

# Technical Reviewers' Rating Summary

Proposal Number  Application Title  Submitted By   
 Request For  Total Project Costs

## Section A. Scoring

Statement	Weighting Factor	G-46-01A	G-46-01B	G-46-01C	Average Weighted Score
1. Objectives	9	4	3	4	27
2. Achievability	7	4	2	5	21
3. Methodology	8	3	3	5	24
4. Contribution	8	5	4	4	32
5. Awareness / Background	5	5	5	5	25
6. Project Management	3	4	3	4	9
7. Equipment / Facilities	2	4	3	5	8
8. Value / Industry - Budget	4	4	5	5	16
9. Financial Match - Budget	4	4	3	5	16
<b>Average Weighted Score</b>		<b>205</b>	<b>169</b>	<b>230</b>	<b>201</b>

Total: 50

**250 possible points**

## OVERALL RECOMMENDATION

FUND  X  X  
 FUNDING TO BE CONSIDERED   X  
 DO NOT FUND

## Section B. Ratings and Comments

- 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:

The objective is to form an industry consortium R&D program to address the prevention and detection of pipeline spills. The goal of the intelligent Pipeline Integrity Program (iPIPE) is to develop and demonstrate cutting edge technology that can prevent and/or detect gathering pipeline leaks. This is proactive approach by industry to investigate and promote emerging technologies to prevent and detect pipeline leaks. Current industry participants are Hess Corporation, Statoil Pipelines LLC, Oasis Midstream Partners, ONEOK and Goodnight Midstream. Additional industry partners are expected to join the consortium. The following objectives support the project: • Select the most promising emerging (near-commercial) technologies for demonstration • Demonstrate multiple technologies on working gathering pipelines • Document results of technology demonstrations • Facilitate adoption of technologies into North Dakota pipeline operations

- Reviewer: G-46-01A

- Rating: 4

I believe the applicant's intentions are well aligned with the OGRC goals and could assist with the following OGRC goals/purposes: -Promote efficient, economic, and environmentally

sound exploration, development, and use of North Dakota's oil and gas resources. -Encourage, and promote the use of new technologies and ideas that will have a positive economic and environmental impact on oil and gas exploration, development, and production in North Dakota.

- Reviewer: G-46-01B

- Rating: 3

This proposal meets NDIC-OGRC goals related to the promotion of efficient and environmentally sound development of North Dakota's oil and gas resources. The proposal also encourages, and promotes the use of new technologies and ideas that will have a positive environmental impact on oil and gas development in North Dakota. The iPIPE consortium will be focused on identifying and demonstrating emerging technologies presently not deployed in pipelines on a commercial scale anywhere, including North Dakota. The intent of the proposal is to advance gathering pipeline leak detection and prevention technologies in North Dakota.

- Reviewer: G-46-01C

- Rating: 4

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

The duration of the project is 44 months. It is anticipated that the project will continue long term to ensure sufficient momentum required to mature multiple technologies. Total cost of the project is \$3,714,000

- Reviewer: G-46-01A

- Rating: 4

The application was intentionally vague on the exact types of research that would be conducted using the OGRC funds. The proposed consortium format would be responsible for choosing the research projects and reporting back the details to the OGRC/NDIC.

- Reviewer: G-46-01B

- Rating: 2

The timeline proposed is 44 months with testing new leak detection and prevention technologies every year for 4 consecutive years. The budget is dependent on adding members to the consortium and matching NDIC-OGR grant funds of \$1,600,000 for the first year, \$1,000,000 in 2019, \$800,000 in 2020, and \$600,000 in 2021. In total over the 44 month timeframe the applicants are requesting \$4,000,000 from the NDIC-OGR. This would include adding up to 18 members of the consortium by 2021.

