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University of North Dakota
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

July 28, 2017

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

Dear Ms. Fine:

Subject: Final Report Entitled "Web-Based Liquids Gathering Pipeline Technology Database"
Contract No. G-038-074; EERC Fund 21252

Enclosed is the subject final report for your review.

If you have any questions or require clarification of any point, please contact me by phone at (701) 777-5260 or by e-mail at jalmlie@undeerc.org.

Best regards,

Jay C. Almlie
Principal Engineer

JCA/kal

Enclosure

FINAL REPORT SUMMARY FOR "WEB-BASED LIQUIDS GATHERING PIPELINE TECHNOLOGY DATABASE" CONTRACT NO. G-038-074

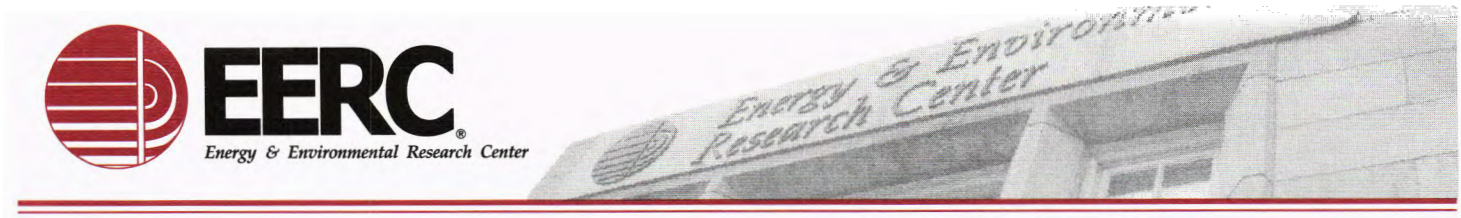
At the request of the North Dakota Industrial Commission (NDIC), and in an effort to assist pipeline operators in their efforts to decrease the incidence and impacts of liquids gathering pipeline spills, the Energy & Environmental Research Center (EERC) constructed a Web-based database to match commercial pipeline technology offerings to the operational needs of operators of liquids gathering pipelines. The goal of this project was to bridge the gap in understanding between capabilities claimed by vendors and true operational needs of gathering pipeline operators by clearly delineating the operational needs. This goal would be accomplished by working with vendors to adequately submit for the record how their products (services, systems, and/or hardware) address the challenge of contributing significantly to fewer pipeline leak/spill incidents, volumes, and impacts. This approach has previously been effectively employed by the EERC to perform a similar function on the topic of flaring mitigation technologies.

The categories in which technology offerings were originally sought included leak detection systems, pipeline materials, pipeline inspection systems and equipment, and other technologies. Requests for information (RFI) specific to each category were developed to elicit objectively comparative information that would enable end users (pipeline operating companies) perusing the database entries to focus attention on those products or technologies that best suited their application. A Web-based portal was constructed to guide each vendor to an RFI appropriate for that vendor's technology entry.

The EERC contacted a broad set of vendors to solicit database submissions on multiple technology offerings. To date, only three companies have submitted technology entries to the database. The EERC will continue this effort during execution of Phase III of the legislatively mandated pipeline study (July 2017 through June 2019) because it will aid the goals of that project. State entities such as the Department of Mineral Resources and the Governor's Office are also pushing vendors interested in business in North Dakota to the database Web site. The Pipeline Technology Database can be accessed at https://undeerc.org/pipeline_solutions/.

The EERC has discussed the database with North Dakota state representatives, including the Governor's Office and the Department of Mineral Resources. The EERC suggests that when state entities are contacted by vendors of pertinent pipeline technology, the state entities should point the vendors to the database and emphasize its use. The EERC believes that credibility of the database and its purpose will be reinforced if the state displays interest in it. Pointing vendors to the database Web site will also provide the state entities with a productive off-ramp for discussions with vendors of pipeline technologies.

