



July 30, 2019

Ms. Karlene Fine  
Executive Director  
North Dakota Industrial Commission  
State Capitol, 14th Floor  
600 East Boulevard Avenue, Department 405  
Bismarck, ND 58505-0840

Dear Ms. Fine:

Subject: Revised Quarterly Progress Report Entitled "iPIPE – intelligent Pipeline Integrity Program," Contract No. G-046-88; UND Project – Fund 43500-UND0022445  
EERC Funds 23121 and 23211

Attached is a revised quarterly progress on the subject project for the period of April 1, 2019 – June 30, 2019. We revised numbers in Table 2 after finding typographical errors. We are sorry for any inconvenience.

If you have any questions, please contact me by phone at (701) 777-5260 or by e-mail at [jalmlie@undeerc.org](mailto:jalmlie@undeerc.org).

Sincerely,

A handwritten signature in black ink, appearing to read "Jay C. Almlie", is written over a horizontal line.

Jay C. Almlie  
Principal Engineer  
Mid/Downstream Oil & Gas Group Lead

JCA/rlo

Attachment

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# **iPIPE – INTELLIGENT PIPELINE INTEGRITY PROGRAM**

## **Quarterly Progress Report**

*(for the period of April 1, 2019 – June 30, 2019)*

*Prepared for:*

Karlene Fine

North Dakota Industrial Commission  
State Capitol, 14th Floor  
600 East Boulevard Avenue, Department 405  
Bismarck, ND 58505-0840

Contract No. G-046-88

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July 2019

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# **iPIPE – INTELLIGENT PIPELINE INTEGRITY PROGRAM**

## **Quarterly Progress Report April 1, 2019 – June 30, 2019**

### **BACKGROUND**

During a May 2017 meeting with North Dakota pipeline operators, Governor Doug Burgum challenged industry to apply advanced technologies to eliminate pipeline leaks in North Dakota. In response to the Governor's challenge, industry chose a proactive path and engaged in a 3½-year program to advance development and application of emerging technologies that will prevent and detect pipeline leaks. The program intends to assist in the development of multiple emerging technologies to prevent and detect pipeline leaks by engaging with technology providers to refine not-yet-commercial products specifically for buried gathering pipelines in North Dakota, and then demonstrate technology application on working gathering pipelines.

The goal of this project is to develop and demonstrate cutting-edge technology that can prevent and/or detect gathering pipeline leaks. This goal will be supported by accomplishment of the following objectives:

- Select the most promising emerging (near-commercial) technologies for demonstration.
- Assist technology providers in refinement of their products.
- Demonstrate multiple technologies on working gathering pipelines.
- Document results of technology demonstrations.
- Facilitate adoption of technologies into North Dakota pipeline operations.

Multiple demonstrations of emerging technologies on working pipelines will simultaneously assist technology providers in refining designs, pave a path toward full commercialization in the North Dakota market, prepare pipeline operators for adoption of the new tools, and improve the performance and economics of gathering pipeline operations in North Dakota. With demonstrated success, additional consortium members (pipeline operators) will join the effort, thus enabling field testing of more technologies and further proliferating new technology among all pipeline operators.

The nine members of the industry-led consortium include Hess Corporation, Equinor, Oasis Midstream Partners, Goodnight Midstream, ONEOK, Andeavor, Whiting Petroleum, DCP Midstream, and Enbridge. The consortium has asked the Energy & Environmental Research Center (EERC) to manage the program on its behalf. As such, the EERC submits a quarterly report and an annual report on behalf of the members of the iPIPE consortium.

The following quarterly report summarizes the program activities from April 1, 2019, through June 30, 2019.

