North Dakota Energy Workforce Development

DE-OE0000063 Final Report

Bismarck State College

December 29, 2014

Project Title:	North Dakota Energy Workforce Development
DOE Award Number:	DE-OE0000063
Duration:	October 1, 2009-September 30, 2014
Recipient:	Bismarck State College
Principal Investigator:	Drake Carter, Ph.D.
Consortium/Teaming Members:	Dickinson State University Minot State University Williston State College

Executive Summary:
Department of Energy Award Number DE-OE0000063, North Dakota Energy Workforce Development project, was designed to help provide the highly skilled workforce needed to successfully open the Bakken Oil Field in the Williston Basin of western North Dakota and, thereby, significantly lessen America's dependence on foreign oil from the politically volatile regions of the Middle East. Major accomplishments of the project included the development and/or expansion of four key programs to provide skilled workers needed by the oil industry in North Dakota. These associate degree credit programs included: Petroleum Engineering Technology; Petroleum Production Technology; Welding; and Residential Carpentry. Non-credit workforce training activities related to oil field safety and petroleum production were also supported. Additional major accomplishments included the planning and sponsorship of four symposia designed to foster communication and understanding of the positive and negative impacts of oil field development among citizens, communities, and industrial and political leadership to facilitate planning and timely response to predictable needs in the oil patch. The grant also funded 33 interregnum town hall meetings across western North Dakota to gather information to help direct the focus of the third and fourth symposia on immediate needs in affected areas.

Outreach and awareness plans were successfully implemented to inform the public and potential students about the availability and career potentials for the programs and activities funded by the grant.

Comparison of Actual Accomplishments with the Goals and Objectives of this Project:
Major goals and objectives of the project included: delivery of Residential Carpentry training in Williston; delivery of Welding instruction in Williston; development and delivery of Petroleum Production Technology in western ND; development and delivery of Petroleum Engineering Technology in western ND; delivery of supplementary credit and non-credit workforce training in welding in western ND; and development and hosting of four symposia, two each in Dickinson and Minot, addressing oil development related impacts in the oil patch.

Throughout this document, the phrase "development of an academic program" refers to the following activities funded by the grant: hiring of fulltime and adjunct faculty, development and refinement of curriculum with input from industry, payment for technical support from curriculum designers, identification and purchase of necessary equipment, supplies, software, hardware, and various expendable materials as necessary.

The major goals and objectives of the project were completed within the timeframe of the grant. Following is a bulleted list of accomplishments by each of the partner institutions.

Bismarck State College:

- Developed and offered Petroleum Engineering Technology, a 2-year program leading to an AAS degree. As the first cohorts of students progressed through the program, BSC continued to refine and improve the curriculum.
- Developed and offered Petroleum Production Technology, a 2-year program leading to an AAS degree. As the first cohorts of students progressed through the program, BSC continued to refine and improve the curriculum. This program is offered online to meet the needs of working and/or place-bound students.
- Expanded capacity in the Welding program from 12 students per year to 36; improved welding facilities and equipment to remain current in the trade. Base cost of the expansion was covered by appropriations from the North Dakota State Legislature; DOE grant money was leveraged for specific upgrades in welding facilities and in the purchase of high cost welding supplies.
- Improved and expanded welding training capacity in the third semester of the Mechanical Maintenance Program which includes 14 semester credits of coursework from the Welding Program.
- Purchased and retrofitted a welding trailer designed to provide noncredit training for new workers and advanced training for established welders. Welding simulators have been used to reduce training expenses and enhance student experience. BSC has partnered with the North Dakota Department of Corrections and Rehabilitation (NDDOCR) to provide welding training for low-risk inmates nearing the completion of their incarceration so that they are more readily employable upon release.

Williston State College:

- Developed and offered a Welding program. Curriculum was aligned so that high school students could take some of the Welding courses for simultaneous high school and college credit, moving them closer to job readiness upon graduation from high school.
- Developed and offered a Residential Carpentry program.
- Developed and offered non-credit workforce training in oilfield safety, petroleum production and related oilfield activities.

