The Status of Carbon Dioxide Storage in Geological Formations, British Columbia, Canada

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Summary

Carbon dioxide (CO_2) can be stored in geological formations to effectively reduce greenhouse gas emissions in British Columbia, Canada. Screening of sedimentary basins to determine the CO_2 storage potential of specific reservoirs requires a significant amount of geotechnical data to provide an accurate estimate of capacity and injectivity, qualify containment risk and obtain regulatory approval. A comprehensive understanding of reservoir characteristics and expected migratory path of the injected CO_2 ensures public and environmental safety and provides confidence the desired goal of long-term CO_2 confinement will be met. Other site selection criteria include: proximity of CO_2 source, tectonic stability, urbanization and regional geography (terrain).

An initial screening of suitability for CO_2 storage of major sedimentary basins in British Columbia revealed that the most likely region is the Western Canada Basin in the Northeast. A very active oil and gas industry has resulted in more than 99% (>19,500 wells) of the province's drilling activity to be located in this area. As a result, the geology of the Northeast is very well documented and meets all appropriate selection criteria. Other BC basins were deemed to be currently unsuitable for various reasons, including: lack of existing data, distance from large CO_2 source, urbanization, mouintainous terrain, tectonic instability and/or a drilling moritoruim that restricts access.

In Northeast British Columbia, there are presently 12 acid gas disposal sites permanently storing more than 100,000 tonnes of CO_2 per year in depleted natural gas pools or saline aquifers. These facilities act as small-scale demonstration projects highlighting the feasibility and safety of the technology. Depleted gas pools provide secure storage options, having clearly displayed the competency to trap natural gas for significant periods of geological time. Two thirds of existing pools large enough to be considered for CO_2 storage will not become available until after 2020. As a result, saline aquifers will need to be utilized to bridge the timing gap and meet near-term storage requirements.

In the Northeast, the regional geological setting, reservoir quality and widespread areal distribution of both Triassic and Middle Devonian saline aquifer systems make them ideal candidates for CO_2 storage. These systems are isolated by thick shale units restricting interformational hydrodynamic flow. Lateral facies changes and/or updip erosional truncation create stratigraphic barriers further impeding escape of injected CO_2. Erosion of Triassic strata in the north limits this system's storage opportunities to the southern portion of the Northeast. To the north, the Middle Devonian Keg River-Sulphur Point-Slave Point succession offers ample storage capacity. There are large CO_2 sources in

the Northeast that can be matched with appropriate storage reservoirs to significantly reduce British Columbia's greenhouse gas emissions.