- Reviewer: G-46-01C

- Rating: 5

To clarify, the program is initially asking for \$1.6M in cash contribution from NDIC. IF additional members are recruited (which satisfies an interest the state has in promoting improved pipeline operations among ALL operators in the state), then the program would request additional funding. The program anticipates additional membership from those companies who have expressed desire, but could not quickly commit. There will also be members who will join only after they see the tremendous progress made and benefits presented to members of the program. The program is NOT requesting \$4M from NDIC at this time.

- Applicant

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

The consortium will be governed by a five-seat executive committee made up of members of the consortium and an advisory member of the Energy & Environmental Research Center

(EERC). The EERC will manage the program and coordinate communications, meetings and scheduling. The five seat executive committee will rotate annually. Specific methodologies were not identified since the executive committee has not been formed. Five examples were provided on page 7. 1. Produced Water Pipeline Leak Detection: Use of artificial intelligence (machine learning algorithms) on data from multiple instruments aboard a drone aircraft, with emphasis on novel radiological sensors. 2. Liquids Gathering Pipeline Leak Detection: Use of drones to monitor large areas for pipeline leaks, with emphasis on beyond-visual-line-of-sight drone operations. 3. Inline Inspection for Difficult-to-Pig Pipelines: Miniaturized, neutrally buoyant sensor to locate pipelines and detect small leaks via acoustic measurements. 4. Dedicated Leak Detection System for High-Consequence Areas (HCAs): Turnkey, nonintrusive suite of hardware and software to detect small leaks within pipelines in HCAs with limited power and communication infrastructure. 5. Liquids Gathering Pipeline Leak Detection: Opportunistic Artificial Intelligence (AI) processing of available data sets from satellites, commercial aircraft, drones, and fixed sensors.

- Reviewer: G-46-01A

- Rating: 3

Rating the methodology is particularly challenging because it is currently unknown. First, the consortium needs to agree to an area of research and then the methodology will be developed. I feel that the EERC's research expertise will greatly assist in coming up with the appropriate methodology for the chosen research area(s).

- Reviewer: G-46-01B

- Rating: 3

The idea of developing a consortium made up of pipeline operators and managed by the EERC is exactly what is needed to advance technology in detecting and preventing gathering pipeline leaks in North Dakota. It may be the only way to advance this technology or at least this consortium will expedite the development and deployment of these new and emerging technologies for gathering pipelines. The proposal did point out Governor Burgum's challenge to the industry to develop and apply cutting edge technology to eliminate pipeline leaks. This proposal is aiming to do just that.

- Reviewer: G-46-01C

- Rating: 5

The program will initially focus on (1) leak detection and (2) leak prevention specifically for liquids gathering pipelines. This will address the Governor's and the Legislature's stated interests. With success, the program may expand to other areas of interest. (response to reviewer B's comments)

- Applicant

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:

This project aligns with the OGRC objective and goal of encouraging and promoting the use of new technologies and ideas that will have a positive economic and environmental impact on oil and gas exploration, development, and production in North Dakota. The success of this project will result in less pipeline spills.

- Reviewer: G-46-01A

- Rating: 5

If the consortium is formed and receives the proposed funding and participation from industry, the outcomes could be very significant for the overall petroleum industry. The topic of pipeline integrity is very much in the minds of regulators, policy makers, industry, and general public. There are many areas of potential research that may prove very beneficial for all stakeholders.

- Reviewer: G-46-01B
- Rating: 4

The proposal meets the NDIC-OGRC goals for advancing new technologies not currently in use. Some of the technologies proposed may be in use in other industries, but the applicants are proposing to utilize some of these technologies for the first time in oil and gas pipelines. This proposal will demonstrate and evaluate emerging technologies. The consortium is also willing to share the results of their investigations with non-members. This will benefit the industry as a whole and ultimately benefit North Dakota. Specifically the NDIC-OGRC goal that relates directly to this proposal is to encourage, and promote the use of new technologies and ideas that will have a positive economic and environmental impact on oil and gas exploration, development, and production in North Dakota.

