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Proposed Criteria Used in Considering The Frequency of the Periodic Gas Sonar Surveys Of Caverns

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Abstract

Sonar surveys are normally conducted during solution mining of a cavern before the first gas injection and, following completion of the final wellhead assembly, a sonar survey under gas is typically performed when the hanging strings are removed. After that, periodic sonar surveys are subsequently run to provide an indication of cavern geometry changes over time, to allow comparison to cavern design and gas storage operating criteria and to assure storage-facility longevity.

Data of cavern sonar surveys under gas are collected at some frequency as determined by regulatory entities and this frequency may be stipulated by the appropriate authorities. For instance, in North America sonar surveys do not have any established requirement or schedules, although the Louisiana DNR does require a capacity verification “every five years, but in no event shall this period exceed 10 years” while the Texas RCC specifies sonar surveys “every five years”. In the UK, the Health and Safety Executive guidance SPC /Enforcement 185 specifies that “periodic sonar surveys should subsequently be run” without clarifying the required frequency. Moreover, the British Standard Draft pr EN 1918-3:2014, simply states that “The cavern shape shall be monitored periodically by sonar or other acceptable techniques”.

To regulate the frequency of the periodic gas sonar surveys of the caverns operated by SSE Gas Storage, a set of criteria has been established which, in addition to:

- the time-dependent convergence of the caverns,

consideration was given to:

- the volumetric changes of the cavern roof and the upper parts of the side walls; and
- the changes in the thickness of the salt cover above the caverns' roof, with reference to the location of the last cemented casing shoe.

The aforementioned criteria are used to classify the caverns in accordance to the following categories:

- Green: where the sonar survey frequency can be more than 3 years to a maximum of 5 years;
- Yellow: where the sonar survey frequency should be no greater than 3 years;
- Orange: where specific assessment of the geomechanical conditions is required and, depending on the outcome of further investigations, sonar survey frequency can be between 6 months and 3 years; and
- Red: where a suspension of the gas storage operations is recommended and an immediate assessment of the geomechanical conditions is required. Any sonar surveys will depend on the outcome of the required geomechanical investigations.

Key words: Bedded Salt Deposits, Caverns for Gas Storage, Regulations, Sonar, United Kingdom.