NDIC Funding to Support Research of Petroleum Engineering Program at University of North Dakota

Submitted by:
Petroleum Engineering Program
University of North Dakota

- **Request for: $3,728,000**
- **Total Project Costs - $7,317,150**
- **Project Duration: 3 years**

Project Description

The department of Petroleum Engineering (DPE) at University of North Dakota (UND) received a total of $600,000 funding in support of his research activities in Sept 2018. The contract (Contract No. G-045-89) was for 18-month period with the expectation to support 9 Ph.D. students from the NDIC funding, plus 6 additional students supported by the DPE to work on project topics proposed by the NDIC and listed in the contract as the followings:

- Big Data Analytics/UAS/Data Mining
- CO2-EOR x Sulfate Deposition
- Machine Learning/Refracking

The DPE commenced its graduate program in Fall 2016, however, now serves as the largest graduate program at the College of Engineering and Mines (CEM) with currently 32 Ph.D. students and 20 Master students. This rapid growth could not happen without the strong support of the industry. The DPE has 30 representatives serving at the Industry Advisory Council (IAC) of the department and meet twice per year in fall and spring to discuss the state of the program and provide advice on how to expand and make the program stronger. Nearly all of our undergraduate students now receive job offers with the industry as soon as they are close to graduation, thanks to the support from the IAC.

The current NDIC funding in support of Ph.D. students' tuition and stipend, as well as faculty summer salary will end in Feb 2020. The funding promoted the department, UND and the state of ND by generating large number of quality publications in the areas of interest to ND oil and gas industry, several travels of students to different conferences and advertising for the undergraduate program in Petroleum Engineering at UND. While the Ph.D. program at UND DPE started in Fall 2016, we had our first graduate in Summer 2018, and then 7 graduates so far in 2019, and expect 8 new graduates in Spring 2020. This shows an average of less than 3-year graduation period, which is a great success. All of these students could find job within the local industry in ND, mostly working at the EERC. The 100% job placement and having over 9 of our current Ph.D. students working at the EERC during their Ph.D. program period is a strong indication of the quality of the students and how much they can support the research and projects in oil and gas industry in ND.

This proposal also includes a request for the installation of Full-Scale Reservoir Simulated Drilling and Completion Labs. These labs will offer drilling at 15,000 psi pressure suitable for geothermal simulations. It is a unique set up for educating and providing hands on and practical experience for students ready to go and work in the field upon completion of their B.S. degree; valuable resources for grad students to do research and great support for industry to do pilot projects and do proof of concept before doing any field scale operations.

TECHNICAL REVIEWERS' RATING SUMMARY

		Technical Reviewer			
Statement	**Weighting Factor**	**G-51-02A**	**G-51-02B**	**G-51-02C**	**Average Weighted Score**
Objectives	**9**	2	5	3	27
Achievability	**7**	2	5	4	21
Methodology	**8**	2	4	2	16
Contribution	**8**	2	3	4	24
Awareness / Background	**5**	4	5	4	20
Project Management	**3**	2	3	3	6
Equipment / Facilities	**2**	2	5	3	6
Value / Industry-Budget	**4**	3	4	4	12
Financial Match – Budget	**4**	2	3	3	8
Average Weighted Score		114	208	166	162
Maximum Weighted Score				**250 possible points**	

Technical Reviewer Totals

G-51-02A

Average Weighted Score: **114 out of 250**

DO NOT FUND

G-51-02B

Average Weighted Score: **208 out of 250**

FUND

G-51-02C

Average Weighted Score: **166 out of 250**

FUNDING TO BE CONSIDERED

Technical Reviewer Comments

Reviewer G-51-02A

It is clear from the application that the goal is to promote the education of students in UND's DPE, but no clear deliverables were outlined in the proposal. The donated drilling equipment appears to have potential, but further details are desired to clearly understand what need it will fill.
No detailed timelines or research objectives were provided by applicant. Roughly half of the budget was student tuition, stipends, and staff salary. The other half of the budget was lab facility rent and equipment prep/refurbishing.
Recommendation: Do Not Fund

Reviewer G-51-02B

This has been an exemplary program to date, providing critical funds for immersion of students in practical Williston Basin applications. The PI, Dr. Rasouli is a well-recognized subject matter expert. This program should be continued !!! Perhaps slightly less funding toward the program could be made available ? - not sure if the OGRP should pay for 100% of a new hire faculty member and/or the lab manager.
Recommendation: Fund

Technical Reviewer Comments

Reviewer G-51-02C

The proposed project is well aligned with OGRC goals and will continue to provide Ph.D. graduates from UND Petroleum Engineering Program, who are highly likely to be employed in North Dakota. Development of this expertise will help meet the OGRC goal to promote efficient, economic, and environmentally sound exploration, development, and use of North Dakota's oil and gas resources. Donation of the TerraTek Drilling and Completions Lab equipment to UND provides an opportunity to develop a unique research facility that could elevate the UND-PE capabilities and program stature. The lab development has received support from the DOE - NETL lab. This opportunity would benefit from further evaluation and development of a business/operations plan.

Recommendation: Funding to be Considered

Director's Recommendation:

Recommend funding $2,788,000 with contingencies and with the condition that $1,306,000 would come from the current biennium 2019-2021and $1,482,000 coming from the next biennium 2021-2023 appropriations. The Council could designate that $606,000 (student tuition and stipends and summer faculty summer salary) to come from the Council's education budget for the 2019-2021 biennium and $1,212,000 for the 2021-2023 biennium.

Contingency:

A. In order for the Oil and Gas Research Program (OGRP) to meet the statutory goals and purposes as defined by the Legislature the Council/Commission requires further assurance of the University of North Dakota's ongoing commitment of fiscal support for the UND Petroleum Engineering Program. Historically, the OGRP has been supportive of this UND Petroleum Engineering Program and would like to leverage its ongoing support. Detailed requirements to be discussed at the Council meeting.

B. No OGRP funding to be used for the Lab Manager Salary including benefits, Lab Consulting Fees and the Associate Professor Endowed Position (totaling $940,000).

C. The funding and progress shall be reviewed after year two to determine the effectiveness and before a permanent funding mechanism is established.