requirements of paragraph (b) (6) of this section apply, there must be at least two approximately equal incremental increases.

(d) If records for cast iron or ductile iron pipeline facilities are not complete enough to determine stresses produced by internal pressure, trench loading, rolling loads, beam stresses, and other bending loads, in evaluating the level of safety of the pipeline when operating at the proposed increased pressure, the following procedures must be followed:

(1) In estimating the stresses, if the original laying conditions cannot be ascertained, the operator shall assume that cast iron pipe was supported on blocks with tamped backfill and that ductile pipe was laid without blocks with tamped backfill.

(2) Unless the actual maximum cover depth is known, the operator shall measure the actual cover in at least three places where the cover is most likely to be greatest and shall use the greatest cover measured.

(3) Unless the actual nominal wall thickness is known, the operator shall determine the wall thickness by cutting and measuring coupons from at least three separate pipe lengths. The coupons must be cut from pipe lengths in areas where the cover depth is most likely to be the greatest. The average of all measurements taken must be increased by the allowance indicated in the following table:

Pipe size inches (millimeters)	Allowance inches (millimeters)		
	Cast iron pipe		Ductile iron pipe
	Pit cast pipe	Centrifugally cast pipe	
3 to 8(76 to 203)10 to 12(254 to 305)14 to 24(356 to 610)30 to 42(762 to 1067)48(1219)54 to 60(1372 to 1524)	0.075(1.91)0.08(2.03)0.08(2.03)0.09(2.29)0.09(2.29)0.09(2.29)	0.065 (1.65) 0.07 (1.78) 0.08 (2.03) 0.09 (2.29) 0.09 (2.29) 	0.065 (1.65) 0.07 (1.78) 0.075 (1.91) 0.075 (1.91) 0.08 (2.03)

(4) For a cast iron pipe, unless the pipe manufacturing process is known, the operator shall assume that the pipe is pit cast pipe with a bursting tensile strength of 11,000 p.s.i. (76 MPa) gage and a modulus of rupture of 31,000 p.s.i. (214 Mpa) gage.

[Amdt. 192-37, 46 FR 10157, Feb. 2, 1981; Amdt. 192-62, 54 FR 5625, Feb. 6, 1989; Amdt. 192-85, 63 FR 37500, July 13, 1998]

GUIDE MATERIAL

1 PLANNING AND INVESTIGATIVE STUDIES

1.1 Feasibility.

After developing a written plan in accordance with the requirements of §192.553(c), an evaluation of the adequacy of the system design and the feasibility of uprating at the increased pressure levels should include the following.

- (a) A review of the pressure ratings of the pipeline system components, such as valves, fittings, pipe, and regulators.
- (b) In the case of cast iron, a review of the §192.753 requirements regarding joint retention and pressure limits when deciding on the MAOP uprating.

- (c) An analysis of stresses imposed on cast iron and ductile-iron pipe wherein operators commonly use the design criteria addressed in §192.557(d).
- (d) A review of leakage, corrosion, operating pressure, and maintenance history to ascertain the present condition of facilities.
- (e) An analysis of the effect of the ultimate separation and uprating on adjoining facilities.

1.2 Additional consideration.

- (a) An analysis should be made to confirm that the proposed MAOP is in accordance with the requirements as set forth in §192.553(d).
- (b) For cast iron pipe, see Guide Material Appendix G-192-18.

2 WORK PRELIMINARY TO UPRATING

2.1 Leak survey.

A leak survey may be required by §192.557(b)(2). Types of leakage surveys are described in Guide Material Appendix G-192-11 (Natural Gas) and Guide Material Appendix G-192-11A (Petroleum Gas).

2.2 Changes to the system.

Repairs, replacements, or other alterations necessary for the safe operation of both the system to be uprated and the existing system should include the following.

