

Design and Operation of Solution-mined Salt Caverns Used for Natural Gas Storage

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Contents

	Page
1 Scope	1
1.1 Overview	1
1.2 Applicable Rules and Regulations	2
2 Normative References	1
3 Terms, Definitions, Acronyms, and Abbreviations	2
3.1 Terms and Definitions	2
3.2 Acronyms and Abbreviations	7
4 Overview of Underground Natural Gas Storage	9
4.1 General	9
4.2 Types of Underground Natural Gas Storage	9
4.3 Natural Gas Storage in Salt Formations	9
4.4 Functional Integrity	10
4.5 Overview of Major Steps in the Development of Gas Storage Caverns	10
5 Geological and Geomechanical Evaluation	12
5.1 General Considerations	12
5.2 Site Selection Criteria	12
5.3 Geologic Site Characterization	13
5.4 Geomechanical Site Characterization	22
5.5 Assessment of Cavern Stability and Geomechanical Performance	26
6 Well Design	28
6.1 General	28
6.2 Hole Section Design	30
6.3 Casing Design	31
6.4 Wellhead Design	33
7 Drilling	37
7.1 Rig and Equipment	37
7.2 Drilling Fluids	40
7.3 Drilling Guidelines	41
7.4 Logging	42
7.5 Casing Handling and Running	43
7.6 Cementing	43
7.7 Completion	47
8 Cavern Solution Mining	47
8.1 General	47
8.2 Cavern Solution Mining Design	48
8.3 Cavern Development Phases	51
8.4 Equipment	53
8.5 Instrumentation, Control, and Shut Down	55
8.6 Monitoring of the Cavern	56
8.7 Workovers during Solution Mining	59
8.8 Workover to Configure for Gas Storage Service	60
8.9 Debrining the Cavern	61
8.10 Existing Cavern Conversions	63
8.11 Cavern Rewatering	64
8.12 Cavern Enlargement	64

Contents

	Page
9 Gas Storage Operations	65
9.1 Minimum and Maximum Operating Limits	65
9.2 Equipment	67
9.3 Instrumentation, Control, and Shutdown	66
9.4 Inspection and Testing	68
9.5 Workovers	68
9.6 Site Security and Safety	69
9.7 Operating Administration	71
10 Cavern Integrity Monitoring	72
10.1 General	72
10.2 Holistic and Comprehensive Approach	75
10.3 Integrity Monitoring Program	75
10.4 Review of Integrity Monitoring Methods	75
11 Cavern Abandonment	75
11.1 Abandonment Objectives	75
11.2 Abandonment Design	75
11.3 Removal of Stored Gas	76
11.4 Wellbore Integrity Test	76
11.5 Removal of Downhole Equipment	76
11.6 Production Casing Inspection	76
11.7 Sonar Survey	76
11.8 Long-Term Monitoring	76
Annex A (informative) Open-hole Well Logs	77
Annex B (normative) Integrity Monitoring Methods	80
Bibliography	86
Figures	
1 Typical Cemented Casing Program for Domal Salt	29
2 Typical Solution Mining Wellhead	34
3 Typical Gas Storage Wellhead with Hanging String	35
4 Typical Gas Storage Wellhead without Hanging String	36
5 Cavern Development Phases	52
Table	
1 Integrity Monitoring Methods	73

Design and Operation of Solution-mined Salt Caverns Used for Natural Gas Storage

1 Scope

1.1 Overview

This recommended practice (RP) provides the functional recommendations for salt cavern facilities used for natural gas storage service and covers facility geomechanical assessments, cavern well design and drilling, solution mining techniques and operations, including monitoring and maintenance practices. This RP is based on the accumulated knowledge and experience of geologists, engineers, and other personnel in the petroleum and gas storage industries and promotes public safety by providing a comprehensive set of design guidelines. This RP recognizes the nature of subsurface geological diversity and stresses the need for in-depth, site specific geomechanical assessments with a goal of long-term facility integrity and safety.

This RP includes the cavern well system (wellhead, wellbore, and cavern) from the emergency shutdown (ESD) valve down to the cavern and facilities having significant impact to safety and integrity of the cavern system.

This RP may be applied to existing facilities at the discretion of the user.

This RP does not apply to caverns used for the storage of liquid or liquefied petroleum products, brine production, or waste disposal; nor to caverns which are mechanically mined, or depleted hydrocarbon or aquifer underground gas storage systems.

1.2 Applicable Rules and Regulations

This document was written to provide a technical reference for the development and operations of solution-mined salt caverns and is not intended to represent or reflect any Federal, State, or local regulatory requirement. Depending on location and nature of the project, the recommended practices herein may address items that are in conflict with some regulatory requirements. If this occurs, the regulatory requirement supersedes the recommended practice unless an appropriate waiver or variance is granted from the issuing agency. A thorough review of the applicable Federal, State, and local rules and regulations is to be performed prior to the design of solution-mined natural gas storage caverns to ensure ongoing compliance.

2 Normative References

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

API Technical Report 5C3, *Technical Report on Equations and Calculations for Casing, Tubing, and Line Pipe Used as Casing or Tubing; and Performance Properties Tables for Casing and Tubing*

API Specification 10A, *Specification for Cements and Materials for Well Cementing*

API Recommended Practice 10F, *Recommended Practice for Performance Testing of Cementing Float Equipment*

ASTM D3967¹, *Standard Test Method for Splitting Tensile Strength of Intact Rock Core Specimens*

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.