ABSTRAK

DELINEASI KOMPONEN *GEOLOGICAL STORAGE* BERDASARKAN INTEGRASI DATA SEISMIK DAN *WELL LOGGING* UNTUK TEKNOLOGI *CARBON CAPTURE AND STORAGE* (CCS) DI LAPANGAN EP, CEKUNGAN MELAWI, KALIMANTAN BARAT

Oleh

Eka Pramuditia

Peningkatan emisi karbon dioksida (CO_2) sebagai gas rumah kaca utama mendorong pengembangan teknologi *Carbon Capture and Storage* (CCS) sebagai salah satu solusi mitigasi perubahan iklim, yang memanfaatkan formasi geologi sebagai media penyimpanan CO_2 secara aman di bawah permukaan. Cekungan Melawi, Kalimantan Barat, merupakan wilayah yang memiliki potensi sebagai lokasi penyimpanan CO_2, namun kajian terkait hal ini masih terbatas. Penelitian ini bertujuan untuk mengidentifikasi *geological storage* serta mengestimasi volume bulk penyimpanan CO_2 di lokasi penelitian. Data yang digunakan meliputi satu data sumur KD dan enam data seismik refleksi 2D *post-stack*. Tahapan penelitian meliputi analisis petrofisika, identifikasi jenis *geological storage*, interpretasi seismik, inversi *acoustic impedance*, dan perhitungan volume bulk reservoir penyimpanan. Hasil penelitian menunjukkan keberadaan tiga sistem *geological storage*, dengan *seal rock* yang didominasi oleh litologi serpih (*shale*) dan reservoir oleh batupasir (*sandstone*). Nilai resistivitas air formasi (Rw) yang rendah (<0,15 ohmm) serta salinitas fluida yang tinggi (>30.000 ppm) mengindikasikan bahwa sistem penyimpanan termasuk dalam jenis *deep saline aquifer*. Delineasi zona target reservoir menunjukkan nilai *acoustic impedance* berkisar antara 8.000 - 10.000 (m/s)(g/cc), sedangkan *seal rock* memiliki nilai lebih dari 10.000 (m/s)(g/cc). Estimasi volumetrik menghasilkan total *bulk volume* reservoir sebesar 4627,73 km^3 sebagai kapasitas ruang penyimpanan secara geometris pada area penelitian. Penelitian ini menunjukkan bahwa Lapangan EP memiliki potensi sebagai kandidat lokasi implementasi teknologi *Carbon Capture and Storage* (CCS).

Kata kunci: *acoustic impedance, carbon capture and storage* (CCS)*,* Cekungan Melawi*, deep saline aquifer, geological storage,* petrofisika.

ABSTRACT

DELINEATION OF GEOLOGICAL STORAGE COMPONENTS USING INTEGRATED SEISMIC AND WELL LOG DATA FOR CARBON CAPTURE AND STORAGE (CCS) IN THE EP FIELD, MELAWI BASIN, WEST KALIMANTAN

By

Eka Pramuditia

The increasing emissions of carbon dioxide (CO_2) as a major greenhouse gas have driven the development of Carbon Capture and Storage (CCS) technology as one of the key solutions for climate change mitigation, utilizing geological formations as a secure medium for subsurface CO_2 storage. The Melawi Basin, West Kalimantan, is a region with potential for CO_2 storage however, related studies remain limited. This study aims to identify geological storage systems and estimate the bulk volume of CO_2 storage in the study area. The data used include one well (KD) dataset and six 2D post-stack seismic reflection lines. The research workflow consists of petrophysical analysis, identification of geological storage types, seismic interpretation, acoustic impedance inversion, and bulk volume calculation of the storage reservoir. The results indicate the presence of three geological storage systems, with seal rocks dominated by shale lithology and reservoirs by sandstone. The low formation water resistivity (Rw) values (<0.15 ohmm) and high fluid salinity (>30,000 ppm) suggest that the storage system is classified as a deep saline aquifer. Delineation of the target reservoir zones shows acoustic impedance values ranging from 8,000 to 10,000 (m/s)(g/cc), while the seal rocks exhibit values greater than 10,000 (m/s)(g/cc). Volumetric estimation yields a total reservoir bulk volume of 4,627.73 km^3, representing the geometric storage capacity within the study area. These findings indicate that the EP Field has potential as a candidate site for the implementation of Carbon Capture and Storage (CCS) technology.

Keywords: acoustic impedance, carbon capture and storage (CCS), deep saline aquifer, geological storage, Melawi Basin, petrophysics