



January 29, 2024

Mr. Reice Haase
Deputy Executive Director
North Dakota Industrial Commission
600 East Boulevard Avenue, Department 405
State Capitol, 14th Floor
Bismarck, ND 58505-0840

Dear Mr. Haase:

Subject: Combined Quarterly Progress Report and Annual Project 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 combined quarterly progress and annual project report on the subject project for the periods of October 1, 2023 – December 31, 2023, and January 1, 2023 – December 31, 2023, respectively.

If you have any questions, please contact me by phone at (701) 777-5402 or by email at amcrae@undeerc.org.

Sincerely,

DocuSigned by:
A handwritten signature in black ink that reads "Austin McRae".

2CF0ADB88C44D7...
T. Austin McRae
Research Engineer
Integrated Petroleum Systems

TAM/bjr

Attachment

c: Brent Brannan, North Dakota Industrial Commission
Brenna Jenssen, North Dakota Industrial Commission



IPIPE – INTELLIGENT PIPELINE INTEGRITY PROGRAM

Combined Quarterly Progress Report and Annual Project Report

*(for the periods of October 1, 2023 – December 31, 2023,
and January 1, 2023 – December 31, 2023, respectively)*

Prepared for:

Reice Haase

North Dakota Industrial Commission
600 East Boulevard Avenue, Department 405
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Bismarck, ND 58505-0840

Contract No. G-046-88

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January 2024

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iPIPE – INTELLIGENT PIPELINE INTEGRITY PROGRAM
Combined
Quarterly Progress Report October 1, 2023 – December 31, 2023
and
Annual Project Report January 1, 2023 – December 31, 2023

EXECUTIVE SUMMARY

This document is a combined quarterly and annual report for activity conducted by the intelligent Pipeline Integrity Program (iPIPE), led by the Energy & Environmental Research Center, for the North Dakota Industrial Commission Oil and Gas Research Program (OGRP). The goal of iPIPE is to develop and demonstrate cutting-edge technology that can prevent and/or detect pipeline leaks.

Activity in 2023 focused on one remaining project:

Dedicated Space-Based Hyperspectral Imaging – Orbital Sidekick (OSK) is a company that is providing unmatched resolution for hyperspectral imaging from space to identify right-of-way threats and hydrocarbons including methane. iPIPE supported OSK in the first launch of its Aurora satellite via SpaceX rideshare in 2021. The learnings developed from the Aurora program in 2022 were applied to OSK’s GHOS_t satellite constellation, which launched and commissioned the first three of a planned six satellites in 2023. OSK vertically integrates satellite technology to better service commercial clients.

OSK continued to focus attention on the deployment of the GHOS_t constellation of satellites and services throughout 2023. Three of the planned six GHOS_t satellites were launched this year with more robust design elements incorporated based on the experience from the iPIPE-supported Aurora launch and commissioning process in 2021–2022. Processes and methodologies for capturing, downlinking, and processing hyperspectral imagery from the initial GHOS_t satellites were continually refined and streamlined through the second half of 2023 while also preparing for the launches of the remaining satellites in the constellation scheduled for 2024. iPIPE and OSK have continued to work collaboratively through the difficulties of demonstrating emerging space-based technologies in the midstream industry.

iPIPE – INTELLIGENT PIPELINE INTEGRITY PROGRAM
Combined
Quarterly Progress Report October 1, 2023 – December 31, 2023
and
Annual Project Report January 1, 2023 – December 31, 2023

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, led by the Energy & Environmental Research Center (EERC), to advance development and application of emerging technologies to prevent and detect pipeline leaks. The intelligent Pipeline Integrity Program (iPIPE) assists 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 pipelines in North Dakota and demonstrate technology application.

The project goal is to develop and demonstrate cutting-edge technology that can prevent and/or detect pipeline leaks. This goal is 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 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 pipeline integrity.

Members of the industry-led consortium that provided funding for iPIPE 1.0 include Enbridge, Energy Transfer Partners, Equinor, Oasis Midstream, Whiting Petroleum, Goodnight Midstream, Hess Corporation, Marathon Petroleum Logistics (MPLx), ONEOK, DCP Midstream, and TC Energy.

The following quarterly report summarizes the program activities from October 1, 2023, through December 31, 2023. After the quarterly report, an annual report is included within this document and summarizes program progress from January 1, 2023, through December 31, 2023.

