

# Climate Change

October 24-26, 2016 Valencia, Spain

## CO<sub>2</sub> EOR and sequestration technologies in petro China

Mingqiang Hao, Yongle Hu and Wenhui Li

Petro China Research Institute of Petroleum Exploration & Development, China

CO<sub>2</sub> flooding technologies which can reduce CO<sub>2</sub> emission while enhancing oil recovery, is the best way to realize CO<sub>2</sub> emission in present economic and technology condition. Therefore, the major oil companies and some government organizations have keep an eye on it. China conducted laboratory study of CO<sub>2</sub> flooding in Daqing Oil Field and Shengli Oil Field in the mid of 1960s. Some pilot tests were conducted in Daqing Oil Field, Jiangsu Oil Field and Shengli Oil Field in the mid of 1990s. But eventually the CO<sub>2</sub> flooding technology was developing slowly in some reasons such as the lack of natural CO<sub>2</sub> resources in China, the prominent contradiction of gas channeling. During the 10th five-year planning stage, a large number of high CO<sub>2</sub> reservoirs have been found in Songliao Basin. The following, some national projects, company projects and oil field company projects were implemented to restart tackling the key problem of the CO<sub>2</sub> flooding technology for the characteristics of our continental reservoirs and significant technology achievements have been achieved. The results show that besides C<sub>2</sub>-C<sub>6</sub>, C<sub>7</sub>-C<sub>15</sub> also has strong ability of mass transfer and it is useful for phase mixing. We have synthesized hydrocarbon surface active agent CAE to reduce the MMP and defined a new hydrocarbon component factor  $X_f = (C_2 - C_{15}) / (C_1 + N_2 + C_{16} +)$  that better describe the relationship between component and MMP. Promoted and applied WAG injection, and development indices variation, such as gas/oil ratio, replacement ratio, and water content for CO<sub>2</sub> flooding in high water cut reservoirs were. We also established WAG flooding characteristic curve equation that includes the effect of miscible phase degree; uniform replacement in heterogeneous reservoir could be reached through adjustment of injection-production ratio. Two separated layer gas flooding processes are conducted and then transformed from commingled gas injection to separated layer gas flooding technology. We developed an on-line anti-corrosion monitoring system, core lift equipments and three kinds of effective lift technology. Studied on the phase characteristic of CO<sub>2</sub> under different velocity and impurity were conducted, and we established the optimization method and process of pipeline design. Several technologies like circularity water, gas/liquid mixture transportation, centralized separation and measurement, airtight gathering and transportation, and studied on separation and purification technologies and formed three kinds of CO<sub>2</sub> flooding produced gas injection technologies are formed. CO<sub>2</sub> geological storage capacity calculation method was formulated to compute the relative parameters. We also collected CO<sub>2</sub> emission data for more than 600 enterprises in eight major industries, and conducted primary plan of sinks and sources matching features. And some pilots were conducted in block Hei59, Hei79, Hei46 of Daqingzijing Oil Field, the oil recovery can improve more than 10%, and the CO<sub>2</sub> geological sequestration rate is above 90%.

### Biography

Mingqiang Hao is currently working at Petro China Research Institute of Petroleum Exploration & Development, China. Mingqiang Hao research interests are CO<sub>2</sub> Capture and Sequestration, Climate Change and Health etc.

### Notes: