Technical Reviewers' Rating Summary

Proposal Number G-35-01 Application Title TENORM Characterization Submitted By Battelle Energy Alliance, LI Request For $450,000.00 Total Project Costs $900,000.00

Section A. Scoring

Statement	Weighting Factor	G-35-01A	G-35-01B	G-35-01C	Average Weighted Score
1. Objectives	9	**3**	**3**	**4**	**27**
2. Achievability	7	**3**	**2**	**4**	**21**
3. Methodology	8	**2**	**1**	**4**	**16**
4. Contribution	8	**3**	**4**	**5**	**32**
5. Awareness / Background	5	**3**	**4**	**5**	**20**
6. Project Management	3	**3**	**3**	**4**	**9**
7. Equipment / Facilities	2	**3**	**2**	**4**	**6**
8. Value / Industry - Budget	4	**3**	**3**	**4**	**12**
9. Financial Match - Budget	4	**2**	**3**	**5**	**12**
Average Weighted Score		**138**	**138**	**217**	**164**
	Total: 50				**250 possible points**

OVERALL RECOMMENDATION

FUND			**X**
FUNDING TO BE CONSIDERED	**X**	**X**	
DO NOT FUND			

Section B. Ratings and Comments

1. The objectives or goals of the proposed project with respect to clarity and consistency with North Dakota Industrial Commission/Oil and Gas Research Council goals are:

   Overall the intent of the project was described adequately
   - Reviewer: G-35-01A
   - Rating: 3

   Although the stated goals of the proposal are clear, the reviewer has some hesitation regarding the proposer's knowledge of TENORM disposal regulations in ND. The proposal states that the technology will be capable of segregating nonradioactive wastes <5 pCi/gr. However, the proposal does not address the proposed new ND Department of Health threshold of <50 pCi/gr. It is unclear whether the technology is tunable for the higher threshold.

- Reviewer: G-35-01B
- Rating: 3

The project will promote environmentally sound practices that will allow operators to manage waste in a more efficient and cost-effective manner while protecting the environment and health of ND citizens. The project will allow waste handlers to provide a new service to operators, creating new jobs and employing technology not presently in use in ND while reducing the footprint of the industry. The project, if proven, can be implemented elsewhere in ND.
- Reviewer: G-35-01C
- Rating: 4

2. With the approach suggested and time and budget available, the objectives are:

No comment
- Reviewer: G-35-01A
- Rating: 3

It is difficult to ascertain whether the objectives are achievable because so little methodology is detailed in the proposal. In large part, the proposal reads like a sales bulletin, not a research project proposal. No detail is provided as to how the technology will accurately measure extremely low level radioactive waste in a timely manner, or how the proposed project will go about proving the technology and its methodology.
- Reviewer: G-35-01B
- Rating: 2

The rapid characterization of TENORM waste and proper handling is a pressing need in managing oilfield waste. The qualifications and experience of the applicants should provide a reasonable chance of success.
- Reviewer: G-35-01C
- Rating: 4

3. The quality of the methodology displayed in the proposal is:

Needed a little more QA/QC description to identify correlation of instrument readings with laboratory data. Accuracy and reproduction of analysis data was not clearly articulated.
- Reviewer: G-35-01A
- Rating: 2

As stated earlier, no detailed methodology is presented in the proposal. The proposal states that the technology “allows all measurements to be performed even shortly after the waste is generated at the well head thereby allowing disposal requirements to be defined shortly after the waste is generated,” but it does not address how the technology reliably employs an alternate approach to current accepted methodologies that depend upon ingrowth of daughter decay products and achievement of secular equilibrium.
- Reviewer: G-35-01B
- Rating: 1

Applicant has outlined the method by which the project will be implemented, how the technology will be utilized, what the benefits are, and how it will positively impact the industry and the environment.

- Reviewer: G-35-01C
- Rating: 4

4. The scientific and/or technical contribution of the proposed work to specifically address North Dakota Industrial Commission/Oil and Gas Research Council goals will likely be:

   The 2a project if completed successfully could provide a needed rapid identification technology that could be put to immediate use. However, the applicability to current disposal requirements and waste regulations of part 2B is questionable.
   - Reviewer: G-35-01A
   - Rating: 3

   If successful, as described, this technology has the potential to address one of the shortcomings in the currently-proposed ND Department of Health TENORM disposal regulations – a clear method of measuring radioactivity in a timely and cost-effective manner. This assumes that the proposed technology can be commercialized in an affordable manner. No commercial cost projections were offered in the proposal or the appendix.
   - Reviewer: G-35-01B
   - Rating: 4

   Successful implementation of the project will bring new companies and investment to ND, create jobs, tax revenue, employ technologies not present in ND, create a new practice to reduce the footprint of the industry, develop baseline information that will lead to other projects, and facilitate education of the industry on proper handling of TENORM waste.
   - Reviewer: G-35-01C
   - Rating: 5

5. The background of the principal investigator and the awareness of current research activity and published literature as evidenced by literature referenced and its interpretation and by the reference to unpublished research related to the proposal is:

