

BAMI-I ²⁰₂₄

Biannual Journal H2 2024



NAVIGATING THE CHALLENGES OF UTILITY MANAGEMENT: A JOURNEY OF LEADERSHIP AND INNOVATION IN LOGANSPORT UTILITIES
(Cover Story at page 24)

SMALL TOWN, BIG IMPACT: BAMI-I AND AIRW SECURE \$650K GRANT FROM INDIANA FINANCE AUTHORITY TO DEVELOP A COMPREHENSIVE ASSET MANAGEMENT PLAN FOR SWITZ CITY, IN (See page 19)



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Purdue University Students Shine at 2024 Underground Infrastructure Conference

Cover photo: Logansport leadership team: Left: Brian DeWitt, Right: Jackson Wiseley

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Message from BAMI-I President

Dr. Tom Iseley

Ph.D., P.E., Dist. M. ASCE, PWAM, BAMI-I President

In each of the past couple of BAMI-I Journal issues, Ms. Wei Liao has provided a continuing story regarding our work with the small town of Switz City, IN. With less than 300 people, one might have a tendency to question the significance of this initiative. After relocating from Louisiana Tech University to Purdue University in 2020, we established the Purdue UIT (Underground Infrastructure Team) and a partnering relationship with BAMI-I to explore how we could learn more about water asset management initiatives in Indiana, and how we might be able to get our students involved. The timing of our relocation was perfect because in March 2022, the Governor signed Senate Bill (S.B.) 272 into law which requires every water utility in the State to have an approved AMP (Asset Management Plan) to qualify for funding through the Indiana State Revolving Fund (SRF) Loan Program. The AMP must be developed in accordance with the Indiana Finance Authority IFA) which administers the SRF as well as other Environmental Finance Programs. Please read Ms. Liao's article in this issue for the exciting latest developments with the Switz City program. Even though Switz City has a population than 300, they must comply with the same guidelines as the utilities with 300,000 cus-

tomers.

It is important that the passage of S.B. 272 was the result of must work and investment which was officially initiated in 2025. The following is the timeline:

- October 2015 – Evaluation of Water Utility Planning in Indiana – A survey of best practices, challenges, and needs an IFA report prepared pursuant to SB 474 for the Indiana State Legislature.
- March 22, 2016 – SB 347 signed by the Governor (Public Law 102) Requires water audits in accordance with the AWWA M-36 guidelines and QC verification
- August 2018 – IFA report – Financial Needs for Stormwater Infrastructure and Programming in Indiana (2016-2036). Prepared by IU Public Policy Institute
- 2020 – IFA report - Indiana Wastewater Monitoring Program – Sampling Community Sewersheds For SARS-CoV-2, Prepared by 120Water, IU, Notre Dame, and Microbac
- 2021 – IFA State Revolving Fund (SRF) Loan Program – Clean Water and Drinking Water Asset Management Program Guidelines
- September 2019 – IFA report – Asset Management Program – Guidance for The Indiana State Revolving Fund Loan Program
- March 7, 2022 – ISB 272 signed by the Governor

When our Purdue UIT studied the 2019 IFA AMP Guidelines, we were very impressed and pleased with how closely it followed what BAMI-I has been teaching in our Certification of Training in Asset Management (CTAM 100-400) courses since 2010. You will be impressed with the following sections taken directly from the IFA Guidelines Document:

An AMP is important for the following reasons:

1. Utility assets provide an essential customer service.
2. Proper O&M and scheduled replace-

ment of these assets is essential for public health and safety.

3. These assets represent a major public investment.
4. Utilities are important to economic development.
5. Proactive management will maximize system reliability and control efficiency.

Whether a Utility has implemented an AMP or will implement an AMP, these plans should provide a basis for the ongoing “living document” for the Utility and stakeholders to assist in the long-term management of assets. An AMP is required for the entire wastewater system for CWSRF funded projects and for the entire water system for DWSRF funded projects.

The IFA provides this guidance document to assist in the development of an effective and compliant document. It is incumbent upon a community to determine the proper tools or framework for the AMP to provide a “best fit” for the size and type of the Utility. It is important to ensure stakeholders are involved early in the process such as the governing board/council, Mayor, Town Manager, City Engineer, etc.

The AMP guidance is organized into the following three sections:

1. Technical
2. Managerial
3. Financial

It is recommended that the Utility's AMP be organized in a similar fashion.

BAMI-I appreciates the support received from IFA to pursue our goal of not just developing a document to check-off on a requirement to qualify for a SRF loan but to make it a Gold Standard” and a model to other small utilities to follow and to establish it as a “Living Lab” to validate management and technical products entering into the State. Please read the articles in this issue of the BAMI-I journal for the project. You can also contact us to learn more about it and BAMI-I initiatives.



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ASCE 75-22: Utility “As-Building” and Utility Record Drawing Standard
ASCE Subsurface Utility Engineering for Municipalities: Scope of Work and Pre-Qual Criteria

5 days: December 9-13, 2024

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This 5-day school is designed to provide the licensed professional and their staff involved with utility investigations knowledge necessary for being in professionally responsible charge of a utility investigation practice. If you practice in the realm of subsurface utility engineering, this 40-hour PDH school is for you.

Course Director

Tom Iseley, Ph.D., P.E., Dist. M. ASCE, PWAM
Professor of Engineering Practice
Beavers Heavy Construction Distinguished Fellow
Purdue University

Course Developer

Jim Anspach, PG(r), Dist. M. ASCE
ASCE/UESI President 2018
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UNDERGROUND INFRASTRUCTURE TEAM





Message from Journal Editor

Ms. Wei Liao

PWAM

and complexity of the contract left a strong impression on me, and we discussed the fact that no matter how detailed and comprehensive a contract may be—like insurance or loan agreements—it can never fully prevent future legal disputes. The key to avoiding potential issues lies in choosing trustworthy partners. As we discussed, when you choose a reliable partner, you don't even need a contract! During our conversation, Dr. Iseley reiterated his familiar phrase, "Do it in faith. Get things done. Then you will build the trust." This principle has also guided BAMI-I since its inception, and for the past twenty years, it has been dedicated to building a trusted community where members feel a sense of belonging and value.

Another important principle I learned from Dr. Iseley is, "Do something different." Through the article "Small City, Big Impact" in this publication, you will sense our commitment to faith and our spirit of pursuing something unique. Life, at its core, is an experience. We create new things that become part of others' lives, and in the process, we also find meaning in what others have created. This brings me to the Global Buried Asset Management Congress (GBAMC) that we have meticulously planned. In the initial design phase, I was inclined to replicate the model of other successful conferences, but Dr. Iseley believed we should create something different. How do we achieve that? We can only move forward by exploring. Despite the many challenges, as long as we don't give up, we cannot fail! "You never know if you'll succeed unless you try!" Guided by this belief, we launched the BAMI-I Journal, which has now published its fifth issue, and the GBAMC, which is about to hold its second edition in Indianapolis, Indiana this November. Throughout this journey, I am most grateful for the trust

and support of all our industry partners.

As an editor of the BAMI-I journal, I am deeply aware of the responsibility that comes with being an information provider. Today, AI technology has evolved to the point where it can assist people in creating content. However, in my experience using AI to aid in writing, I have concluded that artificial intelligence cannot replace human writing, no matter how much it is hyped. Writing is a uniquely human skill—the process of converting the brain's networked thinking into linear information and presenting it through words. Especially in the engineering field, content is a summary, synthesis, and report of our actions and creations. Only through a series of genuine actions and innovations can truly valuable content be generated. Every day, people in our industry are creating their unique content. If you want others to know what you are doing, you can share it on your social media/website or publish it on professional media platforms. BAMI-I is trying to create a professional platform to report on your activities! On every page of this journal, you will find stories of people in action. I hope this journal provides useful insights, helping us recognize the importance of human contributions in the midst of advancing technology as we work together toward a better future.

Meanwhile, I want to call on more industry experts, scholars, and practitioners to join us and share your insights and experiences. Whether by writing articles, participating in discussions at the upcoming Global Buried Asset Management Congress (GBAMC), or contributing in other meaningful ways, your involvement will make a significant impact on our industry. Don't hesitate to submit your work or sign up for our events—we look forward to your contributions.

Although the technology has changed the way we communicate, the fundamental nature of social connections remains unchanged. The evolution of any society and its structures is rooted in the culture of primitive tribes. Building trust relationships often requires working, playing, and communicating together. By reading this issue of BAMI-I Journal, you will see how our participants have formed meaningful connections throughout our team's actions.