QUARTERLY PROGRESS REPORT (October 1, 2023 – December 31, 2023)

ACCOMPLISHMENTS DURING REPORTING PERIOD

- Program-level activities
 - Program management
 - ♦ In December, the EERC submitted a contract extension request for iPIPE 1.0 to the North Dakota Industrial Commission (NDIC) on behalf of the consortium. The request was in support of iPIPE’s continued commitment to Orbital Sidekick’s (OSK’s) vision of an industry-dedicated, vertically integrated satellite-based hyperspectral imaging service.
 - Program meetings
 - ♦ On October 20, November 17, and December 15, 2023, iPIPE held monthly member meetings to update all members on program status. No significant motions were provided by the membership in relation to the OSK iPIPE 1.0 subcontract.
 - Program media mentions
 - ♦ The EERC featured the April launch of OSK’s first two GHOSatellites in the EERC’s Top 10 Moments of 2023 in a December 12 media posting. Since inception, iPIPE has now been highlighted in more than 95 public multimedia and print articles. A partial listing of known media mentions is provided in Appendix A.
- Technology selection
 - The EERC continues to engage with companies from around the globe, offering emerging (not yet commercial) technologies as they discover or are directed to iPIPE. Additional technology providers will be sought through iPIPE 3.0.
- Demonstration execution – OSK
 - OSK has continued to develop and refine the data capture and spectral analysis capabilities of the three GHOSatellites currently in orbit.
 - The first data capture over the three iPIPE areas of interest (AOIs) has commenced.
 - Design improvements gleaned from the GHOSatellites in orbit have been implemented on the next three. GHOSatellites 4 and 5 have successfully completed vibration and temperature testing.
 - OSK and iPIPE continued to meet throughout the quarter on a biweekly basis to discuss progress and upcoming events.
- Demonstration execution – Satelitycs Phase IV
 - Satelitycs has completed its analysis of land movement detection using a current stereo pair of images and stereo pairs-generated historical data.
 - The independent EERC evaluation report for this task has been drafted and is under internal review.
- Demonstration execution – Pipeline-Risk

- Pipeline-Risk has delivered its final report, completed its construction of a risk-learning system for gathering lines, and demonstrated its abilities using member-provided data.
- The independent EERC evaluation report is being drafted.
- Demonstration execution – TOKU
 - TOKU has completed its demonstration of pipeline-monitoring equipment, analysis of leak simulation data, and refinement of algorithms and has submitted its final report.
 - The independent EERC evaluation report for this task has been drafted and is under internal review.

MEMBERSHIP AND FINANCIAL INFORMATION

The original budget proposed to the NDIC Oil and Gas Research Program (OGRP) totaled \$3,714,000, as shown in Table 1. To demonstrate additional resources provided by new members, additional financial commitment from NDIC, and significantly increased in-kind cost share provided by technology providers and program members, an updated budget is presented in Table 2. Table 2 demonstrates the rapid growth of this program. Table 3 presents greater detail on the expected budget and actual expenses incurred by the program to date.

Table 1. iPIPE Original Budget

Sponsors	2018	2019	2020	2021	Total
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
Total	\$792,320	\$980,226	\$968,454	\$973,000	\$3,714,000

Table 2. iPIPE Updated Budget

Sponsors	2018	2019	2020	2021	Total
NDIC – Cash	\$565,909*	\$735,730*	\$438,772*	\$859,589	\$2,600,000
Industry – Cash	\$352,000*	\$700,000*	\$850,000*	\$675,000	\$2,577,000
Industry and Technology Provider – In-Kind	\$525,878*	\$1,074,077*	\$949,051*	\$500,000	\$3,049,006
Total	\$1,443,787	\$2,509,807	\$2,237,823	\$2,034,589	\$8,226,006

* Reflects actuals for these years.

The program continues to solicit additional members to contribute to this program. As additional members join the program, Tables 2 and 3 will be updated to show the additional financial resources brought to the program.

Table 3. iPIPE Expected Budget and Expenses to Date

Sponsors	Expected Budget	Actual Expenses as of 9/30/2023	Balance Remaining of Expected Budget
NDIC Share – Cash	\$2,600,000	\$2,440,258	\$159,742
Industry Share – Cash	\$2,577,000	\$2,431,712	\$145,288
Industry – In-Kind	\$375,000	<i>DCP</i> \$60,500 <i>Enbridge</i> \$126,436 <i>Equinor</i> \$153,230 <i>Goodnight</i> \$37,135 <i>Hess</i> \$228,093 <i>MPLx</i> \$17,936 <i>Oasis</i> \$40,069 <i>ONEOK</i> \$5,000 <i>Whiting</i> \$9,042 <i>TransCanada USA</i> \$0 <i>Dakota Access, LLC</i> \$0	
TOTAL	\$375,000	\$677,441	\$0
Technology Providers – In-Kind	3,076,597*	<i>Satelytics</i> \$1,713,450 <i>Direct-C</i> \$185,867 <i>Ingu</i> \$88,266 <i>Orbital Sidekick</i> \$1,321,061 <i>Toku</i> \$190,990 <i>Pipeline Risk</i> \$50,000	
TOTAL	\$3,076,597	\$3,549,634	\$0
Total	\$8,628,597	\$9,099,046	\$305,030**

* Includes budget estimates from proposals for 2020 technology development projects and an estimate of anticipated 2021 in-kind from technology providers.