- (a) Installation of anchors or joint reinforcement as required in §192.557(b)(4).
- (b) Renewal of gas service lines where warranted.
- (c) Installation of service line shut-off valves where required and in accordance with §§192.363 and 192.365.
- (d) Installation of service regulators where required and in accordance with §§192.197, 192.353, 192.355, and 192.357.
- (e) Consideration of the adequacy of existing service regulators and their characteristics with present orifice sizing at the proposed pressure levels.

2.3 Monitoring.

Provision should be made for monitoring field pressures prior to and during uprating to ensure the integrity of both the system to be uprated and the adjacent systems that might be affected by the uprating.

2.4 Interface.

The necessary field work should be performed to provide positive control to avoid overpressuring the sections of the systems that are not being uprated. Control procedures may involve actual physical separation of sections, installation of regulator equipment that is properly operated and set to control at the proper pressure, or other effective means of separation.

2.5 Customer notification.

Customers should be notified of planned interruptions of gas service.

3 INCREASING PRESSURE

3.1 Communications.

Lines of communication should be established between all control points.

3.2 Isolation.

The system should be isolated from all lower pressure systems.

3.3 Pressure regulation.

The valve to each service regulator should be closed or the operation of each service regulator should be monitored as the pressure in the main is increased.

- 3.4 Leak check. See §192.553(a)(1).
- 3.5 Leak repairs. See §192.553(a)(2).
- 3.6 Monitoring.
 - The pressure in adjacent facilities should be monitored during the uprating procedure to establish:
 - (a) That no connection is acting as a source of unregulated gas from the higher pressure segment to the lower pressure system; and
 - (b) The adequacy of the remaining lower pressure system at points of separation and other locations.

3.7 Final leak survey.

After the uprating is completed, a final leak survey should be made to confirm the integrity of the facilities. Necessary leak repairs should be made.

4 RECORDS

The records of investigations, the work, and the testing should be forwarded to the proper department for retention for the life of the facility.

SUBPART L OPERATIONS

§192.601

Scope.

[Effective Date: 11/12/70]

This subpart prescribes minimum requirements for the operation of pipeline facilities.

GUIDE MATERIAL

No guide material necessary.

§192.603

General provisions.

[Effective Date: 10/25/13]

(a) No person may operate a segment of pipeline unless it is operated in accordance with this subpart.

(b) Each operator shall keep records necessary to administer the procedures established under §192.605.

(c) The Associate Administrator or the State Agency that has submitted a current certification under the pipeline safety laws, (49 U.S.C. 60101 et seq.) with respect to the pipeline facility governed by an operator's plans and procedures may, after notice and opportunity for hearing as provided in 49 CFR 190.206 or the relevant State procedures, require the operator to amend its plans and procedures as necessary to provide a reasonable level of safety.

[Amdt. 192-27A, 41 FR 47252, Oct. 28, 1976; Amdt. 192-66, 56 FR 31087, Jul. 9, 1991; Amdt. 192-71, 59 FR 6579, Feb. 11, 1994; Amdt. 192-75, 61 FR 18512, Apr. 26, 1996 with Amdt. 192-75 Correction, 61 FR 38403, July 24, 1996; Amdt. 192-118, 78 FR 58897, Sept. 25, 2013]

GUIDE MATERIAL

- (a) Operators may use any recordkeeping method that produces authentic records. The data constituting these records should be retained in a medium that has a life expectancy at least equal to the specified retention period.
- (b) Additional records may be required by state or other federal regulatory agencies.
- (c) See guide material under §192.605. Also see Guide Material Appendix G-192-17 for summary of records required by Part 192.

§192.605

Procedural manual for operations, maintenance, and emergencies.

[Effective Date: 02/01/10]

(a) *General.* Each operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response. For transmission lines, the manual must also include procedures for handling abnormal operations. This manual must be reviewed and updated by the operator at intervals not exceeding 15 months, but at least once each calendar year. This manual must be prepared before operations of a pipeline system commence. Appropriate parts of the manual must be kept at locations where operations and maintenance activities are conducted.