Minot State University:*

- Developed and coordinated a symposium (March 2010) titled "Energy Independence and Security" with 112 registered participants.
- Developed and coordinated a symposium (March 2011) titled "Growing with Energy: Economic and Infrastructure Impacts" with 165 registered participants.

Dickinson State University:*

- Developed and coordinated a symposium (August 2010) titled "Energy Technology" with 121 registered participants.
- Developed and coordinated a symposium (August 2011) titled "Growing with Energy: Environmental and Workforce Impacts" with 192 registered participants.

- Carried out 33 "town hall type" meetings, between their first and second symposia, across western North Dakota to gather information needed to address accumulated impacts of oilfield development on a rural infrastructure designed to handle a much smaller population.

**Symposia materials were sent with appropriate quarterly reports.*

Summary Narrative of Project Activities:

The initial scope of the project was traditional and focused. The four participating colleges, sister institutions in the North Dakota University System and located in the western half of North Dakota, were each to undertake specific activities to address the growing demands of an expanding oil industry and the impact on the citizens, communities and economy of the region. Growth in oil field exploration and drilling was being driven by a newly perfected technology: hydraulic fracturing. Among the initial activities to be undertaken were four energy-related symposia to be offered over two years and the development and expansion of Welding and Carpentry programs offered by BSC onto the WSC campus. Subsequent extension of the grant allowed for industry requested additional academic program development (i.e., Petroleum Engineering Technology program and Petroleum Production Technology program.)

At the time the project was designed and funding requested, no one could have accurately predicted the incredible explosion of oil field activity in the Williston Basin, with the small city of Williston, home to Williston State College, at the epicenter. Within months of the start of the project it became apparent that the original plan for BSC to secure the facilities and faculty needed to offer Welding and Carpentry in Williston in partnership with WSC was not feasible. It was more logical to cede that portion of the grant activities and related funding to WSC to pursue in such a way to best meet the college's role and mission in northwestern ND.

WSC did, in fact, gain approval from the North Dakota University System to offer the two programs. Curriculum was developed with support from BSC and the programs offered with mixed success. The quality of the programs has been excellent, but demand for labor in the Bakken has been so great, and salaries so high, that students and faculty both have been drawn away from their programs to the oilfield and much larger paychecks. WSC received money through legislative action to build a technical center that would house Welding and Carpentry, among other programs. In somewhat ironic fashion, construction of the building that was to house Carpentry, however, failed to meet deadline after deadline because of the short supply of materials and workers coupled with the incredible demand for construction of all types in the area. Following completion of the facility it has still been difficult to recruit students; it has been difficult to retain high performing students until the end of their programs. It has been difficult to hire and retain competent instructors. Employers have been desperate for labor. Anyone with a clean record and even basic skills has been highly employable. Thus students even one semester into their programs are often recruited into industry.

Another barrier faced by the WSC Residential Carpentry program has been the exorbitant cost of lots and of housing in Williston coupled with a short supply of building materials and specialty subcontractors. It was impossible to replicate BSC's long-standing traditional program in which a cohort of students built a house on site, performing all the work except site preparation, digging and pouring the basement, and finishing siding and shingling, all tasks normally done by subcontractors. WSC's solution in the first year of their program was to purchase and remodel and expand an older, run-down property. This proved successful, but prices and non-availability of suitable houses soon made that financially unfeasible.

By the second year of the project, as oil exploration and drilling continued expanding at unprecedented rates, it became apparent that demands for skilled and unskilled labor were far outstripping the available workforce. It was also apparent that academic programs needed to be developed to address specific unmet workforce needs. At the behest of industry, two new programs were envisioned, developed and eventually implemented: Petroleum Production Technology and Petroleum Engineering Technology. Both programs have been successfully offered at BSC, with graduates taking directly related employment in the petroleum industry.

