe (see 49 *CFR* 192.327, 49 *CFR* 195.248, 49 *CFR* 195.252, and ASME B31.4 Section 434.11).

— Inspectors should check suitability of backfill material (no rocks or other hard objects to be placed on the pipe) and equipment used for backfilling and ensure the pipe is properly supported and padded (see 49 *CFR* 192.319). The inspector must also ensure that owner/operator specifications are met.

— Inspectors should verify depth requirements as stipulated for each location and type of terrain in accordance with 49 *CFR* 195.248, 49 *CFR* 192.327, and the job specifications.

— Inspectors should ensure compaction meets job specifications and settlement is considered for the ditch cover, including water pack requirements.

— Inspectors should check rock shield or other soft earth padding (at least 12-in. thick) is in place in rocky terrain in accordance with job specifications.

— Inspectors should monitor the following cleanup operations that involve restoring the land to it’s agreed upon condition prior to construction:

  — removal of waste materials, rocks, and other debris resulting from construction;

  — repair all damaged land by filling holes, ruts, and other land disturbances;

  — plow, disc, or drag ROW to dress the land and remediate excessively compacted areas, especially in cultivated areas;

  — remove temporary structures and ROW access roads/trails per agreed upon requirements;

  — repair fences with new posts, braces, and fencing material and tighten to satisfy landowner expectations;

— ensure that proper seeding, where required, has been applied in accordance with design and permit conditions and/or the landowner agreements;

— check that pipeline warning markers, milepost and aerial markers, and river crossing signs are placed and installed in accordance with drawings, specifications, and API 1109 (see 49 *CFR* 195.410 and ASME B31.4 Section 434.18).

7.16 Pipeline Cleaning Requirements

Inspectors should monitor the areas below in the use of pipeline cleaning devices.

— Inspectors should check launching and receiving traps for proper configuration and suitability for the operation, including pressure relief provisions and mainline valve positioning.

— Inspectors should ensure cleaning devices are constructed per specifications to properly gauge the internal condition of the new pipeline.

— Inspectors should monitor cleaning device location and speed.

— Inspectors should be knowledgeable in cases of damage to the gauging plate, if a swab becomes stuck, or anomalies are indicated by other devices. Such defects or obstructions must be located and repaired in accordance with job specifications.

7.17 Internal Line Inspection Requirements

Inspectors should be knowledgeable of owner/operator requirements for internal line inspection. Owner/operators often run internal line inspection devices following construction to establish their baseline assessments as part of their integrity management programs. Inspectors should monitor the following areas when these devices are used (see 49 *CFR* 195.450 to 195.452).

— Inspectors should check launching and receiving facilities for proper configuration and suitability for using these inspection tools, including pressure relief provisions and mainline block valve positioning.

— Inspectors should be knowledgeable of tool run activities and monitor tool run activities. If the inspection device becomes lodged in the pipeline, coordinate activities with contractors in order to locate the tool, perform extraction work, and make pipeline repairs.

7.18 Hydrostatic Pressure Testing Requirements

7.18.1 General

Inspectors should be knowledgeable of API 1110 provisions, 49 *CFR* 192 Subpart J, and 49 *CFR* 195 Subpart E. Ensure the owner/operator test plan is implemented and then monitor, assess, and report on the hydrostatic pressure testing process steps listed below (see also ASME B31.4 Chapter VI).

7.18.2 Permit Requirements

Inspectors should review permits, if any, to obtain test water from local sources (i.e. municipal, river, streams, or other sources) and plans to treat test water (filtration, chemical treatment, or use of other conditioning means) to ensure specified quality before it enters the new pipeline. Review disposal plans and requirements following test completion to ensure that the discharged water meets permit and/or specified quality parameters.

7.18.3 Check Test Equipment

Inspectors should check the following to ensure that the test equipment is compatible with testing requirements.

— Filling equipment condition and suitability for service (e.g. high volume, low pressure pumping equipment, piping, scrapers, and test manifold and blinds and/or plugs are in place on all side connections and other small piping not to be included in the mainline test).

— Test equipment, including low volume, high pressure pump, dead weight tester, thermometers, recording instruments, associated piping, and other appurtenances to ensure all equipment is properly connected and suitable for the test. All test equipment must meet industry calibration standards.