During the five years of working in America underground infrastructure Industry, I have not only gained valuable professional knowledge from many experts but, more importantly, I have learned how to conduct myself and develop the right mindset. Dr. Iseley, who has been my most important mentor, often says to me, "Do it in faith. Get things done. Then you will build the trust." This phrase has had a profound impact on me, helping me find direction and strength in this new environment.

Recently, Dr. Iseley and I reviewed a service contract together. The length

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- Asset Inventory, Organization Strategies & Tools
- Water & Wastewater Condition Assessment
- Data Content, Analysis, Sharing & Distribution

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- Accounting Principles, Reporting & Budgeting
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- Public-Private Partnerships and Design- Build
- Level of Service and Capital Improvement Plans
- Life-Cycle Costing
- Case Study Examples

Why offer courses in Asset Management?

The Buried Asset Management Institute-International (BAMI-I) created the Certification of Training in Asset Management (CTAM) program to increase awareness and train utility personnel on the best way to implement and use asset management to extend the life and efficiency of their water and wastewater systems. CTAM is an educational series for obtaining certification of training in the management of water asset infrastructure.

Levels of Certification

- Certificate of Completion – requires completion of each course
- Associate Water Asset Manager (AWAM) – requires completion of CTAM 100-400 and an application submitted to the BAMI-I Asset Management Certification Board
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Benefits of the CTAM Series

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- Earn internationally recognized certification in the field of asset management.
- Earn CEU / PDHs* for each course.

2024 GLOBAL BURIED ASSET MANAGEMENT CONGRESS (GBAMC) OPENS REGISTRATION

GBAMC

The 2nd Global Buried Asset Management Congress

 The 2024 Global Buried Asset Management Congress (GBAMC) is here, offering an exceptional platform for professionals across the underground infrastructure sector. Scheduled for November 14-16 in Omni Severin Hotel, Indianapolis, this event promises to be a highlight in the industry calendar. The GBAMC is among the most anticipated gatherings of experts, innovators, and leaders from around the world, featuring presentations/panel discussions from some of the most influential thought leaders in the field. By supporting this initiative, our sponsor showcases a strong commitment to advancing industry knowledge and fostering collaboration. We are deeply grateful for their backing, which makes this landmark event possible. Furthermore, with BrainDrip, LLC generously providing scholarships to individuals from municipalities and utilities, we are ensuring that professionals from these critical public sectors can participate in and benefit from this invaluable event.

About the Global Buried Asset Management Congress

The GBAMC stands as a premier gathering for professionals dedicated to the management of buried infrastructure assets. Since its inception, GBAMC has become an essential platform for driving innovation and facilitating the exchange of knowledge among industry leaders.

The inaugural 2023 congress, held in Chicago, was a milestone success, attracting a diverse group of experts from around the world to set global objectives, assess the current state of practice, and chart

a course of action. It featured a series of impactful discussions, presentations, and networking opportunities, all centered on the most pressing challenges and innovations in buried asset management.



Inaugural GBAMC Ribbon-Cutting Ceremony



Panel at 2023 GBAMC

Building on this strong foundation, the 2024 congress will continue this tradition, bringing together global experts to explore cutting-edge advancements and share best practices. This year's agenda will cover critical topics, including water and wastewater asset management, asset mapping and inventory, pipeline condition assessment, technical solutions for buried infrastructure, and hydrogen infrastructure management. By addressing a broad spectrum of issues, the congress offers a thorough examination of the challenges and opportunities in buried asset management, making it a must-attend event for anyone in the field.

Speakers Highlight

This year, GBAMC will showcase nearly 30 renowned thought leaders in the field of water and buried asset management. These distinguished speakers include Government officer, leading experts, innovators, and practitioners who will present on a diverse range of topics.

Our speakers are selected for their expertise and impact across a wide range of industries, ensuring that attendees receive cutting-edge insights and practical knowledge. Their diverse backgrounds and cross-industry perspectives will provide a comprehensive view of buried asset management, covering not only traditional topics but also emerging trends and innovations. This breadth of experience will enrich the discussions and offer valuable insights applicable to various sectors involved in managing buried infrastructure.

All of our research presentations and discussions will take place on a single stage, allowing you to hear directly from every thought leader over the course of two days. This concentrated format not only enriches the depth of discussions but also ensures you receive a comprehensive understanding of the latest advancements. It provides valuable insights that are applicable across various sectors involved in managing buried infrastructure. Additionally, this format maximizes your time efficiency, enabling you to absorb cross-industry knowledge, build meaningful connections, and enhance your professional network without the need to navigate multiple tracks.

Congress Highlights

The GBAMC has the potential to be dynamic and very enriching event, through:



Presentation at 2023 GBAMC

- **Expert Keynotes:** A wide range of different representatives from the buried asset management field will tell their stories and share their ideas about how to advance the buried management industry.
- **Panel Discussions:** Enhance vital matters and alternatives with professionals in different fields during the stimulating interactions.
- **Exhibition:** Look into the recent products and services of the long-standing cutting-edge companies in the infrastructure sector.
- **Networking Opportunities:** Make professional connections with peers, possible partners, and leaders in your industry through organized networking sessions and casual meet-ups.



Moment at 2023 GBAMC

BrainDrip & IQ4H2 Scholarship Opportunities

Braindrip, LLC is dedicated to advancing education and innovation within the underground infrastructure sector. Their support for the GBAMC, including premier sponsorship and the generous provision of 25 scholarships specifically for individuals from municipalities and utilities, underscores their commitment to enhancing access and participation for professionals in these critical public sectors. By targeting these essential areas, BrainDrip ensures that key stakeholders in infrastructure management can benefit from the event.

The Braindrip and IQ4H2 Scholarship program provide via these scholarships will be the following crucial fees such as:

- **Registration Fees:** Congress Fees Are Paid In Full.
- **Accommodation:** The event's scholars are given assistance with their accommodation costs, which ensures that they can participate in the event without financial strain.

To apply for the Braindrip & IQ4H2 Scholarship, please ensure that your sub-

mission includes the following:

- **Application Form:** Complete the scholarship application form available on the GBAMC website. Be sure to fill out all sections thoroughly.
- **Applicants** will be notified of their status no later than October 1.

Sponsorship and Exhibition Opportunities

Explore sponsorship opportunities to showcase your company and gain visibility at the 2024 GBAMC. As a sponsor, you will get a chance to:

- **Enhance Brand Visibility:** Your brand will be promoted to a specific group of industry professionals and decision-makers.
- **Engage with Attendees:** Through different sponsorship packages and event activities, connect with potential clients and partners.
- **Support Industry Growth:** Show your applause for the field of buried asset management and support the development of industry talent.

A heartfelt thank you to our sponsors who have committed their support so far:

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Your generous contributions reflect your unwavering commitment to advancing the industry.

Don't Miss Out!

Secure your spot today and be part of an event that promises to shape the future of infrastructure management. Check out the different sponsorship opportunities that can enhance the visibility of your brand as well as they will be a great help in the development of the industry.

For more information and registration, explore our website at:

<https://bami-i.com/congress/>, and contact Wei Liao at liao186@purdue.edu or **3184978288**

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2024 CONGRESS SPEAKERS

(Speakers are subject to change, with more to be announced)



JAMES H. ANSPACH, PG(R), DIST.M.ASCE, NAC
Affiliate Assistant Professor, Iowa State University

Jim Anspach is one of the original developers of subsurface utility engineering. He chaired ASCE 38, the standard for how to investigate and document

utilities on project development plans. He was a prime developer of ASCE's Utility Engineering and Surveying Institute, and served as the 2018 President for its first year of stand-alone operation. Jim jointly developed the concepts and curriculum for

the BAMI-I Utility Investigation School, now give 23 times across the country. Jim currently serves as the Chair of the UES Certification Board for Pipeline Engineers (Water), Project Utility Engineers, and Surveying Engineers.



STEVEN L. BARFUSS
Research Professor at Utah State University, Associate Director at the Utah Water Research Laboratory

Steve has been employed full time at USU since 1987. He

performs hydraulic research in the UWRL hydraulics laboratory and supports graduate students in their research. His research focus

on Hydraulic structures, physical modeling, flow meter, pipe and valve testing.



GLENN BARNES
Director, Water Finance Assistance

Glenn Barnes is the Director of Water Finance Assistance, a training and technical assistance organization dedicated to building the financial and managerial skills of drinking water and

wastewater utility employees. He has worked for more than 15 years with utilities of all sizes across the country. Glenn's work focuses on rate setting, asset management, affordability, increasing bill payments, accessing infrastructure funding, water loss and conservation, and workforce retention.

All the work of Water Finance Assistance is rooted in data analysis, allowing utility staff to make informed and objective decisions to improve their sustainability and to serve their communities for years to come. Glenn is based in North Carolina.



MICHELLE D. BEASON, PE

Regional Manager/Principal Engineer, National Plant Services, Inc.

