

TR Number	20-08
Primary	192.12
Purpose	Review existing GM for changes required by the underground storage final rule, Amdt 192-126 for updates to 192.12
Assigned to	Transmission

[Publication Note: §192.12 in the Guide needs to be updated to current regulation; Amendment 192-126 is not included in Addendum 3 version of Guide.]

Section 192.12

~~Note: This guide material is based upon the adoption of an Interim Final Rule (81 FR 91860, December 19, 2016, effective January 18, 2017). PHMSA issued a Stay of Enforcement (82 FR 28224, June 20, 2017) to consider issues raised in comments received and to announce the suspension of enforcement citations for a period of one year after the Final Rule is published.~~

1 ~~API RECOMMENDED PRACTICES API RP 1170 AND API RP 1171 (See §192.7 for IBR)~~

Guidance provided in API RP 1170 ~~for solution-mined salt caverns~~ and API RP 1171 ~~for depleted hydrocarbon reservoirs and aquifer reservoirs used~~ (see §192.7 for IBR) for the operation of underground ~~storage of~~ natural gas storage facilities (UNGSFs) is represented as “recommended practices.” However, ~~§192.12(f) a) and (b) requires the operator to follow the general program recommendations of API RP 1170 or API RP 1171, as applicable, unless the operator justifies in its written program or procedural manual why compliance with all or certain provisions of the recommended practice is not practicable and not necessary for safety.~~ ~~requirements for solution-mined salt cavern and depleted hydrocarbon and aquifer reservoir UNGSFs are as follows listed in the table below.~~

<u>UNGSF Type</u>	<u>Constructed Date</u>	<u>IBR Requirements</u>
<u>Solution-Mined Salt Cavern</u>	<u>After March 13, 2020</u>	<ul style="list-style-type: none"> • <u>API RP 1170</u> • <u>API RP 1171, Section 8</u>
	<u>Between July 18, 2017 and March 13, 2020</u>	<ul style="list-style-type: none"> • <u>API RP 1170</u> • <u>API RP 1171, Section 8</u>
	<u>On or before July 18, 2017</u>	<ul style="list-style-type: none"> • <u>API RP 1170, Sections 9, 10, 11</u> • <u>API RP 1171, Section 8</u>
<u>Depleted Hydrocarbon or Aquifer Reservoir</u>	<u>After July 18, 2017</u>	<ul style="list-style-type: none"> • <u>API RP 1171</u>
	<u>On or before July 18, 2017</u>	<ul style="list-style-type: none"> • <u>API RP 1171, Sections 8, 9, 10, 11</u>

TABLE 192.12i

2 **ADDITIONAL REFERENCES**

(a) National standards and the sections referencing them in API RP 1170 and API RP 1171 are ~~as follows listed in the table below.~~