(b) *Maintenance and normal operations.* The manual required by paragraph (a) of this section must include procedures for the following, if applicable, to provide safety during maintenance and operations.

(1) Operating, maintaining, and repairing the pipeline in accordance with each of the requirements of this subpart and subpart M of this part.

(2) Controlling corrosion in accordance with the operations and maintenance requirements of subpart I of this part.

(3) Making construction records, maps, and operating history available to appropriate operating personnel.

(4) Gathering of data needed for reporting incidents under Part 191 of this chapter in a timely and effective manner.

(5) Starting up and shutting down any part of the pipeline in a manner designed to assure operations within the MAOP limits prescribed by this part, plus the build-up allowed for operation of pressure-limiting and control devices.

(6) Maintaining compressor stations, including provisions for isolating units or sections of pipe and for purging before returning to service.

(7) Starting, operating and shutting down gas compressor units.

(8) Periodically reviewing the work done by operator personnel to determine the effectiveness, and adequacy of the procedures used in normal operation and maintenance and modifying the procedures when deficiencies are found.

(9) Taking adequate precautions in excavated trenches to protect personnel from the hazards of unsafe accumulations of vapor or gas, and making available when needed at the excavation, emergency rescue equipment, including a breathing apparatus and a rescue harness and line.

(10) Systematic and routine testing and inspection of pipe-type or bottle-type holders including-

(i) Provision for detecting external corrosion before the strength of the container has been impaired;

(ii) Periodic sampling and testing of gas in storage to determine the dew point of vapors contained in the stored gas which, if condensed, might cause internal corrosion or interfere with the safe operation of the storage plant; and

(iii) Periodic inspection and testing of pressure limiting equipment to determine that it is in safe operating condition and has adequate capacity.

(11) Responding promptly to a report of a gas odor inside or near a building, unless the operator's emergency procedures under §192.615(a)(3) specifically apply to these reports.

(12) Implementing the applicable control room management procedures required by §192.631.

(c) Abnormal operation. For transmission lines, the manual required by paragraph (a) of this section must include procedures for the following to provide safety when operating design limits have been exceeded:

(1) Responding to, investigating, and correcting the cause of:

- (i) Unintended closure of valves or shutdowns;
- (ii) Increase or decrease in pressure or flow rate outside normal operating limits;
- (iii) Loss of communications;
- (iv) Operation of any safety device; and

(v) Any other foreseeable malfunction of a component, deviation from normal operation, or personnel error, which may result in a hazard to persons or property.

(2) Checking variations from normal operation after abnormal operation has ended at sufficient critical locations in the system to determine continued integrity and safe operation.

(3) Notifying responsible operator personnel when notice of an abnormal operation is received.

(4) Periodically reviewing the response of operator personnel to determine the effectiveness of the procedures controlling abnormal operation and taking corrective action where deficiencies are found.

(5) The requirements of this paragraph (c) do not apply to natural gas distribution operators that are operating transmission lines in connection with their distribution system.

(d) Safety-related condition reports. The manual required by paragraph (a) of this section must include instructions enabling personnel who perform operation and maintenance activities to recognize conditions that potentially may be safety-related conditions that are subject to the reporting requirements of §191.23 of this subchapter.

(e) *Surveillance, emergency response, and accident investigation.* The procedures required by §§192.613(a), 192.615, and 192.617 must be included in the manual required by paragraph (a) of this section.

[Amdt. 192-27A, 41 FR 47252, Oct. 28, 1976; Amdt. 192-59, 53 FR 24942, July 1, 1988 with Amdt. 192-59 Correction, 53 FR 26560, July 13, 1988; Amdt. 192-71, 59 FR 6579, Feb. 11, 1994 with Amdt. 19271A, 60 FR 14379, Mar. 17, 1995; Amdt. 192-93, 68 FR 53895, Sept. 15, 2003; Amdt. 192-112, 74 FR 63310, Dec. 3, 2009]

GUIDE MATERIAL

This guide material is under review following Amendment 192-112.