7.18.4 Conduct of the Test

As required by owner/operator, inspectors should observe the performance of the test and verify the results, report any temperature/pressure variations, and verify test report completeness. Owner/operator defines roles of the inspectors in regards to the witnessing, sign off on, and recording the completed test plan. Test reports should include:

— company name, testing company, and person responsible;

— date and time of test;

— description of facility tested;

— test medium;

— deadweight tester and gauge certification including unique identifiers (serial numbers);

— temperature/pressure records including unique identifiers (serial numbers);

— minimum test pressure;

— weather conditions and explanation of any pressure deviations or other pressure discontinuities;

— records of any failures and repairs;

— PV plots;

— unique test identifier (i.e. test number);

— duration of the test.

7.18.5 Precautions During the Test

Inspectors should confirm safety precautions are in place to protect against hazards, such as sudden unexpected pressure release from piping and/or appurtenances under test.

7.18.6 Test Documentation

Inspectors should review, report, and document any failures and subsequent repairs. Confirm and acknowledge the test plan.

7.18.7 Displacement Activities

Inspectors should check displacement methods (usually with nitrogen or air) and disposal of test medium in accordance with permits and job specifications and removal of blinds/plugs and open valves to prepare the line for commissioning the completed pipeline.

7.19 Commissioning Requirements

Inspectors should monitor purging/cleaning practices, ensure safe disconnection procedures are followed, check dew point (moisture in the line) as necessary, following dewatering/dehydration activities, and ensure owner/operator commissioning procedures are followed.

7.20 Documentation Requirements

Inspectors are expected to complete all documents required by 49 *CFR* 195.266 or 49 *CFR* 192 and owner/operator requirements, including but not limited to:

— daily logs/reports;

— extra work memoranda;

— work shutdown/move around reports;

— completion of paperwork requirements of permits to close them out;

— drawing markups for as-built records, including location of crossing pipelines and other utilities, valves, CP units, test station locations, and other connections installed in the new pipeline;

— amount, size, wall thickness, grade, heat number, other pipe nomenclature and coating of pipe laid, its location, and depth of cover;

— number of welds, welds tested, rejection rates, and repairs made;

— weld logs to include weld numbers and unique identifiers (i.e. pipeline number);

— as-built surveys to include weld identifiers, location, depth of pipe, and other information per the owner/operator specifications;

— hydrostatic tests and any test failures.

7.21 Inspector Tools for Communication and Documentation Requirements

Inspectors should be able to competently use the following tools and devices to aid in communication, recording data, and recordkeeping for safety/hazard observations, construction problems, logs, and other required records and documentation, including but not limited to:

— laptop computer,

— radios,

— GPS devices,

— digital cameras,

— air cards (for internet access),

— mobile devices.

Annex A
(normative)

Chief Inspector

A.1 Scope

Individuals assigned as chief inspectors are typically highly skilled and experienced in pipeline construction and have served in a number of different inspection classifications. Chief inspectors must be capable of managing, directing, and overseeing all pipeline construction inspection personnel involved in each construction activity, including welding inspectors, corrosion control inspectors, utility inspectors, and specialized inspectors, such as blasting and HDD. Chief inspectors usually report to an owner/operator project manager or other management personnel charged with completing a pipeline project.

A.2 Qualifications

A.2.1 General

Chief inspectors must be knowledgeable in each of the major requirement areas of pipeline construction. The basic requirements are detailed herein and include:

— pipeline construction inspector responsibilities,

— personnel and general pipeline safety,

— environmental and pollution control,

— general construction inspection.

A.2.2 Special Inspection Requirements

Chief inspectors must have in depth knowledge of welding inspection, corrosion control inspection, and specialty inspection, such as blasting, HDD, and other specialty inspection that may be required by the project.

A.2.3 Other Knowledge and Skill Requirements

A.2.3.1 Principles of Project Management

Project management is responsible for designing and constructing a safe, maintainable facility that operates efficiently within design conditions, complies with laws, regulations, and industry standards, and is completed on time and within budget. Chief inspectors must be knowledgeable and capable of implementing this management process, which includes, but is not limited to: understanding project objectives, staffing and supervising the inspection organization, contract administration, planning and scheduling tasks, controlling costs, measuring and controlling job progress, managing quality assurance, and completing documentation requirements, all within the requirements of the owner/operator.