The EERC began a third phase of pipeline study during the month in which this report was filed. This third phase of the pipeline study will include engagement of a pipeline stakeholders group, which, in turn, will allow the EERC to continue promotion of this database to the end users of the database. It will also remind these end users of a productive outlet they can provide to vendors of pipeline technologies when those vendors make sales calls to the pipeline operators.



WEB-BASED LIQUIDS GATHERING PIPELINE TECHNOLOGY DATABASE

Final Report

(for the period June 1, 2016, through July 31, 2017)

Prepared for:

Karlene Fine

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

Contract No. G-038-074

Prepared by:

Jay C. Almlie

Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

2017-EERC-07-01

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WEB-BASED LIQUIDS GATHERING PIPELINE TECHNOLOGY DATABASE

ABSTRACT

At the request of the North Dakota Industrial Commission, and in an effort to assist pipeline operators in their efforts to decrease the incidence and impacts of liquids gathering pipeline spills, the Energy & Environmental Research Center (EERC) constructed a Web-based database to match commercial pipeline technology offerings to the needs of operators of liquids gathering pipelines. The goal of this project was to bridge the gap in understanding between capabilities claimed by vendors and true operational needs of gathering pipeline operators by clearly delineating the operational needs, then to work with vendors to adequately submit for the record how their systems/hardware address the challenge of decreasing pipeline leak/spill incidents, volumes, and impacts. This approach has previously been effectively employed by the EERC to perform a similar function on the topic of flaring mitigation technologies. This report details the development of this database and results achieved to date.

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EXECUTIVE SUMMARY

At the request of the North Dakota Industrial Commission (NDIC), and in an effort to assist pipeline operators in their efforts to decrease the incidence and impacts of liquids gathering pipeline spills, the Energy & Environmental Research Center (EERC) constructed a Web-based database to match commercial pipeline technology offerings to the operational needs of operators of liquids gathering pipelines. The goal of this project was to bridge the gap in understanding between capabilities claimed by vendors and true operational needs of gathering pipeline operators by clearly delineating the operational needs. This goal would be accomplished by working with vendors to adequately submit for the record how their products (services, systems, and/or hardware) address the challenge of contributing significantly to fewer pipeline leak/spill incidents, volumes, and impacts. This approach has previously been effectively employed by the EERC to perform a similar function on the topic of flaring mitigation technologies.

The categories in which technology offerings were originally sought included leak detection systems, pipeline materials, pipeline inspection systems and equipment, and other technologies. Requests for information (RFI) specific to each category were developed to elicit objectively comparative information that would enable end users (pipeline operating companies) perusing the database entries to focus attention on those products or technologies that best suited their application. A Web-based portal was constructed to guide each vendor to an RFI appropriate for that vendor's technology entry.

The EERC contacted a broad set of vendors to solicit database submissions on multiple technology offerings. The EERC will continue this effort during execution of Phase III of the legislatively mandated pipeline study (July 2017 through June 2019) because it will aid the goals of that project. State entities such as the Department of Mineral Resources and the Governor's Office are also pushing vendors interested in business in North Dakota to the database Web site. The Pipeline Technology Database can be accessed at https://undeerc.org/pipeline_solutions/. A screen capture of the home page is shown in Figure ES-1.

EERC Home Contact

Pipeline Technology Database

Home >>

North Dakota continues to experience widespread growth of pipeline networks to support the sustainable development of the Bakken petroleum system. The primary goal of the state is to ensure that industry is employing the right technology for safe transport of produced fluids and enable rapid response if problems do occur. To support this goal, the Energy & Environmental Research Center has created the Pipeline Technology Database where information about products for the safe and efficient operation of pipeline networks can be shared between vendors and operators.

Vendors with the following technologies or those that are applicable to any other aspect of pipeline operation and maintenance are encouraged to create an account and submit information to the database.