Michelle received a BS in Civil Engineering from Purdue University, and is a registered Professional Engineer in California, Nevada, Oregon, and Arizona; with over 30 years of water and wastewater asset management and construction experience. She has worked as a Project Engineer for Capitol Engineering (Indianapolis) and Black & Veatch (Kansas City), as an Asset

Management Engineer with the East Bay Municipal Utility District, she owned her own Engineering & Construction firm for 5 years, and for the last 14 years has specialized in multi-sensor inspections and trenchless rehabilitation of sewer, storm, and water assets. She is currently the Regional Manager for National Plant Services, Inc., covering the 12 Western States, including Hawaii and Alaska. Michelle is also active in many industry

organizations. In addition to serving as a Board Member of the Western Chapter of the North American Society for Trenchless Technologies, she is a Board Member of NASSCO, and is Chair of the NASSCO Infrastructure Assessment Committee which manages all revisions to the US standard language for pipe and manhole defect codes (NASSCO's PACP/MACP/LACP).



BILL BLOMQUIST

White River Alliance, Indianapolis, Indiana USA

Bill Blomquist began working at White River Alliance in 2022, having previously been a member of the Alliance's board of directors representing IUPUI. Bill's work

with the Alliance focuses mainly on the Indiana Water Summit and Summit-related activities such as the Water Summit Working Group and our pre- and post-Summit online Science & Policy forums. Bill also follows the legislative process during the sessions

of the Indiana General Assembly. Bill is also a Professor Emeritus of Political Science at IU-Indianapolis, a Senior Research Fellow at the IU Ostrom Workshop, and an adjunct instructor of Political Science at Butler University.



PAUL CROCKER

Senior Reliability Engineer, ReliabilityX

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Environment (KDHE) Class IV Drinking Water Operator • Associate Boards of Certification (ABC) Class III Maintenance Technologist • Association of Maintenance Professionals (AMP) Certified Reliability Leader (CRL) • Certified Maintenance and Reliability Professional (CMRP) • Certified

Asset Management Assessor (CAMA) • Mobius Institute Vibration Analyst Cat-IP • Previously: 28-year Kansas City Kansas Board of Public Utilities (BPU) last role as Supervisor of Maintenance at Nearman Drinking Water Treatment Plant.



ADAM HERSHBERGER

EPA Water Specialist, Alliance of Indiana Rural Water

Adam has a background in water and wastewater operations management, including

treatment, distribution and collection systems. He currently holds WT4, DSM, and Wastewater Class II certifications along with having a Loss Audit Validator Adam

spent time as a Utility Asset Management Consultant prior to joining the Alliance in August 2023.



JILL HOFFMANN
Executive Director, White River Alliance

Jill Hoffmann is Executive Director of the White River Alliance, and President and Principal Owner of Empower Results, LLC, an environmental consulting company focused primarily

on environmental education, outreach, and various public involvement services. Her work as the Executive Director for the White River Alliance is gaining national recognition as a model for water partnerships and programs. Jill has been recognized with several state and local

awards for her work. Jill is experienced in technical disciplines such as water quality assessment, stormwater management, and nonpoint-source pollution prevention strategies, and in policy areas such as zoning, ordinance development, and public information.



HEATHER HIMMELBERGER
Director, Southwest Environmental Finance Center, University of New Mexico

Heather Himmelberger, P.E. is a registered professional engineer with over 35 years of experience working with water and wastewater utilities all across the U.S. She has a BS from Penn State Univer-

sity and an MS from Johns Hopkins University both in Environmental Engineering. As Director of the SW EFC, Heather has been a staunch advocate and promoter of asset management practice for over 20 years. She has provided hundreds of asset management trainings and directly assisted

systems of all sizes and types with understanding and implementing asset management. She has presented asset management presentations at regional, national, and international conferences. She has created guidance materials and documents.



STEVEN KRAMER, PE
Senior Vice President, COWI

Steven Kramer, PE, FASCE is a Senior Vice President at COWI. He has 40 years of experience in engineering firms serving the infrastructure

industry. Steve led the design, management and construction of over 75 underground projects around the globe with construction values up to \$1 billion. A frequent speaker and active participant at industry conferences and in technical

societies, Kramer has published more than 90 technical and management papers. Kramer served as the 2023 President of the ASCE Utility Engineering and Surveying Institute (UESI).



GEORGE E. KURZ, P.E., DEE
Independent Consultant and Researcher – Sewer Capacity Management

George has 46 years of experience as a government and private engineering consultant focused on improving effectiveness and efficiency in municipal

sewer systems. He believes that I/I is the most significant problem facing most operators, but that the true magnitude of the problem is underestimated and has been largely overlooked. He is a specialist in detecting, measuring, and stopping

I/I in sewage collection systems. George developed standard methods for measuring effectiveness of rehabilitation using flow monitoring and existing treatment plant data.



CORY KREUTZER

Technical director for IQ4H2, a subsidiary of Braindrip, LLC

Cory is a subject matter expert (SME) in hydrogen systems integration and has diverse background in mechanical engineering, chemistry, computational science, and business. Cory has an extensive history in applied research and development on energy systems including system design, safety assessment, product development and optimization, and control system design,

with an emphasis on renewable energy systems. His role at IQ4H2 is focused on safety, optimization, and acceleration of hydrogen systems with an emphasis on the advancement of Braindrip's novel composite pipeline technology. This includes the incorporation and advancement of pipeline health monitoring through advanced sensor systems. Prior to working at IQ4H2, Cory worked at the National Renewable Energy Laboratory as a group manager and research engineer for

the hydrogen infrastructure team. Prior to that, he worked professionally on a range of topics including electric vehicle climate control technologies, biomass cookstove development and manufacturing, and natural gas internal combustion engine performance. Cory holds a bachelors degree in chemistry from the Colorado School of Mines and masters degree in mechanical engineering from Colorado State University.



DR. JOHN C. MATTHEWS

Director, Trenchless Technology Center (TTC)

Dr. John C. Matthews has over 20 years of experience in the rehabilitation, installation, and inspection of infrastructure systems. He is the Director of the Trenchless Technology

Center (TTC) and Eminent Scholar Chair in Construction at Louisiana Tech University. He previously served as Pipe Renewal Service Line Manager at Pure Technologies, Water Infrastructure Lead at Battelle Memorial Institute, and Research Associate at the TTC. He has given more than 200

conference and workshop presentations and authored more than 300 technical publications. He is very active in NASTT, ASCE, AWWA, and currently serves on the Board of Directors of the ISTT.



JUSTIN NOLAN

Project director, UNC Environmental Finance Center

Justin Nolan is a project director for the UNC Environmental Finance Center. He has been with the organization for going on two years now doing work on a variety of projects

including EPA P2, the 2024 Appalachian Regional Commission study, C2 Technical Assistance for Communities, and providing learning opportunities for water utility staff across the EPA Region 4.

Justin graduated from UNC with his master's degree in City and Regional

Planning and immediately went to work with the Environmental Finance Center. He continues to apply the skills from his origins in the NC education system to the work he does engaging with NC citizens around the state.



JOHN W. NORTON, JR., PH.D., PE

Director of Energy, Research, & Innovation Great Lakes Water Authority

Dr. John Norton is Director of Energy, Research, and Innovation for GLWA, a combined water/wastewater utility in Southeast Michigan. GLWA treats more

than 40% of the water, and 30% of the wastewater, for the state of Michigan. Norton leads GLWA's research efforts to understand, extend, and enhance its linear and process infrastructure and directs projects ranging from source water

monitoring and distribution system water quality, through to energy extraction from biosolids. GLWA owns over 388 miles of PCCP, and over 800 miles of transmission main, 4 ft diameter or greater.



MIKE PETERS

Member and Team Principal, Braindrip & IQ4H2

Mike Peters joined Energy Services and Solutions (EnServ) as their Business Development Manager and Lead Hydrogen Consultant in January of 2022. He leads EnServ's Renewable Energy and Sustainability Group which includes projects in hydrogen (H2), renewable natural gas (RNG), carbon

capture, utilization and storage (CCUS), and Environmental, Social, and Governance (ESG). Mike has been working in hydrogen systems R&D and commercialization for over a decade, specializing in renewable electrolysis and hydrogen infrastructure. He has worked on projects from production to end-use and everything in-between. His previous role as an applied researcher at the National Renewable Energy Laboratory

led to numerous advances of hydrogen technologies including demonstrating electrolyzers as distributed energy resources (DERs) within the grid, leading a medium-/heavy-duty modeling and hardware test program for Class 8 trucks, and bringing together a \$15M, 30+ partner hydrogen blending project for the U.S. Department of Energy.



