

Methodology for Evaluation of Integrity for Storage Wells

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Abstract

With increasing life-time of storage locations the integrity evaluation of wells becomes a vital requirement for the determination of the current and prospective operational state. Therefore, both safety-related and economical aspects are extremely important. The evaluation procedures comprise the entire spectrum of data collection, suitable test and measuring methods, investigations, selection of load assumption scenarios, calculation algorithms and software applications up to the output of results.

Based on the investigation results, e.g. material properties of the casings, rock mechanical investigations, cement resistance, etc. load assumption scenarios, characteristic material values and calculation algorithms will be derived. These, in turn, are the basis for the evaluation of the well situation and therefore for its remaining life-time.

- Material-technical examinations of pulled out, operationally stressed old casings partially indicate significant discrepancies of specific material parameters known from the installation documents. On basis of these examinations “the concept of minimal deformation and stress” /1/ was developed and from that an evaluation method for operating wells was derived.
- The use of subsurface safety valves is technical standard. Analyses were performed regarding the consequences for the axial load situation in production strings during an abrupt closure of such valves. Thereout derived calculation approaches complete the methodology for determining the total axial load situation of production strings.
- By using well logging and well tests the dimensional data, such as wall thicknesses of casings can be verified. Based on the FEM-program ANSYS it is possible to analyze local wall thickness reductions in casings with regards of strength load calculations.
- In addition to the particular well situation thermodynamic simulations and analyses of the storage operation provide the initial data for the load case assumptions referring to the strength calculations of well installation and completion.
- The results of “Evaluating the Rock Pressure Development in Reconstructed Gas Storage Caverns” are used in the integrity evaluation of a well

Key words: integrity, evaluation old wells, inspection, concept of minimal deformation and stress, FEM-ANSYS, SSSV, thermodynamic calculations.