- Leak Detection
- Pipeline Inspection Systems and Equipment
- Pipeline Monitoring Instrumentation
- Pipeline Materials
- Communications System and Equipment

An informative briefing on liquid gathering pipelines in North Dakota and the business impetus for improved approaches to leak detection and leak prevention is available for download here.

The Pipeline Technology Database is administered by the Energy & Environmental Research Center for the state of North Dakota.

Please direct any questions about the database to Pipeline_Database@undeerc.org or call (701) 777 - 5260.

ADD A TECHNOLOGY / VENDOR LOGIN

SEARCH TECHNOLOGY LISTINGS

Figure ES-1. Screen capture showing pipeline technology database home page.

WEB-BASED LIQUIDS GATHERING PIPELINE TECHNOLOGY DATABASE

INTRODUCTION

The Energy & Environmental Research Center (EERC) was tasked with constructing a Web-based database to facilitate the matching of commercially available liquids gathering pipeline technologies and the needs of operators of liquids gathering pipelines in North Dakota. This database is intended to serve as a clearinghouse of information on technologies that can improve the safety, reliability, and performance of pipelines in North Dakota, especially with respect to pipeline leaks and spills. A primary function of this database is to create a single point of contact for information sharing.

It is intended that this database will be populated with a broad array of data necessary to determine the compatibility of each submitted technology with the operational demands of liquids gathering pipelines in North Dakota. Environmental operating ranges, measurement limits, sensitivity information, communication infrastructure requirements, retrofittability characteristics, compatibility with fluid types, and compatibility with various pipeline materials are all addressed within the database to assist the end user in selection of appropriate technologies for specific pipeline designs.

The goal of this project is to bridge the gap in understanding between capabilities claimed by vendors and true operational needs of gathering pipeline operators by clearly delineating the operational needs, then working with vendors to adequately submit for the record how their products (services, systems, and/or hardware) directly address the challenge of contributing significantly to fewer pipeline leak/spill incidents, volumes, and impacts. This goal was supported by the following objectives:

a) Construct a Web-based database
b) Solicit technical data from vendors
c) Populate the database
d) Promote the database to state and industry entities for use as a technology selection tool

This approach has previously been effectively employed by the EERC to perform a similar function on the topic of flaring mitigation technologies (found at www.undeerc.org/flaring_solutions/).

METHODOLOGY

Following in the successful footsteps of the EERC Flaring Solutions Technology information clearinghouse (found at www.undeerc.org/flaring_solutions/), the EERC created a Web-based database to promote available technologies to address liquids gathering pipelines and improve the safe transport of fluids without leaks and spills in the state of North Dakota. The first step in creation of a Pipeline Technology Database was to define categories of interest. Each

category of technologies was chosen because of its potential effect on decreasing the frequency of pipeline leaks and total leak volumes. Eight categories of technologies were initially defined:

- Leak Detection Systems
- Pipeline Materials
- Construction/Installation Tools
- Construction/Installation Materials
- Pipeline Monitoring Instrumentation
- Communications Systems and Equipment
- Pipeline Inspection Systems and Equipment
- Other

Requests for information (RFI) specific to each category were then developed. These RFI were designed to elicit objectively comparative information that would enable end users perusing the database entries to focus attention on those products or technologies that best suited their application. The EERC asked for and received assistance in vetting the form and content of the questionnaires from a set of five vendors with whom the EERC had an existing strong relationship. The content of the questionnaires is provided in Appendix A.

For some of the proposed categories, the EERC was not able to develop a sufficient list of meaningful and objective questions. Via the effort of defining questions, it became apparent that either the category was too broad and disparate, and therefore did not permit meaningful, comparative information gathering, or that sufficient interest from vendors could not be obtained to warrant inclusion.

Therefore, the categories were refined to initially include only the following:

- Leak Detection Systems
- Pipeline Materials
- Pipeline Inspection Systems and Equipment
- Other

This approach allowed the EERC to actively engage known vendors in the refined category list. The database was designed to accommodate additional categories as vendor demand for additional categories developed.