A.2.3.2 Fundamentals of Project Accounting

Chief inspectors must understand proper pipeline accounting requirements, including but not limited to: receipt of materials/supplies, verification of materials versus specifications, capital and operating expense booking processes, and timely communication with the accounting staff using the proper forms and procedures.

A.2.3.3 Contract Administration

Chief inspectors must be knowledgeable about the details of the contract governing the assigned project, including but not limited to: contract performance provisions, each parties' contractual obligations, terms and conditions, terminology, restrictions, bid and extra work provisions, and contract dispute resolution processes.

A.2.3.4 Project Materials Tracking/Traceability

Chief inspectors must be familiar with the processes and procedures used in supply management systems, including but not limited to: tracking and tracing materials and supplies using identifiers, such as serial numbers, mill numbers, and heat numbers, verifying adherence to specifications, and resolving delivery timing issues and their influence on job progress.

A.2.3.5 Elements of Public Relations

Chief inspectors must have experience and training in how to deal openly and honestly with the general public, including landowners, regulatory and law enforcement officials, mass media representatives, and other individuals who may interface with the project construction. Inspectors should also know owner/operator requirements as to what is pertinent and appropriate in providing information, answering questions, and resolving issues

Annex B
(normative)

Blasting Inspector

B.1 Scope

Individuals assigned as blasting inspectors are recognized as specialists in this activity and typically have additional schooling from explosive suppliers and other sources or have gained experience while actively involved in the use of explosives. Inspectors assigned to blasting operations report to the chief inspector and may handle other inspection duties depending on their training and experience.

B.2 Qualifications

B.2.1 General

Blasting inspectors should be knowledgeable of the basic requirements included in API 1169 and be knowledgeable in the following areas related to use of explosives and pipeline construction blasting operations.

B.2.2 Transportation, Handling, and Storage of Explosives

Inspectors should be familiar with OSHA and DOT regulations as to the safe movement, storage, and handling of explosives (see OSHA 1910.109, OSHA 1926.900 to 1926.914, and 49 *CFR* 177).

B.2.3 Blasting Plan

Inspectors must be familiar with the contractor's blasting plan and ensure all safety precautions are implemented per the plan.

B.2.4 Permit

Inspectors should be knowledgeable of pertinent permits and their issuing agencies and ensure the provisions of the permits are properly addressed by the contractor.

B.2.5 Safety Precautions

Inspectors must be knowledgeable of safety precautions to be taken during blasting operations, including but not limited to: notifications, warning signage, use of two-way radios, barriers, and safe distance parameters from the blast zone.

B.2.6 Blasting Preparation

Inspectors must be familiar with charge placement drilling operations, including configurations and depth of charge holes, charge placement procedures, charge padding activities using earth or blast mats, proper fusing techniques, use of correct wiring, and blasting machines, and ensure each of these activities follow accepted practices and owner/operator procedures.

B.2.7 Blasting

Inspectors should monitor the results of the blasting to ensure its effectiveness and measure and record, if required, the area blasted in the event of extra work authorization or special bid pricing.

B.2.8 Cleanup

Inspectors should monitor cleanup activities to ensure minimal collateral damage for excess heaving or debris scatter.

Annex C
(normative)

Horizontal Directional Drilling Inspector

C.1 Scope

Individuals assigned to carry out the inspection duties related to horizontal directional drilling (HDD) are recognized as specialists due to the nature and complexity of these operations. Thorough monitoring and documentation by qualified inspection personnel is crucial since a drilled installation is typically buried with deep cover under inaccessible terrain or infrastructure features and its installed condition cannot be verified by visual examination. HDD inspectors will usually have completed training provided by HDD contractors or other sources and they have experience in this crossing methodology. HDD inspectors report to the chief inspector and may handle other inspection duties as directed by the chief inspector.