TABLE 192.12-4

National Standard	API RP 1170	API RP 1171
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API Bulletin 5A2, <i>Bulletin on Thread Compounds for Casing, Tubing, and Line Pipe</i>	*	
API Bulletin E3, <i>Well Abandonment and Inactive Well Practices</i>		6.7.1
API Guidance Document HF1, <i>Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines</i>		6.5.3
API Guidance Document HF2, <i>Water Management Associated with Hydraulic Fracturing</i>		6.5.3
API Guidance Document HF3, <i>Practices for Mitigating Surface Impacts Associated with Hydraulic Fracturing</i>		6.5.3
API RP 5A3, <i>Recommended Practice on Thread Compounds for Casing, Tubing, Line Pipe, and Drill Stem Elements</i>	8.4.2.6	
API RP 5A5, <i>Field Inspection of New Casing, Tubing, and Plain-end Drill Pipe</i>	*	
API RP 5B1, <i>Gauging and Inspection of Casing, Tubing and Line Pipe Threads</i>	*	
API RP 5C1, <i>Recommended Practice for Care and Use of Casing and Tubing</i>	8.4.2.5	
API RP 10D-2, <i>Recommended Practice for Centralizer Placement and Stop-collar Testing</i>		6.4.5
API RP 10F, <i>Recommended Practice for Performance Testing of Cementing Float Equipment</i>	2, 7.6.1	
API RP 13D, <i>Rheology and Hydraulics of Oil-well Drilling Fluids</i>	*	
API RP 14B, <i>Design, Installation, Repair and Operation of Subsurface Safety Valve Systems</i>		6.2.5
API RP 14E, <i>Recommended Practice for Design and Installation of Offshore Production Platform Piping Systems</i>		6.3.5
API RP 49, <i>Recommended Practice for Drilling and Well Servicing Operations Involving Hydrogen Sulfide</i>		6.8.1
API RP 51R, <i>Environmental Protection for Onshore Oil and Gas Production Operations and Leases</i>		5.5.1, 6.8.1
API RP 53, <i>Recommended Practices for Blowout Prevention Equipment Systems for Drilling Wells</i>	*	11.5.2
API RP 54, <i>Recommended Practice for Occupational Safety for Oil and Gas Well Drilling and Servicing Operations</i>		6.8.1, 11.5.2, 11.6.2
API RP 76, <i>Contractor Safety Management for Oil and Gas Drilling and Production Operations</i>		5.5.1, 6.8.1
API RP 1114, <i>Recommended Practice for the Design of Solution-Mined Underground Storage Facilities</i>	*	
API RP 1115, <i>Design and Operation of Solution-mined Salt Caverns Used for Liquid Hydrocarbon Storage</i>	*	
API Specification 5CT, <i>Specification for Casing and Tubing</i>	*	
API Specification 5DP, <i>Specification for Drill Pipe</i>	*	
API Specification 5L, <i>Specification for Line Pipe</i>	*	
API Specification 6A, <i>Specification for Wellhead and Christmas Tree Equipment</i>	*	6.2.1
API Specification 6D, <i>Specification for Pipeline Valves</i>	*	
API Specification 10A, <i>Specification for Cements and Materials for Well Cementing</i>	2, 7.6.1	6.4.2, 6.7.2
TABLE 192.12ii-4 (Continued)		
National Standard	API RP 1170	API RP 1171
API Specification 14A, <i>Specification for Subsurface Safety Valve Equipment</i>		6.2.5
API Standard 65-2, <i>Isolating Potential Flow Zones during Well Construction</i>		6.4.5
API Standard 1104, <i>Welding of Pipelines and Related Facilities</i>	*	

API Technical Report 5C3, <i>Calculating Performance Properties of Pipe Used as Casing or Tubing</i>	2, 8.4.2.3	
API Technical Report 10TR1, <i>Cement Sheath Evaluation</i>		6.4.6
API Technical Report 10TR3, <i>Technical Report on Temperatures for API Cement Operating Thickening Time Tests</i>	*	
API Technical Report 10TR4, <i>Selection of Centralizers for Primary Cementing Operations</i>	*	6.4.5
ASTM C150/C150M, <i>Standard Specification for Portland Cement</i>		6.4.2, 6.7.2
ASTM D3740, <i>Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction</i>	5.4.2.1	
ASTM D3967, <i>Standard Test Method for Splitting Tensile Strength of Intact Rock Core Specimens</i>	2, 5.4.2.4	
ASTM D4543, <i>Standard Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances</i>	2, 5.4.2.3	
ASTM D4645, <i>Standard Test Method for Determination of In-Situ Stress in Rock Using Hydraulic Fracturing Method</i>	2, 5.4.4	

* Standard referenced in API RP 1170, Section 2, but not associated with another particular section.

TABLE 192.12ii-4

- (b) For additional guidance on managing risk for gas storage operations, the operator may refer to the following.
- (1) ISO 31000, Risk Management – Guidelines.
 - (2) ISO 31010, Risk Management – Risk assessment techniques.
 - (3) ISO 55000 Asset Management – PAS 55-1:2008, Asset management – Part 1: Specification for the optimized management of physical assets, PAS 55-2:2008 Asset management – Part 2: Guidelines for the application of PAS 55-1.
 - (4) ASME B31.8S, Managing System Integrity of Gas Pipelines.
 - (5) “Pipeline Risk Management Manual,” W. Kent Muhlbauer, Gulf Publishing Company, ISBN: 0750675799.

[Editorial Note: The guidance material topics in GM 3 below were moved to new Table 192.12i in GM 1 above and expanded to cover dates since July 18, 2017.]