- Reviewer: G-46-01C
- Rating: 4

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:

The EERC will manage the project under the direction of the consortium executive board. The EERC has extensive experience with participating and managing various projects with the ND oil industry. The current industry consortium partnership is made up of companies that have a large and long presence in ND. They are leaders in the ND oil industry. As the project progresses additional companies are expected to join the consortium.

- Reviewer: G-46-01A
- Rating: 5

The team at the EERC has a very strong record of providing high quality research for the petroleum industry. If the EERC's research team is combined with the industry's experienced personnel, I believe the potential exists for very high quality and meaningful research.

- Reviewer: G-46-01B
- Rating: 5

The proposed consortium and the EERC are considered experts in testing new technologies on gathering pipelines. The current members of the consortium will be testing these technologies on their gathering pipeline systems. This project should also attract additional members and therefore more expertise. The EERC has a proven track record and will be playing a key role in managing the project. The EERC has lead efforts of an ongoing study of liquids gathering pipelines since 2015 and has completed 2 of 3 phases with the 3rd phase currently under way and focused on risk assessment and emerging leak detection and prevention technologies.

- Reviewer: G-46-01C
- 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:

The project will be managed by the EERC. The consortium will authorize at least one technology demonstration yearly which the EERC will work with and report the results. The timetable provided is sufficient and attainable.

- Reviewer: G-46-01A
- Rating: 4

Limited details existed in the application due to the exact research details being worked out through the proposed consortium. The application outlined the consortium research selection process and the reporting of its decisions to the OGRC/NDIC.

- Reviewer: G-46-01B
- Rating: 3

The project will be managed and operated by the EERC with a well-defined schedule and quarterly reporting. The plan for communications seems sufficient with a 5-member board voting and the EERC as a nonvoting member making recommendations to the board and reporting to the NDIC. The EERC will be managing and operating the project. Milestones, reporting and the financial plan are clearly defined in the chart provided on page 14.

- Reviewer: G-46-01C
- Rating: 4

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

The purchase of equipment is not defined in the budget since the technology partner has not been identified. The equipment budget of \$2,150,000 (NDIC - \$900,000, Applicants - \$1,250,000) should be sufficient.

- Reviewer: G-46-01A
- Rating: 4

No details existed in the application due to the exact research details being worked out through the proposed consortium. With the consortium format and level of industry participation outlined in the application, the availability of research facilities and equipment should be adequate for the stated goals.

- Reviewer: G-46-01B
- Rating: 3

The EERC built a custom trailer for its 2016 pipeline leak detection demonstration project and will use the trailer as the key piece of equipment for this project. All facilities will be existing in-service gathering pipeline systems operated by consortium members. In order to test leak detection and prevention technologies those services may need to be purchased. The applicants are hoping for an in-kind cost sharing of those services.

- Reviewer: G-46-01C
- Rating: 5

8. The proposed budget "value"<sup>1</sup> relative to the outlined work and the commitment from other sources is of:

This project is best performed in an active oil and gas operations. There is strong support from industry.

- Reviewer: G-46-01A
- Rating: 4

The industry commitments to forming the proposed consortium is very encouraging. There appears to be a strong desire for meaningful, collaborative research in the area of pipeline integrity. The potential value of an engaged industry working together with quality research experts is exceptionally good.

- Reviewer: G-46-01B
- Rating: 5

The applicants propose to match all requested funds and assure that NDIC-OGRC cost share will not exceed 50%. As previously stated the total amount requested by the applicants from the NDIC-OGRC over the 44 month project is \$4,000,000. The value of developing commercial ready cost effective leak detection and prevention technology for gathering pipelines is difficult to compare to the overall cost. Since 2015 North Dakota has put forth a lot of effort to improve gathering pipeline integrity. This proposal is the next step to not only improving integrity, but also leading in the development of these technologies. The

advancement of emerging technology specific to gathering pipelines can be done best in the manner proposed by the applicant. The value is good if the result is improved gathering pipeline integrity, reduced spills related to oil and gas, and cost effective commercially ready leak detection and prevention technologies.