## ACCOMPLISHMENTS DURING REPORTING PERIOD

- Program-level activities
  - Program briefings
    - ♦ EERC staff presented an overview of iPIPE at the Interstate Oil & Gas Compact Commission (IOGCC) Annual Business Meeting in Oklahoma City, Oklahoma, on May 5, 2019.
    - ♦ EERC staff presented an overview of iPIPE to the North Dakota Petroleum Council's Technical Solutions Group (NDPC TSG) in Dickinson, North Dakota, on May 8, 2019.
    - ♦ EERC staff presented an overview of iPIPE at an Interstate Natural Gas Association of the Americas (INGAA) workshop entitled, "Enhancing Safety and ROW Inspections" in Houston, Texas, on May 14, 2019.
    - ♦ EERC staff presented an overview of iPIPE at the 2019 Energy Disruptors Summit in Kohler, Wisconsin, on June 20, 2019. This invitation-only summit was hosted by DrillingInfo. The presentation was copresented by Jay Almlie and Lynn Helms, Director of the North Dakota Department of Mineral Resources. The two gentlemen presented iPIPE as an example of North Dakota's unique approach to innovation vs. regulation.
  - Member recruitment
    - ♦ Enbridge became the newest member of the iPIPE consortium on May 28, 2019.
    - ♦ The program continued discussion with a number of companies regarding membership in the consortium. Some of these companies have approached the program regarding membership requirements and benefits, while others have been approached by the program and/or existing consortium members.
  - Program media mentions
    - ♦ iPIPE has now been highlighted in more than 45 public multimedia and printed articles. For a partial listing of known media mentions, please refer to Appendix A.
- Technology selection
  - During this reporting period, the EERC pursued leads on 55 potential emerging technologies that iPIPE may consider during the 2019 technology selection round. During coming months, these technologies will be further vetted before the ones most promising to be presented before the technology selection committee are determined.
  - On June 14, 2019, the 2019 iPIPE request for proposals (RFP) was sent to promising emerging technology providers. As the program continues to explore emerging technologies, this RFP will also be sent to these providers. The due date for proposals is September 6, 2019.
  - During this reporting period, EERC staff made firm plans for the next technology selection event. This event will be held on October 22 and 23, 2019.
- Development project execution
  - Ingu Solutions
    - ♦ The final, remaining Pipers run was executed on an Equinor pipeline on June 5, 2019. This test focused specifically on leak detection capabilities of the Pipers sensor. Equinor simulated a pipeline leak. With this test, all Ingu runs have now been completed. An Ingu test report is anticipated in July 2019.
  - Sateletics, Phase II

- ♦ Satelytics monitoring of the same area of interest monitored in 2018 began on June 2, 2019.
- ♦ On June 9, 2019, Satelytics began monitoring a secondary area of interest in North Dakota. This secondary area of interest is located approximately 13 miles north of the primary area of interest. This secondary area of interest was added to ensure that all North Dakota members of the consortium have assets monitored by Satelytics. This addition required a contract modification and a minor cost increase.
- ♦ On June 16, 2019, Satelytics began monitoring a third area of interest in New Mexico. This third area was added to ensure that each member of iPIPE had assets monitored by Satelytics. Again, this required an additional contract modification and a minor cost increase to the program. The program is now demonstrating in the Williston Basin and in the Permian Basin. This change will also serve member recruitment goals.
- ♦ By the end of the reporting period, Satelytics had completed three of 16 planned weekly data captures and analyses.
- Direct-C
  - ♦ During this reporting period, EERC staff collected produced water and crude oil samples from several program members for use in lab tests to determine the electrical performance of naked Direct-C sensors (not packaged in one of their three typical configurations).
  - ♦ Lab tests were begun after characterizing the fluids to facilitate sensitivity studies of the sensors to different fluids.
  - ♦ During this reporting period, EERC staff worked with program members to secure commitments for in-field installations of three typical configurations of Direct-C sensors for long-term tests over winter 2019/2020. Final commitments are pending.
- Insitu
  - ♦ On May 9, 2019, after lengthy negotiations with Insitu to finalize its contract with iPIPE to complete the planned scope of work, Insitu and iPIPE mutually agreed to discontinue negotiations. Reasons cited by Insitu included lack of progress with the U.S. Federal Aviation Administration regarding planned beyond-visual-line-of-site flight operations, and business factors not related to iPIPE. One of these business factors was related to the Boeing 737-MAX incidents reported in the news (Insitu is a subsidiary of Boeing).

## MEMBERSHIP AND FINANCIAL INFORMATION

The original budget proposed to the NDIC Oil and Gas Research Program (OGRP) was \$3,714,000, as shown in Table 1. Table 2 presents an expected budget and actual expenses incurred by the program to date.

