

Creedence Energy Services EOR Biosurfactant Applications

Submitted by:

Creedence Energy Services/Locus Bio-Energy

- ☐ **Total Funding Request - \$205,750**
Total Project Costs - \$622,288
Project Duration: 18 months

PROJECT DESCRIPTION

Recover oil from current production assets left behind by previous technological capabilities. This increased oil recovery will be done through use of 'squeeze' or batch treatment applications of a nano biosurfactant. This increased oil production can be at costs significantly smaller than those associated with full scale re-stimulations.

To increase production by appreciable amounts over the expected production decline of oil producing wells that are being depleted due to formation conditions. Creedence aims to prove suitability of novel biosurfactant chemistry, which, due to its incredibly small micelle size (< 2.0 nm) will be able to contact reservoir surfaces previously unreachable. The biosurfactant has properties which allow adsorption onto rock surface, allowing for long term chemical effect (> 6 months). Once in contact with formation surface and production fluids, the highly active biosurfactant will water-wet the formation rock (decreasing oil affinity for adhering to rock), reduce the surface tension of fluids (reducing the force needed to lift the fluids to surface), and reduce the interfacial tension of oil and water.

PROJECT DESCRIPTION

Creedence aims to prove this technology in closed hole, legacy assets, as well as early Bakken production wells with limited perforation surface area. Once the adsorption and mechanism of stimulation is proven, Creedence aims to explore open-hole applications and more recent Bakken production wells with increased perforation space. This technology is a low pressure injection stimulation job which should prove less costly than full-scale “refracs”. This decreased economic impact may help reduce statewide production decline while economic conditions are unfavorable to investment in new wells or full-scale re-fracs. With the return of favorable economic conditions and proof of the biosurfactant suitability, this chemistry may be applied initially in well stimulations to increase initial production of Bakken wells also. Lastly, if enough demand is created, investment in a biosurfactant fermenter may be warranted in the state, which would utilize canola oil and sugar as fuel sources, both of which are abundantly available due to North Dakota’s agriculture industry.

Technical Reviewers' Rating Summary					
		Technical Reviewer			
Statement	Weighting Factor	<u>G-53-01A</u>	<u>G-53-01B</u>	<u>G-53-01C</u>	<u>Average Weighted Score</u>
Objectives	9	4	4	4	36
Achievability	7	4	3	3	21
Methodology	8	3	2	3	16
Contribution	8	3	4	3	24
Awareness / Background	5	2	2	2	24
Project Management	3	3	3	3	9
Equipment / Facilities	2	4	2	2	4
Value / Industry-Budget	4	4	4	4	16
Financial Match – Budget	4	3	4	3	12
Average Weighted Score		167	160	156	161
Maximum Weighted Score				250 possible points	

TECHNICAL REVIEWER TOTALS

- G-53-01A

Average Weighted Score: **167 out of 250**

FUNDING TO BE CONSIDERED

- G-53-01B

Average Weighted Score: **160 out of 250**

FUNDING TO BE CONSIDERED

- G-53-01C

Average Weighted Score: **156 out of 250**

FUNDING TO BE CONSIDERED

TECHNICAL REVIEWER COMMENTS

Reviewer G-53-01A

The applicants have indicated a multi-tiered set of goals that would provide escalating levels of economic benefit if the technology is proven viable. First level would involve increasing production from existing candidate wells, primarily legacy and early unconventional completions to help reduce the decline in statewide oil and gas production. Second level would involve incorporation of the technology in new completions to enhance oil and gas recovery. Third level would involve construction of a commercial chemical manufacturing facility within North Dakota to supply demand for the technology by processing of existing North Dakota agricultural products as the inputs.

Recommendation: Funding to be Considered

Reviewer G-53-01B

The proposed EOR methodology has tremendous potential in both conventional and unconventional reservoirs in the Williston Basin. The introduction of a low-cost EOR treatment during a time of industry downturn would help to enhance production and cashflow from existing wells at higher rates of return without large capital commitments. Areas of concern include the inadequate testing of reservoir lithologies with respect to biosurfactants. In addition, no published technical references or data was presented illustrating the efficacy of the proposed treatment, especially in fracture stimulated reservoirs. However, excluding technical details, the upside in testing the application of this low cost treatment far outweighs the cost borne by the OGRC as a whole

Recommendation: Funding to be Considered

Reviewer G-53-01-C

The description of the technology, applicability to the Williston Basin, plan for demonstration and how the technology will be deployed if the technology impact is as the requestor anticipates are all clearly stated. What is not clear is the percentage of wells in general are candidates. It also does not state an expectation of success of re-application of the treatment, since the affects only last a year or two. Both need to be addressed to assess the potential impact of the technology.

Recommendation: Funding to be Considered

Recommendation:

Fund in the amount of \$205,750 contingent upon the following:

- 1. Applicant needs to benchmark specific deliverables within 18 months and state how they intend to communicate these results within their quarterly reports.**
- 2. Approved contract with operator for pilot project.**