C.2 Qualifications

C.2.1 General

HDD inspectors should be knowledgeable of the basic inspection requirements included herein and be knowledgeable about the characteristics, features, and work performance activities of HDD operations, including but not limited to the following:

— drill path,

— pilot hole,

— downhole survey systems/surface tracking systems,

— course length,

— inclination,

— azimuth,

— stationing,

— elevation,

— entry/exit angles,

— radius of curvature,

— pull section,

— reaming,

— buoyancy control,

— coating integrity,

— drilling fluid,

— documentation requirements.

C.2.2 Construction Staking and Marking

Inspector should be familiar with staking and marking of the drilled segment, particularly the entry and exit points, including the distance between the points, their elevations, and how each of these is determined. Inspector should understand the importance of these accurately located points that provide a benchmark for the downhole survey and the orientation of the survey measuring instruments.

C.2.3 HDD Equipment

Inspector should be familiar with HDD equipment of various sizes and types suitable for different jobs, machinery condition, and suitability for the intended work.

C.2.4 HDD Personnel

Inspector should observe the functioning of the HDD equipment operating personnel and their supervision as to their competence and proficiency and how they handle the HDD equipment and its associated gear, including the surface monitoring system used to determine the downhole probe location.

C.2.5 Drilled Path

Inspectors should monitor the drilled path during pilot hole drilling and assess if the drilling is on the proper inclination and azimuth to ensure the vertical and horizontal positioning, including the drilled length, depth of cover, and entry/exit angles required by the owner/operator specifications. Inspectors should also assess if the exit location is within limits set forth by the specifications.

C.2.6 Pipe Installation

C.2.6.1 General

Inspector should review the pipe installation operation to ensure owner/operator specifications are met, including the following.

C.2.6.2 Pull Section

Inspector should ensure that the welds, pipe, and joint coating of the carrier pipe string to be pulled into the drilled crossing have been properly inspected and the pull section is ready for placement.

C.2.6.3 Reaming

Inspector should be knowledgeable of the equipment and its appurtenances used to enlarge the drill hole to accommodate the pull back operation and be able to assess the effectiveness of this operation.

C.2.6.4 Pull Section Handling

Inspector should monitor and assess the adequacy of support of the pull section during pull back. Roller stands or other support mechanisms as well as the lifting equipment should be checked to ensure satisfactory movement of the pipe string into its drilled crossing.

C.2.6.5 Buoyancy Control

Inspector should be knowledgeable of buoyancy control processes that may be used to lessen pulling loads.

C.2.6.6 Pipe Coating

Inspector should ensure the pipe coating is inspected with a properly calibrated holiday detector just prior to the pipe entering the reamed drill hole and that any needed coating repairs meet owner/operator specifications.

C.2.7 Drilling Fluid

Inspector should be familiar with types of drilling mud and its proper use, monitor the ROW for potential drilling mud migration or intrusion, and ensure the containment and disposal of the drilling mud follow accepted procedures.

C.2.8 Documentation

Inspector should understand requirements established by the owner/operator and any permitting agencies and complete needed documentation in a timely and complete manner.

Annex D
(normative)

Welding Inspector

D.1 Scope

Individuals assigned as welding inspectors shall be qualified as welding inspectors to ensure the inspection of this critical activity is carried out in strict accordance with codes, regulations, and owner/operator specifications. Qualification and certification in this function requires additional schooling and usually a significant amount of on the job experience. Welding inspectors report to the chief inspector and may function as backup for the chief.

D.2 Qualifications

D.2.1 General

Welding inspectors should be knowledgeable of the basic requirements included in API 1169, have completed training in API 1104, AWS, or other industry welding schooling, and be skilled in the following areas related to pipeline welding.

D.2.2 Certification and Qualification Verification

The welding inspectors should be familiar with both welder and NDT technician qualification and certification documentation provided by the contractor or individual and be capable of verifying the documents' authenticity. Any AWS certifications should be carefully reviewed to ensure they cover pipeline welding and not an unrelated type welding such as structural steel welding.

D.2.3 Testing Welders

All mainline pipeline welding strictly follows owner/operator approved and qualified welding procedures, which consistently produces sound welds with correct mechanical properties and meet the requirements of API 1104. Every welder, welding on the pipeline, must be tested and qualified by making an acceptable weld using the approved/qualified procedure to be used in the construction. The welding inspectors must be capable of monitoring and assessing these tests and the determining acceptability of the welds by visual examination, NDT, and destructive testing using the standards of acceptability in API 1104. Inspectors ensure that each welder passing the qualification test is issued and uses an identification number to identify his welds during construction.