** This amount does not include industry in-kind contributions provided in excess of the expected budget.

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

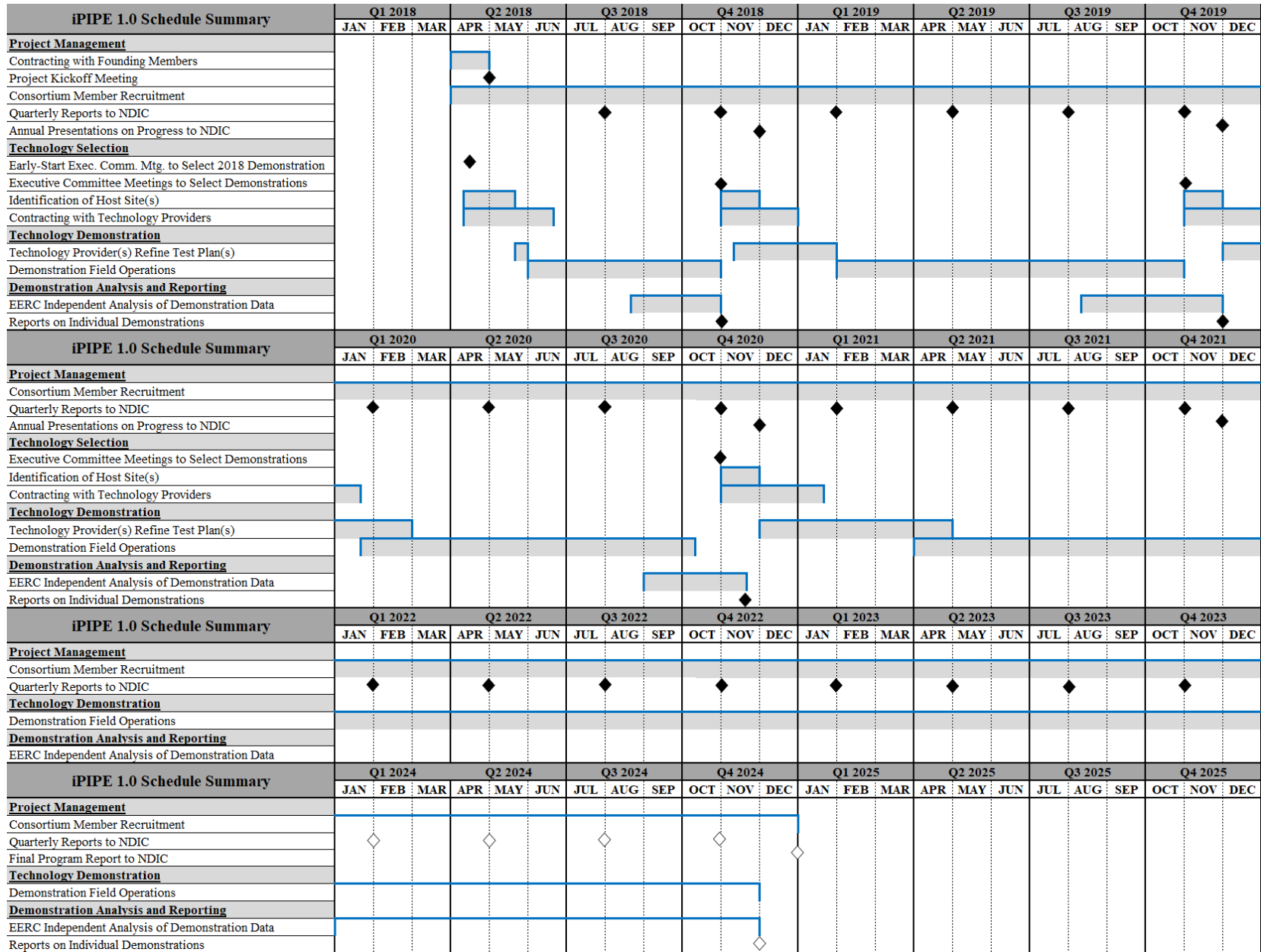


Figure 1. Project progress.

FUTURE ACTIVITIES

The planned activities for the next quarter are detailed below:

- Program-level activities
 - The EERC will work with consortium members and stakeholders to continue iPIPE on its successful path beyond the original 2018–2021 timeline with iPIPE 2.0 and 3.0.
 - iPIPE will continue ongoing and start new discussions with potential program members.
- Technology selection
 - The EERC will remain engaged with and on the lookout for providers of relevant, promising, emerging technology with iPIPE continuing beyond its original 3½-year timeline with iPIPE 3.0.
- Demonstration execution – OSK
 - Proof of commissioning for the second GHOSat satellite is expected early in Quarter (Q)1 2024.
 - The first full data capture over iPIPE AOIs is now expected near the end of Q1 2024, with the hope the second data capture can be completed in Q2 2024.
 - GHOSat 4 and 5 are still scheduled for launch on Transporter 10 sometime in March 2024. GHOSat 6 is still tentatively scheduled for Q3–Q4 2024. These additional satellites will ideally increase data capture frequency.
- Demonstration execution – Satelitycs Phase IV
 - The EERC will complete and distribute its independent review of this project. This will result in full project completion.
- Demonstration execution – Pipeline-Risk
 - The EERC will complete and distribute its independent review of this project. This will result in full project completion.
- Demonstration execution – TOKU
 - The EERC will complete and distribute its independent review of this project. This will result in full project completion.