**Table 1. iPIPE Original Budget**

<b>Sponsors</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
NDIC – Cash	\$403,320	\$405,226	\$393,454	\$398,000	\$1,600,000
Industry – Cash	\$264,000	\$450,000	\$450,000	\$450,000	\$1,614,000
Industry and Technology Provider – In-Kind	\$125,000	\$125,000	\$125,000	\$125,000	\$500,000
<b>Total</b>	<b>\$792,320</b>	<b>\$980,226</b>	<b>\$968,454</b>	<b>\$973,000</b>	<b>\$3,714,000</b>

**Table 2. iPIPE Expected Budget and Expenses to Date**

Sponsors	Expected Budget	Actual Reported Expenses as of 6/30/19	Balance Remaining of Expected Budget
<b>NDIC Share – Cash</b>	\$1,600,000	\$945,855	\$654,145
<b>Industry Share – Cash</b>	\$2,402,000*	\$671,031	\$1,730,969
<b>Industry – In-Kind</b>	\$250,000	<i>Andeavor</i> \$17,936 <i>DCP Midstream</i> \$13,580 <i>Enbridge</i> \$7,905 <i>Equinor</i> \$118,030 <i>Goodnight</i> \$6,800 <i>Hess</i> \$104,181 <i>Oasis</i> \$19,620 <i>Whiting</i> \$3,642 <b>Total</b> <b>\$291,694</b>	\$0**
<b>Technology Providers – In-Kind</b>	\$250,000	<i>Satellytics</i> \$819,013 <i>Direct-C</i> \$0 <i>Ingu</i> \$88,266 <b>Total</b> <b>\$907,279</b>	
<b>Total</b>	<b>\$4,502,000*</b>	<b>\$2,815,859</b>	<b>\$2,385,114*</b>

\* These expected budget figures were each increased by \$788,000 over the original budget because of the addition of three new consortium members.

\*\* The program has already exceeded the budgeted amount of in-kind cost share by \$696,890.

CY2019 program membership dues have been collected from all nine members of the iPIPE consortium. The program continues to solicit additional members to contribute to this program. As additional members join the program, Table 2 will be updated to show the additional financial resources brought to the program.

Project progress, as represented by the project schedule presented in the original NDIC OGRP proposal, is shown in Figure 1.



Figure 1. Project progress.

## **FUTURE ACTIVITIES**

The planned activities for the next quarter are detailed below:

- Program level activities
  - In August 2019, EERC staff will present a high-level iPIPE program summary at the IOGCC Annual Conference in Medora, North Dakota.
  - iPIPE will continue to solicit additional consortium members, following up on several open discussions.
- Technology selection
  - The EERC will continue to research and evaluate potential new and emerging technologies for consideration by iPIPE. The EERC will contact several potential candidates for the next technology selection event and will solicit proposals from select technology providers. This is a continuous task that will continue until the next iPIPE technology selection event, scheduled to occur in October 2019.
- Development project execution
  - Satelytics, Phase II
    - ♦ Weekly satellite data capture and processing will continue through the end of the coming reporting period. Weekly WebEx-facilitated update meetings will continue to occur between consortium members and Satelytics.
  - Direct-C
    - ♦ Lab tests exposing Direct-C sensor coupons to actual fluid samples collected from consortium member facilities will conclude at the EERC. A report on lab results will be shared with consortium members.
    - ♦ The EERC will finalize a list of member volunteers and specific locations for field demonstrations of sensors installed on operating pipelines.
    - ♦ Installation of field demonstrations will begin.