1 GENERAL

- (a) Each procedural manual for operations, maintenance, and emergencies should include a written statement, procedure, or other document addressing each specific requirement of §192.605. The requirements include the maintenance and normal operation of any pipeline; and the abnormal operations of transmission lines, other than those transmission lines operated in connection with a distribution system.
- (b) The comprehensive manual can consist of multiple binders with relevant sections kept at appropriate locations. Appropriate sections of other documents may be referenced instead of being incorporated, but the referenced documents are to be present at the location to which they apply.
- (c) The manual will necessarily vary in length and complexity depending upon the individual operator, its size, locale, policies, and types of equipment in use and the amount of material included in its entirety or cross-referenced, including manufacturers' instructions, where appropriate.
- (d) Procedures for only those facilities within the operator's system need be included in the manual. Therefore, it is not necessary to have a manual for each pipeline.
- (e) The required review of the manual should ensure that the operator's current facilities and any deficiencies in the manual are addressed. An operator should consider reviewing its operator qualification (OQ) processes and procedures since changes to the manual may affect the OQ program. More serious deficiencies, possibly identified following an accident, may require immediate correction.

Addendum 3, March 2013

235

2 TRAINING

2.1 Operations and maintenance (O&M) procedures.

Each operator should establish a training program that will provide operating and maintenance personnel with a basic understanding of each element of the procedural manual for operations, maintenance, and emergencies appropriate to the job assignment. See 3.7 below regarding periodic reviews, procedure modifications, and retraining of personnel.

- 2.2 Operations and maintenance tasks. See Subpart N.
- 2.3 Emergency response procedures.

Each operator is required by §192.615(b)(2) to train the appropriate operating personnel to ensure that they are knowledgeable of the emergency procedures. See 2 of the guide material under §192.615.

3 MAINTENANCE AND NORMAL OPERATIONS

In addition to those items required to be in the manual under Subparts L and M as they apply to the operator's facilities, other Subparts (e.g., E, F, I, J, and K) may also require written procedures. Additional guide material can be found under individual sections.

3.1 Control of corrosion.

Refer to guide material for respective sections of Subpart I.

- 3.2 Availability of construction records, maps, and operating history.
 - (a) Construction records, maps, and operating history should be comprehensive and current. The construction records, maps, and operating history will depend upon the individual operator, its size and locale, and the types of equipment in use.
 - (b) The construction records, maps, and operating history should be made available to operating personnel, especially supervisors or those called on to safely operate pipeline facilities or respond to emergencies, or both. Dispatch or gas control personnel should have maps and operating history available.
 - (c) For transmission facilities, the types of records and data that could be made available are as follows.
 - (1) Pipeline system maps, including abandoned and out-of-service facilities.
 - (2) Compressor station and other piping drawings (mechanical and major gas piping).
 - (3) Maximum allowable operating pressures.
 - (4) Inventories of pipe and equipment.
 - (5) Pressure and temperature histories.
 - (6) Maintenance history.
 - (7) Emergency shutdown systems drawings.
 - (8) Isolation drawings.
 - (9) Purging information.
 - (10) Applicable bolt torquing information.
 - (11) Operating parameters for engines and equipment.
 - (12) Leak history.
 - (d) For distribution systems, the types of records and data that could be made available are as follows.
 - (1) Maps showing location of pipe, valves, and other system components.
 - (2) Maps and records showing pipe specifications, valve type, and operating pressure.
 - (3) Auxiliary maps and records showing other useful information, including abandoned and out-ofservice facilities.
 - (e) Communications with knowledgeable personnel should be maintained to respond to questions concerning the records, maps, or history if the need arises.

