Exhibit A: Project Description
(Scope of Work, Special Requirements)

Project Title: Enhancing Montana's Energy Resources: Research in Support of the State of Montana Energy Policy Goals

Research Focus 1: Innovative technologies to seal wells

- Small aperture leaks in wells, such as fractures or delaminations between cement and rock or cement and casing, can provide a pathway for hydrocarbon seepage and potential contamination of other horizons. ERI, in partnership with a MT company, is pursuing novel methods of biochemical and chemical mineralization to "grow new rock" in small aperture leaks using low viscosity (similar to water) solutions. Previous work successfully developed a biomineralization sealing technology based on the microbial hydrolysis of urea and resulting calcite precipitation. This new research aims to build on this technology by targeting use of the active enzyme as the catalyst instead of the entire cell, as well as direct thermal hydrolysis of urea to drive mineralization precipitation. These approaches will facilitate engineered mineralization sealing at greater depths and higher temperatures than currently possible with our existing biomineralization technology.
- Mineral precipitation also has potential to reduce permeability of thief zones in EOR. These zones rapidly divert injected fluids preventing sweeping of the oil to increase production. ERI will perform bench scale tests on samples with very heterogeneous permeability to assess thief zone plugging potential.

Outcomes will include: laboratory tests of enzymatic and / or thermal mineralization; tests of mineralization in porous media to help assess thief zone plugging potential; assessment and plan for field demonstration of the technology, potentially in a MT well; efforts to secure federal and / or private sector funding.

Research Focus 2: Clean Coal Technologies (utilization of Montana's vast coal reserves in an environmentally sound manner)

Recent federal regulations around coal extraction and utilization set forth requirements to prevent leakage of contaminants from CCR storage areas into ground water, prevent the formation of contaminated dust and to prevent failure of the banks (storage walls) of the surface impoundments. These requirements come with considerable costs to operators of facilities and the Talen Energy, Colstrip, MT plant will be impacted.

- One proposed method to remediate CCR storage pond concerns is the use of microbially induced calcite precipitation (MICP). MICP has been shown to reduce permeability and seal fractures in rocks and the team has recently demonstrated in the laboratory the ability to cement together fly ash particles. This project will collect samples from Colstrip, perform bench scale MICP experiments on those samples, and assess efficacy and feasibility of the approach at commercial scale.
- The use of bacterially driven mineral formation to directly treat contaminated water will also be investigated. Previous research has demonstrated that several heavy metal contaminants can be sequestered in solid minerals via bacterially driven precipitation.

The proposed work will direct efforts towards demonstrating the ability to remove a diversity of heavy metals, such as cadmium, arsenic and selenate from water produced by coal mining operations and ash storage areas. This technology also has potential application to produced waters from oil, unconventional (shale) oil, and coalbed methane operations.

There is potential to use some of the carbon (CO2) emissions from coal combustion productively. ERI will characterize existing Montana oilfields for CO2 enhanced oil recovery (EOR) potential.

- Generalized 3-dimensional reservoir models will be parameterized with reservoir temperature, pressure, oil gravity, viscosity, and permeability, and high-ranking fields will be used to estimate EOR production and associated CO2 storage capacity.
- Geospatial network analysis will be performed on oil field proximity to Colstrip, pipeline infrastructure and potential CO2 storage hubs.
- Another carbon management scheme to be investigated combines CO2 air capture using algae or cyanobacteria (collectively referred to as algae) with co-firing of fossil power plants using the algal biomass and geologic carbon sequestration.
- Extracts from the algae (taken before use as biomass fuel) also have potential use as fertilizer and animal feed.
- Recent bench scale work indicates that an algae-based product can stimulate the micro-organisms in the coal seam responsible for converting coal to methane thereby increasing coal bed methane (CBM) production. The team will conduct a test of growing the algae in produced water from CBM wells and evaluate algal byproducts to assist in assessing whether algal air capture of CO2 for carbon management from coal combustion combined with co-firing and other use of by-products is feasible on a commercial scale.

The team will: collect samples of bottom ash, fly ash and pond water at the Colstrip plant ponds and perform laboratory studies to assess the feasibility of MICP fly ash pond remediation; contact site(s) of interest to obtain mine wastewater samples, isolate native organisms capable of biomineralization and conduct laboratory studies of bio-precipitation of heavy metals; utilize fine-resolution geospatial methodologies to estimate CO2 storage potential, source to sink infrastructure, and enhanced oil production from fields that meet screening criteria and develop an interactive mapping application; perform a small pilot scale test of algae growth in CBM produced water, assess carbon capture potential of algae and coal conversion potential of algal byproduct; submit proposals for and / or secure private or federal funding for 4 projects in this area.