ANNA PRIDMORE, PHD, PE, DBIA

Senior Vice President, Structural Technologies

Anna Pridmore, PhD, PE, DBIA is a Senior Vice President for Structural Technologies, leading the company's efforts in the Water/Wastewater market with a focus on design-build rehabilitation of civil infrastructure. Anna delivers pursuit, startup, and executive oversight for large design-build projects across the United States and Canada. She received her PhD

in Structural Engineering, is a licensed professional engineer in California, and has over 20 years of interdisciplinary experience specializing in large diameter pipeline asset management and renewal, with over 500 inspection and rehabilitation projects implemented to date.

Anna is a Vice-Chair of DBIA's Water/Wastewater Committee and committee member for Water Collaborative Delivery

Association. She was the past chair of the Pipelines Division of American Society of Civil Engineers (ASCE) and has served as secretary for the development of the AWWA C305 subcommittee. She serves as an instructor for ASCE and EUCI, teaching both technical content related to civil infrastructure renewal as well as courses on engineering ethics and diversity in engineering.



CHAD REYNOLDS

Water Circuit Rider, Alliance of Indiana Rural Water

Chad started his water and wastewater career in 2001. He holds a DSS, WT3 and Class 1 license, and he is a validator for

water audits. He holds a Level 2 license and is the RD Apply for USDA to assist in filling out loan applications. Chad also holds a Category 8 license for mosquito spraying. He sits on a committee with IFA and AWWA

overseeing water audits, as well as the IDEM Water Exams Committee. In his free time, Chad loves to be involved with his two boys, deer hunt and fish.



MATTHEW RUSHING

Project Engineer, North Carolina's Department of Environmental Quality

Matthew Rushing, E.I., manages the Asset Inventory and Assessment grant and Merger/Regionalization Feasibility Study grant programs at North Carolina's Department of Environmental Quality which directly support North

Carolina's Statewide Water and Wastewater Master Plan, "The Road to Viability".

Since graduating from Ole Miss with a B.S. in Chemical Engineering in 2011, Matthew has managed over 450 construction and planning projects for drinking water and wastewater utilities.

His passion to confront complex

challenges with a combination of best practices and unique solutions has resulted in a wealth of experience engaging with all levels of the regulated community and supporting their efforts to provide reliable and affordable water and wastewater services



BOSTON SNYDER
Asset Manager, City of Goshen, IN

Boston started his municipal utility career in 2008 performing construction on sewer systems. He worked construction for a few years before taking

a role in 2014 where he focused primarily on geographic information systems and construction inspection. After joining the Goshen team in 2022, he assumed the role as the city’s first Asset Manager in March of 2024. He is currently enrolled at Indiana

University – South Bend where he is obtaining a Bachelor of Science in Business with a concentration in Management Information Systems and a minor in Business Analytics where he is set to graduate in 2024.



MARK G. WADE, P.E.
President, BlueWater Solutions Group, Inc.

Mark is President and a Senior Pipeline Technologist for BlueWater Solutions Group. This includes a wide range of buried pipeline infrastructure for municipal, commercial, federal, and industrial clients. Throughout his 46 years of experience in consulting engineering he has accumulated a broad range of experience for

the improvement and management of water, wastewater, and stormwater conveyance systems. This includes planning, modeling, design, and asset management services. He has managed more than 1,100 projects and programs related to buried pipeline systems in North America, Southeast Asia, New Zealand, and Europe. Mark has also authored and presented nearly 100 technical papers related to conveyance system evaluation and

rehabilitation. Several have been published in trade magazines, journals, manuals-of-practice, and books. He currently provides senior-level technology and project management oversight for several sewer assessment and rehabilitation projects, particularly large-diameter conveyance systems, in Colorado, Texas, Missouri, Mississippi, Florida, Kansas, and Iowa.



ROSS WAUGH
Director, Waugh Infrastructure Management

Ross is the founder of Waugh Infrastructure Management and is an Asset Management and systems integration specialist with 40 years experience in local government asset

management and engineering. Ross has been consulting in asset management practices for 24 years.

Ross is passionate about assisting people to practice Asset Management holistically and comprehensively yet practically. His strategic analysis of client practices is

balanced with a strong practical background that always ensures results not theory. Ross has experience of eight cycles of integrating asset management planning with long term Council financial planning within the New Zealand context.



KURT WRIGHT
Owner/President, SDG Engineering, Inc

Mr. Wright established his own professional engineering firm in 2002 based in Rutherford County, North Carolina. The corporate mission is to meet client’s requirements by providing quality professional water and wastewater engineering services with solutions for a sustainable environment. Mr. Wright has 36 years of experience in engineering

planning, design, project financing (grantsmanship), advertisement/bidding, contract administration, construction management, and startup services for numerous types of projects. Most of Mr. Wright’s experience is with municipal water and wastewater infrastructure.

Mr. Wright’s experience with Asset Management began in 2012 with his membership in BAMI-I (Buried Asset Management Institute – International).

Mr. Wright was the chief author of the Asset Management Plan for the town of Spindale, NC, which was approved by the state of North Carolina in 2013. He holds a certificate of completion for CTAM 100, 200, 300 & 400, is a Professional Water Asset Manager (PWAM), and contributed to the development of the CTAM 200 and 400 training manuals.



The 2nd Global Buried Asset Management Congress



NOVEMBER 14-16, 2024 - OMNI SEVERIN HOTEL, INDIANAPOLIS, IN CONGRESS AGENDA (SUBJECT TO CHANGE)

NOVEMBER 14, 2024

| | |
|--------------------------|--|
| 2:00 PM - 5:00 PM | BOARD OF DIRECTORS/COMMITTEE MEETINGS |
| 5:30 PM - 7:00 PM | KICKOFF RECEPTION EVENT |
| 2:00 PM - 5:00 PM | REGISTRATION OPEN AND EXHIBIT TABLE SET UP |

NOVEMBER 15, 2024

| | |
|----------------------------|---|
| 8:30 AM - 9:00 AM | WELCOME o Tom Iseley, BAMI-I/Purdue University o Wei Liao, BAMI-I/Purdue University |
| 9:00 AM - 9:30 AM | PRESENTATION: COMPREHENSIVE COMPONENT OF DEVELOPING AN ASSET MANAGEMENT PROGRAM o Glenn Barnes, Water Finance Assistance |
| 9:30 AM - 10:00 AM | I PRESENTATION: SPINDALE WASTEWATER COLLECTION, CONVEYANCE, AND TREATMENT SYSTEM ASSET MANAGEMENT PLAN UPDATE 2024 o Kurt Wright, SDG Engineering, Inc |
| 10:00 AM - 10:30 AM | BREAK |
| 10:30 AM - 11:00 AM | PRESENTATION: WHY ARE WE STILL TALKING ABOUT I/I? – ANSWERS FROM STATEWIDE STUDIES o George Kurz, Sewer Capacity Management |
| 11:00 AM - 12:00 PM | PANEL 1: WATER AND WASTEWATER ASSET MANAGEMENT IN THE US o Moderator: Heather Himmelberger, Southwest Environmental Finance Center, University of New Mexico o Panelists: representatives from various states (TBD) |
| 12:00 PM - 1:30 PM | LUNCH AND KEYNOTE SPEECH |
| 1:30 PM - 2:30 PM | PRESENTATION: TBD o Heather Himmelberger, Southwest Environmental Finance Center, University of New Mexico o Ross Waugh, Waugh Infrastructure Management |
| 2:30 PM - 3:00 PM | PRESENTATION: IMPLEMENTING ADVANCED TECHNOLOGIES AND ASSET MANAGEMENT TO HELP PRIORITIZE AND REHABILITATE CRITICAL PRESSURIZED PIPELINE INFRASTRUCTURE o Mark Wade, BlueWater Solutions Group, Inc. |

| | |
|--------------------------|---|
| 3:00 PM - 3:30 PM | BREAK |
| 3:30 PM - 4:00 PM | PRESENTATION: TBD o John Norton, Jr, Great Lake Authority |
| 4:00 PM - 5:00 PM | PANEL 2: HYDROGEN INFRASTRUCTURE MANAGEMENT o Moderator: TBD o Panelists: o Michael Peters & Cory Kreutzer, Brindrip & IQ4H2 |

