INTRODUCTION

Significant volumes (> 1 million barrels) of co-produced water are generated daily during production operations throughout the state. Major production areas have high concentrations of water-dissolved solids. Produced water has historically been considered a waste in the oil and gas industry. However, research has shown that produced water can be treated and reused for multiple applications. The oil and gas industry in North Dakota currently treats and reuses produced water for various purposes such as drilling, fracking, and water injection for enhanced oil recovery.

THE DAKOTA GROUP

Geology of the area is the major factor in determining if injection is a viable option for produced water disposal. The Dakota Group is a net-porosity, sandstone-dominated sequence that provides a good seal for produced water disposal. The Dakota Group is mainly composed of the Lower Cretaceous Dakota Group and the Upper Cretaceous Wahpeton and Williston Basins.

The Dakota Group consists of three formations:
- Lower Dakota Formation
- Middle Dakota Formation
- Upper Dakota Formation

The Lower Dakota Formation is composed of sandstones and shales and is the primary target for produced water disposal. It is approximately 1,000 feet thick and is composed of sandstones and shales.

The Middle Dakota Formation is composed of sandstones, shales, and evaporites and is approximately 200 feet thick.

The Upper Dakota Formation is composed of sandstones and shales and is approximately 200 feet thick.

The Dakota Group is underlain by the Pierre Shale and overlain by the Wahpeton Formation.

The Lower Dakota Formation is divided into three members:
- Lower Dakota Shale
- Dakota Sandstone
- Lower Dakota Shale

The Middle Dakota Formation is composed of sandstones, shales, and evaporites.

The Upper Dakota Formation is composed of sandstones, shales, and evaporites.

The Dakota Group has a good seal for produced water disposal due to the overlying Pierre Shale and underlying Williston Basin.

RESERVOIR QUALITY

The Dakota Group is a net-porosity reservoir, with high permeability and porosity. The sandstones are well-sorted and clean, with good interconnectivity.

The Dakota Group is a good candidate for produced water disposal due to its high permeability and porosity, which allows for easy injection and effective water management.

The Dakota Group is underlain by the Pierre Shale, which provides a good seal for produced water disposal.

The Dakota Group is overlain by the Wahpeton Formation, which provides a good cap for produced water disposal.

The Dakota Group is a thick sequence, with a thickness of approximately 1,000 feet, which provides a large volume of potential produced water disposal capacity.

The Dakota Group is a net-porosity reservoir, with high permeability and porosity. The sandstones are well-sorted and clean, with good interconnectivity.