

UNIVERSITI TEKNOLOGI MARA

**INTERMITTENT CARBON DIOXIDE
(CO₂) INJECTION IN A SANDSTONE
RESERVOIR IN SABAH BASIN**

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ABSTRACT

The intermittent carbon dioxide (CO₂) injection is another alternative method which actually had already been used for a several cases such as heavy oil reservoir and also for the low permeability but none of this technique had been found to be used for light and intermediate oil types of reservoir. Most common problems faced for the carbon dioxide injection is the carbon dioxide breakthrough in the hydrocarbon resulting in the production of carbon dioxide higher than oil. The simulation of the intermittent of carbon dioxide injection using Petrel 2015 and Eclipse 300 has showed positive results of oil recovered and also avoiding the drawback of carbon dioxide breakthrough during injection. The results have showed that, for injection rates of 10,000 MScf/day, can recovered for about 8.75% of oil, which is approximately 24,949,904 STB of oil produce throughout the year compared to only production of oil without injection which is 22,767,158 STB. Although the continuous injection have shown a higher oil recovered percentage which is 14.15% for 10,000 MScf/day injection rates, however, the drawback of continuous injection is, an increase in gas injected produce back to the surface. Therefore, it can be conclude that, intermittent injection method is more efficient compare to the continuous injection, since it improve the oil recovery while avoiding the drawback of carbon dioxide breakthrough.

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

Global warming is a continuous increase of overall temperature of the earth caused when carbon dioxide (CO₂) and other air pollutants such as sulphur dioxide (SO₂), Nitrogen dioxide (NO₂) and many other are collect in the atmosphere which the absorbed by sunlight and solar radiation that later bounced off the earth's surface. This radiation normally would escape into the space, however, due to these pollutants, the planet are getting hotter since the heat are trapped at the atmosphere which later increase the global temperature (Putman, Ott, Darmenov, & daSilva, 2015).

The global greenhouse gas emissions consist 65% of carbon dioxide release, which shows that, the major pollutions were caused by the carbon dioxide (Hashemi Fath & Pouranfard, 2014). Furthermore, the power generation from offshore platform, where continuous burning of conventional fuels generate for about 80% of the total carbon dioxide and nitrogen dioxide, which affect the surrounding environmental (Putman et al., 2015). Carbon capture and storage (CCS) are one of the methods to reduce the emission of carbon dioxide to the atmosphere and according to CCS Association, the Carbon capture and storage (CCS) method could capture up to 90% of the carbon dioxide emission produce from the use of fossil fuels in electricity generation(Khan, Amin, & Madden, 2013). Other than CCS method, another way to efficiently reduce the carbon dioxide emission is to recycle the compound and to reuse in the Enhanced Oil Recovery, in terms of Carbon Dioxide Injection to increase the production of hydrocarbon (Parker et al., 2009).

In general, the production of hydrocarbon from the underground reservoir involves in whether chemical or mechanical process that reduce the reservoir pressure thus, it could lead to the decreased production. Therefore, the oil recovery methods were introduced in order to increase the production of the hydrocarbon in the reservoir. The oil recovery methods could be divided into three categories which is, primary, secondary and tertiary (Furuvik & Halvorsen, 2015). In primary recovery methods, the oil production is usually by using the existing natural pressure in the, the method were known as, solution-gas drive, rock expansion, water drive process and