ANNUAL PROJECT REPORT (January 1, 2023 – December 31, 2023)

ANNUAL REPORT SUMMARY

The iPIPE 1.0 contract was extended at the end of 2022 for 1 year to carry over a single subcontract between the EERC and OSK. A subcontract extension was executed between the EERC and OSK to accommodate continued development of OSK's GHOST constellation and launch dates scheduled for 2023 including up to 10 data captures over a defined AOI. OSK launched two planned satellites followed by a third in the first half of the year. Commissioning was verified for one satellite, and all three are currently operational. OSK is presently collecting data over iPIPE's AOIs and has acquired pipeline imagery. iPIPE awaits the full data collection of the AOI and OSK's detection results. OSK has achieved sensor calibration and is working on improving data collection frequency. Additional launches are planned for 2024. Ten data captures remain to be completed within the subcontract. The first full data capture is expected within Q1 of 2024, and successful completion of the subcontract will be dependent on increasing data capture frequency.

OSK Background and Development Activities

OSK is a satellite-based, hyperspectral image analysis company. iPIPE's interest in OSK lies in its ability to provide a dedicated hyperspectral-capable satellite to monitor pipeline right-of-way for the presence of hydrocarbon and produced water leaks as well as threat detection and vegetation change. The previous-generation Aurora satellite was launched on June 30, 2021, but suffered critical component failures. Lessons learned were implemented in the form of improved design and critical system redundancies for the next-generation GHOST satellites. GHOST 1 and 2 were successfully launched into orbit on April 14, 2023, and GHOST 3 was successfully launched on June 12, 2023.

Proof of commissioning for the first satellite was provided to iPIPE in Q3 2023 and is likewise expected for the second satellite early in the new calendar year 2024. Since the launch of the first set of GHOST satellites, OSK has been improving the satellites' efficiency. These efforts have focused on improved geographic and spectral calibration accuracy and tasking capabilities. The entire commissioning process has continued to provide insight, which has manifested in the form of further improvements to the next set of GHOST satellites. The remaining satellites are scheduled for launch in 2024.

CONCLUSION

Interest in remote monitoring via satellite remains exceptionally high among iPIPE members. OSK announced a \$10 million capital raise in January of 2023, including oil and gas sector funding from Williams and ONEOK. Press releases from OSK have been issued throughout 2023 and can be referenced at <https://www.orbitalsidekick.com/news-blog>. iPIPE previously allocated 67% of funding into remote monitoring from space, and one member has implemented technology from Satelytics to actively monitor their assets. Early reports are that

the technology has been successful in identifying leaks early that would otherwise go unnoticed for longer periods. The industry is at the front end of this new technology, and iPIPE is leading the way in our understanding of the capability and advancement.

A year-in-review calendar shown in Figure 2 summarizes activities and timing throughout 2023.

iPIPE 1.0 2023 Schedule Summary	Q1			Q2			Q3			Q4		
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Project Management												
Reporting												
Annual Report Submitted to NDIC		◆										
Quarterly Reports Submitted to NDIC		◆			◆			◆			◆	
Member Meetings												
Monthly Program Update Meeting with Members (Virtual)	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
2023 Project Execution												
Orbital Sidekick												
GHOSt Satellite Development (Manufacturing, Commissioning, Laboratory Stress Testing, etc.)												
GHOSt Satellite Launches				◆		◆						

Figure 2. 2023 year-in-review calendar summary.



APPENDIX A

PARTIAL LISTING OF iPIPE MEDIA MENTIONS

PARTIAL LIST OF ARTICLES HIGHLIGHTING IPIPE:

