

INTRODUCING THE 2018 EDITION OF THE CSA Z341 SERIES OF STANDARDS

Alex Reed

Keyera Corporation, Calgary, Alberta, Canada

Abstract

In 2018, CSA Group will publish the seventh edition of the CSA Z341 Series of Standards “Storage of hydrocarbons in underground formations”. This series consists of CSA Z341.1, Reservoir storage, CSA Z341.2, Salt cavern storage, and CSA Z341.4, Salt cavern waste disposal. CSA Z341.3 covering hydrocarbon storage in mined caverns was removed in 2006 and is no longer maintained or updated.

These standards cover the storage of hydrocarbons in naturally formed geological reservoirs and solution-mined salt caverns in CSA Z341.1 and CSA Z341.2 respectively. The standards cover the storage of oilfield wastes from hydrocarbon production in solution mined salt caverns in Z341.4. This series is intended to establish essential requirements and minimum standards for the design, construction, operation, maintenance, abandonment, and safety of underground storage systems.

Two major revisions have been made in the 2018 edition. The first is that the chapters of all three standards have been reordered to more closely reflect the sequence in which underground storage projects are executed. Establishing the location of underground storage facilities, and design & development requirements now precede the selection of well materials and well completion & conversion processes.

The second major revision was a complete rewrite of the salt cavern abandonment chapter. Based on SMRI research reports, a pre-abandonment stabilization period is now required to allow caverns to stabilize in terms of pressure, temperature, creep and brine permeation effects. A cavern will be considered ready for abandonment when static equilibrium is reached, and a risk analysis and pressure build-up predictions have been performed to confirm that no adverse impacts to adjacent formations or caverns will occur. Well abandonment shall be performed by placing a series of cement plugs to create a continuous column of cement from the bridge plug to the surface.

Minor adjustments were made to a number of clauses including the following: number of casings in a well; cement compressive strengths; integrity management of surface piping; emergency shutdown valve pressure rating; and interpretation of mechanical integrity test results.

CSA Z341 is a primary document for Canadian underground storage operators, regulators and consultants. However, it is anticipated that it may have some applicability to other underground storage operations internationally. A brief comparison of CSA Z341 to American Petroleum Institute recommended practices and European standards is presented.

Key words: Caverns for Gas Storage, Caverns for Liquid Storage, Caverns for Waste Disposal, Reservoirs for Gas Storage, Standards, Regulations, Abandonment.