Subject Matter Study

**OSHA Regulations Applicable to Pipelines and**

**Pipeline Regulations Applicable to OSHA**

October 2020

By

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**Executive Summary**

Many parts of the OSHA regulations generally refer to the “employer” as being responsible for complying with the requirements in the regulations. However, when contractor or sub-contractor employers are performing work on facilities of another employer who owns and/or operates the facilities, the OSHA regulations are not always explicit on which employer has primary or lead responsibility for complying with various OSHA regulatory requirements. If OSHA compliance responsibilities are not clearly stated or otherwise known, compliance activities can be misunderstood and worker safety will be compromised.

This report contains the following sections.

1. Introduction
2. Pipeline Safety Regulations Overview
3. Recommended Application of OSHA Regulations to Pipelines
4. OSHA Regulations Applicable to Pipelines
5. Overview of ASME B31.8
6. American Petroleum Institute Recommended Practices and Standards
	1. API 2220
	2. API 2221
	3. API 1169
	4. API 2009
	5. API 2015

When a contractor employer works on pipeline facilities of an owner and operator, the relationship between the various employers is normally one of the following.

1. For new or grass roots pipeline facilities, the contractor employer is a prime contractor with primary control, authority and responsibility on who performs the work and how a project is conducted on the pipeline owner and/or operator’s pipeline property as long as the work meets the specifications, standards, drawings, and schedule stipulated or agreed to by the pipeline owner and/or operator. The prime contractor may use numerous sub-contractors to conduct the work. The facility owner and/or operator’s pipeline role is normally to participate in inspection, oversight and operational startup.
2. For new additions, revisions, repairs, and maintenance to existing pipeline facilities, contractor employer(s) furnishes labor, equipment and/or materials to work at the owner and/or operator’s facilities under the direction of an owner/operator employee(s) and/or designated pipeline owner/operator representative(s). There is no prime contractor. The pipeline owner and/or operator have primary control, authority and responsibility on who performs the work and how a project is conducted. The pipeline owner and/or operator also perform inspection duties. Payments to a contractor employer are usually based on preset hourly rates for labor and equipment (Time and Materials).
3. For offsite fabrication of pipeline equipment used for item 1 or 2 above, the contractor (or subcontractor) employer furnishes labor, equipment and materials to fabricate equipment at the contractor employer’s offsite facilities and the fabricated equipment is later erected at the pipeline owner and/or operator’s facilities. The contractor employer has primary control, authority and responsibility for the fabrication work at his workplace. If the fabrication contractor is also the prime contractor, his onsite control, authority and responsibilities for installation of the fabricated work is the same as stated above for item No. 1. If the fabrication contract employer is a sub-contractor, the prime contractor provides control, authority and responsibility for the onsite assembly work. If there is no prime contractor, the pipeline owner and/or operator provides primary control, authority and responsibility for the onsite assembly of the offsite fabrication.

The Pipeline Safety Acts of 1979 and subsequent amendments require that the pipeline owner and/or operator are responsible for all compliance activities with Federal pipeline safety regulations in Title 49, Parts 186 to 199 in the Code of Federal Regulations. OSHA regulations are not specifically referenced in the Federal pipeline safety regulations.

Section 195.10, in Title 49, Responsibility of operator for compliance with this part, contains the following statements.

An operator may make arrangements with another person for the performance of any action required by this part. However, the operator is not thereby relieved from the responsibility for compliance with any requirement of this part.

The term “operator” is defined in section 195.2 as “a person who owns or operates pipeline facilities”. In section 192.3, the term “operator” means “a person who engages in the transportation of gas”. Many pipelines are operated by the pipeline owner. However, some pipelines are operated by a separate company that may or may not be a partial owner of the pipeline system.

Some and perhaps most pipeline companies use contract terms to minimize their responsibilities to support and oversee the work performed by contractors. Pipeline operators frequently require contractors to be responsible for pipeline regulatory compliance through contracts. If the contractor does not accept the compliance responsibilities stated in contracts prepared by pipeline operators, they will not be awarded work. This practice clearly is inconsistent with the intent of the pipeline safety regulations.

Pipeline facilities “must be constructed in accordance with comprehensive written specifications or standards that are consistent with” the regulations (see 195.202 and 192.3) and “Inspection must be provided to ensure the installation of pipe or pipeline systems in accordance with this subpart” (see 195.204 and 192.305). “Construction records, maps and operating history shall be maintained and be made” available as necessary for safe operation and maintenance [see 195.402 and 192.605(b)].

Sections 192.605 and 195.402 require that “Each operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response.”

The following pipeline facilities are exempt from U.S. DOT pipeline safety regulations, but are covered by OSHA regulations. These pipeline facilities may be designed, constructed, operated, and maintained without any rules specific to pipelines other than OSHA rules. Pipelines exempt from U.S. DOT regulatory oversight include:

1. Onshore gas and petroleum gathering pipelines outside populated areas;
2. Offshore pipelines upstream of where produced hydrocarbons are first separated or processed;
3. Offshore pipelines on the Outer Continental Shelf operated by a producing (non-transportation) operator;
4. Lower stress onshore petroleum pipelines outside populated areas;
5. Lower stress petroleum pipelines subject to Coast Guard regulations;
6. Lower stress petroleum pipelines less than 1 mile long that serve refining, manufacturing, or terminal (truck, rail or vessel) facilities;
7. Onshore petroleum or carbon dioxide pipelines used for production (flow lines), refining, manufacturing, or storage operations.

Even if the U.S. DOT chooses not to enforce pipeline safety regulations on the above pipelines, OSHA regulations should apply to all pipelines on issues involving worker safety.

The word “employer” is seldom used in any of the Department of Transportation (U.S. DOT) pipeline safety regulations. “Employee” is only used in Part 199 on drug testing and the pipeline operator is responsible for conducting drug testing. For pipeline operating, maintenance, testing, startup, and construction activities, the pipeline operator is responsible for all compliance activities concerning U.S. DOT regulations. This same responsibility makes sense with OSHA regulations; however, the OSHA regulations generally refer to “employers” which could refer to pipeline owners, operators, contractors, subcontractors, consultants, service companies, and others. These uncertainties on compliance responsibility can result in inadequate attention to OSHA regulations and unnecessary risk to employees.

American Society of Mechanical Engineers (ASME) in the gas pipeline code known as B31.8 contains the following statements on the compliance responsibilities:

1. Activities involving the design, construction, operation, or maintenance of gas transmission, gathering, or distribution pipelines should be undertaken using supervisory personnel having the experience or knowledge to make adequate provisions for unusual conditions and specific engineering and construction details.
2. All work performed within the scope of this Code shall meet or exceed the safety standards expressed or implied herein.
3. This Code is concerned with:
	1. Safety of the public and
	2. Employee safety to the extent that it is affected by the basic design, quality of materials, workmanship, and requirements for testing, operations, and maintenance.
4. Existing industrial safety procedures pertaining to work areas, safety devices, and safe work practices are not intended to be supported by this Code.
5. “Operating company” or “operator” is the individual, partnership, corporation, public agency, owner, agent, or other entity responsible for the design, construction, inspection, testing, operation, and maintenance of the pipeline facilities.

American Society of Mechanical Engineers (ASME) in the B31.4 Code for hazardous liquids and slurries incorporates much of the above information in the B31.8 Code with the following exceptions.

1. The purpose of the Code is---for protection of the general public and operating company personnel.
2. This Code is concerned with employee safety to the extent that it is affected by the basic design, quality of materials, workmanship, and requirements for construction, inspection, testing, operation, and maintenance of liquid pipeline systems.

The above statements can be summarized as follows:

1. Pipeline should be designed, constructed, tested, inspected, operated, and maintained based on considerations of public and worker safety.
2. The provisions of the Codes are not intended to interfere with worker safety regulations and standards.
3. Pipeline Code compliance activities should not compromise worker safety activities.
4. Pipelines should be designed and constructed with equipment and materials compatible and consistent with worker safety regulations and compliance activities.

American Society of Mechanical Engineers (ASME) B31.8, Gas Transmission and Distribution Piping Systems applies to gas pipeline systems and is incorporated by reference into U.S. DOT Part 192. ASME B31.4 is incorporated by reference into U.S. DOT Part 195 on hazardous liquid pipelines. Both of these national used codes were in existence before the U.S. DOT began to regulate pipelines. These documents are widely followed by pipeline companies and these codes do not conflict with OSHA regulations.

Both of these ASME Codes cover design, materials construction, operating, maintenance, and emergency response activities. Both Codes specify that the operator is responsible for compliance activities. Both Codes require that the operator develop and implement detailed plans and instructions for employees covering operating, maintenance, and other pipeline safety emergency response activities.

Pipelines store, transport, and deliver liquids and/or gases that are flammable and potentially very dangerous to employees and the public. Regulations should be as explicit as practical to prevent confusion and compliance avoidance by pipeline operators and other employers engaged in pipeline activities. The petroleum, natural gas, and pipeline industries are competitive and the lowest cost is often the primary factor in which a contractor is selected to provide people and equipment to perform pipeline work activities.

OSHA regulations should complement and be integrated into pipeline safety compliance activities. However, OSHA regulatory requirements are not always fully integrated into a pipeline operator’s normal construction, repair, operation, maintenance, and emergency response practices and procedures. Pipeline companies are likely to have separate OSHA compliance plans that are not integrated into U.S. DOT compliance plans and procedures. Therefore, OSHA compliance plans can become secondary to U.S. DOT compliance plans. OSHA and U.S. DOT regulatory compliance activities should be integrated for maximum compliance attention and effectiveness for both employees, the environment, and public safety.

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**Introduction**

Many parts of the OSHA regulations generally refer to the “employer” as being responsible for complying with the requirements in the regulations. However, when contractor or sub-contractor employers are performing work on facilities of another employer who owns and/or operates the facilities, the OSHA regulations are not always explicit on which employer has primary or lead responsibility for complying with various OSHA regulatory requirements. If OSHA compliance responsibilities are not clearly stated or otherwise known, compliance activities can be misunderstood and worker safety will be compromised.

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Terms used in OSHA regulations to describe employee and employer entities involved with OSHA regulations include the following.

