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Geothermal Gradient Anomalies of Hydrocarbon Entrapment at Southern North Sea Basin, UKCS: A Mature Basin Rejuvenation Technique*

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Abstract

Anomalous geothermal gradients of oil and gas fields are known since early well logging days; they are by-products of migration, entrapment and leakage of heat transporting fluids. This paper presents a computerised procedure (CGG-ESTI©) to correct Bottom-hole temperatures (BHTs), calculate and plot the geothermal gradients of individual wells, conduct interactive cross plot analysis geothermal gradient of 500 Exploration, production, suspended and dry-holes in the UKCS of the Southern North Sea Basin in order to define the limits of anomalously high geothermal gradients of known fields and discoveries, and use their anomalous geothermal cluster limits to identify

missed and/or bypassed hydrocarbon traps in dry-holes showing similar geothermal anomalies among the 500 used wells. The study identified fifty proven, ten potential, eleven probable and twenty six possible CGG-ESTI anomalies of hydrocarbon entrapment, which amounts to 54% to 75% success ratio*. Geothermal anomalies of hydrocarbon entrapment is a quick look technique for integrative prospects generation, mature basin rejuvenation, dry-hole post-mortems and re-entry justification of possible, probable or potential "un-discovery wells" listed as dry holes in the North Sea and other mature basins.