

# THE POTENTIAL FOR, AND POSSIBLE EFFECTS OF CO<sub>2</sub> STORAGE IN THE BASAL AQUIFER OF THE NORTHERN PLAINS – PRAIRIE REGION OF NORTH AMERICA: A JOINT US-CANADA PROJECT<sup>1</sup>

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The Northern Plains – Prairie region of North America is underlain at the base of the sedimentary succession by a Basal Aquifer that, like the Mt. Simon aquifer in the US Midwest, extends over a very large area greater than 1.1 million km<sup>2</sup> (686 thousand sq. mi.) in three western Canadian provinces and four US states. The CO<sub>2</sub> sources with individual emissions greater than 1 Mt CO<sub>2</sub>/year in the region underlain by this aquifer account, at 80 Mt CO<sub>2</sub>/year, for 44% of Canada's emissions from such sources (i.e., more than 10% of Canada's CO<sub>2</sub> emissions), and 67 Mt CO<sub>2</sub>/year, or approximately 1% for such US sources. This aquifer, which reaches maximum depth and salinity of more than 5000 m and more than 350,000 mg/L, respectively, crops out in Manitoba and South Dakota, where the water salinity is less than 10,000 mg/L and where it serves as a source of potable groundwater. This aquifer has a very large potential for storing CO<sub>2</sub> emissions from various large sources in the region and even from neighbouring states like Minnesota that do not have CO<sub>2</sub> storage potential of their own. Furthermore, this aquifer is penetrated by comparatively few wells, less than 3000, compared with the hundreds of thousands of wells drilled in this region, which makes this aquifer attractive from the point of view of security of CO<sub>2</sub> storage. A joint US-Canada multi-year, multi-organizational study has been initiated in October 2010 with support from various levels of government in both countries. The main objectives of the study are to characterize the Basal Aquifer that underlies the Northern Plains – Prairie region of North America with respect to its static and dynamic CO<sub>2</sub> storage capacities. Results of this evaluation will indicate the effects of long-term, large-scale CO<sub>2</sub> injection from multiple sources, with particular attention paid to the fate of the injected CO<sub>2</sub> and of the displaced brine. Finally, given the age and condition of some of the wells that penetrate the aquifer, an evaluation of the possible effects of CO<sub>2</sub> leakage through wells will be conducted. The study, its main objectives and some preliminary results will be presented at the conference.



Areal extent of the Northern Plains – Prairie Basal Aquifer in the Northern Great Plains region of the United States and the Prairie region of Canada, showing the areas of outcrop and subcrop.

<sup>1</sup> This presentation is for the session on “The US-Canadian CCS Collaboration”