Updated October 2, 2022

Title	Date	URL
Industry Responds to Governor's 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/
Satelytics Selected to Participate in the intelligent Pipeline Integrity Program (iPIPE)	5/18/2018	https://mailchi.mp/satelytics/satelytics-chosen-to-participate-in-iPIPE-project?e=922473135e
ND Implements Intelligent Pipeline Project	5/22/2018	http://northamericanshalemagazine.com/articles/2380/nd-implements-intelligent-pipeline-project
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	https://twitter.com/HessCorporation/statuses/999315208261853185
North Dakota Pipeline Leak Detection Initiative Announced	5/25/2018	https://extension.psu.edu/north-dakota-pipeline-leak-detection-initiative-announced
New Consortium Sets Goal of Improving Pipelines	5/26/2018	https://www.mrt.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php
Industry Responds to Governor's Initiative to Improve Pipeline Technology; Program Funding Approved by North Dakota Industrial Commission	5/26/2018	https://www.oilandgasonline.com/doc/industry-governors-initiative-pipeline-program-north-dakota-industrial-commission-0001
New Consortium Sets Goal of Improving Pipelines	5/27/2018	https://www.timesunion.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php
Principal Engineer Jay Almlie Discusses the iPIPE Program on Energy Matters Radio	5/31/2018	https://www.youtube.com/watch?v=ZQuwsK0z2aM
North Dakota Selects Ingu Solutions for Demonstration of Cutting-Edge Leak Detection and Prevention Technology for Oil and Gas Pipelines	5/31/2018	https://ingu.co/iPIPE/
Leak Detection Project Kicks Off This Summer	6/1/2018	https://myemail.constantcontact.com/Here-are-the-week-s-top-North-Dakota-energy-stories-.html?soid=1102657032033&aid=NpwT2Ynl17c
How a Canadian Solution to Detecting Pipeline Leaks Is Being Used in North Dakota	6/5/2018	https://www.bnnbloomberg.ca/video/how-a-canadian-solution-to-detecting-pipeline-leaks-is-being-used-in-north-dakota~1410402
iPIPE Program Helps Solve Pipeline Leaks in ND	6/6/2018	http://www.kfyrtv.com/content/news/iPIPE-Program-helps-solve-pipeline-leaks-in-ND--484747291.html
Startup Uses Small Sensors to Check North Dakota Oil Pipes	6/10/2018	https://www.alvareviewcourier.com/story/2018/06/10/interesting-items/startup-uses-small-sensors-to-check-north-dakota-oil-pipes/37406.html
Sensors to Monitor Oil, Brine Gathering Lines Coming to ND	6/12/2018	https://www.westfargopioneer.com/news/science-and-nature/4459638-sensors-monitor-oil-brine-gathering-lines-coming-nd
Pipe Sensors to Monitor Gathering Lines	6/12/2018	https://bismarcktribune.com/business/local/pipe-sensors-to-monitor-gathering-lines/article_cd64586c-1d52-52df-83e6-b661d3b95f0a.html
Startup Uses Small Sensors to Check North Dakota Oil Pipes	6/21/2018	https://www.apnews.com/9d65538034a24711a4a84d4e2bb38efe
Startup Uses Small Sensors to Check North Dakota Oil Pipes	6/21/2018	https://www.usnews.com/news/best-states/north-dakota/articles/2018-06-21/startup-uses-small-sensors-to-check-north-dakota-oil-pipes
Startup Uses Small Sensors to Check North Dakota Oil Pipes	6/21/2018	https://m.washingtontimes.com/news/2018/jun/21/startup-uses-small-sensors-to-check-north-dakota-o/
iPIPE: Taking a Bite Out of Leaks	6/25/2018	http://blogs.und.edu/und-today/2018/06/taking-a-bite-out-of-leaks/
iPIPE: Taking a Bite Out of Leaks	6/29/2018	http://www.northdakotaagconnection.com/story-state.php?Id=688&yr=2018
Industry Demonstrates Commitment to Stopping Pipeline Leaks	7/17/2018	http://northamericanshalemagazine.com/articles/2444/industry-demonstrates-commitment-to-stopping-pipeline-leaks
Testing of New Pipeline Inspection Device Begins in Bakken	7/18/2018	https://www.spe.org/en/ogf/ogf-article-detail/?art=4404