Addendum 6, April 2014

236

- (f) Field identification of valves.
 - (1) Valve identification criteria should be established.
 - (2) Each operator should have available sufficiently accurate records (including field location measurements) to readily locate valves and valve covers.
 - (3) Where valves are located in a valve cluster or in close proximity to valves of other operators, in addition to records and field location measurements, the following are also recommended.
 - (i) A valve identification system should be developed so that each valve will have a unique set of numbers or letters, or both, which is keyed to the records or mapping system.
 - (ii) For above ground and vault applications, a readily observable and durable code identifying tag, stamp, or other device should be affixed to the valve.
 - (iii) For remotely operated and underground valves, a readily observable and durable code identifying tag, stamp or other device should be affixed to the inside wall of the valve box or valve extension unit. It should be affixed so that it will not interfere with the valve operation, and will not be defaced or dislocated by normal operations.

3.3 Data gathering for incidents.

- (a) The operator should designate personnel to gather data at the incident site and other locations where records are retained.
- (b) For verification and telephonic reporting that an incident has occurred on the operator's facility, the following information should be gathered as soon as possible. See Guide Material Appendix G-191-1.
 - (1) Time of the incident.
 - (2) Location of the incident.
 - (3) Number of fatalities and personal injuries necessitating in-patient hospitalization.
 - (4) Estimate of property damage, including gas lost.
 - (5) Type of incident: leak, rupture, other.
 - (6) Whether there was an explosion.
 - (7) Whether there was a fire.
 - (8) Whether there was a curtailment or interruption of service.
 - (9) Environmental impact.
 - (10) Apparent cause.
 - (11) Component(s) involved and material specification.
 - (12) Pressure at the time of incident.
 - (13) Estimated time of repair and return to service.
 - (14) A 24-hour staffed telephone number.
- (c) Procedures should be established for personnel to determine if the event meets the criteria for the Part 191 definition of an "incident" and to make the telephonic report. Alternate personnel should be included in the procedures in case primary personnel are not available. If some of the information is not available, the notification should be made without that information. Any corrections or additional information may be provided later. See guide material under §191.5.
- (d) For post-accident drug and alcohol testing, see Part 199 Drug and Alcohol Testing and OPS Advisory Bulletin ADB-12-02 (77 FR 10666, Feb. 23, 2012; see Guide Material Appendix G-192-1, Section 2).
- (e) For the written Incident Report, see guide material under §192.617 and Guide Material Appendices G-191-2 and G-191-5.

3.4 Starting up and shutting down a pipeline.

- (a) Starting up a new transmission line or distribution main.
 - (1) For transmission lines, following the test to establish maximum allowable operating pressure (MAOP), the operator and the person in charge of placing the pipeline in service should establish procedures for commissioning the new pipeline and placing it in service. The procedures should include provisions for the following.
 - (i) Ensuring that the procedural manual for operations, maintenance, and emergencies addresses the new pipeline.
 - (ii) Inspecting all overpressure protection devices required for starting up a new pipeline, including the testing of set pressures and the checking of capacities, if necessary.

- (iii) Determining requirements for purging and notifying public officials. See guide material under §192.751.
- (iv) Establishing communication with field personnel and gas control personnel.
- (v) Controlling the purge flow rate when pressurizing the pipeline and monitoring pressures until normal operation is established.
- (vi) Conducting a follow-up leak survey, if applicable.
- (vii) Updating maps and other pertinent operating records.
- (2) For distribution mains, following the test to prove tightness or strength, the operator should establish procedures for commissioning a new main. The procedures should include provisions for the following.
 - (i) Ensuring that the procedural manual for operations, maintenance, and emergencies addresses the new main.
 - (ii) Tying-in the new system segment.
 - (iii) Determining requirements for purging and notifying public officials and residents of purging activity. See guide material under §192.751.
 - (iv) Updating maps and other pertinent operating records.
- (b) Starting up or reinstating service lines.

The operator should establish procedures for reinstating the service line following the test to prove tightness or strength. The procedures should include provisions for the following.