D.2.4 Welding Equipment

Inspectors check the following for compliance with welding procedures and specifications:

— suitability of welding machines (minimum 200 amp NEMA rating), electrode holders, grounding clamps, and cables and their proper use;

— welding rod, including AWS classification and size;

— storage/handling procedures for welding rod and other welding supplies;

— other equipment, such as cutting/beveling machines, any preheat equipment, brushes, and grinders.

D.2.5 Alignment of Pipe for Welding

Inspectors monitor the following pipe gang and line up activities.

— Swabbing of the pipe before fit up to remove foreign debris and/or wildlife.

— Pipe gang proficiency to ensure proper handling, fit up, and bevel alignment.

— Clamping procedures and proper support of pipe during and after welding, including padded skids for coated pipe.

— Clamp Holding time—100 % of stringer bead for internal line up clamps (larger that 6-in. O.D. pipe). Check specifications for permissible use of external line up clamps and holding times on smaller diameter pipe and at tie-ins.

— Seam alignment, if any, to ensure pipe seams are rolled off top center per specifications,

— Potential magnetism [near high voltage alternating current (HVAC) lines or where there is evidence of residual magnetism] that could adversely affect welding (arc blow) and take steps to degauss the pipe. (If the pipe is being laid under HVAC lines, verify that the pipe section is grounded.)

D.2.6 Welding Inspection

Inspectors must carry out their responsibilities in the areas below to ensure compliance with specifications and standards (see AWS manual, API 1104, and ASME B31.4 Section 434.8). Inspectors should:

— have a copy of the qualified welding procedure readily available and the qualification papers of qualified welders and verify that proper welding procedures are being consistently followed;

— visually inspect each weld and observe welder technique/performance including smoothness of metal application, rod travel speed, starts/stops, and welder identification;

— verify that NDT contractor has provided written NDT procedures for all processes and performs in accordance with those procedures, and verify NDT of welds is in accordance with industry standards and regulations (Regulations require 10 % coverage, but generally, owner/operators inspect 100 % of all welds with suitable NDT.);

— evaluate weld quality by reviewing NDT results; noting defective welds, rejection rates, and repairable/nonrepairable (cutouts) welds versus standards of acceptability contained in API 1104 and owner/operator specifications; marking any unacceptable welds for repair or cutout, and noting which welder or welders made the unacceptable welds.

D.2.7 Weld Repairs/Replacement

Inspectors inspect any repairs in the same manner and intensity as production welds and conduct the following.

— Ensure the cylinder of pipe cutout and the replacement pipe piece meet length restrictions for the diameter of pipe involved and ensure any weld repairs follow API 1104 and the qualified welding procedure that was used on the initial weld.

— Check proper beveling, fit up, weld quality, and NDT results versus standards. (If owner/operator allows more than one repair in a previously repaired area, verify that the repair is in accordance with a qualified weld repair procedure per 49 *CFR* 195.230.)

D.2.8 Tie-ins

Inspectors must inspect tie-in operations for proper alignment, beveling, welding, coating repair, and pipe placement and ensure pipe is properly supported when placed in the ditch (see ASME B31.4 Section 434.9).

D.2.9 Documentation

Inspectors complete in a timely manner all required records of welding operations, including but not limited to: number of welds, NDT records, rejection rates, repairs, and other documentation as specified by the owner/operator.

Annex E
(normative)

Corrosion Control Inspector

E.1 Scope

Individuals assigned as corrosion control inspectors (or coating inspectors) must be qualified and certified in corrosion control. Qualification and certification requires specialized schooling, usually under the auspices of NACE.

E.2 Qualifications

E.2.1 General

Corrosion control inspectors should be knowledgeable in the basic requirements included herein, have completed the NACE Coating Inspector Program (CIP), Level 1, and be capable of carrying out the inspection duties below.

E.2.2 Pipe Coating Requirements

Inspectors should be knowledgeable about proper aboveground/belowground coating application techniques, including surface preparation, priming, type and method of application, curing time, application limitations, atmospheric condition restrictions, and integrity testing (see NACE RP0169-06 and SSPC Volume 1).