Title	Date	URL
Testing of New Pipeline Inspection Device Begins in Bakken (link not active)	7/18/2018	https://www.spe.org/en/print-article/?art=4404
6 Companies Collaborating on Pipeline Leak Detection	8/15/2018	https://www.willistonherald.com/news/companies-collaborating-on-pipeline-leak-detection/article_bbce3194-a098-11e8-8bac-1b765123019e.html
More Skin in the Game: New Technology to Find, Fix Leaks	8/20/2018	https://pgjonline.com/magazine/2018/august-2018-vol-245-no-8/features/more-skin-in-the-game-new-technology-to-find-fix-leaks
Burgum Highlights Oil Industry's Progress, Challenges at ND Petroleum Council's Annual Meeting in Fargo	9/25/2018	https://www.governor.nd.gov/news/burgum-highlights-oil-industry%E2%80%99s-progress-challenges-nd-petroleum-council%E2%80%99s-annual-meeting
Burgum Highlights Oil Industry's Progress, Challenges at ND Petroleum Council's Annual Meeting in Fargo	9/25/2018	https://votesmart.org/public-statement/1287849/burgum-highlights-oil-industrys-progress-challenges-at-nd-petroleum-councils-annual-meeting-in-fargo#.XDz9tVxKjmE
The Digital Oilfield: How Digital Technologies Are Changing the Oil Industry in ND and Nationwide	9/30/2018	http://www.prairiebusinessmagazine.com/business/energy-and-mining/4506605-digital-oilfield-how-digital-technologies-are-changing-oil
Progress for Partners Key to Energy & Environmental Research Center (link not active)		https://www.ndliving.com/content/progress-partners-key-energy-environmental-research-center
API Banquet Salutes Stars of Bakken Oil and Gas	11/19/2018	https://www.willistonherald.com/news/api-banquet-salutes-stars-of-bakken-oil-and-gas/article_a006f78e-eb98-11e8-a353-abe9fc1170fc.html
Energy Matters: iPIPE Receives Industry Innovation Award	12/3/2018	https://www.youtube.com/watch?v=L21Er2Xu4aw
Energy Matters with iPIPE	12/12/2018	https://www.satelytics.com/blog/oil-gas-solutions/2018-energy-matters-with-iPIPE/
Developing Technology to Prevent Pipeline Leaks	1/3/2019	https://mydigitalpublication.com/publication/?i=547462&p=&pn=#{%22issue_id%22:547462,%22page%22:34}
Innovative Pipeline Consortium Marks New Highlights	1/8/2019	http://undeerc.blogspot.com/2018/12/innovative-pipeline-consortium-marks.html
2018 State of the State Address	1/23/2019	https://www.governor.nd.gov/events/2018-state-state-address
North Dakota Eyes Expanded Use of Drones for Oil and Natural Gas Operations	2/8/2019	https://www.naturalgasintel.com/articles/117347-north-dakota-eyes-expanded-use-of-drones-for-oil-and-natural-gas-operations
The Crude Life Interview: Joe Dancy, Energy Expert & Educator	5/18/2019	http://www.thecrudelife.com/podcast/the-crude-life-interview-joe-dancy-energy-expert-educator/
The Big Data Revolution: Detecting Pipeline Leaks, Encroachments and More Using Satellites	6/15/2019	https://www.pipeline-journal.net/journal/pipeline-technology-journal-32019
Energy Matters Radio: iPIPE	9/6/19	https://youtu.be/4tTA_WEsM18
iPIPE Program Assisting in Detection of Pipeline Leaks in the Pipeline & Gas Journal September Edition (Page 50–52)	9/10/2019	https://www.nxtbook.com/nxtbooks/gulfpub/pgj_201909/
iPIPE Receives IOGCC Chairman's Stewardship Award for Environmental Partnership	9/10/2019	https://www.am1100theflag.com/news/10755-iPIPE-receives-iogcc-chairman%E2%80%99s-stewardship-award-environmental-partnership
iPIPE Receives Chairman's Stewardship Award	9/10/2019	http://undeerc.blogspot.com/2019/09/iPIPE-receives-chairmans-stewardship.html
iPIPE Receives Chairman's Stewardship Award	9/13/2019	https://www.willistonherald.com/news/business/iPIPE-receives-stewardship-award/article_e7c45bf0-d636-11e9-b069-739139b5d75b.html
API Award Winner Shares What Recognition Has Meant	10/14/2019	https://www.willistonherald.com/news/oil_and_energy/api-award-winner-shares-what-recognition-has-meant/article_ec10b56a-eecc-11e9-a94a-0f17a0778d95.html
AI Raising Drone Game in Oil, Gas but FAA Challenges Remain	10/15/19	https://www.naturalgasintel.com/articles/119892-ai-raising-drone-game-in-oil-gas-but-faa-challenges-remain
Almlie and Helms: Where Innovation Leads, Regulation Follows	10/18/19	https://trib.com/opinion/columns/almlie-and-helms-where-innovation-leads-regulation-follows/article_ee198ef8-05aa-599f-9df9-67bfd8492bc0.html
Shared on Drilling Info's Social Media Site: Almlie, Helms: Innovation Leads, Regs Follow	10/20/19	https://www.grandforksherald.com/opinion/columns/4728897-Almlie-Helms-Innovation-leads-regs-follow
Almlie, Helms: Innovation Leads, Regs Follow	10/20/19	https://www.grandforksherald.com/opinion/columns/4728897-Almlie-Helms-Innovation-leads-regs-follow
Where Innovation Leads, Regulation Follows	10/21/19	https://bismarcktribune.com/opinion/letters/where-innovation-leads-regulation-follows/article_6018311c-49fd-5744-b815-2a485b881e59.html
Bakken Backers Email: Almlie, Helms: Innovation Leads, Regs Follow	10/25/19	https://www.grandforksherald.com/opinion/columns/4728897-Almlie-Helms-Innovation-leads-regs-follow