1. Employer
2. Owner
3. Operator
4. Agent
5. Employee
6. Owner, operator, or agent in charge at the establishment
7. Employer, owner, operator, agent or employee of an establishment
8. Employer’s factory, plant, establishment, construction site, workplace, or

 environment where work is performed by an employee of an employer

1. You
2. Your business
3. Owner or partners
4. Self-employed individual(s) or person
5. Contractor’s employee
6. Contractor’s employee is under the day-to-day supervision of the contractor
7. You supervise the contractor employee’s work on a day-to-day basis
8. Temporary help service, employee leasing service, personnel supply service,

 or contractor

1. Employee representative
2. Employer’s worksite
3. Small employers
4. Maintenance, contractor, laboratory, or other support personnel
5. Employee involved in operating a process
6. Employer, when selecting a contractor
7. Contract employers
8. Contract employee
9. Employees including maintenance and contract employees
10. Employers who use contractors
11. Contract employees or employees of the owner
12. Qualified craftsmen
13. Maintenance personnel
14. Maintenance supervisor, contractor representative or other person
15. Organized group of employees, designated by the employer
16. Employer who retains contractor or subcontractor services
17. Contractor or subcontractor or their representative
18. Employee designated representatives
19. Site safety and health supervisor
20. General supervisor
21. Supervisors and employees
22. Supervisors and management responsible for the site
23. All employees working on site
24. General site workers (such as equipment operators, general laborers and

 supervisory personnel)

1. Employees and supervisors
2. Trainers
3. On-site management and supervisors
4. Physician’s
5. High-risk employees
6. Employees, contractors, and subcontractors (or their representative)
7. Unauthorized employees
8. New employees
9. Current employees
10. The individual in charge of the ICS
11. Senior emergency response official
12. Employees engaged in emergency response and exposed to hazardous

 substances

1. Safety officer
2. Qualified basic life support personnel
3. Skilled support personnel
4. Personnel
5. Employer’s own employees
6. Employer’s regular employees
7. Specialist employees
8. First responders
9. On scene incident commander
10. Incident commander
11. Workers handling hazardous substances
12. Workers performing hazardous substance spill control work
13. Co-workers
14. Attendant
15. Authorized entrant
16. Entry supervisor
17. Host employer
18. Employees of another employer (contractor)
19. Host employer personnel and contractor personnel
20. Contractor personnel
21. Persons
22. Rescuing entrants
23. Unauthorized personnel
24. The individual
25. Each affected employee
26. Technically qualified professional
27. Laboratory employers
28. Responsible party
29. Chemical manufacturers, importers, or employers
30. Multi-employer work places
31. Chemical manufacturers, importers, distributors, or employers
32. Chemical manufacturer, importer, employer, or other responsible party
33. Responsible staff
34. Prime contractor and any subcontractors
35. Prime contractor and his subcontractors
36. Competent persons designated by the employers
37. Contract employer(s)
38. Affected personnel
39. Trained team of people to audit
40. Auditors
41. Audit team members
42. Controlling contractor
43. General contractor
44. Construction manager
45. Other legal entity which has the overall responsibility for the construction of a

 project

The use of more descriptive employers and employees including many of the above terms will decrease confusion where only “employer” or “employee” are used in describing a regulatory requirement. The issuance of additional criteria on general compliance responsibilities will also decrease confusion on OSHA enforcement compliance responsibilities.

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1. For new or grass roots pipeline facilities, the contractor employer is a prime contractor with primary control, authority and responsibility on who performs the work and how a project is conducted on the pipeline owner and/or operator’s pipeline property as long as the work meets the specifications, standards, drawings, and schedule stipulated or agreed to by the pipeline owner and/or operator. The prime contractor may use numerous sub-contractors to conduct the work. The facility owner and/or operator’s pipeline role is normally to participate in inspection, oversight and operational startup.
2. For new additions, revisions, repairs, and maintenance to existing pipeline facilities, contractor employer(s) furnishes labor, equipment and/or materials to work at the owner and/or operator’s facilities under the direction of an owner/operator employee(s) and/or designated pipeline owner/operator representative(s). There is no prime contractor. The pipeline owner and/or operator have primary control, authority and responsibility on who performs the work and how a project is conducted. The pipeline owner and/or operator also perform inspection duties. Payments to a contractor employer are usually based on preset hourly rates for labor and equipment.
3. For offsite fabrication of pipeline equipment used for item 1 or 2 above, the contractor (or subcontractor) employer furnishes labor, equipment and materials to fabricate equipment at the contractor employer’s offsite facilities and the fabricated equipment is later erected at the pipeline owner and/or operator’s facilities. The contractor employer has primary control, authority and responsibility for the fabrication work at his workplace. If the fabrication contractor is also the prime contractor, his onsite control, authority and responsibilities for installation of the fabricated work is the same as stated above for item No. 1. If the fabrication contract employer is a sub-contractor, the prime contractor provides control, authority and responsibility for the onsite assembly work. If there is no prime contractor, the pipeline owner and/or operator provides primary control, authority and responsibility for the onsite assembly of the offsite fabrication.

**Pipeline Safety Regulations Overview**

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4. Lower stress onshore petroleum pipelines outside populated areas;
5. Lower stress petroleum pipelines subject to Coast Guard regulations;
6. Lower stress petroleum pipelines less than 1 mile long that serve refining, manufacturing, or terminal (truck, rail or vessel) facilities;
7. Onshore petroleum or carbon dioxide pipelines used for production (flow lines), refining, manufacturing, or storage operations.

Even if the U.S. DOT chooses not to enforce pipeline safety regulations on the above pipelines, OSHA regulations should apply to all pipelines on issues involving worker safety.

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American Society of Mechanical Engineers (ASME) in the gas pipeline code known as B31.8 contains the following statements on the compliance responsibilities:

1. Activities involving the design, construction, operation, or maintenance of gas transmission, gathering, or distribution pipelines should be undertaken using supervisory personnel having the experience or knowledge to make adequate provisions for unusual conditions and specific engineering and construction details.
2. All work performed within the scope of this Code shall meet or exceed the safety standards expressed or implied herein.
3. This Code is concerned with:
	1. Safety of the public and
	2. Employee safety to the extent that it is affected by the basic design, quality of materials, workmanship, and requirements for testing, operations, and maintenance.
4. Existing industrial safety procedures pertaining to work areas, safety devices, and safe work practices are not intended to be supported by this Code.
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1. The purpose of the Code is---for protection of the general public and operating company personnel.
2. This Code is concerned with employee safety to the extent that it is affected by the basic design, quality of materials, workmanship, and requirements for construction, inspection, testing, operation, and maintenance of liquid pipeline systems.

The above statements can be summarized as follows:

1. Pipeline should be designed, constructed, tested, inspected, operated, and maintained based on considerations of public and worker safety.
2. The provisions of the Codes are not intended to interfere with worker safety regulations and standards.
3. Pipeline Code compliance activities should not compromise worker safety activities.
4. Pipelines should be designed and constructed with equipment and materials compatible and consistent with worker safety regulations and compliance activities.

Employees of pipeline operating companies are integrated into a pipeline operator’s U.S. DOT regulations compliance activities, but contractor employees are not likely to be included in the same level of compliance activities as pipeline operator employees. U.S. DOT compliance activities cover, but are not limited to the following activities:

1. Incident reporting,
2. Safety related conditions reporting,
3. Pipeline design,
4. Welding,
5. Nondestructive testing,
6. Repairs,
7. Construction,
8. Pipeline revisions,
9. Inspection,
10. Internal corrosion control,
11. External corrosion control,
12. Pressure testing,
13. Emergency response,
14. Public education,
15. Leak detection,
16. Damage prevention,
17. Training,
18. Firefighting,
19. Public awareness communications,
20. Accident investigations,
21. Integrity maintenance,
22. Supervision, and
23. Record keeping.

American Society of Mechanical Engineers (ASME) B31.8, Gas Transmission and Distribution Piping Systems applies to gas pipeline systems and is incorporated by reference into U.S. DOT Part 192. ASME B31.4 is incorporated by reference into U.S. DOT Part 195 on hazardous liquid pipelines. Both of these national used codes were in existence before the U.S. DOT began to regulate pipelines. These documents are widely followed by pipeline companies and these codes do not conflict with OSHA regulations.

Both of these ASME Codes cover design, materials construction, operating, maintenance, and emergency response activities. Both Codes specify that the operator is responsible for compliance activities. Both Codes require that the operator develop and implement detailed plans and instructions for employees covering operating, maintenance, and other pipeline safety emergency response activities.

Pipelines store, transport, and deliver liquids and/or gases that are flammable and potentially very dangerous to employees and the public. Regulations should be as explicit as practical to prevent confusion and compliance avoidance by pipeline operators and other employers engaged in pipeline activities. The petroleum, natural gas, and pipeline industries are competitive and the lowest cost is often the primary factor in which a contractor is selected to provide people and equipment to perform pipeline work activities.

OSHA regulations should complement and be integrated into pipeline safety compliance activities. However, OSHA regulatory requirements are not always fully integrated into a pipeline operator’s normal construction, repair, operation, maintenance, and emergency response practices and procedures. Pipeline companies are likely to have separate OSHA compliance plans that are not integrated into U.S. DOT compliance plans and procedures. Therefore, OSHA compliance plans can become secondary to U.S. DOT compliance plans. OSHA and U.S. DOT regulatory compliance activities should be integrated for maximum compliance attention and effectiveness for both employees, the environment, and public safety.

**Pipeline Personnel Qualification Requirements**

In 1987, the National Transportation Safety Board (NTSB) made explicit recommendations for training, testing, and qualification of personnel performing pipeline regulatory compliance activities. In 1987, the Office of Pipeline Safety (OPS) issued a notice inviting public comment on the need for additional regulations or a certification program for the qualification of all personnel who design, construct, operate, and maintain pipelines subject to Title 49 CFR Parts 192 and 195.

The Pipeline Safety Act of 1992 included language requiring that personnel responsible for the operation and maintenance of pipelines be tested for qualifications and certifications to operate and maintain pipelines. In 1994, the Office of Pipeline Safety published a Notice of Proposed Rulemaking to establish minimum training requirements for qualification of pipeline workers. The 1996 pipeline industry response was so negative, the Office of Pipeline Safety withdrew the Notice of Proposed Rulemaking and issued a notice to form a negotiated rulemaking committee to develop a final rule. A final rule was issued on August 27, 1999. The final rule was not prescriptive and provided considerable flexibility for pipeline operators. The vagueness of rule created compliance enforcement difficulties. The Office of Pipeline Safety could not agree on protocols covering implementation, inspection, and enforcement of the new qualification rule.

A project team was set up in 2003 to develop a consensus standard identified as American Society of Mechanical Engineers (ASME) B31Q title *Pipeline Personnel Qualification*. The B31Q was approved on July 10, 2006.

Pipeline personnel qualification requirements for hazardous liquid pipelines are found in Subpart G of Title 49 CFR Part 195. Pipeline personnel qualification requirements for gas pipelines are found in Subpart N of Title 49 CFR Part 192. The sections have identical requirements.

Pipeline personnel qualification requirements apply equally to pipeline operator employees and contractor employees doing work involving pipelines. The regulations apply equally to pipeline operators and the contractors they employ. A pipeline employee or contractor employee must be qualified by training to have the knowledge, skills, and physical capability to perform each task assigned for them to perform.

A covered task to be covered by an operator’s written qualification program is an activity that:

1. Is performed on a pipeline facility,
2. Is an operations and maintenance task,
3. Is performed as a requirement of this part, and
4. Affects the operation or integrity of the pipeline.

Each operator shall have and follow a written qualification program that includes provisions to:

1. Identify each covered task;
2. Ensure through evaluation that individuals performing covered tasks are qualified;
3. Allow individuals that are not qualified pursuant to this subpart to perform a task if directed and observed by an individual that is qualified;
4. Evaluate an individual if the operator has reason to believe that the individual’s performance of a covered task contributed to an incident;
5. Evaluate an individual if the operator has reason to believe that the individual is no longer qualified to perform a covered task;
6. Communicate changes that affect covered tasks to individuals performing those covered tasks;
7. Identify those covered tasks and the intervals at which evaluation of the individual’s qualifications is needed;
8. After December 16, 2004, provide training, as appropriate, to ensure that individuals performing each covered task has the necessary knowledge and skills to perform the tasks in a manner that ensures the safe operation of pipeline facilities; and
9. After December 16, 2004, notify the U.S. DOT or appropriate state agency if the operator significantly modifies the program after the U.S. DOT or state agency has verified that it complies with this section.

The term “evaluate” is defined as a process, established and documented by the operator to determine an individual’s ability to perform a covered task by any of the following:

1. Written examination,
2. Oral examination,
3. Work performance history review,
4. Observation during:
	1. Performance on the job,
	2. On-the-job training, and
	3. Simulations.
5. Other forms of assessment.

**ASME B31.Q, *Pipeline Personnel Qualifications***

Neither 49 CFR Part 192 nor 49 CFR Part 195 incorporates by reference ASME B31Q. This is puzzling since ASME B31Q in its forward indicated the U.S. DOT committed to jointly develop a consensus standard similar to ASME B31Q.

