SUBTASK 1.7 – EVALUATION OF KEY FACTORS AFFECTING SUCCESSFUL OIL PRODUCTION IN THE BAKKEN FORMATION, NORTH DAKOTA – PHASE 2

1. EXECUTIVE SUMMARY

The Bakken Formation is rapidly emerging as an important source of oil in the Williston Basin. The formation typically consists of three members, with the upper and lower members being shales and the middle member being dolomitic siltstone and sandstone. Total organic carbon (TOC) within the shales may be as high as 40%, with estimates of total hydrocarbon generation across the entire Bakken Formation ranging from 200 to 400 billion barrels. While the formation is productive in numerous reservoirs throughout Montana and North Dakota, with the Elm Coulee Field in Montana and the Parshall area in North Dakota being the most prolific examples of Bakken success, many Bakken wells have yielded disappointing results. While variable productivity within a play is nothing unusual to the petroleum industry, the Bakken play is noteworthy because of the wide variety of approaches and technologies that have been applied with apparently inconsistent and all too often underachieving results. Developing a "winning" approach to Bakken exploitation is further complicated by the fact that the typical Bakken well can face significant challenges in all phases of operation. In summary, the Bakken Formation in the Williston Basin is seen by many as holding a world-class prize, the development of which is plagued by a myriad of challenges. A robust, systematic, scientific, and engineering research effort can play a vital role in overcoming these challenges and unlocking the vast resource potential of the Bakken Formation in the Williston Basin.

The Energy & Environmental Research Center (EERC) is continuing a second phase of Bakken research as part of the ongoing EERC–U.S. Department of Energy (DOE) Joint Program on Research and Development for Fossil Energy-Related Resources Cooperative Agreement (Subtask 1.7). The first activity is the development of the Bakken decision support system (BDSS), which is a geographic information system (GIS) Web-based analytical tool that includes a database of well file information. The second activity includes geomechanical data sets to examine how macroscale stress and strain forces can affect the geomechanical properties of Bakken rocks and capitalize on the analytical methods developed under Phase 1. The third activity continues geochemical evaluations of Bakken samples to evaluate potential relationships between geochemical and petrological properties of the Bakken and oil productivity. The fourth activity establishes an industry advisory board for the project and will include three meetings of the research team and industry advisory board to ensure the needs of stakeholders are being met. It is anticipated that the activities proposed by the EERC herein will be coordinated with complementary, but separate, ongoing research efforts being conducted by the North Dakota Geological Survey and a consortium of petroleum production and service companies. Taken as a whole, it is anticipated that the results of all of these research efforts will provide stakeholders with a clearer understanding of how to efficiently maximize the exploitation of the vast Bakken resources in the Williston Basin.