NOVEMBER 16, 2024

| | |
|----------------------------|--|
| 8:30 AM - 9:00 AM | PRESENTATION: ADVANCING BETTER WATER POLICY AND STRATEGIES: DEVELOPMENT OF THE INDIANA WATER SUMMIT o Bill Blomquist & Jill Hoffmann, White River Alliance |
| 9:00 AM - 9:30 AM | PRESENTATION: UNIQUE ASSET MANAGEMENT CHALLENGES IN CAMPUS-TYPE FACILITIES o Jim Ansapch, Iowa State University |
| 9:30 AM - 10:00 AM | PRESENTATION: PREDICTIVE MODELING AND USER RATES - GOSHEN'S LEAD SERVICE LINE INVENTORY AND REPLACEMENT PLAN o Boston Snyder, City of Goshen, IN |
| 10:00 AM - 10:30 AM | BREAK |
| 10:30 AM - 11:00 AM | PRESENTATION: BALANCING THE RISKS AND REWARDS OF DELIVERY METHODS FOR UNDERGROUND AND TRENCHLESS PROJECTS o Steve Kramer, COWI |
| 11:00 AM - 12:00 PM | PANEL 3: TECHNICAL SOLUTION FOR BURIED ASSET o Moderator: Irene F McSweeney, Boston Water & Sewer Commission o Panelists: TBD |
| 12:00 PM - 12:45 PM | LUNCH |
| 12:45 PM - 1:15 PM | PRESENTATION: STRATEGIC WATER AUDITS: DRIVING SUSTAINABILITY AND EFFICIENCY IN UTILITY MANAGEMENT o Adam Hershberger, Alliance of Indiana Rural Water o Chad Reynolds, Alliance of Indiana Rural Water |
| 1:15 PM - 1:45 PM | PRESENTATION: NC GRANT EFFICACY STUDY AND OUTCOMES o Matthew Rushing, North Carolina's Department of Environmental Quality o Justin Nolan, UNC Environmental Finance Center |
| 1:45 PM - 2:15 PM | PRESENTATION: UTILIZING NEW TECHNOLOGIES TO MAKE BETTER ASSET MANAGEMENT DECISIONS o Michell Beason, National Plant Services, Inc. |
| 2:15 PM - 2:45 PM | PRESENTATION: THE CURRENT STATE OF THE PIPE INFRASTRUCTURE IN THE USA AND CANADA FROM A RECENT USU STUDY o Steven L. Barfuss, Utah State University |
| 2:45 PM - 3:00 PM | BREAK |
| 3:00 PM - 3:30 PM | PRESENTATION: LARGE DIAMETER PIPELINE ASSET MANAGEMENT o Anna Pridmore, Structural Technologies |
| 3:30 PM - 4:30 PM | PANEL 4: BUILDING THE FUTURE: VISIONARY APPROACHES AND EMERGING TRENDS IN ASSET MANAGEMENT o Moderator: John Matthews, Trenchless Technology Center (TTC) o Panelists: Paul Crocker, ReliabilityX |

SMALL TOWN, BIG IMPACT: BAMI-I AND AIRW SECURE \$650K GRANT FROM INDIANA FINANCE AUTHORITY

- Ziptility
- BFU
- Utility Inspection Services
- Smart-View
- InfoSense
- 4M Analytics

to Develop a Comprehensive Asset Management Plan for Switz City, IN



The first project meeting in the Switz City town hall

“I like what you guys are doing, it’s boots on the ground and it’s getting things done and you’re going to benefit the utilities”

Jim McGoff, Director of Indiana Finance Authority (IFA) said to Dr. Tom Iseley and Wei Liao, right before he agreed to provide \$650K to fund BAMI-I’s efforts on developing an Asset Management Plan (AMP) for Switz City, Indiana.

The project to develop an Asset Management Plan (AMP) for Switz City, Indiana, began in January 2023. Purdue Underground Infrastructure Team (UIT), Ziptility, BFU, and BAMI-I have volunteered to collaborate on creating the AMP for Switz City since then. This initiative aims to explore ways to support the implementation of Indiana state laws. As the project progressed, numerous companies and individuals joined the effort. They are:

- Alliance of Indiana Rural Water (AIRW)
- Purdue UIT / BAMI-I
- George Kurz Independent I&I Consultant

With Adam Hershberger transitioning from Ziptility to AIRW, the main parties of the project are now BAMI-I and AIRW. All parties involved in this project continue to support it in various ways.

The project is estimated to cost \$650,000, which the state has agreed to fund. This is the first phase of the entire program. The ultimate program goal is to set the efficient and erectical asset management model for utilities across Indiana State and the asset management industry in the United States. With the strong support from IFA, BAMI-I team will lead the efforts to achieve this goal.

The impetus behind the project is to help water utilities comply with Indiana’s new regulation, Indiana Senate Bill 272 (2022), which requires that after July 1, 2023, all water utilities whose project funding applications for infrastructure improvements are approved by the IFA must have an approved AMP.

About Switz City

Switz City is a small town in Greene County, Indiana, with a population of approximately 261 residents as of 2021. Switz City’s water infrastructure includes approximately 28 miles of water mains, ranging from 2 inches to 8 inches in diameter. The town purchases its water from Linton City and distributes it through this network. The wastewater infrastructure consists of one wastewater treatment plant, around 5 miles of gravity and force mains, 74 manholes, and three lift stations, all maintained through contracts with external service providers.

Why is this project important to water industries especially in rural areas?

Drinking water and wastewater infrastructure is subject to wear and tear over time, eventually reaching a point of failure. This deterioration leads to increased emergencies, which are often

more costly to address than preventative measures.

To maintain reliable service delivery, including consistent water supply and efficient wastewater treatment, utilities must prioritize proactive management. A comprehensive risk-based asset management program is essential for achieving this goal.

Indiana Senate Bill 272 (2022)

Indiana has established itself as one of the leaders in water-related developments through a series of strategic initiatives and legislative actions. Key milestones include the 2015 evaluation of water utility planning, the 2016 requirement for water audits, and significant reports on financial needs for stormwater infrastructure and wastewater monitoring programs. The state further demonstrated its commitment with the 2019 publication of the Asset Management Program guidelines and the 2021 guidelines for the State Revolving Fund Loan Program. The signing of ISB 272 in March 2022 marks a significant step, positioning Indiana as a leader in water asset management. The Indiana Finance Authority (IFA) has been designated to oversee these efforts.

Small water utilities are facing challenges

Small water utilities face numerous challenges in developing Asset Management Plans (AMP), including limited funding and human resources, difficulties in data collection and management, lack of professional knowledge and technical skills, complex regulatory compliance requirements, aging infrastructure, insufficient community support and awareness, and limited external support.

Project Team and Collaboration

The project is a collaborative effort between BAMI-I, the Alliance of Indiana Rural Water, and Purdue UIT. The team will leverage the expertise and resources of these organizations to develop and implement the AMP for Switz City. Purdue University will provide technical and administrative support through its Underground Infrastructure Team (UIT), involving graduate students in practical

learning experiences.

Background

BAMI-I was invited to conduct presentation sessions at Alliance’s annual conferences on September, 2022. Through this initiative BAMI-I was introduced to Ziptility and Bynum Fanyo Utilities (BFU). It was decided by all 3 parties to volunteer their efforts to develop an AMP in accordance with the IFA Guidelines. The motivation for this initiative was to learn the details of what it takes to develop an AMP utilizing these guidelines. In January 2023, the Town of Switz City enthusiastically agreed to allow us to develop an AMP for their drinking water and wastewater systems. The agreement with Switz City was with BAMI-I, and Alliance became a

cooperative partner.

An Underground Infrastructure Team (UIT) was formed in the College of Engineering at Purdue University in the Construction Engineering and Management (CEM) program. Purdue provides technical and administrative support to BAMI-I through the UIT. During the Fall of 2023, a graduate-level course was taught on Asset Management of Underground Infrastructure with 22 students. The students were divided into 5 teams, with each assigned to develop an AMP in accordance with the IFA Guidelines. The UIT took the 5 AMPs and merged sections with what had been accumulated and produced what was referred to as the Interim AMP plan for Switz City. It was referred to as “Interim” because the development team had no



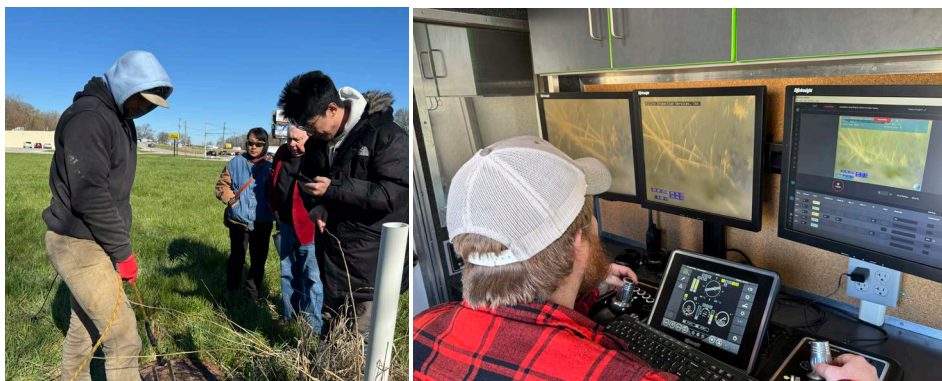
The project team visited Switz City Treatment plant

pipeline condition assessment (PCA) data which means all recommendations had to be very conservative until real PCA data could be acquired.