The introduction section of ASME B31Q on scope indicates this standard applies to tasks that impact the safety or affect integrity of pipelines except:

1. Design and engineering tasks and
2. Tasks primarily designed to ensure personnel safety.

The B31Q project team assumed that design and engineering tasks would be performed by appropriately educated and experienced individuals using guidelines and procedures for the performance of design and engineering work. This may be true for pipeline operators and pipeline design companies with large, well established engineering design groups. However, a significant amount of design work is done without proper engineering involvement, especially with modifications to existing facilities and small facility addition projects. Few pipeline companies have rigorous design standards and guidelines on how to perform design and other engineering functions. Examples of existing facilities are often used as the basis for new facility design.

The B31Q project team also assumed the quality of design and engineering work product is confirmed by field inspection and testing of the design as required by the applicable ASME B31.4 or B31.8 codes. The B31Q project team either did not understand the nature of field inspection and testing or the project team was looking for rationale to not address a subject they were not prepared to handle.

The main body of the standard starts with section 4 and continues through section 13. The Appendices to B31Q include suggested or non-mandatory task lists with:

1. Task description,
2. Potential applicability of task,
3. Difficulty to perform the task,
4. Importance of task,
5. Qualification evaluation methods, and
6. Span of control ratio of qualified to nonqualified individual.

A total of 163 tasks are listed in the Appendices. Some tasks are very broadly defined and are broken up into many subtasks. For example, to perform a one-call line locate and inspect a pipeline during nearby excavation activities will involve at least the following tasks:

1. Task 0151, Visual Inspection of Buried Pipe and Components when Exposed;
2. Task 0171, Measure External Corrosion;
3. Task 0201, Visual Inspection of Installed Pipe and Components for Mechanical Damage;
4. Task 0211, Measure and Characterize Mechanical Damage on Installed Pipe and Components;
5. Task 1291, Locate Underground Pipelines;
6. Task 1301, Install and Maintain Pipeline Markers;
7. Task 1311, Inspect Pipeline Surface Conditions;
8. Task 1321, Damage Prevention During Excavation Activities by or on Behalf of the Operator;
9. Task 1331, Damage Prevention Inspection During Third Party Excavation on Encroachment Activities as Deemed Necessary by the Operator;
10. Task 1341, Provide or Assure Adequate Pipeline Support During Operator Initiated Excavation Activities;
11. Task 1411, Indirect Examination Techniques; and
12. Task 1421, Direct Examination Techniques.

Requirements in ASME B31Q for each pipeline operator’s written operator qualification program should include:

1. Introduction covering business units, scope, and purpose of the operator qualification program.
2. Description of processes used to identify covered tasks including:
	1. Subject matter experts,
	2. Fault tree processes, and
	3. List of identified tasks.
3. Description of when and how training requirements are determined for each individual.
4. Description of how operator qualification evaluators and proctors are selected.
5. Evaluation method for each covered task.
6. Identification of persons responsible for various operator qualification activities.
7. Description for assigning qualified individuals to perform covered tasks during an emergency response.
8. Description of process for performance of covered tasks by non-qualified individuals working under the direction and evaluation of a qualified person.
9. Description of processes to evaluate the effectiveness of the operator qualification program.
10. Description of record keeping requirements and processes.

**Industry Compliance with U.S. DOT and ASME B31Q**

Few pipeline operators have few subject matter experts needed to develop and implement effective operator qualification programs. Many of the training coordinators or managers of pipeline companies have little knowledge and experience of pipeline operating and maintenance activities.

Operator qualification training is often based on computer training modules developed by outside parties that provide a generic or “one-size-fits-all” approach training. This type of training is seldom based on operating and maintenance procedures and practices of specific pipeline operating companies that use the computer modules.

Some and perhaps many pipeline operators offer little supplemental training other than the computer modules. The computer modules are cheap, provide testing, and keep minimum records of the module’s training activities. Most of the training is on-the-job training by a field supervisor that is sometimes haphazard and insufficient. Field supervisors often have eight to fifteen employees reporting to them. Many employees have to be qualified in 15 to 30 tasks. The field supervisors work load due to the operation qualification program is significant, especially since the field supervisors are usually the qualification evaluator for individuals that report to them.

Field pipeline technicians often have numerous operating and maintenance tasks and that may be assigned an area of 500 to 1,500 square miles. The area of responsibility for a field supervisor can be 5,000 to 25,000 square miles. Most field supervisors have some pipeline facilities in high consequence areas involving numerous pipeline integrity management program activities. The net result of these responsibilities is that supervisors are overloaded and unable to perform their supervisor duties on monitoring the activities of their field technicians to ensure their work is being performed and being performed properly. Many pipeline field operation units are understaffed.

The weakest part of pipeline operator qualification program involves the monitoring of each qualified individual’s performance to determine if each individual is performing tasks according to company operating and maintenance procedures. Many tasks are being performed with little or no supervisory monitoring and record keeping on performing each task is minimal or nonexistent.

The U.S. DOT regulations and ASME B31Q do not explicitly address this issue with specific compliance requirements and little documentation is required in this area. However, this issue on performance monitoring and evaluation goes way beyond operator qualification issues. This issue affects all compliance activities, because most operators only perform documentation requirement demanded by regulatory agencies. Since most of the regulations are performance based and not prescriptive, regulatory auditors and investigators are at a disadvantage in enforcing all elements of compliance with U.S. DOT regulations.

In Texas alone, between January 1, 2007 to September 8, 2010, one major pipeline operator was charged with being noncompliant on 134 issues during Texas Railroad Commission audits. The 134 areas of noncompliance are likely the “tip of the iceberg”. The reported areas of noncompliance were:

1. Operating and maintenance plans or record keeping were inadequate: 48 violations.
2. Cathodic protection was inadequate or facilities were not maintained: 18 violations.
3. Overpressure relief was inadequate or equipment not maintained: 27 violations.
4. Line markers and line patrols were inadequate: 15 violations.
5. Valving inadequate: 6 violations.
6. Inadequate pipeline design and operating pressure: 8 violations.
7. Inadequate inspection: 3 violations.
8. Operator qualification: 1 violation.

As shown above only one operator qualification violation was found, but 133 other violations were found mainly due to unqualified employees. Clearly, the operator qualification requirements are not covering “all bases”.

**Reliance on Consultants and Contractors**

Because of the loss in knowledge and skilled pipeline personnel in the pipeline operating companies and emphasis on cost control and profitability, not quality of the activity, many pipeline companies have shifted to contractors to perform the majority of the compliance activities required in 49 CFR Parts 192 and 195. Contractors are used for:

1. Pipeline facility design,
2. Material and equipment specifications and procurement,
3. Construction specifications,
4. Construction,
5. Materials transportation,
6. Coatings,
7. Welding,
8. Construction inspection,
9. OSHA compliance,
10. Records creation,
11. Pressure testing,
12. Construction project management,
13. Pressure testing,
14. Corrosion control,
15. Pipeline operating control design,
16. Design of compressor and pump stations,
17. Pipeline patrols,
18. Pipeline leak testing,
19. Piping inspection,
20. Nondestructive testing of pipe and pipeline component,
21. Training of pipeline personnel, and
22. Other activities.

Contractors can only maintain a staff of employees that is consistent with their current work load. Contractors can perform minimum training of their employees, because pipeline operating companies solicit work based on low bids to do the work with consultants and contractors; the knowhow and quality of work performed is highly variable and uncertain creating self-imposed risks to the pipeline operator and the public and environment.

This reduction in expertise among pipeline companies has also affected the quality of technical support provided to the U.S. DOT by the industry. This is very critical, because the U.S. DOT has always relied heavily on the pipeline industry to provide standards and recommended practices along with support of technical studies on issues perceived to be important to the U.S. DOT.

**Recommended Application of OSHA Regulations to Pipelines**

OSHA Regulations are sometimes unclear on who has primary responsibility for compliance requirement. However, U.S. DOT regulations clearly place all compliance responsibility on the pipeline owner and/or operator. This jurisdiction uncertainty is caused by the inability and unwillingness of government agencies to overlapping jurisdictional areas. The use of “memorandum of understanding” has been an effort to clarify judicial boundaries, but gray jurisdiction areas continue to exist due to overlapping issues. The following recommendations are made on the applicability of OSHA regulations to pipeline systems.

1. Applicable sections of OSHA 1910
2. The pipeline owner and/or operator are responsible for compliance with all OSHA regulations pertaining to all pipeline operations, maintenance, testing, and emergency response.
3. A pipeline owner and/or operator may make arrangements with a contractor or other business entity for performance of any action within the scope of OSHA regulations or required by OSHA regulations. However, the owner and/or operator should not be relieved of any responsibility for compliance with all applicable OSHA regulations.
4. If a pipeline owner and/or operator makes arrangements with a contractor or other business entity for performance of any action within the scope of OSHA regulations or required by OSHA regulations, both the pipeline owner and/or operator, and the contractor or other business entity should be responsible for complying with applicable OSHA regulations.
5. All pipeline construction, inspection, operation, maintenance, testing, and emergency response activities on all pipeline facilities should be subject to OSHA regulations.
6. 1904.31 – The pipeline operator should be the responsible employer for recording the injuries and illnesses of its employees and of contract employees that the pipeline operator employees and other designated representatives supervise on a day-to-day basis.
7. 1910.119 – The pipeline operator should be required to comply with process safety management (PSM) regulations. The pipeline facility owner and/or operator is only employer likely to have the information and experience necessary to develop a PSM program. An engineering contractor could be involved with assisting the development of a specific PSM program for an operating location, but the pipeline owner and/or operator has to be an integral part of the PSM development program and is the only logical entity to oversee implementation of the PSM program.
8. 1910.120 – The pipeline owner and/or operator should be responsible for complying with OSHA emergency response requirements involving releases of hazardous substances. These responsibilities are of the pipeline owner and/or operator and should at least include:
9. Development and implementation of site-specific emergency response plans and procedures for each pipeline facility.
10. Development and implementation of site-specific written safety and health program for employees and contractor employees that are involved with emergency response activities.

A contractor or subcontractor with employees engaged in emergency response to hazardous substance releases is also responsible for development and implementation of written safety and health program for its employees at each site involved with emergency response and other hazardous waste operations (spill repairs and cleanup).

1. 1910.132 – The pipeline owner and/or operator should be required to assess the workplace to determine if hazards are present, or are likely to be present which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the pipeline owner and/or operator should be required to have each affected employee use the types of PPE that will protect each affected employee.
2. 1910.146 – The pipeline owner and/or operator should be responsible for complying with OSHA confined space requirements.
3. 1910.1200 – The pipeline owner and/or operator should be required to comply with this section to develop, implement and maintain at each work place a written hazard communication program which covers:
	1. Evaluate the potential hazards of chemicals, including natural gas due to its flammability;
	2. Conduct training on hazards and appropriate protective measures to employees at time of initial assignment and whenever new hazards may be introduced into the work area;
	3. Prepare a “written hazard communication program” for all workplaces where employees are exposed to hazardous chemicals;
	4. Develop specific procedures to protect employees from exposure to hazardous chemicals including appropriate work practices, emergency procedures, and personal protective equipment to be used [see 1926.1200(h)];
	5. Develop methods to inform other employers (contractors) of any precautionary measures that need to be taken to protect employees during the workplace’s normal operating conditions and foreseeable emergencies;
	6. Develop and maintain a “responsible staff” with assigned responsibility for both the initial and ongoing hazard communications program; and
	7. Prepare a written plan and set of procedures that clearly describes how the hazard communications program will be implemented at each facility.
4. The pipeline owner and/or operator should be responsible for complying with OSHA requirements in Part 1926 for construction, repairs, additions, and alterations of pipeline facilities. A pipeline owner and/or operator is allowed to reassign OSHA Part 1926 compliance requirements to a prime contractor for construction of new, “grass roots” pipeline systems that are not a part of existing pipeline systems. However, the pipeline owner and/or operator should be responsible for overseeing the prime contractor and the prime contractor’s subcontractors for plans, procedures and work activities that comply with OSHA Part 1926.
5. Section 1926.16 covers responsibilities for the prime contractor and for subcontractors. References to “employer obligations” in Part 1926 should apply to a prime contractor.

