

## CHANGING LEACHING PHASE WITH NO or LITTLE WORK-OVER RIG ASSISTANCE

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### Abstract

The development of salt caverns is generally made of successive leaching phases to obtain the best possible characteristics of volume and shape for storage cavities, and of brine concentration for salt producing cavities, with respect to the authorized extension conditions.

A cavern changing phase program aims at repositioning the casing shoes of each leaching string and at adjusting the blanket level to its new depth before starting again water injection and brine production.

Global costs and times of such a program are often significant as it requires at least removal of the blanket, installation of a Work-Over rig, pulling-out of the inner string, sonar survey, adjustment of the outer string, running-in the inner string, moving away the Work-Over rig, pumping back the blanket fluid before starting the next leaching phase.

A new approach based on a better awareness of the casing's inherent acoustic properties, on adapted preparation works and on the here-after advanced cavity suite of instruments could significantly reduce both the global cost and the total operating time:

- EZ Cutter instrument main advantages concern its ability to cut the inner casing without damaging the outer casing and its capacity to cut the outer casing if inner pipe is moved just above, while ensuring a perfect shape for the cut and making subsequent wireline operations possible.
- Depth correlated and Gyro-oriented Sonar surveying through one or two pipes (on top of upward tilted sections) if correct casing grades combination is anticipated in order to secure the main steps of echoes acquisition, of selected points validation and of data interpretation.
- Pulsed Neutron Tool (or Gamma-Gamma instrument) together with depth correlation system for real time adjustment to next blanket position.

Only a small size Work-Over rig -or even a crane with an adapted working floor- is then necessary to reposition the very few stands of inner casing once the outer casing has been cut and once the sonar survey has been performed.

Other advantages concern the cavity 'neck' which is kept intact of non-saturated brine, the cemented casing which is prevented of any potential scratch from the outer leaching pipe motion, the management of complicated situations like dual string together damaged in cavity, the blanket fluid surface network that may become un-necessary or the short notice to decide an intervention.

This paper details both the changing string conventional way and the new methods proposed by FLODIM to adjust inner and outer casing shoes before next leaching phase starts.

**Key words:** Leaching phase, Work-Over rig, Sonar, Casing properties, Casing cut.