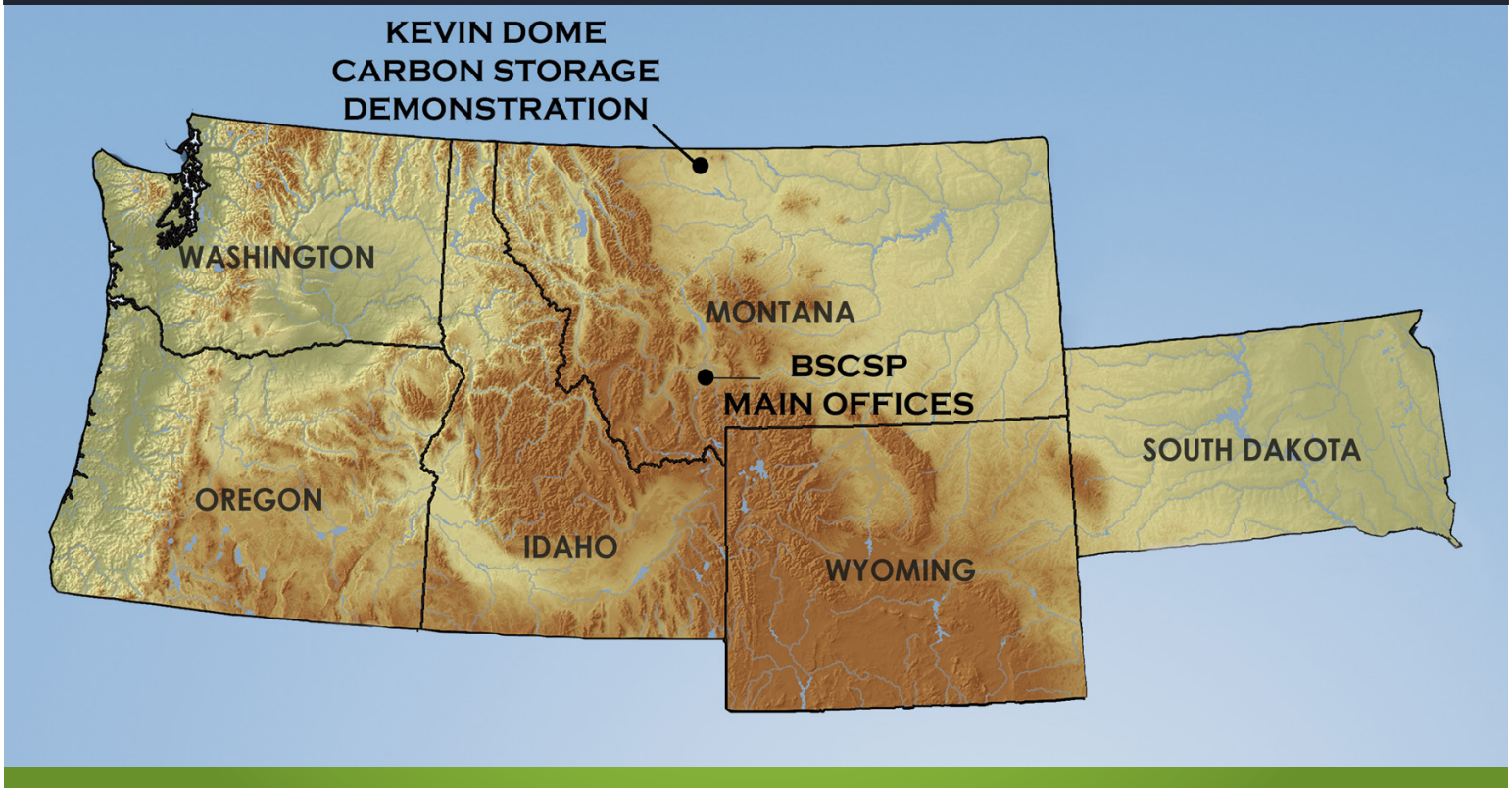
KEVIN DOME PROJECT

Duperow Formation, Toole County, Montana

Big Sky Carbon Sequestration Partnership



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BACKGROUND

The Big Sky Carbon Sequestration Partnership (BSCSP) is conducting a large-scale field project in north-central Montana to assess CO2 storage potential. Through this study, BSCSP aims to show that a geologic structure known as Kevin Dome in Tool County, Montana, is a safe and viable site to permanently store CO2. The dome covers more than 750 square miles and has trapped naturally occurring CO2 for millions of years. Because of this proven seal and trap integrity, the dome is an ideal site to demonstrate carbon storage.