## **APPENDIX A**

# **PARTIAL LISTING OF iPIPE MEDIA MENTIONS**

## Partial List of Articles Highlighting iPIPE

Title	Date	URL
Industry responds to governor's initiative to improve pipeline technology; program funding approved by North Dakota Industrial Commission		<a href="https://www.ndoil.org/industry-responds-to-governors-initiative-to-improve-pipeline-technology-program-funding-approved-by-north-dakota-industrial-commission/">https://www.ndoil.org/industry-responds-to-governors-initiative-to-improve-pipeline-technology-program-funding-approved-by-north-dakota-industrial-commission/</a>
Satelytics Selected to Participate in the Intelligent Pipeline Integrity Program (iPIPE)	5/18/2018	<a href="https://mailchi.mp/satelytics/satelytics-chosen-to-participate-in-ipipe-project?e=922473135e">https://mailchi.mp/satelytics/satelytics-chosen-to-participate-in-ipipe-project?e=922473135e</a>
ND implements intelligent pipeline project	5/22/2018	<a href="http://northamericanshalemagazine.com/articles/2380/nd-implements-intelligent-pipeline-project">http://northamericanshalemagazine.com/articles/2380/nd-implements-intelligent-pipeline-project</a>
North Dakota Governor Doug Burgum provides remarks this morning at the Williston Basin Petroleum Conference in Bismarck, thanks Hess and the industry for innovation through iPIPE program.	5/23/2018	<a href="https://twitter.com/HessCorporation/statuses/999315208261853185">https://twitter.com/HessCorporation/statuses/999315208261853185</a>
North Dakota Pipeline Leak Detection Initiative Announced	5/25/2018	<a href="https://extension.psu.edu/north-dakota-pipeline-leak-detection-initiative-announced">https://extension.psu.edu/north-dakota-pipeline-leak-detection-initiative-announced</a>
New consortium sets goal of improving pipelines	5/26/2018	<a href="https://www.mrt.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php">https://www.mrt.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php</a>
Industry Responds to Governor's Initiative to Improve Pipeline Technology; Program Funding Approved by North Dakota Industrial Commission	5/26/2018	<a href="https://www.oilandgasonline.com/doc/industry-governors-initiative-pipeline-program-north-dakota-industrial-commission-0001">https://www.oilandgasonline.com/doc/industry-governors-initiative-pipeline-program-north-dakota-industrial-commission-0001</a>
New consortium sets goal of improving pipelines	5/27/2018	<a href="https://www.timesunion.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php">https://www.timesunion.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php</a>
Principal Engineer Jay Almlie discusses the iPipe Program on Energy Matters Radio	5/31/2018	<a href="https://www.youtube.com/watch?v=ZQuwsK0z2aM">https://www.youtube.com/watch?v=ZQuwsK0z2aM</a>
North Dakota selects Ingu Solutions for demonstration of cutting-edge leak detection and prevention technology for oil and gas pipelines	5/31/2018	<a href="https://ingu.co/ipipe/">https://ingu.co/ipipe/</a>
Leak Detection Project Kicks Off This Summer	6/1/2018	<a href="https://myemail.constantcontact.com/Here-are-the-week-s-top-North-Dakota-energy-stories-.html?soid=1102657032033&amp;aid=NpwT2Ynl17c">https://myemail.constantcontact.com/Here-are-the-week-s-top-North-Dakota-energy-stories-.html?soid=1102657032033&amp;aid=NpwT2Ynl17c</a>
How a Canadian solution to detecting pipeline leaks is being used in North Dakota	6/5/2018	<a href="https://www.bnnbloomberg.ca/video/how-a-canadian-solution-to-detecting-pipeline-leaks-is-being-used-in-north-dakota~1410402">https://www.bnnbloomberg.ca/video/how-a-canadian-solution-to-detecting-pipeline-leaks-is-being-used-in-north-dakota~1410402</a>
iPIPE Program helps solve pipeline leaks in ND	6/6/2018	<a href="http://www.kfyrvtv.com/content/news/iPIPE-Program-helps-solve-pipeline-leaks-in-ND--484747291.html">http://www.kfyrvtv.com/content/news/iPIPE-Program-helps-solve-pipeline-leaks-in-ND--484747291.html</a>
Startup uses small sensors to check North Dakota oil pipes	6/10/2018	<a href="https://www.alvareviewcourier.com/story/2018/06/10/interesting-items/startup-uses-small-sensors-to-check-north-dakota-oil-pipes/37406.html">https://www.alvareviewcourier.com/story/2018/06/10/interesting-items/startup-uses-small-sensors-to-check-north-dakota-oil-pipes/37406.html</a>
Sensors to monitor oil, brine gathering lines coming to ND	6/12/2018	<a href="https://www.westfargopioneer.com/news/science-and-nature/4459638-sensors-monitor-oil-brine-gathering-lines-coming-nd">https://www.westfargopioneer.com/news/science-and-nature/4459638-sensors-monitor-oil-brine-gathering-lines-coming-nd</a>
Pipe sensors to monitor gathering lines	6/12/2018	<a href="https://bismarcktribune.com/business/local/pipe-sensors-to-monitor-gathering-lines/article_cd64586c-1d52-52df-83e6-b661d3b95f0a.html">https://bismarcktribune.com/business/local/pipe-sensors-to-monitor-gathering-lines/article_cd64586c-1d52-52df-83e6-b661d3b95f0a.html</a>
Startup uses small sensors to check North Dakota oil pipes	6/21/2018	<a href="https://www.apnews.com/9d65538034a24711a4a84d4e2bb38efe">https://www.apnews.com/9d65538034a24711a4a84d4e2bb38efe</a>
Startup Uses Small Sensors to Check North Dakota Oil Pipes	6/21/2018	<a href="https://www.usnews.com/news/best-states/north-dakota/articles/2018-06-21/startup-uses-small-sensors-to-check-north-dakota-oil-pipes">https://www.usnews.com/news/best-states/north-dakota/articles/2018-06-21/startup-uses-small-sensors-to-check-north-dakota-oil-pipes</a>

