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CO₂ ORIGINS AND DISTRIBUTION IN WESTERN INDONESIA

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ABSTRACT

As the pace of gas exploration and development increases in Indonesia, the problem of encountering CO₂ and its subsequent impact on economic development of reserves has come sharply into focus. Not only does the amount of CO₂ affect the volume of recoverable hydrocarbon reserves, but expensive separating plants also put up the cost of development. Consequently, an understanding of the factors controlling the occurrence of CO₂ is of major economic importance. This paper presents the results of a study on the origin and distribution of CO₂ in western Indonesia.

Subsurface formation of CO₂ can occur by a variety of organic and inorganic processes and it is quite possible that more than one process is active in any given area. The interpretation of the ultimate source(s) of CO₂ presented here is largely based on $\delta^{13}\text{C}$ analyses of CO₂ from gas/oil fields. However, such analyses rarely give unambiguous results. Such

ambiguity can occur for a number of reasons. Some CO₂ sources do not have a unique isotopic signature.

Additionally, chemical reactions taking place during migration can modify not only CO₂ concentrations, but also the isotopic signature of the CO₂. Lastly, mixing of CO₂ from different sources with different isotopic signatures can confuse matters. By considering $\delta^{13}\text{C}$ values of CO₂ in conjunction with the occurrence of other non-combustible gases, such as He and N₂, and the geology of an area, more precise interpretations of the origin of CO₂ can be made.

Typically, the site of CO₂ production is not the site of its accumulation. It is prone to migration just as hydrocarbons are. Geological analysis of individual basins in western Indonesia has helped to identify migration pathways and barriers to movement.

By understanding the origins of CO₂ and the factors controlling its migration it has been possible to predict CO₂ occurrence with some confidence in western Indonesia. Although the study considered a limited area, its results are probably applicable on a wider regional scale.

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