**OSHA Regulations Applicable to Pipelines**

Specific OSHA regulations related to contractor work activities performed on pipelines are covered in this section of my report. A search of OSHA regulations indicated that the word “contractor” is found in 83 locations. Several of these more significant reference are included in these sections from Parts 1904, 1910 and 1926.

*Part 1904*

Section 1904.31, “Recording and reporting occupational injuries and illness”, includes the following employer responsibilities.

1. 1904.31(a) – You must record on the OSHA 300 Log the recordable injuries and illnesses of all employees on your payroll, whether they are labor, executive, hourly, salary, part-time, seasonal, or migrant workers. You also must record the recordable injuries and illnesses that occur to employees who are not on your payroll if you supervise those employees on a day-to-day basis.
2. 1904.31(b)(2) – You must record injuries and illnesses of employees from a temporary help service, employee leasing service, or personnel supply service if you supervise the employees on a day-to-day basis.
3. 1904.31(b)(3)
	1. If a contractor’s employee is under the day-to-day supervision of the contractor, the contractor is responsible for recording any injury and illness.
	2. If a contractor’s employee is under the day-to-day supervision of another employer, this other employer is responsible for recording any injury and illness.

*Part 1910*

This part covers general occupational safety and health standards for affected employers and employees.

*1910.12*

This section covers “Construction work” and indicates that Part 1926 of the OSHA regulations shall apply “to every employment and place of employment of every employee engaged in construction work”. Each employer shall protect the employment and places of employment of each of his employees engaged in construction work. Construction work is defined as “work for construction, alteration, and/or repair, including painting and decoration”.

*1910.119*

This section pertains to process safety management of facilities that use, store, manufacture, handle, or move certain quantities of highly hazardous chemicals, including flammable gases and liquids. Requirements include the following.

1. 1910.119(a) allows some facilities to be excluded from the process safety management requirements of 1910.119. These process exclusions include the following.
2. Handles less than the following quantities:
	1. For highly toxic or reactive chemicals, less than the stated threshold quantity value or
	2. For flammable liquid or gas on site at one location, less than 10,000 pounds;
3. Fuel quantities greater than 10,000 pounds if fuels are used solely for workplace consumption;
4. Flammables liquids greater than 10,000 pounds that are stored in atmospheric tanks without refrigeration;
5. Retail facilities;
6. Oil or gas well drilling or servicing; and
7. Normally unoccupied remote facilities.
8. 1910.119(d) – The employer shall complete a compilation of process safety information before conducting any process hazard analysis required by the standard. The compilation of written process safety information is to enable the employer and employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals.
9. 1910.119(e)(1) – The employer shall perform an initial process hazard analysis (hazard evaluation) on processes covered by this standard.
10. 1910-119(e)(4) – The process analysis shall be performed by a team with expertise in engineering and process operations, and the team shall include at least one employee who has experience and knowledge specific to the process being evaluated.
11. 1910.119(e)(5) – The employer shall establish a system to promptly address the process analysis team’s findings and recommendations. The employer shall communicate the actions to operating, maintenance and other employees whose work assignments are in the process and who may be affected by the recommendations or actions.
12. 1910.119(f)(1) – The employer shall develop and implement written operating procedures that provide clear instructions for safely conducting activities including initial startup, normal operations and temporary operations.
13. 1910.119(f)(4) – The employer shall develop and implement safe work practices including control over entrance into a facility by maintenance, contractor, laboratory, or other support personnel. These safe work practices shall apply to employees and contractor employees.
14. 1910.119(h)(1) – This section is titled “Contractors” and applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process. It does not apply to contractors providing incidental services which do not affect process safety, such as janitorial work, food and drink services, laundry, delivery, or other supply services.
15. 1910.119(h)(2) – This section is titled “Employer responsibilities”. Stated responsibilities of the employer include:
	1. Employer shall obtain and evaluate a contractor’s safety performance and programs;
	2. Employer shall inform contract employees of the known potential fire, explosion, or toxic release hazards related to the contractor’s work and the process;
	3. Employer shall explain to contract employees, the applicable provisions of the emergency action plan;
	4. Employer shall develop and implement safe work practices to control the entrance, presence and exit of contract employers and contract employees in covered process areas;
	5. Employer shall periodically evaluate the performance of contract employers in fulfilling their obligations under 1910.119(h)(3); and
	6. Employer shall maintain a contract employee injury and illness log related to the contractor’s work in process areas.
16. 1910.119(h)(3) – This section is titled “Contract employer responsibilities”. Stated responsibilities of the contract employer include:
	1. Contract employer shall assure that each contract employee is trained in the work practices to safely perform his/her job;
	2. The contract employer shall assure that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to the job and the process, and the applicable provisions of the emergency action plan;
	3. The contract employer shall document that each contract employee has received and understood the required training and maintain training records;
	4. The contract employer shall assure that each contract employee follows the safety rules of the facility including the safe work practices covered in 1910.119(f)(4); and
	5. The contract employer shall advise the employer of any unique hazards presented by the contract employer’s work or hazards found by the contract employer’s work.
17. 1910.119(i) – Employer shall perform a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information.
18. 1910.119(k) – This section is titled “Hot work permit”. The employer shall issue a hot work permit for hot work operations conducted on or near a covered process. Permit shall document that the fire prevention and protection requirements of 1910.252(a) have been implemented prior to beginning the hot work.
19. 1910.119(l) – This section is titled “Management of change”. The employer shall establish and implement written procedures to manage changes to process chemicals, technology, equipment, procedures, and other changes to facilities that affect a covered process.
20. 1910.119(m) – This section is titled “Incident investigation”. The employer shall investigate each incident which resulted in, or could reasonable have resulted in a catastrophic release of highly hazardous chemical in the workplace.
21. 1910.119(n) – This section is titled “Emergency planning and response”. The employer shall establish and implement an emergency action plan x.
22. 1910.119 Appendix C – The process safety management standard targets highly hazardous chemicals that have the potential to cause a catastrophic incident. This standard as a whole is to aid employers in their efforts to prevent or mitigate episodic chemical releases that could lead to a catastrophe in the workplace and possibly the surrounding community. To control these types of hazards, employers need to develop the necessary expertise, experiences, judgment, and proactive initiative within their workforce to properly implement and maintain an effective process safety management program.

*1910.120*

This section is titled “Hazardous waste operations and emergency response” and pertains to hazardous spill containment, emergency repairs, and material cleanup sites. Requirements include the following.

1. 1910.120(a) – Emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to the location of the hazard are to comply with 1910.120.
2. 1910.120(a)(2)(iv) – Emergency response operations for release of, or substantial threats of releases of, hazardous substances must only comply with 1910.120(q).
3. 1910.120(a)(3) is titled “Definitions” and includes definitions for the following.
	1. HAZMAT covers hazardous materials response and is used to describe a “HAZMAT team”.
	2. Facility includes “any building, structure, installation, equipment, pipe or pipeline, well, pit, pond, lagoon, impoundment, ditch, storage container, motor vehicle, rolling stock, or aircraft”.
	3. Hazardous substance includes any substance listed by the U.S. Department of Transportation as hazardous materials under 49 CFR 172.101 and appendices. “Methane, compressed or Natural gas”, is included in the “Hazardous Materials Table”.
	4. Hazardous waste operation includes any operation conducted within the scope of 1910.120.
		1. 1910.120(b)(1)(i) – Employers shall develop and implement a written safety and health program for their employees involved with hazardous waste operations. The program shall identify, evaluate and control safety and health hazards, and provide for emergency response for hazardous waste operations. These written site-specific plans shall include:
			1. An organizational structure and
			2. A comprehensive work plan.
4. 1910.120(b)(1)(iv) – Addresses “Contractors and sub-contractors”. “An employer who retains contractor or sub-contractor services for hazardous waste operations shall inform those contractors, sub-contractors, or their representatives of the siteemergency response procedures and any potential fire, explosion, health, safety, and other hazards at the hazardous waste operation that have been identified by the employer’s information program”.
5. 1910.120(b)(1)(v) – “The written safety and health program shall be made available to:
	1. Any contractor or sub-contractor or their representative who will be involved with the hazardous waste operation;
	2. Employees;
	3. Employee designated representatives; and
	4. Regulatory agency personnel.
6. 1910.120(b)(2)(i) – The organizational structure part of the written site program shall establish the specific chain of command and specify the overall responsibilities of supervisors and employees. The site program shall at least include:
7. A general supervisor who has the responsibility and authority to direct all hazardous waste operations;
8. A site safety and health supervisor to develop and implement the site safety and health plan and verify compliance;
9. Lines of authority, responsibility, and communication; and
10. All other personnel needed for hazardous waste operations”.
11. 1910.120(b)(3) – The comprehensive work plan shall also cover a “comprehensive work plan” that at least includes:
12. Work tasks and objectives, and the methods for accomplishing those tasks and objectives;
13. Personnel requirements; and
14. Personnel training requirements.
15. 1910.120(b)(4) – The site-specific safety and health plan shall include:
16. A safety and health risk or hazard analysis for each site task and operation found in the work plan,
17. Employee training assignment,
18. Personal protective equipment (PPE) to be used by employees for each of the site tasks and operations,
19. Air monitoring requirements,
20. An emergency response plan in accordance with 1910.120(l),
21. Confined space procedures,
22. Spill containment program,
23. Pre-entry briefings prior to initiating any site activity, and
24. Inspections by the site safety and health supervisor or other designated employer representative to determine effectiveness of the site safety and health plan. Deficiencies in the plan shall be corrected by the employer.
25. 1910.120(e)(1)(i) – All employees working on site (such as but not limited to equipment operators, general laborers and others) exposed to hazardous substances, health hazards, or safety hazards and their supervisors and management responsible for the site shall receive training required in 1910.120(e) before they are permitted to engage in hazardous waste operations that could expose them to hazardous substances, safety, or health hazards.
26. 1910.120(e)(1)(ii) – Employees shall not be permitted to participate in or supervise field activities until they have been trained to a level required for their job function and responsibility.
27. 1910.120(e)(2) – Training to be conducted for the employee includes:
	1. Safety, health and other hazards present at the site;
	2. Use of personal protective equipment;
	3. Work practices by which the employee can minimize risks from hazards;
	4. Safe use of engineering controls and equipment on the site; and
	5. Contents of the site safety and health plan required in 1910.120(b)(4)(ii).
28. 1910.120(q) is titled “Emergency response program to hazardous substance releases” and applies to employers whose employees are engaged in emergency response to hazardous substance releases. A written emergency response plan is to be developed and implemented.

*1910.132*

This section covers requirements for personal protective equipment and requirements includes the following.