Startup uses small sensors to check North Dakota oil pipes	6/21/2018	<a href="https://m.washingtontimes.com/news/2018/jun/21/startup-uses-small-sensors-to-check-north-dakota-o/">https://m.washingtontimes.com/news/2018/jun/21/startup-uses-small-sensors-to-check-north-dakota-o/</a>
iPIPE: Taking a bite out of leaks	6/25/2018	<a href="http://blogs.und.edu/und-today/2018/06/taking-a-bite-out-of-leaks/">http://blogs.und.edu/und-today/2018/06/taking-a-bite-out-of-leaks/</a>
iPIPE: Taking a Bite Out of Leaks	6/29/2018	<a href="http://www.northdakotaagconnection.com/story-state.php?Id=688&amp;yr=2018">http://www.northdakotaagconnection.com/story-state.php?Id=688&amp;yr=2018</a>
Industry demonstrates commitment to stoping [sic] pipeline leaks	7/17/2018	<a href="http://northamericanshalemagazine.com/articles/2444/industry-demonstrates-commitment-to-stoping-pipeline-leaks">http://northamericanshalemagazine.com/articles/2444/industry-demonstrates-commitment-to-stoping-pipeline-leaks</a>
Testing of New Pipeline Inspection Device Begins in Bakken	7/18/2018	<a href="https://www.spe.org/en/ogf/ogf-article-detail/?art=4404">https://www.spe.org/en/ogf/ogf-article-detail/?art=4404</a>
Testing of New Pipeline Inspection Device Begins in Bakken	7/18/2018	<a href="https://www.spe.org/en/print-article/?art=4404">https://www.spe.org/en/print-article/?art=4404</a>
6 companies collaborating on pipeline leak detection	8/15/2018	<a href="https://www.willistonherald.com/news/companies-collaborating-on-pipeline-leak-detection/article_bbce3194-a098-11e8-8bac-1b765123019e.html">https://www.willistonherald.com/news/companies-collaborating-on-pipeline-leak-detection/article_bbce3194-a098-11e8-8bac-1b765123019e.html</a>
More Skin in the Game: New Technology to Find, Fix Leaks	8/20/2018	<a href="https://pgionline.com/magazine/2018/august-2018-vol-245-no-8/features/more-skin-in-the-game-new-technology-to-find-fix-leaks">https://pgionline.com/magazine/2018/august-2018-vol-245-no-8/features/more-skin-in-the-game-new-technology-to-find-fix-leaks</a>
Burgum highlights oil industry's progress, challenges at ND Petroleum Council's annual meeting in Fargo	9/25/2018	<a href="https://www.governor.nd.gov/news/burgum-highlights-oil-industry%E2%80%99s-progress-challenges-nd-petroleum-council%E2%80%99s-annual-meeting">https://www.governor.nd.gov/news/burgum-highlights-oil-industry%E2%80%99s-progress-challenges-nd-petroleum-council%E2%80%99s-annual-meeting</a>
Burgum highlights oil industry's progress, challenges at ND Petroleum Council's annual meeting in Fargo	9/25/2018	<a href="https://votesmart.org/public-statement/1287849/burgum-highlights-oil-industrys-progress-challenges-at-nd-petroleum-councils-annual-meeting-in-fargo#.XDz9tVxKjE">https://votesmart.org/public-statement/1287849/burgum-highlights-oil-industrys-progress-challenges-at-nd-petroleum-councils-annual-meeting-in-fargo#.XDz9tVxKjE</a>