Next, a Web-based portal was constructed to guide each vendor to an appropriate RFI for that vendor's technology entry. The question tree offered via this portal is shown in Figure 1.

A list of 25 vendors targeted for initial technology information submittal was developed by the EERC. E-mails were sent to each of these vendors, soliciting their input on multiple technology offerings. In some cases, the EERC also followed up via telephone, when a specific contact name was available. The e-mails and telephone conversations explained the factors driving creation of the database, the likely use of the database by industry and state entities, the process for submittal

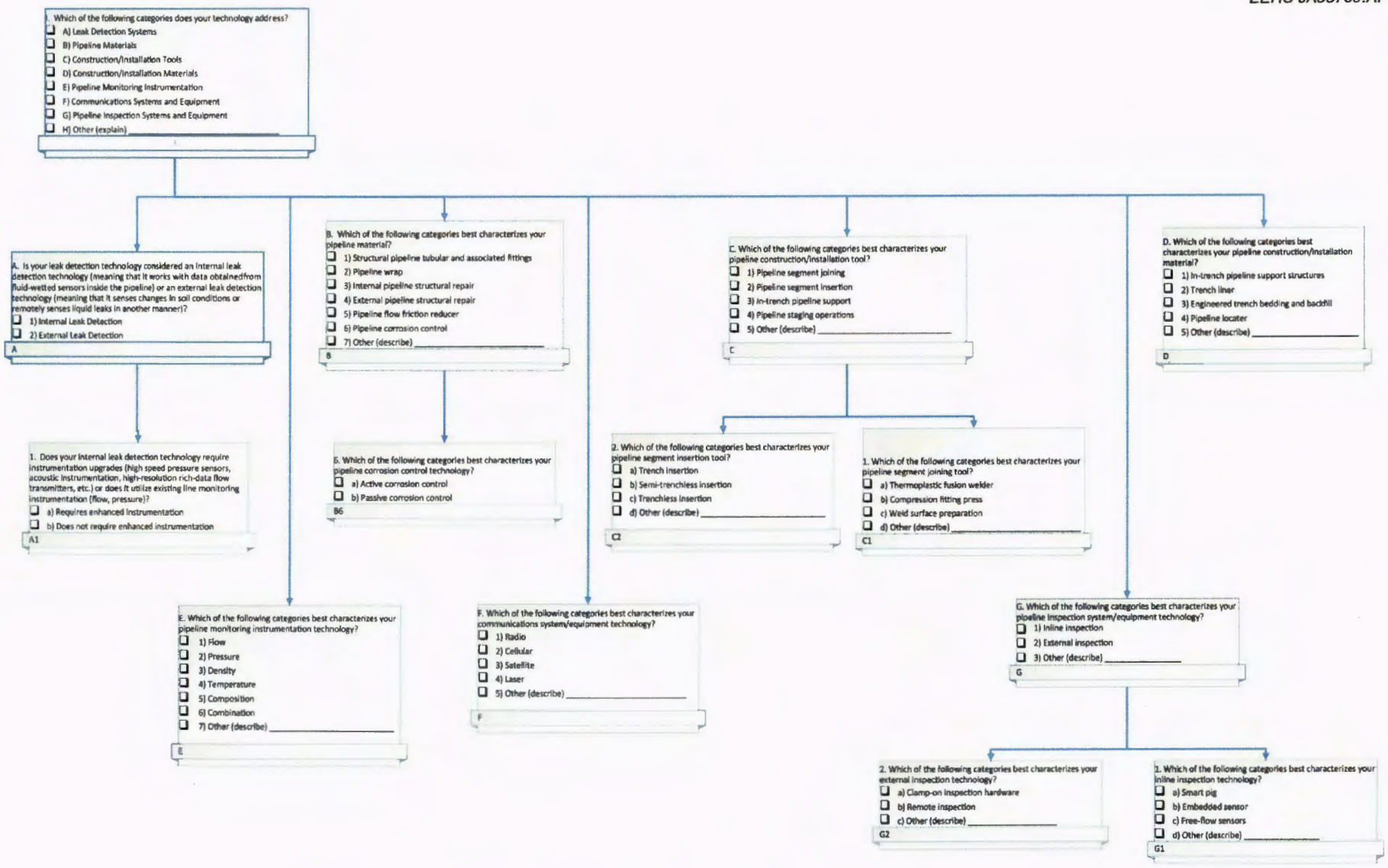

Figure 1. Question tree guiding technology submitters to the appropriate RFI.

of information to the database, and the fundamental landscape of liquids gathering pipelines in North Dakota. The e-mail then invited each company to consider submitting information on each of its applicable technologies.

The EERC continues to solicit entries for the database from vendors. State entities such as the Department of Mineral Resources and the Governor's Office are also pushing vendors interested in business in North Dakota to the database Web site. The EERC will continue to host the Web site and facilitate appropriate entries throughout the course of the ongoing legislatively mandated pipeline study (contracted through June 2019). Continued engagement of this effort will greatly benefit that study.

RESULTS AND DISCUSSION

The Pipeline Technology Database can be accessed at https://undeerc.org/pipeline_solutions/. Here, the user can access an informative briefing on liquids gathering pipelines in North Dakota, register as a new vendor, submit technologies as a vendor, or search technologies submitted to the database. A screen capture of the home page is shown in Figure 2.

At the time this report was filed with the North Dakota Industrial Commission (NDIC), only three companies had submitted technology entries to the database. Maintenance of the database will continue after the contractual end of this project, allowing additional entries as its utility becomes more apparent to vendors and end users.

RECOMMENDATIONS