1. 1910.132(a) – Protective equipment includes personal protective equipment for eyes, face, head, and extremities; protective clothing; respiratory devices; and protective shields and barriers. Protective equipment shall be provided, used, and maintained in a sanitary and reliable condition whenever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants.
2. 1910.132(b) – Where employees provide their own protective equipment, the employer shall be responsible to assure its adequacy.
3. 1910.132(d) is titled “Hazard assessment and equipment selection”. The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the employer shall:
	1. Select and have each affected employee use, the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment;
	2. Select PPE that properly fits each affected employee; and
	3. Communicate PPE selection decisions to each affected employee.
4. 1910.132(f) is titled “Training” and requires the employer to provide training to each employee who is required to use PPE. The training is to cover when PPE is necessary, what PPE is necessary and how to use the PPE. The employer shall verify that each affected employee understands the training through a “written certification”.

*1910.146*

This section is titled “Permit-required confined spaces” and applies to work in tanks, vessels, vaults, pits, and normally unoccupied buildings containing pumps, compressors, piping, and other equipment handling natural gas or petroleum. Requirements include the following.

1. 1910.146(b) – “Definitions” includes the following definition for hazardous atmosphere:

 Flammable gas, vapor, or mist in excess of 10% of its lower flammable

 limit (LFL).

1. 1910.146(b) also indicates that a “Permit-required confined space (permit space)” means a confined space that contains or has the potential to contain a hazardous atmosphere.
2. 1910.146(c)(1) requires “The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces.”
3. 1910.146(c)(2) – If the workplace contains permit spaces, the employer shall inform exposed employees, by posting danger signs.
4. 1910.146(c)(5) indicates:
	1. There may be no hazardous atmosphere within the space whenever any employee is inside the space;
	2. “The atmosphere within the space shall be periodically tested as necessary”; and
	3. If a hazardous atmosphere is detected during entry, each employee shall leave the space immediately.
5. 1910.146(c)(8) – “When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall”:
	1. Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program;
	2. Apprise the contractor of the elements, including the hazards identified and the host employer’s experience with the space, that makes the space in question a permit space;
	3. Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;
	4. Coordinate entry operations with the contractor when both host employer and contractor personnel will be working in or near permit spaces; and
	5. Debrief the contractor at the conclusion of the entry operation including any hazards confronted or created in permit spaces during entry operations.
6. 1910.146(c)(9) – “Each contractor who is retained to perform permit space entry operations shall”:
	1. Obtain information on permit space hazards from the host employer;
	2. Coordinate entry operations with the host employer when both host employer personnel and contractor personnel will be working in or near permit spaces; and
	3. Inform the host employer of the permit space program that the contractor will follow and of hazards encountered.
7. 1910.146(d) requires that the employer shall:
	1. Identify and evaluate the hazards of permit spaces before employees enter;
	2. Prevent unauthorized entry;
	3. Develop and implement the means, procedures, and practices necessary for safe permit space entry operations;
	4. Provide the following equipment at no cost to employees:
		1. Testing and monitoring equipment,
		2. Ventilation equipment,
		3. Communications equipment,
		4. Personal protective equipment,
		5. Lighting,
		6. Barriers and shields,
		7. Ingress and egress equipment, and
		8. Rescue and emergency equipment;
	5. Test and evaluate permit space atmosphere;
	6. Designate roles of persons; and
	7. Develop and implement permit system.
8. 1910.146(g) covers “Training”. “The employer shall provide training so that all employees whose work is regulated by this section require the understanding, knowledge, and skills necessary for the safe performance of the duties assigned.” “Training shall be provided to each affected employee.”

*1910.1200*

This section is titled “Hazard communication” and is intended to address “evaluating the potential hazards of chemicals, and communicating information concerning hazards that may be at the work site and appropriate protective measures to employees” [see 1910.1200(a)(2)]. Requirements include the following.

1. 1910.1200(b)(1) indicates that “Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers. Appendix C of this section is a general guide for such employers to help them determine their compliance obligations under the rule.”
2. 1910.1200(c) is titled “Definitions” which include the following.
	1. “Chemical” means any element, chemical compound, or mixture of elements and/or compounds.
	2. “Employer” means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or sub-contractor.
	3. “Hazardous chemical” means any chemical which is a physical hazard or a health hazard.
	4. “Physical hazard” means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, or is pyrophoric, unstable (reactive), or water-reactive.
	5. “Employee” means a “worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies”.
	6. “Produce” means “to manufacture, process, formulate, blend, extract, generate, emit, or repackage”.
	7. “Distributor” means a business, other than a chemical manufacture or importer, which supplies hazardous chemicals to other distributors or to other employers.
3. 1910.1200(e) covers “Written hazard communication program” and requires the following.
	1. Employers shall develop, implement, and maintain at each workplace, a written hazard communication program”.
	2. For “Multi-employer workplaces”, “Employers who produce, use or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph” at least include:
		1. Methods the employer will use to provide the other employer(s) on-site access to material safety data sheets, and
		2. Methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace’s normal operating conditions and foreseeable emergencies.
4. 1910.1200(h) covers “Employer information and training” and requires the following:
	* + 1. Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new physical or health hazard to the employees have not previously been trained about is introduced into their work area and
			2. Employee training shall at least include the “measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.
5. 1910.1200 Appendix E is titled “Guidelines for employer compliance”. The introduction section contains the following information.
	1. The Hazard Communication Standard (HCS) is based on a simple concept that employees had both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent an adverse effect from occurring.
	2. The HCS address the issues of evaluating and communications hazards to workers.
	3. Knowledge acquired under the HCS will help employers provide safer workplaces for their employees.
6. 1910.1200 item No. 2, “Identify responsible staff”, includes the following:

 In order to have a successful program, it will be necessary to assign responsibility for both the initial and ongoing activities that have to be undertaken to comply with the rule.

1. 1910.1200 item No. 4, “Preparing and implementing a hazard communications program”, includes the following:

 All workplaces where employees are exposed to hazardous chemicals must have a written plan which describes how the standard will be implemented in that facility.

*Part 1926*

This part is titled “Safety and health regulations for construction”. Part 1910 covers general standards or regulations on health and safety. Part 1926 covers additional rules beyond Part 1910 applicable to construction work, including:

 “…construction, alteration, and/or repair”.

*1926.13*

This section covers “Interpretation of statuary terms” and includes:

1. For construction, alteration, and/or repair work, including painting and decorating, no contractor or subcontractor for any part of the contract work shall require any laborer or mechanic employed in the performance of the contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety.
2. On “Accident prevention responsibilities”, it is the responsibility of the employer to initiate and maintain programs necessary to comply with Part 1926.
3. Accident prevention programs shall provide for frequent and regular inspections of the job sites, materials and equipment by competent persons designated by the employers.

*1926.16*

This section covers contractor responsibilities and includes:

1. Prime contractor and sub-contractors may make their own arrangements for compliance obligations on a jobsite basis rather than individually. For example, the prime contractor or a sub-contractor may agree to provide first aid or toilet facilities for workers. However, “In no case shall the prime contractor be relieved of overall responsibility for compliance with the requirements of this part for all work to be performed under the contract.”
2. The “prime contractor assumes all obligations as employer obligations under the standards contained in this part, whether or not he subcontracts any part of the work”.
3. With respect to sub-contracted work, the prime contractor and any sub-contractors shall be deemed to have joint responsibility.

*1926.20*

This section covers “General safety and health provisions” and includes:

1. It shall be the responsibility of the employer to initiate and maintain such programs as may be necessary to comply with Part 1926 and
2. Such programs shall provide for frequent and regular inspections of the job sites, materials and equipment. These inspections shall be made by competent persons designated by the employers.

*1926.24*

This section covers “Fire protection and prevention” and includes:

The employer shall be responsible for the development and maintenance of an effective fire protection and prevention program at the job site throughout all phases of the construction, repair, alteration, or demolition work. The employer shall ensure the availability of the fire protection and suppression equipment required by Subpart F of this part.

*1926.28*

This section covers “Personal protective equipment” and includes:

The employer is responsible for requiring the wearing of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions or where this part indicates the need for using such equipment to reduce hazards to the employees.

*1926.35*

This section requires employers to prepare and implement a written emergency action plan. Section 1926.59 covers “Hazard communication” and requires compliance with 1910.1200.

*1926.50*

This section covers “Medical services and first aid” and requires the following of employers.

1. Provisions shall be made prior to commencement of the project for prompt medical attention in case of serious injury.
2. In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first aid training from the U.S. Bureau of Mines, the American Red Cross or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid.
3. First aid supplies shall be readily accessible when required.
4. First aid kits shall be in a weatherproof container and shall be checked by the employer before being sent out on each job and at least weekly to ensure that expended items are replaced.

*1926.64*

This section, “Process safety management of highly hazardous chemicals”, applies to the following processes.

1. Involves a highly toxic or reactive chemical at or above given threshold quantities or
2. Involves a flammable liquid or gas on site in one location of 10,000 pounds or more except for:
	1. Fuels used solely for workplace consumption or
	2. Flammable liquids are stored in atmospheric tanks without refrigeration.

Other exclusions in 1926.64 include:

1. Retail facilities,
2. Oil or gas well drilling or servicing, or
3. Normally unoccupied remote facilities.

*1926.95*

This section covers “Criteria for personal protective equipment” and requires the following.

1. Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition whenever it is necessary by reason hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.
2. Where employees provide their own protective equipment, the employer shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment.

*1926.150*

This section covers “Fire protection” and requires the following.

1. The employer shall be responsible for the development of a fire protection program to be followed throughout all phases of the construction and demolition work, and he shall provide for the firefighting equipment as specified in this subpart. As fire hazards occur, there shall be no delay in providing the necessary equipment.
2. All firefighting equipment, provided by the employer, shall be conspicuously located.
3. A fire extinguisher, rated not less than 10B, shall be provided within 50 feet wherever more than 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas are being used at the jobsite.

*1926.751*

This section on steel erection includes the following definition for “Controlling contractor”:

 Means a prime contractor, general contractor, construction

 manager, or other legal entity which has overall responsibility

 for the construction of the project – its planning, quality and

 completion.

Sections 1926.750 – 1926.760 contain several references to duties of controlling contractor and steel erection contractor.

*OSHA 3071*

OSHA 3071 is titled “Job hazard analysis” and contains the following information.

1. Job-related injuries and fatalities occur every day in the workplace. These injuries often occur because employees are not trained in the proper job procedure.
2. One way to prevent workplace injuries is to establish proper job procedures and train all employees in safer and more efficient work methods. Establishing proper job procedures is one of the benefits of conducting a job hazard analysis.
3. Job hazard analysis consists of:
	1. Carefully studying and recording each step of a job,
	2. Identifying existing and potential job hazards (both safety and health), and
	3. Determining the best way to perform a job or to reduce or eliminate these job hazards.
4. A job hazard analysis can be performed for all jobs in the workplace, whether the job task is “special” (non-routine) or routine.
5. Before beginning the job hazard analysis, take a look at the general conditions under which the job is performed and develop a checklist. The checklist is by no means complete because each worksite has its own requirements and environmental conditions.
6. After you have listed each hazard or potential hazard and have reviewed them with the employee performing the job, determine whether the job could be performed in another way to eliminate the hazards.
7. If no new procedure can be developed, determine whether any physical changes can be made to eliminate or reduce the danger. Physical changes include redesigning equipment, changing tools, personal protective equipment, or ventilation.
8. Any time a job hazard analysis is revised, training in the new job methods, procedures, or protective measures should be provided to all employees affected by the changes.
9. A job hazard analysis also can be used to train effectively new employees on the steps and job hazards.

**Overview of ASME B31.8**

American Society of Mechanical Engineers (ASME) B31.8, Gas Transmission and Distribution Piping Systems, applies to (see Fig. Q2 of ASME B31.8) the gas pipeline facilities. Chapter V, “Operating and Maintenance Procedures”, requires that “Each operating company having gas transmission or distribution facilities within the scope of this code shall have a written plan covering operation and maintenance procedures in accordance with the scope and intent of this Code. Each plan shall include detailed plans on instructions for employees concerning operating and maintenance procedures. Each operating company shall also have a written emergency plan covering facility failures or other emergencies.