3 — COMPLIANCE DATES FOR EXISTING STORAGE FACILITIES

3.1 — Solution-mined Salt Cavern Reservoirs

~~Each underground natural gas storage facility constructed not later than July 18, 2017 that uses a solution-mined salt cavern reservoir for natural gas storage must meet the requirements and recommendations of the following sections of API RP 1170 by January 18, 2018 (§192.12(b)).~~

- ~~(a) — Section 9, Gas Storage Operations, for operations, maintenance, site security, emergency response and preparedness, and associated records.~~
- ~~(b) — Section 10, Cavern Integrity Monitoring, for integrity demonstration and verification, monitoring, threat and hazard identification, assessment, remediation, and associated records.~~
- ~~(c) — Section 11, Cavern Abandonment, and associated records.~~

3.2 — Depleted Hydrocarbon and Aquifer Reservoirs

~~Each underground natural gas storage facility constructed not later than July 18, 2017 that uses a depleted hydrocarbon reservoir or an aquifer reservoir for natural gas storage must meet the requirements and recommendations of the following sections of API RP 1171 by January 18, 2018 (§192.12(d)).~~

- ~~(a) — Section 8, Risk Management for Gas Storage Operations, for operations, maintenance, and associated records.~~

- ~~(b) Section 9, Integrity Demonstration, Verification, and Monitoring, for integrity demonstration and verification, monitoring, threat and hazard identification, assessment, remediation, and associated records.~~
- ~~(c) Section 10, Site Security and Safety, Site Inspections, and Emergency Preparedness and Response, for site security, emergency response and preparedness, and associated records.~~
- ~~(d) Section 11, Procedures and Training, and associated records.~~

[Letter Ballot note: GM proposed below is all new, so it is not underlined.]

3 WRITTEN PROCEDURES

Each operator must keep records necessary to administer procedures and review and update the required manuals at intervals not exceeding 15 months, but at least once each calendar year (§192.12(c)).

3.1 Operations and Maintenance (O&M) procedures.

Storage field operators may have a pipeline O&M manual because of the transmission lines within the field. Some of the operations and maintenance tasks for storage operations might be similar to pipeline tasks (e.g., corrosion monitoring). Operators of underground storage fields should consider aligning storage procedures with existing pipeline procedures where applicable to avoid duplication or conflicting instructions. See guide material under §192.605 for information regarding O&M manual.

3.2 Emergency plans.

Pipeline operators already have emergency plans in place. Storage operators should consider integrating the UNGSF emergency procedures with existing emergency plans (see guide material under §192.615). Some unique emergency conditions that the storage operator should consider ~~to~~ include the following.

- (a) Leaking annulus of storage well.
- (b) Emergency killing of a well using fluid or downhole plug.
- (c) Well ~~blow-out~~ ~~blowout~~.

3.3 Management of change.

Storage operators should consider implementing the management of change process as required for transmission lines (§192.13(d)).

4 UNGSF INTEGRITY MANAGEMENT PROGRAM

4.1 General.

- (a) The Storage Integrity Management Program (SIMP) consists of program elements encompassing the plans, processes, and procedures required for UNGSF integrity management. The SIMP will vary from one operator to the next but must address the elements as specified in §192.12(d) and ~~the associated~~ API RP 1170 or 1171. The SIMP should document how the processes and associated procedures will be managed and implemented.
- (b) A written program provides a road map for assessment, integration and analysis of data, and courses of action available in managing UNGSF integrity. The program can incorporate or reference existing policies and procedures that may address the elements listed in §192.12(d).
- (c) The operator should consider conducting a gap analysis between current policies and procedures and the requirements of §192.12(d) to determine if additional plans, processes, or procedures may be required.

4.2 Development.

The operator should consider the following when developing its Storage Integrity Management Program (SIMP).

- (a) Existing O&M procedures.
- (b) Existing management systems (e.g., quality assurance, management of change).
- (c) Existing environmental and safety programs.
- (d) "FAQs" from the PHMSA-OPS website at www.phmsa.dot.gov/pipeline/underground-natural-gas-storage/ungs-frequently-asked-questions.

- (e) "Inspection Protocols" from the PHMSA-OPS website at: www.phmsa.dot.gov/forms/phmsa-underground-natural-gas-storage-ia-question-set.
- (f) Key documents and resources from the PHMSA-OPS website at www.phmsa.dot.gov/pipeline/underground-natural-gas-storage/underground-natural-gas-storage-key-documents.
- (g) Documents incorporated by reference (see 1 above).
- (h) Existing or previous risk assessments.
- (g) Existing emergency procedures

4.3 Updates and Changes

It is anticipated that there will be changes over time to an operator's SIMP. A UNGSF operator must document the changes and the reasons for them including decisions, analyses, and processes used to change elements of the SIMP (§192.12(d)(4)). The UNGSF operator should maintain previous versions or revision history of the SIMP for the life of the UNGSF. This documentation can be in electronic format. Factors that might cause a change to the SIMP include the following.