The EERC has discussed the database with North Dakota state representatives, including the Governor's Office and the Department of Mineral Resources. The EERC suggests that when state entities are contacted by vendors of pertinent pipeline technology, the state entities should point the vendors to the database and emphasize its use. The EERC believes that credibility of the database and its purpose will be reinforced if the state displays interest in it. Pointing vendors to the database Web site will also provide the state entities with a productive off-ramp for discussions with vendors of pipeline technologies.

The EERC began a third phase of pipeline study during the month in which this report was filed. This third phase of the pipeline study will include engagement of a pipeline stakeholders group, which, in turn, will allow the EERC to continue promotion of this database to the end users of the database. It will also remind these end users of a productive outlet they can provide to vendors of pipeline technologies when those vendors make sales calls to the pipeline operators.

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Pipeline Technology Database

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ADD A TECHNOLOGY / VENDOR LOGIN

SEARCH TECHNOLOGY LISTINGS

Figure 2. Screen capture showing pipeline technology database home page.

CONCLUSIONS

At the request of the NDIC and in an effort to assist pipeline operators in decreasing the incidence and impacts of liquids gathering pipeline spills, the EERC constructed a Web-based database to match commercial pipeline technology offerings to the needs of operators of liquids gathering pipelines. The goal of this project was to bridge the gap in understanding between capabilities claimed by vendors and true operational needs of gathering pipeline operators by clearly delineating the operational needs, then to work with vendors to adequately submit for the record how their system fits those needs. This database will continue progress toward that goal as vendors submit increasing numbers of applicable technology offerings for consideration.

FINANCIAL INFORMATION

This project was sponsored by the NDIC OGRP. Table 1 presents the current budget and expenses to date for this project.

Table 1. Pipeline Technology Database – Fund Status

	Expected Budget, $	Actual Expenses to Date[1] (7/27/17), $
[redacted]		[redacted]
Supplies and Other	14,851	19,660
F&A	[redacted]	[redacted]
Total Project Costs	100,000	96,007

[1] Reflects expenses posted through 7/27/17. Because of a lag in the university system, final expenses will post by the end of August.
[2] Facilities and administration.