E.2.3 Mill Applied Coating

Inspectors should be capable of inspecting, marking, and following repairs in accordance with specifications and manufacturer's recommended repair criteria for any observed coating damage beginning with when the pipe arrives on the job to lowering in.

E.2.4 Over the Ditch Coating

Inspectors should inspect, assess, and note corrective action needed in the following areas:

— coating machine condition, suitability for the work, correct operation, and operator performance of his/her duties;

— ensure surface preparation meets specifications;

— check that correct primer is used, it is correctly applied at the specified thickness and drying time is within specification;

— verify correct coating is being applied at the proper rate, travel speed, tension, and overlap;

— verify proper lifting/placement techniques are used and coating protection is provided on lower in.

E.2.5 Field Joint Coating

Field joint coating and application methods are typically used on mill applied coating and all tie-ins. Inspectors should check the following to ensure coated field joints meet specifications:

— monitor contract personnel doing this work to ensure specified procedures are followed;

— ensure surface preparation meets specifications and manufacturer's requirements/recommendations are followed;

— ensure correct primer is used, properly applied at the right thickness, and drying time is within specified limits;

— ensure coating is the correct type, applied per specifications and manufacturer's recommendations, and proper curing time is observed before movement of the pipe;

— check that coated pipe is properly handled and protected awaiting lower in.

E.2.6 Coating Repairs

Inspectors must ensure that removal of damaged coating follows manufacturer's recommendations and/or owner/operator specifications and damage to the pipe surface is avoided. Inspectors must check that repair of damaged coating on either mill applied or over the ditch coating follows the specified steps in surface preparation, priming, coating application, and curing.

E.2.7 Cathodic Protection Requirements

New pipelines require installation of corrosion control testing facilities, rectifier units, and ground beds. Inspectors must be knowledgeable about the proper installation and testing of these devices.

— Test leads for corrosion control monitoring should be checked by the inspectors to ensure they were installed properly.

— Rectifier units and ground beds must be checked by the inspectors to ensure proper installation per specifications and that they operate properly. Inspectors should complete owner/operator required documentation for these installations.

E.2.8 Foreign Pipeline Bonding Requirements

Inspectors should be knowledgeable on these installations, including the wiring, test station, and wire terminations and ensure they are tested and operate properly.

E.2.9 Cathodic Protection Testing and Measurement Requirements

Inspectors should ensure all rectifiers are read, calibrated where needed, and pipe to soil potentials are taken at test stations and measure any cased crossings for electrical shorts to ensure all installations meet specifications.

Bibliography

[1] API Specification 5L, *Specification for Line Pipe*

[2] API Specification 6D, *Specification for Pipeline Valves*

[3] API Recommended Practice 1102, *Steel Pipelines Crossing Railroads and Highways*

[4] API Standard 1104, *Welding of Pipelines and Related Facilities*

[5] API Recommended Practice 1109, *Marking Liquid Petroleum Pipeline Facilities*

[6] API Recommended Practice 1110, *Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide*

[7] API Recommended Practice 1161, *Recommended Practice for Pipeline Operator Qualification*

[8] API Recommended Practice 1162, *Public Awareness Programs for Pipeline Operators*

[9] API Recommended Practice 1166, *Excavation Monitoring and Observation*

[10] API, *Security Guidance for the Petroleum Industry*

[11] ACHP Title 36, *CFR* Part 800 [10], *Protection of Historic Properties*

[12] ANSI B16.5 [11], *Pipe Flanges and Flanged Fittings*

[13] ANSI B16.9, *Factory-made Steel Buttwelding Fittings*

[14] ANSI B16.20, *Metallic Gaskets for Pipe Flanges*

[15] ANSI B16.21, *Nonmetallic Gaskets for Pipe Flanges*

[16] ANSI B16.47, *Large Diameter Steel Flanges*

[17] ANSI/ASNT SNT-TC-1A [12], *Personnel Qualification and Certification for Nondestructive Testing Personnel*

