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An Overview of Ghawar Structure as Revealed by Ghawar SuperCube

Recently Saudi Aramco merged more than twenty 3-D seismic surveys along the Ghawar Field trend into one unified SuperCube of approximately 280km by 75km in size. This study of the roughly N-S trending Giant Ghawar Field in eastern Saudi Arabia is based on a series of DETECT (Aramco's equivalent to coherency) horizon slice maps, horizon dip maps, isochron maps (between Base Qusaiba-Base Khuff, Base Khuff- Jilh Dolomite, Jilh Dolomite-Arab D), and a series of structural cross-sections. The study indicates that the Ghawar structure is a transpressive structure with clear evidence of right-lateral slip in the N-S direction, including: (1) A right-step en echelon fault pattern persists along the east flank of the Ghawar structure, with steep to nearly vertical fault planes; (2) An asymmetrical erosional pattern on the Base Khuff to Base Qusaiba isochron map in Haradh area. It is probably caused by the restraining bend of the master fault in SW Haradh; (3) Releasing bends are recognized along 3 portions of the Ghawar field area: NW Haradh, southern Uthmaniyah, and the rhomb-shaped basin between Ain Dar and Shedgum. The Ghawar field was also subjected to right-lateral E-W wrenching as well, although this was probably of secondary importance. A series of E-W trending faults offset N-S trending regional faults and grossly sheared the Ghawar structure into NNE-SSW orientation. This new understanding of Ghawar structure will help exploration and production in the Greater Ghawar area.