Section 802, Scope and Intent, indicates that this Code covers design, fabrication, installation, inspection, testing, operations, and maintenance of facilities used for the transportation of gas. Section 803 defines “transportation of gas” as “gathering, transmission, or distribution of gas by pipeline or the storage of gas”.

The required written operating and maintenance plan shall include detailed plans and instructions for employees. These plans are to at least cover all the requirements in ASME B31.8 which at least include:

1. Periodic review of plans for modification and updating;
2. Define responsibilities of employees;
3. Comprehensive training for employees in established procedures;
4. Recordkeeping;
5. Identify portions of pipeline facilities presenting the greatest hazard to the public;
6. Liaison with appropriate fire, police, and other public officials and public communications media;
7. Public educational program;
8. Pipeline failure investigations;
9. Procedures for prevention of accidental ignitions;
10. Protection from blasting effects;
11. Internal corrosion control;
12. External corrosion control;
13. Periodic surveillance of pipelines;
14. Pipeline patrolling;
15. Maintenance of pipeline cover;
16. Leakage surveys;
17. Pipeline repairs;
18. Testing of pipeline repairs;
19. Nondestructive testing of mechanical damage, welds and repairs;
20. Pipeline leak records;
21. Pipeline markers;
22. Abandonment procedures;
23. Repositioning pipelines;
24. Compressor station maintenance;
25. Maintenance of holders;
26. Maintenance of pressure limiting and regulating stations;
27. Valve maintenance;
28. Valve location records;
29. Prevention of accidental valve operation;
30. Vault maintenance;
31. Class location surveys;
32. Class location changes;
33. Pipeline service conversions; and
34. Odorization.

ASME B31.4 contains similar requirements for petroleum and other hazardous liquids transported by pipelines.

**American Petroleum Institute (API) Recommended Safety Practices**

The American Petroleum Institute (API) has published numerous recommended practices to clarify the vague employer references in OSHA regulations. These documents provide guidance on how pipeline owners/operators are to comply with OSHA requirements. These documents include:

1. API RP 2220, *Repairing Hazardous Liquid Pipelines*;
2. API RP 2221, *Contractor and Owner Safety Program Implementation*;
3. API RP 1169, *Recommended Practice for Basic Inspection Requirements-New Pipeline Construction*;
4. API Standard 2009, *Safe Welding, Cutting, and Hot Work Practices in the Petroleum and Petrochemical Industries*, and
5. API Standard 2015, *Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks*.

*API RP 2220*

Relevant requirements for pipeline owner/operators in American Petroleum Institute (API) RP 2220, *Repairing Hazardous Liquid Pipelines,* included:

1. This RP covers guidelines for safe practices to be employed while repairing in service pipelines for hazardous liquids.
2. Regulatory requirements for pipeline personnel including pipeline and contractor employees are covered in 49 CFR 195.501-195.509, ASME B31Q, and API RP 1161.
3. Pipeline and contractor employees should be briefed on-site about specific repairs and safety procedures.
4. Only qualified pipeline and contractor personnel with the proper training, experience and demonstrated skills shall be allowed to perform pipeline repairs.
5. To ensure the safe and efficient completion of the repair project, the proper preplanning and ground work shall be accomplished by the pipeline owner/operator before any work is done.
6. Preplanning procedures by the pipeline owner/operator should at least include:
	1. Evaluate reported damage and determine appropriate repair method required to mitigate the condition.
	2. Develop a written work plan that includes:
		1. Proper repair procedure,
		2. Drain-down or isolation procedures, and
		3. Equipment required to complete the repair safely.
	3. Ensure all tools and safety equipment are in good working order.
	4. Out of service repairs or replacements may require line shut down, isolation, and evacuation (of line contents) prior to work initiation.
	5. Ensure adequate fire protection equipment is available.
	6. Ensure all electronic equipment is intrinsically safe or will be used a safe distance from potential vapor sources.
	7. Close, lock, and tag valves connected to the line section to be repaired, if line is required to be isolated and taken out of service during the repairs.
	8. Open, lock, and tag the circuit breakers on any rectifier/ground bed installation that could affect the safety of the job.
7. A site hazard assessment should be performed by the pipeline owner/operator prior to commencing any work activity of piping revision, replacement, or repair, in-service or out of service. The site hazard assessment shall at least include (specify):
	1. Specify work permitting requirements and review with repair crew personnel.
	2. Gas (vapor) testing and monitoring requirements.
	3. Excavation requirements.
	4. For confined spaces, appropriate safety control and monitoring activities.
	5. Equipment status and energy control requirements, i.e., lockout/tagout or specific product isolation. Requirements should be reviewed and documented prior to work initiation.
	6. Required PPE.
	7. Miscellaneous safety requirements such as:
		1. Fire watch,
		2. Ventilation,
		3. Bonding/grounding,
		4. Signage, and
		5. Barricades.
8. If the product is spilled during the repair, additional site specific hazard assessments shall be performed by the pipeline owner/operator.
9. For a pipeline segment replacement is to be performed, methods to safely repair the line include:
	1. Inert gas purging,
	2. Mud plugging,
	3. Ice plugging, and
	4. Mechanical plugging.

API RP 2201 should be referred for more details.

1. A written work plan should be generated and communicated by the pipeline owner/operator outlining the:
	1. Process,
	2. Procedures, and
	3. Responsibilities of each party to complete the work in a safe manner.
2. The written work plan prepared by the pipeline owner/operator should at least include:
	1. Job hazard analysis,
	2. Reviews of hazards and plan with all individuals in the drain down or purge,
	3. Maximum flow rate of fluid being displaced,
	4. Maximum pressure requirements at the nitrogen injection or drain site,
	5. Maximum operating pressure of the pipeline,
	6. Nitrogen injection and piping temperature requirements,
	7. Inert gas handling and use precautions, and
	8. Overpressure protection.
3. Safe repair steps required by the pipeline owner/operator include:
	1. When the piping is to be welded, the wall thickness shall be confirmed.
	2. All rectifiers in the area should be turned off, locked, and tagged. This includes company rectifiers, as well as foreign pipeline rectifiers whose line is bonded to or passes in proximity to the line under repair.
	3. Because of the possibility of electrical currents in the pipeline, an electrical bond should be made across all proposed points of separation before the line is cut or a flange joint is separated.
	4. Replacement pipe and joints (flanges) should also be bonded.
	5. Line cuts should be made with mechanical cutters. When cutting, positive confirmation shall be obtained within the line of sight of the cut that the pressure is zero when cutting the pipe.
	6. Removed defect area should be stored in a controlled manner should additional third party defect testing and analysis be required.
	7. If welding is to be performed, all oils, products, and saturated earth should be removed both from within and around the excavation.
	8. The excavation and its surrounding area should be tested and continuously monitored with a combustible gas indicator.
	9. Where vapor seals or plugs are used to prevent the escape of vapor from a pipeline, some positive method of venting or monitoring should be used.
	10. Vents shall be confirmed open and periodically checked to confirm unobstruction prior to and during hot work activities.

*API RP 2221*

American Petroleum Institute (API) RP 2221, *Contractor and Owner Safety Program Implementation* requires:

1. API RP 2221 applies to downstream activities including pipelines, but not exploration and production or marine operations.
2. API RP 2221 provides guidance to the owner/operator for applying the principles outlined in API RP 2220, “Improving Owner/Operator and Contractor Performance”. (1.0)
3. Each pipeline owner/operator is to develop and implement a contractor safety program.
4. This publication may not apply to contractors working in low risk environments that generally do not affect facility safety, such as those that provide incidental or supplemental services such as janitorial, beverage, or laundry. (1.1)
5. The facility owner’s commitment and continued support of a health and safety process are an essential element of all successful owner’s contractor safety programs. (1.1.1)
6. The success of contractor safety initiatives also requires a commitment from the contractor as an employer in addition to the commitment of facility owners. (1.1.2)
7. U.S. DOT regulations, 49 CFR Parts 190 - 191 are included as references in API RP 2221. (2.0)
8. OSHA 1910.1200 on Hazard Communication is included as a reference in API RP 2221. (2.0)
9. Pipeline owner/operator activities to improve contractor performance include (4.2):
	1. Ensure that contractor safety performance is consistent with the pipeline owner’s established contractor safety program elements.
	2. Site-specific safety and health requirements are to be included in contractor bid packages.
	3. Safety and health information are to be requested from each prospective contractor and evaluated during the contractor selection process.
	4. Pipeline owner/operator are to establish and verify specific training requirements for contractors.
	5. Pipeline owner/operator is to conduct pre-job meetings that specifically address safety expectations.
	6. Pipeline owner/operator is to audit and review the safety and health performance of each contractor working on the owner’s sites.
	7. Pipeline owner/operator is to document any deviations from the established safety programs and provide feedback to the contractor for immediate corrective and action and non-recurrence of the deviation.
	8. Pipeline owner/operator is to take corrective action to improve the owner’s and contractor’s safety and health management system when deficiencies are noted.
10. The pipeline owner/operator should establish a contractor health and safety program which requires contractors to be as protective of their contract employees as the owner is of its employees. (4.6.1.1)
11. The pipeline owner shall require reporting by the contractor of injuries, damage, incidents, and near-misses and require the owner to take the lead in investigations as defined in the contract. Pipeline owner shall reserve the right to either participate or independently investigate (or both) all incidents that occur on the pipeline owner’s site or facility. (4.6.1.3 and 4.6.2.3)
12. Pipeline owners shall develop a plan to inspect contractor job sites on both a formal and informal basis. Findings shall be documented and shared. (4.6.1.4)
13. Contractor personnel shall be included in relevant pipeline owner safety meetings during a project or to having owner representatives attend relevant contractor safety meetings. (4.6.1.5)
14. Each contractor shall perform self-examination of their own safety and health programs. (4.6.2.8)
15. Pipeline owners shall establish a system for reviewing their contractor safety and health programs. (4.9)
16. The pipeline owner/operator shall verify that the contractor is familiar with the location, facility, personnel, facility contractor programs, hazards, facility requirements, and other safe work information before work begins. (4.10.4)
17. The pipeline owner/operator shall monitor contractor activities while the work is being conducted, including periodic evaluation of (4.10.5):
	1. Contractor safety and health performance and
	2. Contractor compliance with safety and health requirements.
18. At the completion of the contracted work, the pipeline owner/operator shall evaluate the overall performance of the contractor to remain on the “bid list” of pre-qualified contractors. (4.10.6)
19. After evaluating the contractor performance, the pipeline owner/operator is to determine whether changes in the owner’s contractor safety program are necessary based on work evaluations of the contractor. (4.10.7)
20. Pipeline owner’s contractor safety and health programs shall be designed to reflect the level of risk associated with the work to be performed. Risk factors to consider include (5.2):
	1. Nature of the work;
	2. Location of the work;
	3. Potential for work site to be exposed to hazardous materials;
	4. Potential for the contractor’s work to expose contractor employees, other contractors, owner employees, and the public to hazards;
	5. Duration of the work, and
	6. Contractor’s experience and expertise in performing similar work.
21. The relative risk determined by the pipeline owner/operator for the proposed work by the contractor will influence the depth of owner involvement in the owner’s contractor safety and health program. (5.2.3)
22. The pipeline owner/operator shall establish and implement a method of reviewing and determining whether a contractor can meet the pipeline owner’s safety and health requirements for contractors and being considered for work at the facility. This evaluation shall be based on the contractor’s representations and knowledge of safety performance requirements on the owner’s projects. (6.3)
23. After the pipeline owner/operator determines the type of work and level of potential risk associated with the work to be performed by a contractor, the pipeline owner/operator shall identify the safety and health requirements and communicate them to the contractor. (7.1)
24. The pipeline owner/operator shall review and agree with the contractor’s proposed work approach on the job. (7.1)
25. The pipeline owner/operator shall develop site specific safety and health requirements to address reasonably foreseeable hazards associated with the work to be done. (7.1)
26. Contractors shall develop their own written safety and health programs for the types of work they perform. Items to be incorporated by the contractor into its safety and health program include (7.2):
	1. Outline of methods for compliance with applicable regulations, codes, standards, and the owner’s safety and health program;
	2. List of potential hazards, safety training, and hazard communication procedures;
	3. List of key personnel, emergency action plans, and the person responsible for the safety and health programs; and
	4. Health and safety requirements for the site specific project or work.
27. When contractor’s safety procedures are to be used, they shall meet or exceed the owner’s requirements as determined by the pipeline owner/operator. (7.2)
28. The contractor shall review the pipeline owner’s safety and health requirements prior to accepting each contract to identify any possible hazards or hazardous conditions that may arise by the actions or methods proposed by the pipeline owner/operator before the contractor performs the work. (7.6.1)
29. Safety and health requirements established by the pipeline owner/operator for the contractor shall be consistent with requirements established by the pipeline owner/operator for the pipeline owner’s employees. (7.6.2)
30. Appropriate PPE is to be agreed to by the pipeline owner/operator and the contractor. Determination of who provides and maintains the PPE shall be agreed upon before the work starts. (7.6.3)
31. A pre-job safety meeting shall be held between the contractor and the pipeline owner/operator. The pipeline owner’s representatives shall discuss the specific safety requirements of the project with the contractor’s representatives who will be directly responsible for overseeing the contractor’s work. (8.2)
32. Contractor employees are expected to receive health and safety training that covers owner’s safety programs specific to each facility, such as (8.3.2.2):
	1. Entrance/exit requirements and routes,
	2. Work restrictions within the facility,
	3. Hazardous materials at the facility,
	4. Required PPE,
	5. Work permit system,
	6. Security, and
	7. Facility and operations overview.
33. A successful work monitoring program includes inspections by both pipeline owners and by contractors. (9.1)
34. The pipeline owner shall conduct periodic reviews to verify that contractors performing work on-site have implemented effective safety programs that comply with pipeline owner requirements in the contract. (9.2.2)
35. Pipeline owner shall periodically review the contractor’s safety and health programs, policies, and procedures, and request that they be updated by the contractor when circumstances warrant a revision. (9.3.1)
36. The pipeline owner/operator shall maintain at least an oversight role when inspecting and monitoring the contractor’s work activities. (9.3.1)