The project's targeted injection zone is the regionally extensive carbonate Duperow formation. The project will use the Kevin Dome as a natural analog to study geochemical effects on rocks that have been exposed to CO2 for long time periods and compare them to rocks with recent exposure. Kevin Dome has a significant amount of CO2 storage space and this project will provide engineered system information on CO2 storage in a regionally representative geologic setting.

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PROJECT OVERVIEW

Kevin Dome has the potential to serve as a regional CO2 storage center because of the dome's geologic properties, proximity to present and future sources of anthropogenic CO2, and similarity of its geology to other domes in Montana. The Kevin Dome project will further the understanding of regionally significant formations, such as the Duperow, and provide relevant information of potential use of other analogous domes in the region.

Kevin Dome's geology is ideal because there are porous rocks located within the middle Duperow that are overlain by two seals made of tight carbonates and anhydrites. Additional proven seals are at shallower depths that have historically trapped oil and gas. The project has drilled two characterization wells to depths of 3,800' and 4,700'.

The Kevin Dome Project is unique because it is not operating in conjunction with a commercial project or using existing infrastructure. Consequently, project permitting efforts and the planning phases were conducted to ensure that the project operates in compliance with all state and federal laws and promotes the establishment of long-term relationships with local landowners and nearby communities. The project is also unique because of the wide variety of stakeholders, including several federally recognized tribes in Montana.

PROJECT SUCCESSES

BSCSP technology successes include a 37 square mile 9-component seismic survey that is the largest shear-wave seismic survey in North America. The seismic data indicates that the structure conforms to the original mapping and no major faults are present in the injection area. Joint inversion of shear and p-wave data successfully imaged the 100 ft. middle Duperow reservoir zone, a potential challenge in stiff carbonate rock.

The two wells drilled have been extensively logged and cored. The core and log data indicate that the rock units in the reservoir intervals are very continuous and that the reservoir properties are regionally consistent. Over 30 ft. of caprock was cored and geomechanical tests on this core indicates excellent mechanical integrity for both the primary and secondary seals.

The project has created a static geologic model incorporating data from hundreds of wells, digitized logs and 2D and 3D seismic data. Initial flow modeling has also been completed including a sensitivity analysis and reactive transport modeling.

Cores and formation microimaging logs indicate small fractures in the reservoir that do not penetrate the caprock. Core inspection further indicates mineral precipitation in the fractures that likely acts as a proppant in the subsurface. Well tests confirm dual permeability (matrix and fracture) and data were used to parameterize a multi-continuum model to capture the impact of dual permeability on flow properties. The model indicates the fractures significantly improve injectivity and storage efficiency.

The project has had successes in non-technical areas as well. Due to the diversity of stakeholders, personnel, and agencies involved with the Kevin Dome Project, one project challenge has been to ensure that all involved team members are aware of the suite of permitting compliance regulations and stipulations. Project managers have emphasized contractor training, education, and awareness to promote the project's "100 percent compliance" policy. Increased and consistent communication, including regularly scheduled conference calls, daily correspondence, and face-to-face meetings, has proven to be a successful strategy to ensure compliance.

Effective, frequent outreach efforts with stakeholders has been a top priority throughout the project. In addition, BSCSP produced and released an outreach education video called "What's Shaking on Kevin Dome" that features the project's seismic survey. BSCSP also maintains a blog to keep stakeholders aware of new activities and findings associated with the project.

The Kevin Dome Project has shown exemplary results in awareness and protection of environmental, biological, and cultural resources in the field area. By being proactive and communicating with onsite contractors, BSCSP successfully minimized effects on wildlife and crops. Project activities involving construction or seismic work were scheduled to avoid the migratory and breeding season when possible. Other preventative actions included avoiding preferred habitats, installing reflective bird tags on permanent guide-wires, using freshwater-based drilling muds, installing netting over reserve pits, and maintaining a clean work area free of trash that may attract bears or other wildlife. Other seasonal factors included working around landowner farming activities like tilling, seeding, and cropping.

The project also completed National Environmental Policy Act (NEPA) review and Environmental Assessment with a Finding of "No Significant Impacts."

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