- (a) Information obtained from downhole assessments.
- (b) Operating experience.
- (c) The operator's understanding that the specific integrity threats and their relative importance may change.
- (d) The operator's understanding about the capabilities of a specific integrity assessment technology, tool, or process.
- (e) Threats, consequences, and subsequent risks that evolve over time causing an operator to reprioritize future integrity assessments.
- (f) Identification of a change to a consequence, such as encroachment by the public or commercial entity.
- (g) Changes in the operating parameters of the UNGSF.
- (h) Acquisition or divestiture of storage facilities that could impact integrity assessment priorities.

5 INTEGRITY MANAGEMENT RISK-ASSESSMENT

- (a) UNGSF operators must (§192.12(d)) develop a systematic process for identification of threats and hazards from underground storage operations, and that the likelihood and consequences (risk) of potential adverse events are analyzed and estimated. UNGSF operators should ensure that risk analysis processes include elements identified within Table 1 of API RP 1171 (see §192.7 for IBR).
- (b) Per API RP 1171, Section 8.2.2, the risk assessment process must include the following.
 - (1) Data Collection. Identification and collection of information relevant to the storage field as part of risk assessment.
 - (2) Risk Identification. Identification of potential threats and hazards (Table 1 of API RP 1171) to the storage facility from within the areas of review and buffer zone.
 - (3) Risk Analysis. Evaluation Analysis of the likelihood of events and consequences related to the events.
 - (4) Risk Evaluation. Determination of risk ranking to develop preventative and mitigative (P&M) measures (Table 2 of API RP 1171) to monitor or reduce risk.
 - (5) Record Keeping. Documentation of risk evaluation and decision basis for P&M measures.
 - (6) Periodic Evaluation. Periodic evaluation of risk assessment and determination of need to escalate the implementation or modification of P&M measures.
 - (7) Program Evaluation. Evaluation of risk management program using performance measures.
- (c) The risk assessment should address potential threat interactions, such as casing damage during service work that could exacerbate internal corrosion threat.
- (d) Data used as inputs to the risk analysis should come from design, construction, testing, operating history, routine integrity monitoring, and inspection records. The operator should validate identified data used in the risk analysis to ensure data accuracy. Should validated data not be available, operators should make conservative assumptions and assign conservative values when conducting risk analysis. Examples of risk analysis input data may include the following.

- (1) Reservoir studies.
- (2) Drilling and workover records.
- (3) Material records.
- (4) Well and reservoir performance data.
- (5) Well logs.
- (e) Reassessment of UNGSF risk analysis must be completed within 7 years of the previous risk assessment per §192.12(d)(3). Operators should consider more frequent assessment of risk based upon newly acquired data (e.g., well logs) or when changes occur that could affect previously identified threats, likelihood of failure, and consequence of failure of wells, reservoirs, and caverns. The interval should be of sufficient length that the quantity of new data and information that is brought into the analysis is meaningful and that any developing trends have sufficient data to be identifiable.
- (f) Per API RP 1171, Section 8.6.3-8.7.3, if new threats or hazards are identified, or the impact of existing threats or hazards significantly changes, the operator must assess the risk associated with new conditions and evaluate and prioritize risk management options.

6 PREVENTATIVE AND MITIGATIVE (P&M) MEASURES

- (a) UNGSF operators must develop P&M measures to monitor or reduce the risks to the storage facilities (API RP 1171, Section 8.5.2-8.6.2). The P&M measures are identified to reduce the likelihood or reduce the consequence of events related to the unique threats recognized in the most recent risk assessment. The P&M measures can include programs, methods, tools, or routine condition monitoring activities to monitor and manage risk. Examples of P&M measures for storage activities are listed in API RP 1171, Section 8.4-8.6, Table 2. In addition to those P&M measures listed in Table 2, UNGSF operators might consider evaluating pipeline activity that could affect the integrity of the downhole operations (e.g., pipeline internal corrosion control mitigation activities (see §192.478)).
- (b) Not all risks need a P&M measure if the level of risk is acceptable or if it is not necessary to reduce risk by further efforts.
- (c) The operator must review the results of P&M measures to determine the effectiveness of managing risk based on site-specific conditions. Per API RP 1171, Section 8.6.2-8.7.2, the operator must define a review frequency for the P&M measures, not to exceed three years.

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6 SUMMARY OF PRIMARY WEBSITES

PHMSA-OPS Underground Natural Gas Storage	www.phmsa.dot.gov/pipeline/underground-natural-gas-storage/underground-natural-gas-storage	§192.12
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