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## **CO<sub>2</sub> Geological Sequestration Engineering and Economic Challenges**

### **Abstract**

Carbon dioxide (CO<sub>2</sub>) is one of the most important greenhouse gases and an approach in mitigating climate changes associated with greenhouse gases is CO<sub>2</sub> sequestration in subsurface geological formations. As in any disposal operation, containment and long-term environmental integrity of disposed CO<sub>2</sub> must be assured. In order to insure environmental integrity, specific procedures and guidelines must be established for operational design and quality assurance; and reporting, monitoring and analysis. Each component is an integral part of the assurance processes. The first part of the paper defines the gaps in the technology that are required to be addressed so that an optimum CO<sub>2</sub> geological sequestration process can be carried out. The assurance process is highlighted in the second part and the various steps needed to insure both integrity and compliance of the injection design and operations are defined. Environmental regulation issues are also highlighted. The final part of the paper defines a process for addressing the subsurface injection issues within the context of an economic evaluation of CO<sub>2</sub> capture, sequestration and monitoring. Our collective experience with waste management and subsurface disposal indicates that there are several steps required for the design of these schemes. The various injection options must be evaluated, separately at first and then compared with each other, in order to generate the optimal engineering and economic option.