- (1) Ensuring that the procedural manual for operations, maintenance, and emergencies addresses the new or reinstated services.
- (2) Tying-in new or reinstated service segment.
- (3) Introducing gas into the meter. Also, see 3.4(c) below.
- (4) Updating maps or other pertinent operating records.
- (5) Preventing unauthorized turn-on.
- (c) Starting up service to a new customer.

The operator should establish procedures for starting up service to a new customer. The procedures should include provisions for the following.

- (1) Operating the meter or service-line valve.
- (2) Checking the regulator, if present, and the customer meter.
- (3) Where a closed valve is not used at the meter outlet, checking the meter for indications of downstream leakage (e.g., open fuel line).
- (4) Taking appropriate action when downstream leakage is indicated. This may include actions to prevent unauthorized operation of the meter or service-line valve until downstream leakage is eliminated.
- (d) Shutting down a pipeline.

See Guide Material Appendix G-192-12.

(e) Abandoning a pipeline after it is shutdown. See guide material under §192.727.

3.5 Maintaining compressor stations.

During normal maintenance activities, the following should be considered and applied where appropriate.

- (a) Provisions should be made to prevent gas from entering the compressor cylinders of a reciprocating engine or a compressor case of a centrifugal compressor while work is being performed on the units. These provisions should also include the deactivation of the valve operators.
- (b) Provisions should be made to prevent fuel gas from entering the power cylinders of a reciprocating engine or the burner cans of a gas turbine while work is in progress on the unit or equipment driven by the unit.
- (c) Provisions should be made to prevent starting air from entering the power cylinders of a reciprocating engine and to prevent starting air or gas from entering any other starting device on an engine or turbine while work is in progress on the unit or equipment driven by the unit. The flywheel of the reciprocating engine should be locked in a stationary position where possible.

- (d) Recommended methods for isolating the units from sources of gas or starting air include installation of a blind flange, removal of a portion of the supply piping, or locking a stop valve closed and locking a downstream vent valve open. If a common downstream vent is used, provision should be made to prevent backflow to the units.
- (e) Provisions should be made to prevent energizing the electric circuits of a motor driven or motor started compressor unit while work is in progress on the unit or on equipment driven by the unit.
- (f) See 2 and 3 of the guide material under §192.147 for bolting information.
- (g) Provisions should be made to return the equipment to service in an orderly manner to prevent the uncontrolled release of gas to the atmosphere, or overpressuring an isolated or purged piece of equipment or section of pipe.
- 3.6 Starting, operating, and shutting down gas compressor units.

The procedures for the starting, operating, and shutdown of gas compressor units should be in writing and may be developed from operating experience, direct use of manufacturers' instruction manuals, or a combination of both.

3.7 Periodically reviewing the work done by operator personnel.

The operator should designate a timetable to review personnel performance to determine if the normal operating and maintenance procedures found in the manual are effective and adequate. The operator should determine if deficiencies exist in the procedures. If applicable, modification of procedures should be accomplished as soon as possible. Documentation should be maintained for all procedure modifications and retraining of personnel.

3.8 Taking precautions in excavated trenches to protect personnel.

Personnel working in or near a trench should be aware of the potential for an oxygen-deficient environment and of potential dangers from accumulations of gas or vapor, particularly those associated with liquid petroleum gases. When determining the likelihood of gas or vapors presenting such a hazard to personnel, the operator should consider the depth and configuration of the trench, the product transported, and the diameter, pressure, type of piping material, condition, and configuration of the pipeline facilities. Although natural gas is lighter than air and non-toxic, some natural gas pipelines contain constituents such as hydrogen sulfide, heavier-than-air hydrocarbons, and hydrocarbon liquids that may present a hazard to personnel working in or near the trench. The operator should establish criteria for what constitutes a hazardous condition, taking into consideration the LEL of the gas involved. Escaping gas may present an added hazard because of the displacement of oxygen. An atmosphere containing less than 19.5% oxygen should be considered oxygen-deficient for respiration. When it is necessary for personnel to enter an excavated trench where hazards could reasonably be expected, the operator should consider taking the following actions, as appropriate.

