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Investigating new risk reduction and mitigation selection strategies in the petroleum industry

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The currently used of both qualitative and quantitative risk assessment tools "fall short in identifying and ranking potential risks" in the petroleum industry and they "fail to demonstrate that risks have been reduced as low as reasonably practicable (ALARP)". Moreover, the tools are "limited to large, complex and expensive studies". Because accidents due to both human errors and electromechanical failures still occur and result in various consequences, critics have raised concerns about the petroleum industry's safety and risk mitigation credentials and question its ability to prevent major accidents. My main focus in my research is to introduce new methods that provide more detailed and structure information to decision makers. They are more robust and easier-to-use so that novice engineers can successfully apply them without experts' need. In addition, implementing an effective safety culture is essential to protect employees as well as enhancing the students' safety awareness. Students need to be able to identify hazards, assess the risk associated with them and respond to an emergency situation, should they occur. Therefore, The proposed launch of Health, Safety and Environment focus area in the Petroleum Engineering Department at Kuwait University will boost the credentials of both the department and the university as pioneers in that in that field within academia in the Gulf region.

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Sea water desalination system modeling using geothermal heat from abandoned oil well

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Abandoned oil and gas wells can be used as low temperature geothermal resources for heat extraction from geological formations and have valuable potential that avoids the elevated cost of deep drilling in geothermal projects. In this study, oil wells in southern Iran were modeled using a 3D technique. The bottom-hole temperature of wells AZ was 138.7o C. The circulating fluid is not in direct contact with the hot rock, as in a double-pipe heat exchanger; thus, heat transfer occurs without mass transfer. The fluid circulates in the well by means of a concentric double pipe. Cold water is injected into the well through the outer pipe, heat transfers from the hot rock to the fluid during injection and the hot fluid is extracted through the inner pipe. To avoid heat transfer between the outer and inner pipes, extruded polystyrene thermal insulation surrounds the outer surface of the inner pipe. Heat transfer between fluid injected into the well and the surrounded hot rock was simulated. Well casing geometry for two real abandoned oil wells was considered. The simulation results were optimized for parameters such as input and output fluid flow rate and temperature. The results showed that, in addition to thermal gradient and mass flow rate, well casing geometry and the size of injection and extraction pipes were essential to the output heat extraction rate and clean water production. Total producible clean and fresh water from well AZ-II was 600 m3 per day.

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