AN INTEGRATED CHARACTERIZATION, MODELING, RISK ASSESSMENT, AND MONITORING PLAN FOR THE FORT NELSON CCS PROJECT

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ABSTRACT

The Plains CO_2 Reduction Partnership and Spectra Energy Transmission (SET) are investigating the feasibility of a carbon capture and storage (CCS) project near Fort Nelson, British Columbia Canada. The project aims to reduce carbon dioxide (CO_2) emissions from SET's Fort Nelson sour gas processing plant by injecting approximately 2.5 million tonnes of sour CO_2 (approximately 95% CO_2, 4% hydrogen sulfide, and 1% methane) into a deep mid-Devonian-aged carbonate reef for long-term geologic storage.

The Fort Nelson CCS project provides a unique opportunity to develop a set of cost-effective, risk-based monitoring techniques for large-scale storage of sour CO_2 in deep saline formations. An approach is being developed that integrates characterization, modeling, risk assessment, and monitoring into an iterative process to produce superior quality results during each phase of the project. Elements of any of these activities are crucial for understanding and developing the other activities.

During the preinjection phase of the project, the characterization activities are used as input to the modeling effort. The results of the modeling and characterization activities are used as input to the first-round risk assessment, which helps identify knowledge gaps and project risks. The output from the risk assessment is then used to guide further characterization efforts and develop the monitoring plan. Once injection begins, the monitoring program results will be compared to the modeling predictions. The models will be adjusted as necessary, and new simulations will be run to predict the movement of the injected sour CO_2 in the reservoir. Predictions that closely match the monitoring data will strengthen the project by 1) demonstrating that the modeling can be used to accurately aid in risk identification, 2) providing insight into long-term stability of the CCS system, 3) helping to ascertain when closure conditions have been met in the postinjection phase, and 4) enabling the CCS operator to obtain CCS project closure certification.

Although specific techniques and procedures may change as the project proceeds, this philosophy of integrated characterization, modeling, and risk assessment will ensure that monitoring strategies remain fit for purpose, cost-effective, and efficient throughout the life of the project.