- (a) Confirming that atmospheric monitoring devices, rescue equipment, and breathing apparatus are in working order prior to each use.
- (b) Checking the atmosphere in the excavated trench.
- (c) Establishing a means of exiting the trench.
- (d) Reviewing the rescue plan.
- (e) Placing a safety observer outside the trench to monitor the atmosphere inside the trench and to be available to assist in use of rescue equipment, operation of a fire extinguisher, or otherwise assist in a rescue.
- (f) Minimizing sources of ignition in and around the trench. See guide material under §192.751.
- (g) Taking actions to reduce the accumulation of gas or vapors, such as:
 - (1) Isolating the gas facility by closing valves, squeezing off, bagging off, or using stoppers.
 - (2) Reducing pressure in the facility.
 - (3) Ventilating the work area.
- (h) Requiring the use of flame-retardant clothing, respiratory protection, or a rescue harness and line, as appropriate. The operator's written procedures should describe activities and situations where use of these items is required.

3.9 Responding promptly to a report of a gas odor inside or near a building.

See §192.605(b)(11), which requires procedures in either the procedural manual or its related emergency plan. See 1.1 and 1.3(a) of the guide material under §192.615 for related information.

4 ABNORMAL OPERATIONS

4.1 General.

An abnormal operation is a non-emergency event on a gas transmission facility that occurs when the operating design limits have been exceeded due to a change in pressure, flow rate, or temperature that is outside the normal limits. When an abnormal operation occurs, it does not pose an immediate threat to life or property, but could if not promptly corrected. Where applicable, the actions to be taken by the transmission operator in each situation should incorporate the current procedures. The procedures should be specific enough to ensure uniformity of action relative to the situation, such as those referenced above, while allowing sufficient flexibility to consider the particular details, material, equipment, and configurations involved.

4.2 Considerations for abnormal operations.

When developing response procedures for abnormal operations, the transmission operator should consider the following.

- (a) Type of event. See list under §192.605(c)(1).
- (b) Proximity of the event to the public.
- (c) Potential for the event to become an emergency situation if not immediately corrected.
- (d) Effect of the event on the pipeline system.
- (e) Notification of appropriate operator personnel regarding the abnormal operation.
- (f) Documentation of the response actions taken.

4.3 Preventing recurrence of abnormal operation.

Once the event has been investigated, and normal or safe operations have been restored, the operator should determine what measures can be taken to prevent the cause of the event from recurring. The operator should also consider whether these measures should be implemented elsewhere in the transmission system to avoid similar occurrences of abnormal operation.

4.4 Follow-up monitoring.

The extent of follow-up monitoring should be based on the nature of the event and the probability that the cause of the event could recur. The abnormal operation is considered corrected when an operator determines, at the end of the monitoring period, that the pipeline facility has maintained operations within its operating design limits and is capable of safely operating up to its MAOP.

4.5 Follow-up actions to consider.

- (a) Notify field operations and maintenance personnel to be alert to signs of leakage or damage to pipeline facilities.
- (b) Notify control room personnel, so they can more closely monitor facilities.
- (c) Conduct and document right-of-way patrol of the affected pipeline segment.
- (d) Conduct and document leak survey of the affected pipeline segment.
- (e) Conduct and document inspection of overpressure protection devices for signs of activation. Determine if the devices activated as expected and at the correct pressures.
- (f) Determine probable cause or conduct failure analysis; share results with appropriate personnel. For guidance on performing a failure investigation, see guide material under §192.617.
- (g) Ensure integrity management personnel are informed so this event and associated data can be considered in future risk analyses.
- (h) Review procedural manual, operator qualification program, control room management procedures, and other written procedures for any needed revisions.

Addendum 7, July 2014

240