

## APPLICATION OF NUCLEAR TECHNIQUES IN INTERWELL TRACING FOR ENHANCED OIL RECOVERY

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Water flooding is an important operation to enhance oil recovery. Water is injected in the oil formation under high pressure through an injection well. Movement of the injected water is needed to be traced to test the performance of water flood, investigate unexpected anomalies in flow and verify suspected geological barriers or flow channels, etc. In the present study environmental isotopes and artificial radiotracer (tritium) were used at Finkassar Oil Field of Oil and Gas Development Corporation Limited (OGDCL) where water flooding was started in March 1996 in Sakessar Formation to maintain its pressure and enhance the oil recovery. Environmental isotopes:  $^{18}\text{O}$ ,  $^2\text{H}$  &  $^3\text{H}$ , and chloride contents were used to determine the breakthrough/transit time and contribution of fresh injected water. Water samples were collected from the injection well, the production well, and some other fields for reference indices of Sakessar Formation during June 1998 to August 1999. These samples were analyzed for the  $^{18}\text{O}$ ,  $^2\text{H}$  &  $^3\text{H}$ , and chloride contents. Results show that the water of production well is mixture of fresh water and formation water. The fresh water contribution varied from 68% to 80%, while remaining component was the old recharged formation water. This percentage did not change significantly from the time of breakthrough till the last sampling, which indicates good mixing in the reservoir and absence of any quick channel. The initial breakthrough time was 27 months as the fresh water contributed significantly in the first appearance of water in the production well in June 1998. Tritium tracer, which was injected in November 1999, appeared in the production well after 8 months. It shows that breakthrough time decreased with the passage of time.  $^{14}\text{C}$  of inorganic carbon in the water present in Chorgali and Sakessar Formations was also analyzed which indicates that the water is at least few thousand years old.