Petroleum Production Technology provides students with a base knowledge of the oil industry and the skills needed to work at the well-site to manage oil production, storage and transfer. Petroleum Engineering Technology trains students in the software and techniques needed to support the work of petroleum engineers and geologists. (Links to the BSC websites are provided below for more detailed information on these programs. Additional links provide information on the Carpentry and Welding programs developed at WSC.)

At both WSC and BSC program enrollments have been reasonably strong, but sometimes less robust than originally intended, in part because competition from the oil fields is intense, with many traditional aged students opting for the high paying, but minimum skilled jobs, directly or indirectly related to the oil patch. Even in communities such as Bismarck that are peripheral to the oil patch, jobs at fast food franchises have $15/hour salaries and $500 sign-on bonuses. Unemployment in North Dakota has been at or near 3%, and has been down as low as 2.5% in the west. These are numbers that economists would normally consider unobtainable. Outreach and career awareness efforts, funded in part by this grant, have helped maintain overall enrollments at acceptable levels.

BSC was able to bolster welding training by purchasing a mobile welding lab, more frequently referred to simply as a welding trailer. The enclosed trailer, a typical one for an 18-wheeler, was already outfitted with ten welding stations. It had been designed to deliver welding training on the east side of the state but had been little used. BSC purchased and upgraded the trailer at about 60% of the price it would have cost to purchase and outfit a new one. This trailer has been placed at the Missouri River Correctional Center, Bismarck, ND. The MRCC is a minimum security facility that houses low risk male inmates nearing the date of their release. Some of these men make excellent candidates for welding training, and having some welding skills makes them very employable in the current ND economy, potentially reducing the risk of recidivism.

Identify Products Developed Under the Award and Technology Transfer Activities:

a. Publications, Conference Papers, Other Public Releases of Results: NA
b. Web Site or other Internet Sites: NA
c. Networks or Collaborations Fostered: NA
d. Technologies/Techniques: NA
e. Inventions/Patent Applications, Licensing Agreements: NA
f. Other Products (e.g., Educational Aids or Curricula): *See table below*

Program	College	Internet Links
Petroleum Production Technology	BSC	Video Link: http://www.bismarckstate.edu/academics/programsp/petroleumproductiontech/ Degree Plan: http://info.bismarckstate.edu/degreeplans2014-15/Petroleum%20Production%20AAS%202014-15.pdf Course Descriptions: http://energy.bismarckstate.edu/programs/prod/cd/
Petroleum Engineering Technology	BSC	Video Link: http://www.bismarckstate.edu/academics/programsp/petroleumengineeringtech/ Degree Plan: http://info.bismarckstate.edu/degreeplans2014-15/Petroleum%20Engineering%20Technology%20AAS%202014-15.pdf Course Descriptions: http://www.bismarckstate.edu/academics/programsp/petroleumengineeringtech/courses/
Carpentry	WSC	Fact Sheet: http://www.willistonstate.edu/Documents/Fact%20Sheets/Residential%20Carpentry%202011.pdf Course Descriptions: http://www.willistonstate.edu/Classes/Course-Descriptions/Residential-Carpentry-Courses.html
Welding	WSC	Fact Sheet: http://www.willistonstate.edu/Documents/Marketing%20Ads/Fact%20Sheets/WELDING%20FACT%20SHEET%20Draft%205.pdf Course Descriptions: http://www.willistonstate.edu/Classes/Course-Descriptions/Welding-Courses.html

Computer Modeling: this project did not involve computer modeling.

Summary:
Bismarck State College, along with its partners (Williston State College, Minot State University and Dickinson State University), received funding to help address the labor and social impacts of rapid oilfield development in the Williston Basin of western North Dakota. Funding was used to develop and support both credit and non-credit workforce training as well as four major symposia designed to inform and educate the public; enhance communication and sense of partnership among citizens, local community leaders and industry; and identify and plan to ameliorate negative impacts of oil field development.