In the interim plan, we got data from the below sources:

Ziptility, the software used by Switz City, provides asset data and preliminary condition assessments, laying the groundwork for an informed and strategic approach to asset management in Switz City. This work was primarily done by Adam Hershberger, who is now an EPA Water Specialist with the Alliance of Indiana Rural Water. He also helped collect general and operational information.

George Kurz conducted an in-depth Infiltration and Inflow (I/I) analysis based on the operational data. His work involved using this data to assess the extent and impact of I/I on Switz City’s wastewater system.



The utility Inspection Services team conducted CCTV inspection in the Switz City

advanced acoustic technology known as **SL-RAT (Sewer Line-Rapid Assessment Technology)**. This technology produces a wide range of mapping and condition data, which detects how unobstructed the pipeline is by rating it 0-10 and generating a GIS map with color-coded lines based on how much blockage exists in the lines. For example, a “0” indicates no acoustic signal could travel through

manholes were inspected, and a service was inspected with a special lateral launch CCTV technology.

- **4M ANALYTICS:** This is the first application of this technology in Indiana. It uses satellite imaging technology coupled with AI (Artificial Intelligence) to develop comprehensive location of utility assets.



The project team conducted the manhole inspection in Switz City

BFU, contracted with Switz City for operations, provided utility system diagrams, operation management practices, and strategies for reducing energy consumption.

During the spring semester of 2024, a graduate-level course on Pipeline Condition Assessment and Integrity Management is being taught where the students are taking the Interim AMP for Switz City an integrating the following 3 data sources:

- **ACCOUSTIC:** An Alliance representative teamed with an InfoSense representative to conduct a PCA program on about 90% of the sewer collection system utilizing

the pipe, indicating 100% blockage. It would be color-coded RED. A “10” would indicate the barrel of the pipe is fully open allowing maximum acoustic signal to pass and would be color coded as GREEN. YELLOW would indicate lines with partial blockage.

- **CLOSED-CIRCUIT TELEVISIONING (CCTV):** Utility Inspection Services (UIS) from Knoxville, TN dispatched a 2-person team with their advanced CCTV mobile unit to work with Alliance representative and the Purdue UIT/BAMI-I representatives to internally inspect lines indicating blockage from 0-6. In addition, the

LESSONS LEARNED:

- To develop a comprehensive risk-based AMP in accordance is the IFA Guidelines is demanding even for a small utility like Switz City with less than a population of 300. However, they have a fully operating WWTP with a NPDES permit, a sewer collection system with 4 pumping stations and a water distribution system with an elevated storage tank. This represents a lot of assets, and most are buried.
- The IFA Guidelines are excellent and need to be applied to the fullest extent possible without trying to take short cuts or short circuit certain hard obtain steps. This includes to the best job possible on developing the 3 scenarios which project rates and tasks needed for 20 years.
- It is essential to work closely with the major stakeholders to educate them how this AMP is to be a living document to establish the future business practices. This needs to start with emphasizing the core values and benefits of the AMP.
- It is essential to have a comprehensive strategy for developing AMPs which meet the IFA Guidelines as cost effectively as possible.

Proposal of a Three-Phase Plan



4th project meeting in the Switz City town hall

and Commitment of IFA Support

Based on the work that has been done, the BAMI-I team proposed a comprehensive Sewer System Evaluation Survey (SSES) and an in-depth investigation of the water system. Their recommendation aimed to collect extensive data to develop a top-tier Asset Management Plan that could be used as a model for smaller utilities. Additionally, they envisioned the small town becoming a living lab, where new innovations could be tested and monitored over time once the plan was properly implemented.

They developed the three-phase plan and presented it to the IFA to secure funding for the subsequent stages. Following the presentation to the IFA, Jim, as mentioned at the beginning of this article, appreciated BAMI-I's practical approach and its direct benefits to utilities.

PHASE 1: DEVELOPMENT OF COMPREHENSIVE AMP FOR SWITZ CITY AND MODEL CREATION

In this phase, the program team will further develop a comprehensive Asset Management Plan (AMP) for Switz City. \$250K of the \$650K funding will be allocated for this part. Specific actions will include enhancing the asset management plan's inventory, implementing cost-effective PCA, and creating detailed financial forecasts based on actual data.

Address the urgent needs of Switz City \$400K of the \$650K funding will be allocated for urgent asset upgrades needed in Switz City based on the work

that has been done. Below are some proposed actions:

- Address fixing the I&I sources,
- Perform necessary repairs and upgrades at the WWTP and pump stations,
- Replace all water meters.
- Other

PHASE 2: EXPERIMENTAL PROMOTION AND CONTINUOUS IMPROVEMENT (1-2 YEARS)

This phase will continue to assist in the implementation and management of the Switz City AMP. It will involve developing training materials and selecting 10-15 utilities of various sizes to develop asset management programs and provide training, outreach, and technical assistance. The information collected from this group of utilities should be used for the Manual of Practices (MOP).

PHASE 3: EXTENSIVE IMPLEMENTATION OF MODEL, ESTABLISHMENT OF STATE-WIDE ASSET MANAGEMENT DATABASE AND LIVING LAB (LONG TERM)

Ultimate program Objective:

1. To get the water assets in Switz City in acceptable operating conditions to serve as a "Living Lab" for assisting small utilities. This Living Lab will serve as a host for validating innovative solutions.

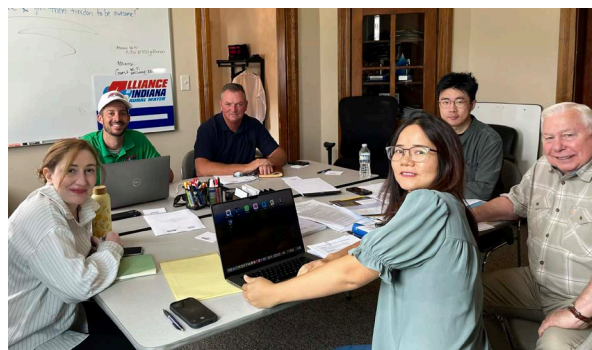
2. A manual of practice (MOP) will be developed to establish tools, templates, and procedures for developing and implementing AMPs in Indiana.

3. Training, education, workforce development, professional development, etc. these will utilize established programs and resources to the maximum extent possible. It will take the existing BAMI-I CTAM program and update it to specifically teach the principles and practices of AM related to how to develop an AMP which we learned from this program.

The first phase will last until July 2025. BAMI-I has already initiated the project in the past month and has brought in more partners to ensure the project's goals are successfully achieved.

About IFA

The Indiana Finance Authority (IFA) is a state agency dedicated to overseeing and managing financial resources and programs to support public and private infrastructure projects across Indiana. Its primary mission is to provide innovative and cost-effective financing solutions that enhance the quality of life for Indiana residents. The IFA administers a variety of programs, including those related to water quality, economic development, and public-private partnerships, ensuring sustainable growth and development within the state. By leveraging financial expertise and resources, the IFA plays a crucial role in facilitating essential infrastructure improvements and fostering economic vitality in Indiana.



Project team meeting in Alliance of Indiana Rural Water office



Flow meter location survey in the Switz City wastewater system

About BAMI-I

The Buried Asset Management Institute – International (BAMI-I) is a non-profit corporation whose main purpose is to educate and assist those who have an interest in applying best-buried asset management practices to extend the life and efficiency of their assets. Although BAMI-I has been mainly focused on water and wastewater systems, the principles of asset management apply to all different types of buried assets including for instance gas distribution pipes, and electric cables.

BAMI-I's mission is to provide a center of excellence for owners of underground infrastructure to join with industry and researchers, using sound science, to evaluate and /or develop buried asset management protocols for application worldwide to benefit ratepayers and other stakeholders by:

- Protecting public health
- Maximizing asset life-cycle value
- Improving the environment
- Sustaining economic development
- Enhancing the quality of life

About AIRW

The Alliance of Indiana Rural Water (AIRW) is a non-profit membership association of over 1,000 water and wastewater systems and related professionals. AIRW is Indiana's only representative to the National Rural Water Association. NRWA is the nation's largest utility association with 31,000 members.