The Digital Oilfield: How digital technologies are changing the oil industry in ND and nationwide	9/30/2018	<a href="http://www.prairiebusinessmagazine.com/business/energy-and-mining/4506605-digital-oilfield-how-digital-technologies-are-changing-oil">http://www.prairiebusinessmagazine.com/business/energy-and-mining/4506605-digital-oilfield-how-digital-technologies-are-changing-oil</a>
Progress for Partners Key to Energy & Environmental Research Center		<a href="https://www.ndliving.com/content/progress-partners-key-energy-environmental-research-center">https://www.ndliving.com/content/progress-partners-key-energy-environmental-research-center</a>
API Banquet salutes stars of Bakken oil and gas	11/19/2018	<a href="https://www.willistonherald.com/news/api-banquet-salutes-stars-of-bakken-oil-and-gas/article_a006f78e-eb98-11e8-a353-abe9fc1170fc.html">https://www.willistonherald.com/news/api-banquet-salutes-stars-of-bakken-oil-and-gas/article_a006f78e-eb98-11e8-a353-abe9fc1170fc.html</a>
Energy Matters: iPIPE receives Industry Innovation Award	12/3/2018	<a href="https://www.youtube.com/watch?v=L2lEr2Xu4aw">https://www.youtube.com/watch?v=L2lEr2Xu4aw</a>
Energy Matters with iPIPE	12/12/2018	<a href="https://www.satelytics.com/blog/oil-gas-solutions/2018-energy-matters-with-ipipe/">https://www.satelytics.com/blog/oil-gas-solutions/2018-energy-matters-with-ipipe/</a>
Developing Technology to Prevent Pipeline Leaks	1/3/2019	<a href="https://mydigitalpublication.com/publication/?i=547462&amp;p=&amp;pn=#{%22issue_id%22:547462,%22page%22:34}">https://mydigitalpublication.com/publication/?i=547462&amp;p=&amp;pn=#{%22issue_id%22:547462,%22page%22:34}</a>
Innovative Pipeline Consortium Marks New Highlights	1/8/2019	<a href="http://undeerc.blogspot.com/2018/12/innovative-pipeline-consortium-marks.html">http://undeerc.blogspot.com/2018/12/innovative-pipeline-consortium-marks.html</a>
2018 State of the State Address	1/23/2019	<a href="https://www.governor.nd.gov/events/2018-state-state-address">https://www.governor.nd.gov/events/2018-state-state-address</a>
North Dakota Eyes Expanded Use of Drones for Oil and Natural Gas Operations	2/8/2019	<a href="https://www.naturalgasintel.com/articles/117347-north-dakota-eyes-expanded-use-of-drones-for-oil-and-natural-gas-operations">https://www.naturalgasintel.com/articles/117347-north-dakota-eyes-expanded-use-of-drones-for-oil-and-natural-gas-operations</a>
The Crude Life Interview: Joe Dancy, Energy Expert & Educator	5/18/2019	<a href="http://www.thecrudelife.com/podcast/the-crude-life-interview-joe-dancy-energy-expert-educator/">http://www.thecrudelife.com/podcast/the-crude-life-interview-joe-dancy-energy-expert-educator/</a>
The Big Data Revolution: Detecting Pipeline Leaks, Encroachments and More Using Satellites	6/15/2019	<a href="https://www.pipeline-journal.net/journal/pipeline-technology-journal-32019">https://www.pipeline-journal.net/journal/pipeline-technology-journal-32019</a>