# The Auger 4D Case Study: Exploiting a Gulf of Mexico Turbidite Field by the Use of Time Lapsed Seismic Surveys

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## Abstract

**At Auger, Garden Banks 426 Field, Shell developed a succession of premier deep-water Gulf of Mexico turbidite reservoirs, with field production peaking in the late 1990's. Following the acquisition of orthogonal baseline seismic surveys and the initiation of production in 1994, three 4D seismic surveys were acquired in 1997, 1999 and 2002, monitoring aquifer progression through the Auger reservoirs. The 2002 acquisition combined a high level of repeatability relative to previous surveys to illuminate 4D effects and technically advanced seismic acquisition and processing to image subtle stratigraphic and structural features. Aquifer influx is well defined by seismic amplitude changes in all gas and oil pay levels, and compliments other reservoir surveillance tools in use, including production logging, geochemical sampling and analysis, and downhole pressure gauges.**

**Integration of 4D seismic snapshots with other surveillance tools illustrates the influx of the aquifer into the producing sands during the field's productive life. Production logging in a dedicated monitor well in conjunction with 4D drainage snapshots reveal distinct vertical flow boundaries and potential bypassed hydrocarbons in the Pink ("S" Sand) reservoir. Recent drilling of the A-5ST validates the presence of bypassed Pink hydrocarbons and 4D expectations. Geochemical analysis, 4D analysis, and production logging indicates a production induced communication between geologically isolated sands in the O series sands. 4D snapshots also demonstrate a directionally controlled aquifer influx caused by seismically visible stratigraphic boundaries within the Yellow ("N" Sand) reservoir.**

**Redevelopment opportunities remaining at Auger as seen from 4D snapshots include: (1) undrained attic hydrocarbons, (2) unswept downdip and laterally isolated hydrocarbons, and (3) newly delineated deeper reservoir potential, illuminated when the overlying bright spots dimmed with production. Opportunities are being further evaluated to assess development options and economic viability. There has been some initial drilling success.**