 *API RP 1169*

Relevant information in the first edition of API 1169, *Recommended Practice for Basic Inspections Requirements – New Pipeline Construction*, July 2013 are:

1. An inspector is to be qualified to monitor, assess, evaluate, verify, discuss, decide, resolve, report, and document pipeline construction activities.
2. A qualified inspector’s objectives are to ensure the requirements of the design, drawings, specifications, regulations, and industry practices are being met safely, efficiently, and in an environmentally sound manner.
3. The inspector or inspection team authority is to be backed up by contractual provisions that state all the work and materials shall be subject, at all times, to inspection by the company in charge of the project.
4. Inspectors are expected to function at all times as representatives of the pipeline company owning and/or managing the project. In most cases, the inspector works for or represents a pipeline company.
5. The pipeline company provides strict procedures and/or contract provisions that spell out the expectations and obligations of the inspector’s performance.
6. Inspectors are expected to be the principle 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.
7. Inspectors must remember that contractors are to be allowed to function as independent contractors with the power and authority to select the means, methods, and manners to perform the contracted work. Inspectors must respect this position and not direct nor supervise the contractor’s work.
8. Inspectors should mutually plan upcoming tasks with their contractor counterparts and pipeline owner/operator representatives.
9. Inspectors are expected to report deficiencies, unsatisfactory work, thefts, vandalism, missing materials/property, or suspicious activities/occurrences and other concerns in a timely and accurate manner to:
	1. Chief inspector,
	2. Project manager, or
	3. Designated pipeline owner/operator personnel.
10. Inspectors should complete required documentation including daily inspection reports and other reports/forms as directed in a format acceptable to the pipeline owner/operator.
11. It is the duty of the pipeline owner/operator and their contractors to be aware of, and comply with, all applicable laws/regulations and manufacturer’s requirements that apply to specific work activities being performed and materials used.
12. Inspectors must report all unacceptable practices in a timely and accurate manner.
13. Job safety analysis (JSA) should be conducted per pipeline owner/operator requirements.
14. Inspectors are required to participate in each JSA.
15. JSAs are required to determine potential hazards and identify plans and mitigative measures needed to address each hazard.
16. Pipeline owner/operator documents are to be available to supplement these safety awareness concepts during each JSA.
17. JSAs involve the practice of:
	1. Analyzing and planning hazardous jobs,
	2. Use of written procedures or permits,
	3. Job review and discussion among key pipeline and contractor personnel, and
	4. Walk through inspections to ensure pipeline and contractor personnel understand potential hazards and the precautions needed to address each hazard.
18. Inspectors should evaluate the following areas to avoid incidents and raise awareness of hazards:
	1. Job sites;
	2. Changes in environmental conditions such as flooding;
	3. Site specific hazards such as:
		1. Terrain,
		2. Waterway crossings,
		3. ROW conditions, and
		4. Other factors encountered;
	4. Climatic factors;
	5. Materials and materials handling; and
	6. Overview review of all major tasks to be performed involving moving equipment and lifting heavy loads in the proximity of:
		1. Personnel,
		2. Trucks,
		3. Holes,
		4. Welding, and
		5. Other hazardous activities.
19. Inspectors shall be familiar with contract provisions regarding contractors and their safety procedures, contractor’s safety programs, and pipeline owner/operator expectations.
20. Contractor is responsible for all safety related activities on the work site.
21. Inspectors should be familiar with the pipeline owner/operator specific processes designed to aid observation, analysis, and reporting with easy-to-use forms for occurrences or actions that could cause harm including:
	1. Lifting/hoisting pipe and
	2. Excavation near pipelines or other utilities.
22. Inspectors should have training in the above pipeline owner/operator processes.
23. Inspectors should be familiar with the pipeline owner/operator and contractors near miss programs which include observations, analysis, reporting, and communications of these occurrences which did not lead to injury or damage.
24. Inspector should have knowledge of each work situation that requires permits, permit limitations, and permit restrictions.
25. Required permitting is to be specific to pipeline owner/operator requirements and inspectors should have knowledge of permit required areas including:
	1. Confined space entry,
	2. Excavation,
	3. Hot work, and
	4. Isolation of hazardous energy sources.
26. Rigging and lifting requirements are pipeline owner/operator specific programs.
27. On excavation, trenching, and boring, safety inspectors are expected to:
	1. Be knowledgeable about excavation safety,
	2. Know what facets of these activities to observe,
	3. How to take corrective action, and
	4. Protective systems and procedures that should be employed.
28. It is important for inspectors to know requirements on:
	1. Spoil placement;
	2. Soil classification;
	3. Soil testing procedures;
	4. Soil types;
	5. Use of soil test equipment;
	6. Protective measures needed;
	7. Documentation requirements; and
	8. Impact of weather conditions, traffic, groundwater, and operating machinery near excavations.
29. Confined space permits are required in areas where an occupant could be trapped (including deep excavations).
30. Inspectors should be knowledgeable about conditions that require atmospheric testing for hazardous conditions.
31. Inspectors should check and verify the qualifications of persons performing specialized work activities including:
	1. Heavy equipment operators,
	2. Excavation competent persons,
	3. Safety professionals, and
	4. Other pipeline inspectors.
32. Inspectors must know proper ditching and excavation procedures to ensure correct pipeline location and facilitate efficient and safe pipe laying conditions.
33. Inspectors should monitor, measure, report, and if required conduct continual excavation inspections in accordance with OSHA 1926.651 in the following areas:
	1. Ditch specifications,
	2. Breaks in excavations,
	3. Soil removal and storage,
	4. Ditch breakers requirements,
	5. Open ditch at end of each day, and
	6. Foreign line crossings.
34. Inspectors should check on the use of trench boxes, bracing, and other ditch shoring requirements.
35. Chief inspector must be knowledgeable in each area of pipeline construction.

*API Standard 2009*

*Introduction*

The February 2002 edition of American Petroleum Institute (API) RP 2002, *Safe Welding, Cutting, and Hot Work Practices in the Petroleum and Petrochemical Industries* contains the following scope statements.

This recommended practice provides guidelines for safely conducting welding, cutting or other hot work activities in refineries, gas plants, petrochemical plants and other facilities in the petroleum and petrochemical industries. It includes specific guidance to evaluate procedures for certain types of work on equipment in service.

The above reference to “other facilities in the petroleum and petrochemical industries” includes pipelines. Hot work is defined in API RP 2009 as follows:

 3.8 hot work: An operation that can produce heat from flame, spark

or other source of ignition, with sufficient energy to ignite flammable vapors, gases, or dust.

API RP 2009 also states that “Special procedures and permits are required when hot work is to be performed in certain areas.” API RP 2009 states the following:

The principles and resources provided in this document are widely applicable. Some activities (such as oil drilling or offshore operations) may be subject to specific regulations or unique work requirements which should be considered when developing welding and hot work programs.

Some of the publications that are referenced in API RP 2009 include:

1. API RP 2003, *Protection Against Ignitions Arising Out of Static, Lightning and Stray Currents* and
2. API Std. 2015, *Safe Entry and Cleaning of Petroleum Storage Tanks*.

The following are minimum procedures and activities to be followed to provide safety during hot work activities.

1. Job description preparation for job hazard analysis and work,
2. Job analysis including evaluate safety of job and work conditions and determine permit conditions,
3. Identify and implement safeguards required for permit conditions,
4. Authorize work and issue permit(s),
5. Maintain surveillance over work conditions to determine that work is performed within permit conditions, and
6. Closing out the permit.

*Job Analysis*

The first step in the work process is establishing what needs to be accomplished, when the work will be performed, and how the work is to be done. The job description needs to be written and prepared in sufficient detail so that “qualified persons” such as experienced engineers, specialists and inspectors can review and approve the work “before the job starts”.

During the job analysis, a “work scope analysis should be performed to determine if alternatives to performing hot work exist within reasonable and economic bounds”. If hot work cannot be avoided and is required, the following should be considered:

1. Move the work to a safe area such as an area unlikely to have flammable materials in the atmosphere,
2. Move the fire ignition hazards to a safe place, or
3. If the fire ignition hazards or work cannot be moved to a safe area, physical barriers to confine fire ignition sources should be constructed.

Hazard evaluation and risk reduction activities to be included in the job analysis at least include the following.

1. Identify physical hazards, protective activities and equipment, and precautions to avoid physical hazards.
2. Identify potential health hazards and activities to reduce risk of workers being affected by health hazards.
3. Determination of whether work place is to be free of hydrocarbon vapors and gas. Hot work should not be permitted unless special conditions and review are provided.
4. Any spark-producing or high-temperature object or activity can be a potential source of ignition and should not be allowed in an area where flammable vapors may be present. Static electricity can be generated by flow of fluids and API RP 2003 should be followed to prevent static electricity accumulation and discharge.

