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Impact of Carbonate Reservoir Heterogeneity on Water Injection Pilots of the Rumaila Field, southern Iraq

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SUMMARY

A water injection trial in one of the giant fields of Southern Iraq has been designed in order to test water injection and sweep efficiency in middle Cretaceous carbonates. Three water injection trial areas have been identified. The areas exhibit different reservoir architectures which will help to understand the nature and mechanisms of water movement. Water injection is underway and the trial is ongoing with preliminary results available.

The reservoir carbonates under investigation are composed of massive grainstones with good reservoir quality, lower reservoir quality mudstones with intercalated wackestones and interbedded packstones, grainstones, wackestones and mudstones. The reservoir section is capped by cemented carbonates. The grainstones are interpreted as a progradational grainstone shoal with rudist build-ups. The mudstones were deposited in a lagoonal setting and overlying carbonates are interpreted to have been deposited in a back shoal and lagoon. The tightly cemented carbonates are interpreted to have been effected by exposure and cementation related to a major sequence boundary.

The water injection pilots are placed to explore these different reservoir architectures. The water injection trial is centred around existing injectors, which had been shut-in since drilled. Production wells were planned to be drilled at 636m and 300m in up-dip locations from the injectors, and the first of these have already been drilled. In addition observation wells will be drilled at 150m from the water injectors. It is planned to take core from the observation wells so as to assess the water saturation and by-passed oil in core.

To this date (after 18 months of injection) water has not reached the newly drilled producers 636m away. During the first 6 months of the water injection trials, injection resulted in an initial pressure increase at existing wells 900m away (50-150psi). This increase in pressure enabled an increase in production in the trial areas, and this offtake caused pressures to stabilise.

The water injection trial will provide important information about sweep efficiency in heterogeneous carbonate reservoirs. Furthermore results will be integrated into the development of this large carbonate field.