- Reviewer: G-46-01C

- Rating: 5

Clarification: The program is asking for \$1.6M at this time. It only requests the additional funds if additional members are recruited (therefore amassing more industry cost share).

- Applicant

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

There are project support and financial commitment letters from Hess Corporation, Oasis Midstream Services, Statoil and Goognight Midstream. Industry has committed \$1,614,000 in cash for the \$3,714,000 project. Also, industry will support the project with \$300,000 of in-kind services and other project sponsor's share of \$200,000.

- Reviewer: G-46-01A

- Rating: 4

The application outlines a near 50/50 cash contribution split between the industry and OGRC. This split is considered average when compared to many other OGRC applications.

- Reviewer: G-46-01B

- Rating: 3

The proposal identifies 5 consortium members, but also states that 6 members contributing \$269,000 each will be necessary to match the requested \$1,600,000. Further additional members are need in the subsequent years in order to continue to match additional funds requested in 2019, 2020, and 2021. The applicants propose to match all requested funds and assure that NDIC-OGRC cost share will not exceed 50%.

- Reviewer: G-46-01C

- Rating: 5

Clarification: The program proposes MORE THAN 50% cash cost share from industry, and less than 50% from NDIC. (response to reviewer C comment)

- Applicant

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

There are numerous projects that address pipeline spill detection. The value of this project is that it addresses both prevention and detection of pipeline spills. It forms a consortium of oil pipeline companies with plans to include additional partners. The EERC will manage the project and coordinate reports and communications. By hosting the data the EERC will provide sustainability to the project. It allows companies to participate at various levels. This project will investigate and implement new technologies for prevention and detection. The technologies will be identified by five members of the executive committee. The examples provided: - utilized drone collection machine learning algorithms and novel radiological sensors - use of drones to monitor pipelines in

areas that are hard to access - use of neutrally buoyant sensor and acoustic measurements for in-line inspection- - hardware and software to detect small leaks in HCA areas with limited power and communications - artificial intelligence processing from satellites, commercial aircraft, drones and fixed sensors The examples are predominantly focused on detection. A challenge for industry is preventing and predicting pipeline failures. The project refers to pipeline integrity and prevention as per the below quotes: "Ultimately, it is envisioned that development of new tools specifically designed for small-diameter, highly segmented, networked gathering pipelines will result in improved pipeline integrity." - Page 10 "Holistically, the project will be successful if it inspires enthusiasm for new technology application to the challenge of early identification of pipeline issues before they become leaks and if it demonstrates North Dakota leadership in such endeavors." - Page 11 Spill detection and pipeline monitoring are important. Spill prevention and predictable analysis with health scoring should also be considered.

- Reviewer: G-46-01A

I would highly recommend the OGRC consider funding this project. The application objectives have the potential to reshape pipeline operations, regulations, and public perception. I am not aware of any similar pipeline integrity research with such broad industry support. As noted above, an engaged industry is key to making this a meaningful endeavor for all stakeholders. Given the high dollar amount, one concern is the lack of influence the OGRC/NDIC will have on the consortium activities and use of matching funds. It will be important for open and frequent communication between the OGRC/NDIC if funds are granted.

- Reviewer: G-46-01B

This proposal is key to advancing new technologies for detecting and preventing leaks in gathering pipelines. If successful the result will be improved pipeline integrity in North Dakota, reduced number of oil and gas related spills, and advancement of new cutting edge technologies, some of which are used in other industries but will be tested in pipelines for the first time as part of this proposal. This proposal gives the NDIC-OGRC the opportunity to partner with industry in advancing these technologies in way that will continue to make North Dakota a leader. An added benefit of this project being successful will be the improving the general public's confidence in pipelines.

- Reviewer: G-46-01C