   No comment
   - Reviewer: G-35-01A
   - Rating: 3

   The PI, Douglas Akers, is an acknowledged expert in the area of radioactivity measurement, and is likely well-versed in current research activity and published literature. It is curious, however, that the proposal does not address comparisons and contrasts between the proposed technology and seemingly-similar technologies currently commercially available. It is recommended that OGRP look into similar technologies to determine whether additional funding toward development of the BEA technology will yield desired results.
   - Reviewer: G-35-01B
   - Rating: 4

   The background, qualifications, and experience of the personnel and companies involved is exceptional. The experience with different types of radiation should prove invaluable in implementing and trouble-shooting the project as it develops.
   - Reviewer: G-35-01C
   - Rating: 5

6. The project management plan, including a well-defined milestone chart, schedule, financial plan, and plan for communications among the investigators and subcontractors, if any, is:

   No comment
   - Reviewer: G-35-01A
   - Rating: 3

   No comment
   - Reviewer: G-35-01B
   - Rating: 3

   The project management plan includes a well-defined milestone chart, schedule, and financial plan.
   - Reviewer: G-35-01C
   - Rating: 4

7. The proposed purchase of equipment and the facilities available is:

   No comment
   - Reviewer: G-35-01A
   - Rating: 3

   The budget table in the main body of the proposal does not seem to match similar tables provided in the appendix. The reviewer is left wondering which budget justification is intended to be proposed. Little explanation is offered regarding how the equipment numbers were derived – past experience, quotes, catalog prices.
   - Reviewer: G-35-01B
   - Rating: 2

   Purchase and assembly of equipment is well documented, and a proposed facility is mentioned but not specific.
   - Reviewer: G-35-01C
   - Rating: 4

8. The proposed budget “value”1 relative to the outlined work and the commitment from other sources is of:

   No comment
   - Reviewer: G-35-01A
   - Rating: 3

   No comment
   - Reviewer: G-35-01B
   - Rating: 3

   The project will evaluate technology to be used to rapidly characterize TENORM waste which will allow more efficient, cost effective, and proper handling. Encapsulation of TENORM waste provides a safe alternative for handling and disposing. Success of the project will provide the industry another means to responsibly handle TENORM waste. Additional funding from Ceramic Cement Corporation is noted as well as $363,000 devoted to labor costs.
   - Reviewer: G-35-01C

- Rating: 4

9. The “financial commitment”2 from other sources in terms of “match funding” have been identified:

   Due to the unknown benefit of part 2B the value may be low.
   - Reviewer: G-35-01A
   - Rating: 2

   C3 seems to have “skin in the game,” indicating a valuable shared risk, but cost share proposed is at the minimum level requested by OGRP.
   - Reviewer: G-35-01B
   - Rating: 3

   Applicants share of project is 50%. Partnership with Ceramic Cement Corporation is noted.
   - Reviewer: G-35-01C
   - Rating: 5

1 “value” – The value of the projected work and technical outcome for the budgeted amount of the project, based on your estimate of what the work might cost in research settings with which you are familiar. A commitment of support from industry partners equates to a higher value.

2 “financial commitment” from other sources – A minimum of 50% of the total project must come from other sources to meet the program guidelines. Support less than 50% from Industrial Commission sources should be evaluated as favorable to the application; industry partnerships equates to increased favorability.

General Comments

Overall Part 2A may have some applications to the state moving toward responsible characterization and disposal of TENORM waste with funding being considered if the QA/QC issues can be addressed. However, it is uncertain what the value of Part 2B would be and the decision to not fund this portion of the proposal may be an option.
- Reviewer: G-35-01A

Please comment in a general way about the merits and flaws of the proposed project. The proposed technology holds promise to answer the question of how TENORM wastes will be quantifiably measured in the field, thus reducing costs and liability for oilfield waste generators and logistics firms. The PI is an acknowledged expert in the overall category of radiation measurement. In the reviewer’s estimation, the shortcomings of this proposal distill to three main points: 1. The proposal does not provide insight into how the new technology will achieve its goals without waiting for decay product ingrowth and achievement of secular equilibrium. The proposal reads more like a sales brochure than a proposal for defined research. 2. The proposal does not address commercialization aspects of the technology – will this technology, if developed successfully, be affordable for use in the field? 3. The proposal does not address how the technology is significantly different from other commercialized rapid scan technologies offered by Canberra, ThermoScientific, Berkely Nucleonics, Ortec, or others. On the surface, the proposer seems to desire to achieve measurements similar to these commercially-available instruments, although these instruments have yet to demonstrate applicability to oilfield waste segregation.
- Reviewer: G-35-01B

The project, if proven successful, will provide a valuable and practical alternate solution for the industry to properly handle TENORM waste. Success will encourage regulatory compliance, reduce the cost of compliance, promote environmental stewardship, protect public health, and address public concerns about proper handling of TENORM waste.
- Reviewer: G-35-01C