[18] ASME B31.3 [13], *Process Piping*

[19] ASME B31.4, *Pipeline Transportation Systems for Liquids and Slurries, Chapter V: Construction, Welding, and Assembly*—Sections 434.1, 434.2, 434.3, 434.3.2, 434.3.3, 434.4, 434.5, 434.6, 434.7, 434.7.3, 434.8, 434.9, 434.10, 434.11, 434.12, 434.13, 434.15, 434.17, 434.18, and 434.19

[20] ASME B31.4, *Pipeline Transportation Systems for Liquids and Slurries, Chapter VI: Inspection and Testing*

[21] ASME B31.4, *Pipeline Transportation Systems for Liquids and Slurries, Chapter VIII: Corrosion Control*

[10] Advisory Council on Historic Preservation, 1100 Pennsylvania Avenue NW, Suite 803, Old Post Office Building, Washington, DC 20004, www.achp.gov.
[11] American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, New York 10036, www.ansi.org.
[12] American Society for Nondestructive Testing, 1711 Arlingate Lane, P.O. Box 28518, Columbus, Ohio 43228, www.asnt.org.
[13] ASME International, 3 Park Avenue, New York, New York 10016-5990, www.asme.org.

[22] ASME B31.8, *Gas Transmission and Distribution Piping Systems*—Sections 802.2.5, 806, and 841.2.2

[23] AWS [14], *Certification Manual for Welding Inspectors*

[24] CGA [15], *Best Practices*

[25] CGA Pamphlet P-1 [16], *Safe Handling of Compressed Gases in Containers*

[26] CGA Pamphlet S-1.1, *Pressure Relief Device Standards—Part 1: Cylinders for Compressed Gases*

[27] FHWA [17], *Manual of Uniform Traffic Control Devices (MUTCD)*

[28] Homeland Security Regulations Public Law 107-296 and 107-71

[29] NACE RP0169-06 [18], *Control of Corrosion in Underground or Submerged Metallic Pipeline Systems*

[30] NFPA 30 [19], *Flammable and Combustible Liquids Code*

[31] OSHA Title 29, *CFR* Part 1910 [20], *Occupational Safety and Health Standards*—Sections 1910.25, 1910.26, 1910.28, 1910.95, 1910.100 to 1910.120, 1910.132 to 1910.136, and 1910.138; Appendices A and B to Subpart I; Sections 1910.141, 1910.146, 1910.147, 1910.151, and 1910.157; Appendix A to Subpart L; and 1910.180, 1910.181, 1910.184, 1910.215, 1910.241 to 1910.244, 1910.254, 1910.1000 to 1910.1028, and 1910.1200

[32] OSHA Title 29, *CFR* Part 1926, *Safety and Health Regulations for Construction*—Sections 1926.21, 1926.23 to 1926.26, 1926.36, 1926.52, 1926.57, 1926.59, 1926.65, 1926.95, 1926.96, 1926.100, 1926.103, 1926.150, 1926.153, 1926.250, 1926.251, 1926.300, and 1926.303; Subpart J (Welding and Cutting); Sections 1926.450, 1926.451, 1926.452, 1926.454, 1926.500, 1926.503, 1926.550, 1926.600, 1926.601, 1926.602, and 1926.604, Subpart P (Excavations); Section 1926.803; Subpart U (Blasting and the Use of Explosives); Sections 1926.1053 and 1926.1060; and Subpart Z (Toxic and Hazardous Substances)

[33] Peabody, A. W., *Control of Pipeline Corrosion*, National Association of Corrosion, Second Edition, January 2001