*Identify and Implement Safeguards*

The evaluation of the work should include the identification of all potential hazards and safeguards to maintain safety while performing the work. These activities and safeguards at least include the following:

1. Knowing hazards in the work area;
2. Reviewing material safety data sheets (MSDS) for materials that may present health and flammability hazards;
3. Sharing hazard information with all affected personnel;
4. Developing and using a rigorous and detailed Hot Work Permit System;
5. Posting permits where required by procedures;
6. Developing and adhering to site-specific safe work conditions and locations specified in permits;
7. Protecting personnel safety against physical hazards;
8. Preventing employee exposure to hazardous amounts of chemical substances and physical agents by monitoring and controlling the work environment;
9. Avoid unintended oxygen deficiency work areas;
10. Preventing uncontrolled ignition of flammable or combustible materials by:
	1. Contain flammables,
	2. Eliminate ignition sources,
	3. Control access to the work area, and
	4. Use continuous monitoring in areas with higher risk of flammable vapor release; and
11. Become familiar with equipment and operating instructions.

Safeguards for equipment purging activities include the following.

1. Blow air, steam or inert gas from an electrically bonded hose into the space to be purged and an electrically bonded exhaust vent to remove the vapors. The exhaust vent should avoid work areas. Inert gas or steam is preferred because there is a high probability that a flammable mixture will be formed.
2. Another purging approach uses dry ice placed in the enclosed space. As the ice sublimes, it releases carbon dioxide which can dilute and displace both air and vapors. This avoids static electricity concerns.
3. Water displacement can also be used to purge a space.

Properly trained and equipped fire watch personnel shall be required whenever a permit is required for hot work. The person assigned as fire watch shall have no other duties that would distract from the primary safety surveillance and response function. A fire watch person may perform other safety-related tasks such as atmospheric monitoring if the fire watch responsibilities are not compromised.

A competent person using a properly maintained, adjusted and calibrated combustible gas detector is required to perform tests of the work area before hot work is started and periodically while hot work is being performed.

*Work Authorization and Permitting*

The permitting process is the step that authorizes and specifies the manner in which work will be performed. Hot work permit process is to at least include the following:

1. Equipment on which work is to be performed and the location(s) of work;
2. Identification and location of relevant MSDS’s;
3. Type and description of work to be performed;
4. Protective equipment and measures required for the work;
5. Standby fire protection equipment and/or personnel required;
6. Area(s) and equipment to be tested with a combustive gas detector plus the test results;
7. Frequency of atmospheric testing and monitoring;
8. Any special precautions to safely conduct job and/or stop work;
9. Notification of affected personnel;
10. Signatures and names of authorized individuals involved at least including:
11. Person(s) issuing the permit,
12. Person responsible for inspecting the work site,
13. Person conducting gas tests,
14. Person(s) in charge of operating the affected facilities or process,
15. Person receiving the permit, and
16. Person responsible for surveillance of work for compliance with permit requirements;
17. Date and time permit is issued; and
18. Permits expiration date and time.

Before the permit is issued, a careful hazard analysis and inspection shall be made (see Section 5). This hazard analysis should at least include flammable vapor tests and determination that no reasonable probability exists of any such material entering the area while hot work is being performed.

*Surveillance for Permit Compliance*

Although Figure 1 in API RP 2009 includes “Maintain Surveillance” as one of the steps in safely conducting hot work activities, API RP 2009 has little detail on this subject. However, this work is inspection and oversight to ensure that predefined job description and permit conditions, procedures and activities are being followed and deficiencies are reported and corrected. This work should be performed by an independent person that does not have other duties that distract from the proper execution of work oversight and inspection duties.

*Closing Out the Permit*

When the work is completed, operations and technical personnel should visit and inspect the job site to determine that the job work done satisfactorily and that no safety hazards were introduced during the work activity.

*API Standard 2015*

*Introduction*

General hot work requirements contained in API Std. 2015 on tank cleaning that are also applicable to other hot work line operations and are contained in this section.

*Definitions*

1. **Hot work**: Any work that has the potential to produce enough thermal energy to provide an ignition source in an area where a potential exists for a flammable gas or vapor-in-air atmosphere in the explosive (flammable) range to occur.
2. **Hot work permit**: The employer’s (owner/operator and contractor) written authorization to perform hot work operation or to use equipment capable of producing a source of ignition. Equipment capable of producing a source of ignition include, but are not limited to open flames, welding, cutting, grinding, burning, heating, internal combustion engines, and non-explosion proof electric motors.
3. **Employer**: An owner, operator, contractor, or sub-contractor whose respective employees are performing a task or activity described in this standard.
4. **Owner/operato**r: The company or person responsible for the facility in which the tank to be cleaned is located.
5. **Contractor**: A company or person selected and hired by the owner/operator to conduct tank cleaning operations and activities in accordance with the contract and tank cleaning agreements.
6. **Sub-contractor**: A company or person selected and hired by a contractor to conduct specific tank cleaning related operations and activities in accordance with sub-contractor agreements.
7. **Shall**: Is used to designate requirements presented in this standard that are mandatory.
8. **Should**: Is used to designate procedures or practices in this standard that are recommended.

*Administrative Controls, Plans and Procedures*

Applicable referenced and modified statements from API Std. 2015 are included below.

1. *General Requirements*

 Employers (owners, operators, or contractors) shall develop and

 implement appropriate administrative controls, procedures and written

plans for tank preparation, entry, and cleaning work from decommissioning through recommissioning, including, but not limited to, the following:

* 1. Scope of work;
	2. Owner/operator responsibilities for each planned operation;
	3. Contractor and sub-contractor selection;
	4. Contractor and sub-contractor responsibilities for each planned operation;
	5. Regulatory requirements and employer (owner/operator and contractor) responsibilities applicable to the specific tank cleaning operation;
	6. Requirements and responsibilities for permits, records, reports, notifications, and record keeping;
	7. Hazard assessment and establishment of safe practices, exposure levels and controls for the storage tank(s) and tank area, and the operations to be conducted;
	8. Qualified persons, responsibilities, training, and personal protective equipment requirements;
	9. Emergency response requirements, notification, designated qualified rescuers, and rescue operations responsibilities;
	10. Procedures and responsibilities for inspecting, testing, recording, and returning tanks to service; and
	11. Requirements for conducting post-tank cleaning reviews and adjusting programs and procedures.
1. *Written Tank Cleaning Program*
	1. Scope of work including tank(s) to be cleaned, their construction and condition details, products contained, specific work to be done and when each phase of work is expected to start and be completed.
	2. An owner/operator evaluation of contractors and sub-contractors experience and training, safety record, equipment, programs, and procedures, and ability to accomplish the planned work safely and efficiently in accordance with the contract requirements and applicable standards and regulations. These evaluations are normally performed in order to determine which contractors are qualified to bid on tank cleaning jobs.
	3. Tank pre-cleaning meetings between appropriate employer (owner/operator and contractor) personnel to cover:
		1. Scope of work,
		2. Specific responsibilities of owner/operator personnel and contractor workers for all aspects of the tank cleaning operator from decommissioning to recommissioning,
		3. Requirements of owner/operator and contractor permit programs, and
		4. Coordination and communications between owner/operator personnel and contractor personnel working in or around the tank.
	4. Identifying and evaluating the hazards and conditions of the tank and the owner/operator contractor experience include an agreement between owner/operator and contractor regarding safe tank cleaning operations.
	5. Work permit requirements and providing information regarding potential hazards to contractors, supervisors and workers.
	6. Qualifying, selecting and assigning qualified person(s) to supervise and perform preparation, decommissioning, testing, supervisory, permit issuance, entry, attendant, standby, cleaning, hot and safe (cold) work, rescue, and recommissioning activities.
	7. Safeguarding the work area including developing and implementing procedures to be followed by employees to control the work area from external hazards, prevent unauthorized entry into work areas, and protect workers and equipment around work areas.
	8. Develop and implement appropriate tank cleaning procedures including decommissioning, product removal, vapor and gas freeing, purging, inerting, flushing, ventilation, entry, cleaning, rescue, and recommissioning operations.
	9. Requirements and responsibility for selecting and supplying tank cleaning equipment.
	10. Assuring and verifying worker compliance with applicable facility and contractor policies, procedures and programs, applicable government regulations, and applicable standards.
	11. Determining responsibility and requirements for recommissioning the tank after tank cleaning activities are finished.
	12. Conducting post tank cleaning reviews between employers (owner/operator and contractors) and representatives of involved parties to cover hazards encountered during tank cleaning activities.
	13. Retaining records associated with the tank cleaning activities for at least 1 year or longer if required by government regulations or employer (owner/operator and contractor) policy.
2. *Qualified Persons*

Employer (owner/operator and contractors) shall ensure that qualified persons are designated and assigned to perform and supervise tank cleaning related tasks and activities. Employers (owner/operator and contractors) shall assure that qualified persons are trained, educated, knowledgeable and experienced to safely perform assigned tank cleaning activities.

1. *Training Requirements*

Employers (owner/operator and contractors) shall ensure that employees are experienced, trained or educated to understand the scope of work, potential hazards of the job, and safely perform their assigned duties.

1. *Contractors*

For all work activities to be undertaken by the contractor, the owner and/or operator shall evaluate the contractor’s experience, performance, work procedures, and practices. Prior to starting work, the owner and/or operator and the contractor shall agree on the tank cleaning requirements, precautions and procedures to be followed by the contractor and the contractor’s responsibility for meeting permit requirements and procedures. The owner or operator of the facility shall advise the contractor of known potential hazards associated with the subject tank, its contents, and the surrounding area, and with any operations to be conducted in the area.

1. *Tank Cleaning Equipment*

Employers (owner/operator and contractor) shall provide and maintain equipment, materials, and job specific personal and respiratory protection equipment required to conduct tank cleaning operations.

*Preliminary Tank Cleaning Activities*

Employers (owner/operator and contractors) shall assure that during planning and prior to conducting tank cleaning operations, the essential elements for preparing a tank for safe entry and cleaning are considered, including, but not limited to, the following:

1. “Employers (owners/operators and contractors) shall review available drawings and sketches” “and develop plans to mitigate or control the physical hazards to be expected before and during the tank cleaning operations” (5.1.1.1).
2. “Employer (owner/operator) and contractor supervisors and qualified persons shall conduct a tank pre-cleaning meeting” to review tank cleaning plans and procedures for each phase of work, establish permit requirements, and assign specific responsibility for each phase of the tank cleaning operation” (5.1.1.5).
3. “Employers (owners/operators and contractors) shall develop written procedures and work plans that provide for safe tank cleaning operations from decommissioning to recommissioning.” “Employers (owners/operators and contractors) shall assure that the procedures and work plans provide applicable information and guidance so that entry supervisors and qualified persons may participate, recognize, test, analyze, and determine appropriate measures to control potential hazards that may be encountered during tank cleaning operations.”
4. “Owners/operators shall establish (with contractor’s agreement), the appropriate permit requirements covering decommissioning, emptying, isolating, vapor and gas freeing, degassing, ventilation, testing, entering, cleaning, sludge and residue handling, refilling, recommissioning, and hot and safe (cold) work performed in and around the tank” (5.1.2.3).

*Tank Cleaning Personnel*

“Employers (owners/operators and contractors) shall assure that tank cleaning personnel are familiar with employer tank cleaning program requirements and all aspects of tank cleaning operations, including, but not limited to, the following”:

1. Recognition of potential hazards,
2. Hazards and properties of the materials to be removed from tanks and the materials used for cleaning tanks,
3. Requirements for safe entry, safe (cold) work and hot work, and
4. Sources of ignition and requirements for bonding and grounding.

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January 3, 2020

Attachment