ACKNOWLEDGEMENTS:

The organizations have donated their time, efforts and technology to the Switz City AMP development programs:

- Alliance of Indiana Rural Water
- Purdue UIT / BAMI-I
- George Kurz Independent I&I Consultant
- Ziptility
- BFU
- Utility Inspection Services
- Smart-View
- InfoSense
- 4M Analytics

These organizations agreed to participate at no cost because they believe in the goal established with the

Town Council of Switz City at our first meeting in January 2023. The goal was to develop a comprehensive risk-based AMP for water and wastewater which will serve as a living document to guide the program decisions on operations and maintenance, rehabilitation/replacement approaches, and funding strategies.

Conclusion

The partnership between BAMI-I & AIRW and the IFA is a significant step forward in addressing the infrastructure challenges faced by small utilities in Indiana. The Switz City AMP project is not just about improving one town's utilities; it's about creating a replicable model that can benefit communities across the state. With the support of the IFA and the dedication of the collaboration team, Switz City is set to become a shining example of how effective asset management can lead to sustainable and efficient utility services. Please stay tuned for our continued updates.

For more information about the program and others, please contact Wei Liao at Liao186@purdue.edu.

Author: Wei Liao, Editor, BAMI-I Journal

Delivering trenchless projects worldwide

AECOM

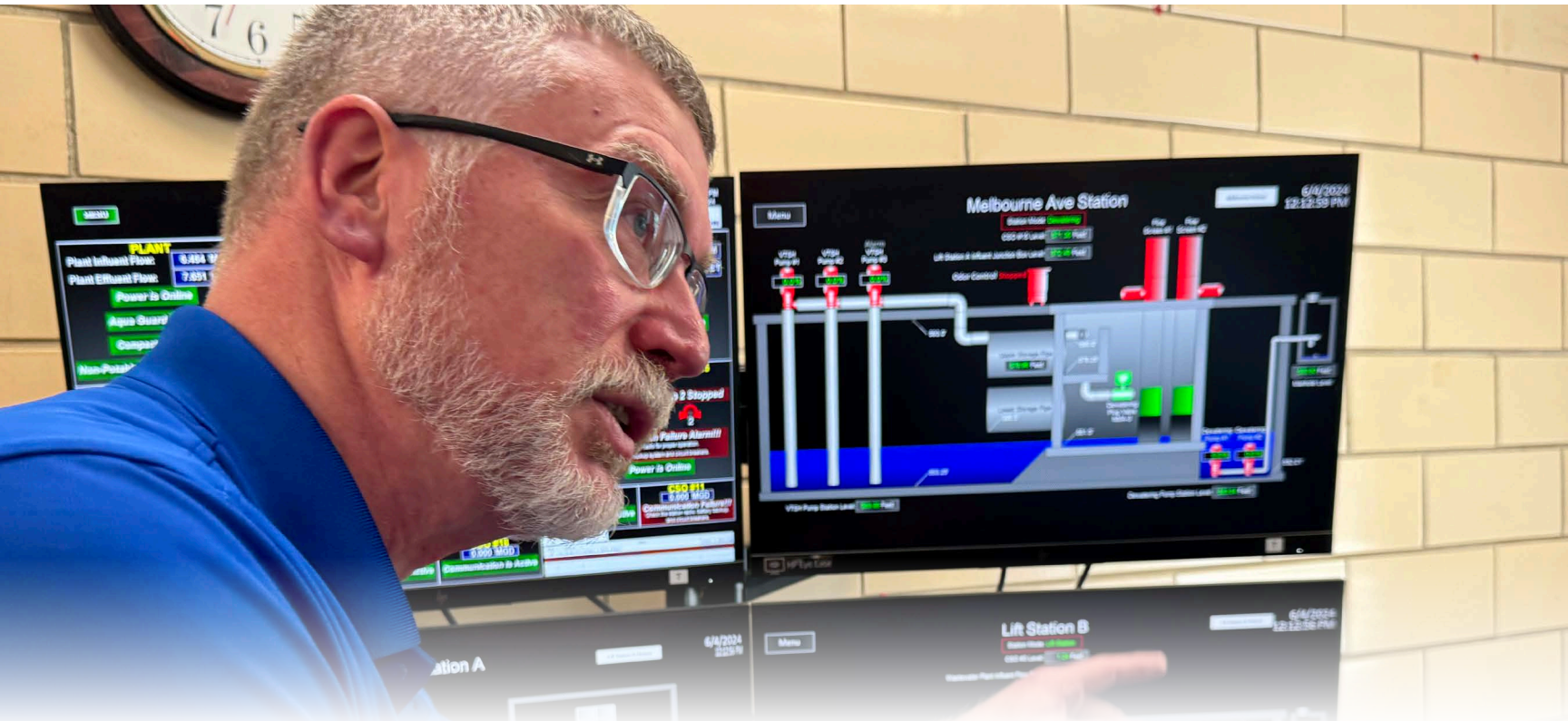
Pictured:
*Direct pipe installation of surface casing
PacifiCorp Albina Electrical Network Improvements
Portland Underground Network
Willamette River Crossing by HDD
Contractor: Michels Pacific Energy/
Engineer: AECOM*

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Navigating the Challenges of Utility Management: **A JOURNEY OF LEADERSHIP AND INNOVATION IN LOGANSPORT UTILITIES**

“To be honest with you, if you had done this about four years ago, I wouldn’t have answered because our boss didn’t like us talking to people on the outside. But with the new superintendent, one of the things he has preached to us is to be open to various opportunities. Whether you take them or not, at least take the time to listen.”

Brian DeWitt, Director of Wastewater at Logansport Utilities, said to us during our visit to their wastewater treatment plant facility.

This shift in mindset was something I experienced firsthand, and it all started with a chance encounter. One day, while walking across Purdue’s campus,

I noticed someone working on the lawn with the sprinklers running. My curiosity got the better of me, and I decided to strike up a conversation. The worker’s name is David Burkhardt. He has worked at Purdue Campus for a few years. As we chatted, I discovered that David’s father-in-law, Brian DeWitt, was the Director at Logansport Utilities. Intrigued, I asked for Brian’s contact information. Not long after, I reached out to him with a simple request: Could I, along with my team, visit Logansport Utility to learn more about their work?

To my surprise, Brian didn’t just respond—he did so quickly and with genuine enthusiasm. He didn’t merely agree to the visit; he went above and beyond to welcome us. When our Purdue underground Infrastructure Team (UIT)—Tom Iseley, Sihan Zhou, and I—arrived, we were greeted warmly by Brian DeWitt, Jackson Wiseley, and Omar Gonzalez. What followed was an enlightening day, as they provided us with a deep dive into

the complexities of managing water and wastewater systems, sharing both the daily challenges they face and the innovative strategies they employ to keep everything running smoothly.

Our conversation began with Dr. Tom Iseley introducing how Purdue underground Infrastructure Team has been supporting the efforts of the Buried Asset Management Institute-International (BAM-I). As part of Purdue, we have been instrumental in advancing the BAM-I and its training programs, particularly in helping various regions improve their water asset management practices.

Dr. Iseley stated that the primary purpose of our visit was to gain a deeper understanding of Logansport Utilities wastewater treatment plant’s approach to asset management. We were eager to learn from their practical experiences and to explore how these insights could contribute to the ongoing optimization of asset management strategies.



Introductory Meeting at the Logansport Utilities Wastewater Treatment Plant office

About Logansport Utility:

Logansport Utilities (LU) is a municipally-owned utility company that has been serving the city of Logansport, Indiana, and the surrounding areas since its establishment in 1894. The company provides electricity and water services to over 20,000 residents and businesses.

The city's wastewater treatment plant, originally built in 1958, has undergone multiple upgrades, including significant improvements in the 2010s with the addition of phosphorus treatment and extra clarifiers to boost capacity and ensure environmental compliance. Recognized for its safety in the 1980s, the plant remains a crucial part of the community's infrastructure. Logansport Utilities manages this system, which serves 7,500 wastewater customers. The infrastructure includes 16 sanitary lift stations and four dewatering lift stations within a combined sewer overflow (CSO) system. The wastewater collection network spans approximately 135 miles, comprising 563,000 feet of combined sanitary and storm sewers, 110,000 feet of separate sanitary sewers, and 43,300 feet of separate storm sewers. Additionally, the system features 3,000 manholes, 44 stormwater outfalls, 10 gravity combined sewer outfalls, and several large underground storage pipelines. The water distribution network covers 126 miles.

Brian DeWitt has worked at Logansport Utilities for 39 years. He started his career in the lab, then became a plant operator,

and eventually took over as the manager in 2017. Throughout his tenure, he has been deeply involved in the utility's operations, strategic planning, and leadership.

The Regulations and the Challenge

The story of Logansport Utility's wastewater treatment system towards developing an asset management plan is one marked by mandates, challenges, and leadership transitions. The Indiana Finance Authority (IFA) introduced the requirement for wastewater treatment and water collection and distribution systems to have an asset management plan in place before they could borrow funding, a move that significantly impacted small utilities like Logansport Utilities.