Title	Date	URL
Cleanup Continues after Keystone Pipeline Oil Spill near Edinburg, ND	11/4/19	https://www.grandforksherald.com/news/accidents/4754456-Nearly-half-of-the-oil-has-been-recovered-in-Keystone-Pipeline-incident-says-TC-Energy
ND Keystone Spill about Half Recovered, Official Says	11/4/19	https://www.bemidjipioneer.com/business/energy-and-mining/4755069-ND-Keystone-spill-about-half-recovered-official-says
DAPL 2.0 Pipeline – Doug Burgum, North Dakota Governor (Governor mentioning iPIPE on “What’s on Your Mind”)	11/7/2019	https://www.am1100theflag.com/news/12229-11719-dapl-20-pipeline-doug-burgum-north-dakota-governor
Previewing the PSC’s DAPL 2.0 Expansion Hearing	11/11/2019	https://www.am1100theflag.com/news/12320-previewing-psc%E2%80%99s-dapl-20-expansion-hearing
Oasis Petroleum’s Jared Iverson Talks about the Next 20 years in the Bakken	12/4/2019	https://www.willistonherald.com/news/oil_and_energy/oasis-petroleum-s-jared-iverson-talks-about-the-next-years/article_2368a346-16f1-11ea-81ad-d3443353be3e.html
DCP Midstream LinkedIn Mention	~Sept 2019	https://www.linkedin.com/posts/dcp-midstream_dcp-wearcdcp-transformation-activity-6577940399116038144-orkP/
iPIPE Looks to Enhance Pipeline Safety	12/17/2019	https://www.kfyrtv.com/content/news/iPipe-looks-to-enhance-pipeline-safety-566298741.html
Burgum, Sanford Reflect on Significant Progress Made During Administration’s Third Year	12/19/2019	https://www.thedickinsonpress.com/incoming/4830773-Burgum-Sanford-reflect-on-significant-progress-made-during-administration%E2%80%99s-third-year-Site-and-date-announced-for-2020-State-of-the-State-address
Burgum, Sanford Reflect on Significant Progress Made During Administration’s Third Year	12/19/2019	https://www.nd.gov/news/burgum-sanford-reflect-significant-progress-made-during-administrations-third-year
Companies Aim to Prevent, Detect Pipeline Leaks with New Technologies	1/5/2020	https://bismarcktribune.com/bakken/companies-aim-to-prevent-detect-pipeline-leaks-with-new-technologies/article_0cac7e82-c49a-5c86-9267-ad8beb5b9799.html
Podcast: iPIPE with Jay Almlie — Real Technology, Real Pipelines, Real Progress	1/7/2020	https://pipelinerspodcast.com/episode-109-iPIPE-jay-almлие/
iPIPE Welcomes New Consortium Member	1/10/2020	https://mailchi.mp/undeerc/news-release-iPIPE-receives-chairmans-stewardship-award-585605
DAPL Owner Joining North Dakota’s iPIPE Consortium to Help Advance Leak Detection Technology	1/13/2020	https://www.willistonherald.com/news/regional/dapl-owner-joining-north-dakota-s-iPIPE-consortium-to-help/article_ab8d13a8-3652-11ea-9117-ef358444f87f.html
Energy Transfer Joins Pipeline Spill Consortium	1/14/2020	https://bismarcktribune.com/bakken/energy-transfer-joins-pipeline-spill-consortium/article_5f983ae5-109c-596e-a254-f09974b1f8c1.html
iPIPE Welcomes New Consortium Member: Dakota Access Pipeline	1/16/2020	http://undeerc.blogspot.com/2020/01/iPIPE-partnership-welcomes-new-member.html
TC Energy Will Join North Dakota’s iPIPE Consortium to Help Advance Leak Detection	1/16/2020	https://www.willistonherald.com/news/oil_and_energy/tc-energy-will-join-north-dakota-s-iPIPE-consortium-to/article_2a52fa3e-38b7-11ea-aca2-23bf860113c.html
iPIPE Partnership Welcomes New Member: TC Energy	1/16/2020	http://undeerc.blogspot.com/2020/01/iPIPE-partnership-welcomes-new-member.html
Podcast: iPIPE — Inside the Tech Pitch with Jay Almlie	1/21/2020	https://pipelinerspodcast.com/episode-111-iPIPE-tech-pitch-jay-almлие/
Enbridge Joins Consortium Evaluating Next-Generation Technology in the Pipeline Industry	1/27/2020	https://www.enbridge.com/stories/2020/january/iPIPE-consortium-evaluating-next-generation-pipeline-technology
Monique Roberts LinkedIn Post	1/29/2020	https://www.linkedin.com/posts/monique-roberts-81a84527_pipelinesafety-iPIPE-pipelineintegrity-activity-6628411257315741697-cUBx/
iPIPE Mentioned in 2019 State of the State Address	1/29/2020	https://www.youtube.com/watch?v=5vllkqT6DaE Link to 1:02 time: https://youtu.be/5vllkqT6DaE?t=3731
Bakken Oil, Gas to Energize North Dakota’s Global Impact, Governor Says	2/3/2020	https://www.naturalgasintel.com/articles/120930-bakken-oil-gas-to-energize-north-dakotas-global-impact-governor-says
iPIPE with Jay Almlie on the Pipeliners Podcast: Episode 111	2/4/2020	https://pipelinerspodcast.com/episode-113-iPIPE-operators-perspective-brian-epperson-greg-tilley/
iPIPE on Energy Matters Radio (beginning at 9:15)	2/15/2020	https://www.am1100theflag.com/news/14840-2-15-20-energy-matters-hour-1#volume
iPIPE on the Pipeliners Podcast: Episode 115	2/18/2020	https://pipelinerspodcast.com/episode-115-iPIPE-vendor-perspective-john-van-pol-sean-donegan/
On the Path to Zero Pipeline Spills	2/27/2020	http://blogs.und.edu/und-today/2020/02/on-the-path-to-zero-pipeline-spills/
iPIPE with Jay Almlie on the Pipeliners Podcast: Episode 117	3/2/2020	https://pipelinerspodcast.com/episode-117-iPIPE-high-tide-floats-all-boats-jay-almлие/
iPIPE with Jay Almlie on the Pipeliners Podcast: Episode 119	3/17/2020	https://pipelinerspodcast.com/episode-119-future-technology-today-jay-almлие/

