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Periodical Results Analysis on Environmental Impact Monitoring for Ordos Demo-project of CO₂ Geological Storage in Deep Saline Aquifers

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Ordos Demo-project of CO₂ Geological Storage in Deep Saline Aquifers was located in the south of Ordos City, Inner Mongolia Autonomous Region and the goal community was 10Mt/a, which is the China's first and the world's largest demo-project on coal-based whole process of CO₂ geological storage in deep saline aquifers. In this article, the demo project environmental impact monitoring was divided into three phases: background monitoring before injection, operation monitoring during the injection and post monitoring when field closed. Monitoring of the atmospheric environment, soil environment, water environment, vegetation ecology, ground deformation, control of project wells, carbon dioxide underground migration diffusion were carried out before injection and during the early injection. Monitoring results showed that the background values of atmospheric CO₂ concentration ranged $384.07 \times 10^{-6} \sim 480.47 \times 10^{-6}$ and the average was 411.59×10^{-6} . The concentration values varied from seasons and were "high in winter, low in summer", which were significant correlation with humidity, solar altitude, temperature, wind speed and pressure. Background value of soil carbon dioxide flux ranged $-0.113 \sim 0.297 \text{mg} / \text{h} \text{m}^2$ and the average was $0.087 \text{mg} / \text{h} \text{m}^2$. The values of soil carbon dioxide flux

also varied from seasons and were "high in summer, low in winter". Bicarbonate and pH value indicators of surface water and groundwater were no significant change. Vegetation Ecology was significant seasonal changes; there were little changes between the time before injection and early injection. D-InSAR monitoring on the injection site found no surface deformation, but the coal mining subsidence area, about 8km northeast to the injection site, showed significantly land subsidence. Because of coal mining the direction of the trend of land subsidence gradually expanded from east to west. Pressure and temperature in reservoirs of injection well and before main caprocks in monitoring wells showed no abnormal increase or decrease abnormal situation. Monitoring of time-lapse seismic profiling method for migration diffusion of carbon dioxide showed that CO₂ moved around the injection well in reservoirs, and the reservoir quality was better. The demo-project injection operated smoothly and the monitoring results showed that no carbon dioxide escaped from reservoirs.

Key words: Ordos; demo-project; CO₂ geological storage in deep saline aquifers; environmental impact; monitoring.

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