

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

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

1 Scope

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, risk management, solution mining techniques and operations, including monitoring and maintenance practices, site security and safety, procedures, training, and abandonment.

This RP is based on the accumulated knowledge and experience of geologists, engineers, and other operations 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 does not apply to caverns used for the storage of liquid or liquefied petroleum products, brine production, or waste disposal; hydrogen, or compressed air, nor to caverns which are mechanically mined, or depleted hydrocarbon or aquifer underground gas storage systems.

This document is intended to supplement, but not replace, applicable local, state, and federal regulations.

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 D3967, *Standard Test Method for Splitting Tensile Strength of Intact Rock Core Specimens*

ASTM D4543, *Standard Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances.*

ASTM D4645, *Standard Test Method for Determination of In-Situ Stress in Rock Using Hydraulic Fracturing Method*

ASTM D7012, *Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures*

ASTM D7070, *Standard Test Methods for Creep of Rock Core Under Constant Stress and Temperature*