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Pipelines Take on Their Biggest Enemy	3/30/2020	https://www.hartenergy.com/exclusives/pipelines-take-their-biggest-enemy-186778?mkt_tok=eyJpIjoiTjJFek5UUmI0ekEzTW1WbSIsInQ0iJUNINxSmdiOHAwN081ZFdrTjRZRG0yK2FvdEIlUXM3TnFpSndSbnE5NUhjZ0NlakxVNfdwM0NUVfwwcmM5UW9hd0g0RFc5T3ROc3ljR0xWXC9uckFnQ3RFRUpNTW1oQlcreFBPQnRDb1BBZFhLU0F5bVE4Nk92WHhock1wS1lrRUt5In0%3D
UND Today: Engineering Students Team Up with Industry	4/2/2020	http://blogs.und.edu/und-today/2020/04/engineering-students-team-up-with-industry/
iPIPE Selects Orbital Sidekick as Partner for Pipeline Monitoring Project	11/19/2020	https://www.prnewswire.com/news-releases/ipipe-selects-orbital-sidekick-as-partner-for-pipeline-monitoring-project-301177019.html
Orbital Sidekick Secures \$16 Million Series A to Commercialize Hyperspectral Satellite Monitoring Solutions for Energy and Defense Sectors	4/13/2021	https://www.prnewswire.com/news-releases/orbital-sidekick-secures-16-million-series-a-to-commercialize-hyperspectral-satellite-monitoring-solutions-for-energy-and-defense-sectors-301267276.html
Smart Pipelines? (iPIPE) Incentivizes Private Industry to Create Smarter & Safer Pipelines	5/17/2021	https://www.kxnet.com/news/smart-pipelines-ipipe-incentivizes-private-industry-to-create-smarter-safer-pipelines/
Orbital Sidekick to Launch Hyperspectral Satellite for Oil, Gas, Mine Monitoring	6/15/2021	https://investableuniverse.com/2021/06/15/orbital-sidekick-hyperspectral-imaging-oil-gas-mining-defense/
Hyperspectral Imaging Satellite, Currently Being Evaluated by iPIPE Consortium, Will Be Aboard SpaceX Flight	6/30/2021	https://www.enbridge.com/stories/2021/june/hyperspectral-imaging-satellite-latest-pipeline-monitoring-technology-officially-out-of-this-world
Latest Pipeline Monitoring Technology Is Officially Out of This World	6/30/2021	https://www.csrwire.com/press_releases/725086-latest-pipeline-monitoring-technology-officially-out-world
Latest Pipeline Monitoring Technology Is Officially Out of This World	6/30/2021	https://news.yahoo.com/latest-pipeline-monitoring-technology-officially-180608431.html
iPIPE Launches into Space	7/6/2021	https://blog.undeerc.org/2021/07/06/ipipe-launches-into-space/
iPIPE to Get Images from Space Satellite to Aid Leak Detection Effort	7/9/2021	https://www.ndenergy.org/Newsletter/Fireworks-Festival/State-Sues-Biden-Over-Lease-Ban
North Dakota's iPIPE Goes to Space!	7/13/2021	https://www.kxnet.com/news/state-news/north-dakotas-ipipe-goes-to-space/
SpaceX Launch Carried an Innovative Piece of the Bakken into Outer Space	8/4/2021	https://www.willistonherald.com/news/oil_and_energy/spacex9-launch-carried-an-innovative-piece-of-the-bakken-into-outer-space/article_65a3ca42-f539-11eb-9257-636de96ec0bd.html
iPIPE Helps Develop New Technology Using Artificial Intelligence	11/21/2021	https://blog.undeerc.org/2021/11/18/ipipe-helps-develop-new-technology-using-artificial-intelligence/
iPIPE Receives OGRP Funding	6/22/2022	https://blog.undeerc.org/2022/06/22/ipipe-receives-ogrp-funding/
Orbital Sidekick Selected as Partner for intelligent Pipeline Integrity Program (iPIPE)	10/6/2022	https://www.prnewswire.com/news-releases/orbital-sidekick-selected-as-partner-for-intelligent-pipeline-integrity-program-ipipe-301642433.html?tc=eml_cleartime