[34] PHMSA Form 7 [21], *Evaluation Report of Liquid Pipeline Construction*

[35] SSPC [22], *Good Painting Practices, Volume 1*

[36] U.S. DOT Title 49, *CFR* Part 177 [23], *Carriage by Public Highway*

[37] U.S. DOT Title 49, *CFR* Part 177, Section 835, *Class 1 materials*

[14] American Welding Society, 550 NW LeJeune Road, Miami, Florida 33126, www.aws.org.
[15] Common Ground Alliance, 2300 Wilson Boulevard, Suite 400, Arlington, Virginia 22201, www.commongroundalliance.com.
[16] Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, Virginia 20151, www.cganet.com.
[17] U.S. Department of Transportation, Federal Highway Administration, 1200 New Jersey Ave, SE, Washington, DC 20590, www.fhwa.dot.gov.
[18] NACE International (formerly the National Association of Corrosion Engineers), 1440 South Creek Drive, Houston, Texas 77218-8340, www.nace.org.
[19] National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02169-7471, www.nfpa.org.
[20] U.S. Department of Labor, Occupational Safety and Health Administration, 200 Constitution Avenue, NW, Washington, DC 20210, www.osha.gov.
[21] U.S. Department of Transportation, Pipeline and Hazardous Material Safety Administration, East Building, 2nd Floor, 1200 New Jersey Ave, SE, Washington, DC 20590, www.phmsa.dot.gov.
[22] The Society for Protective Coatings, 40 24th Street, Sixth Floor, Pittsburg, Pennsylvania 15222, www.sspc.org.
[23] U.S. Department of Transportation, 1200 New Jersey Ave, SE, Washington, DC 20590, www.dot.gov.

[38] U.S. DOT Title 49, *CFR* Part 177, Section 844, *Class 9 (miscellaneous hazardous) materials*

[39] NOAA Title 50, CFR Part 402 [24], —Interagency Cooperation—Endangered Species Act of 1973, As Amended

[40] U.S. DOT Title 49, *CFR* Part 192, *Transportation of Natural and Other Gas by Pipeline*—Sections 192.301, 192.303, 192.305, 192.307, 1902.309, 192.313, 192.319, 192.323, 192.325, and 192.327; Subpart E (Welding of Steel in Pipelines); Subpart I (Requirements for Corrosion Control); Subpart J (Test Requirements); and Subpart M (Maintenance)

[41] U.S. DOT Title 49, *CFR* Part 195, *Transportation of Hazardous Liquids by Pipeline*—Sections 195.200, 195.202, 195.204, 195.206, 195.210, 195.212, 195.214 to 195.234, 195.236, 195.238, 195.242, 195.244, 195.246, 195.248, 195.250, 195.252, 195.254, 195.266, 195.300, 195.302, 195.304, 195.305, 195.306, 195.308, 195.310, 195.404, 195.410, 195.442, 195.501, and 195.505 and Subpart H (Corrosion Control)

[42] U.S. DOT Title 49, *CFR* Part 199, *Drug and Alcohol Testing*

[43] U.S. EPA Title 40 [25], *CFR* Part 110, *Discharge of Oil*

[44] U.S. EPA Title 40, *CFR* Part 112, *Oil Pollution Prevention*

[45] U.S. EPA Title 40, *CFR* Part 116, *Designation of Hazardous Substances*

[46] U.S. EPA Title 40, *CFR* Part 122, *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System*

[47] U.S. EPA Title 40, *CFR* Part 261, *Identification and Listing of Hazardous Waste*—Section 261.3

[48] U.S. EPA Title 40, *CFR* Part 300, *National Oil and Hazardous Substances Pollution Contingency Plan*

[49] U.S. EPA Title 49, *CFR* Part 171, *Hazardous Materials Regulations, General Information & Regulations*—Section 171.8, *Definitions and Abbreviations*

[50] U.S. EPA Title 49, *CFR* Part 172, *Hazardous Materials Table, Special Provisions, Hazardous Materials Communication, ER and Training*

[51] U.S. EPA menu of BMPs for storm water

[52] U.S. FWS [26]/NMFS [27] Title 50, *CFR* Part 402, *Interagency Cooperation Endangered Species Act of 1973, as Amended*—(7 *USC* 136 and 16 *USC* 1531)

[53] U.S. NRC Title 10, *CFR* Part 20 [28], *Standards for Protection Against Radiation*—Sections 20.1301 and 20.1302

[24] NOAA Fisheries Service, 1315 East West Highway, Silver Spring, MD 20910, www.nmfs.noaa.gov
[25] U.S. Environmental Protection Agency, Ariel Rios Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460, www.epa.gov.
[26] U.S. Department of the Interior, U.S. Fish and Wildlife Service, 1849 C Street, NW, Washington, DC 20240, www.fws.gov.
[27] U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 1315 East West Highway, Silver Spring, Maryland 20910, www.nmfs.noaa.gov.
[28] U.S. Nuclear Regulatory Commission, 11545 Rockville Pike, Rockville, Maryland 20852, www.nrc.gov.

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