Brian DeWitt, reflecting on this period, shared how the mandate from IFA pushed their team to act swiftly. "When the mandate came out in 2022, we got right on top of it. We probably had it done within a year," Brian recalled. Despite the initial struggle, which saw them attempting to tackle the extensive work on their own, they eventually realized the enormity of the task and sought assistance from Lochmueller Group, an engineering firm. The decision came after six months of grappling with the project, recognizing that meeting the deadline would require professional help.

The challenge was taken head on

with a leadership transition within Logansport Utilities. In 2020, Greg Toth was hired as the new CEO / superintendent, an outside of Logansport hire coming from Maryland with experience in various industries. This shift in leadership brought a new focus on proactive improvements rather than just reacting to mandated changes. Greg Toth emphasized setting up the utility for the next 50 years, driving the team to think ahead and address infrastructure needs before they became critical issues. This proactive approach marked a significant shift from the past when the utility primarily focused on complying with immediate regulatory mandates.

Under the new leadership, the utility's governance structure also played a crucial role in maintaining continuity and focus. Unlike many utilities, Logansport Utilities operates as a separate entity from the city government, overseen by a Utility Service Board. This structure, comprising five members with staggered four-year terms, ensures that political changes, such as shifts in the mayor's office or city council, have minimal impact on utility operations. This stability allows the utility to maintain a steady course, focused on long-term goals rather than being swayed by political pressures.

Greg Toth's focus on strategic planning has set Logansport Utilities on a path of sustained improvement.



Jackson Wiseley



Omar Gonzalez



Brian DeWitt

By emphasizing proactive measures and maintaining a clear focus on asset management, the utility is better equipped to handle the challenges posed by aging infrastructure and regulatory mandates. As Brian noted, the asset management plan has become a vital tool in guiding their efforts, helping to prioritize projects and ensure that critical infrastructure needs are addressed in a timely manner.

Leadership and Innovation in Utility Management

New Leadership Vision: Greg Toth’s strategic focus on long-term improvements and infrastructure sustainability is a testament to the forward-thinking approach that Logansport Utilities has adopted. Under his leadership, the utility is not just reacting to immediate needs but planning for the future, ensuring that the infrastructure will serve the community for decades to come. This strategic foresight is evident in the ambitious five-year capital improvement plan, which is designed to address critical infrastructure needs before they become unmanageable.

Jackson’s Role: Jackson Wiseley, who developed his career through hands-on experience and continuous learning in the utility sector, currently the assistant manager of water and wastewater (stormwater), is transitioning into the role of Assistant Director of Wastewater and then eventually replacing Brian DeWitt when he retires. He will play a pivotal role in balancing the demands

of aging infrastructure with the need for progressive updates. His experience in both the water distribution and collection systems has positioned him well to handle the complexities of maintaining an old system while integrating new technologies and processes. Jackson’s approach is both practical and visionary, as he works closely with the team to ensure that both reactive and proactive needs are met efficiently. During our visit, Brian mentions his confidence in Jackson Wiseley’s ability to take over after his retirement. He states that Jackson has been “tapped to be my replacement” and expresses his assurance that Jackson will “take this way further than I’ve been able to in the short amount of time I’ve been here,” indicating his strong confidence in Jackson’s capability to lead the wastewater department in the future.

The Importance of Team Effort: While leadership plays a crucial role in guiding Logansport Utilities, the efforts of the entire team are equally important. Brian highlighted the invaluable contributions of his colleagues, particularly the wastewater treatment plant’s supervisor Omar Gonzalez, who manages the day-to-day operations at the wastewater plant. Omar’s technical expertise and leadership ensure that the plant runs smoothly and efficiently, tackling challenges as they arise. Additionally, the lab team, responsible for critical testing required for the NPDES permit and industrial pre-treatment programs, performs essential work that ensures compliance and

operational integrity. Their dedication is a key component in maintaining the utility’s high standards.

Innovative Projects: Logansport Utilities has undertaken several key projects that exemplify its commitment to innovation and sustainability. The water lead service line replacement project is one such initiative, where the utilities has taken significant strides in replacing outdated infrastructure. This project is not only a response to regulatory mandates but also a proactive measure to ensure the safety and reliability of the water system.

Another major undertaking is the construction of the EQ basin and inline storage facilities.

These projects are critical in managing the city’s combined sewer overflows (CSOs), which are a significant environmental and operational challenge. The EQ basin, with a capacity of 5.3 million gallons, and the new inline storage facility, are designed to handle excess stormwater, preventing it from overwhelming the wastewater treatment plant during heavy rain events.

Throughout these initiatives, the leadership at Logansport Utilities has demonstrated a keen understanding of the need to balance immediate operational demands with long-term sustainability. By focusing on both the present and the future, the utility is setting a strong example for how small to mid-sized utilities can manage their resources effectively and responsibly.

The Intersection of Old and New



On-site Introduction at the Logansport Utilities Wastewater Treatment Plant

Integration of New Technology

At Logansport Utilities, integrating new technology with older systems is an ongoing process that requires balancing innovation with the constraints of existing infrastructure. When I asked about how the utility manages to incorporate new technology while maintaining the functionality of older systems, Jackson explained, “We’re a bit behind the curve technologically. For instance, many other utilities are already using AMI or AMR metering systems while we’re still using paper and pencil.” Despite these challenges, the utility has made significant advancements, particularly with the implementation of GIS mapping through Ziptility—a major step forward for the organization. In addition, Logansport Utilities is currently installing an AMI (Automatic Metering Infrastructure) in its water systems, a project expected to be completed in the next couple of years, further enhancing operational efficiency and service delivery.

Although the GIS mapping system is still under development, it has already provided the utility with a better understanding of its infrastructure.

Challenges of Reactive vs. Pro-active Management

When discussing what is the most challenges they are facing today, Jackson highlighted, “The most difficult challenge is balancing reactive and proactive management and giving them

both the right amount of attention. When something comes up and you have to be reactive, you can’t continue to grow until you fix what’s already in place.” This challenge is particularly pronounced in a utility with aging infrastructure, where much of the work is still reactive.

Despite these challenges, the utility has made significant strides in moving towards a more proactive approach. When I asked how the asset management plan helps guide their decisions, Jackson emphasized, “While day-to-day tasks might skew your path occasionally due to reactive maintenance, the asset management plan keeps you aligned with your long-term goals. It gives you that north star to guide you back on track.”

The utility’s approach to managing its infrastructure is shaped by both necessity and strategic planning. For example, when we talk about the decision to replace the headworks at the wastewater treatment plant, originally built in 1958, Jackson explained that it was a direct response to the condition of the aging infrastructure. This project, expected to cost between \$20 and \$21 million, is part of a broader effort to set the utility on a sustainable path for the next 50 years.

A Vision for the Future Training the Next Generation

Logansport Utilities has made significant strides in community outreach and education, actively engaging with the public to raise

awareness about the importance of water and wastewater management. Under the leadership of Greg, the company has placed greater emphasis on public outreach and education, particularly in schools and various community groups.

One notable initiative is the stormwater education program targeted at fourth-grade students. Before the pandemic, Logansport Utilities visited elementary schools annually to educate students about stormwater management. This program included interactive presentations and educational materials designed to help young students understand the impact of stormwater on the environment.

In addition to school programs, the utility company has hosted groups such as the Boy Scouts and nursing students, providing them with tours of the facilities to give them a firsthand understanding of how water and wastewater treatment plants operate. These tours are intended to increase public awareness of the work done by Logansport Utilities while also inspiring young people to consider careers in environmental and utility management.

However, the pandemic posed challenges to these outreach efforts, limiting in-person interactions and school visits. In response, Logansport Utilities is exploring new ways to engage with the community, including closer collaboration with the local soil and water conservation district and expanding educational outreach to high school students. Jackson Wiseley has also participated in field excursions



Logansport Utilities Wastewater Treatment Plant

with high school students, discussing the impact of stormwater on natural waterways and helping students gain a deeper understanding of environmental issues.

These efforts are part of Logansport Utilities' broader strategy, which aims not only to manage its infrastructure effectively but also to foster a community that understands the critical role utilities play in maintaining public health and environmental quality. Through these educational initiatives, the utility company plays a crucial role in helping the next generation appreciate and contribute to the sustainability of community resources.

In this topic's conversation, We highlighted that one of Purdue UIT's core missions is to train the next generation of industry leaders, a commitment clearly reflected in his work at Purdue University. We have developed graduate-level courses that not only teach the fundamentals of asset management but also challenge students to apply these principles in real-world scenarios. We emphasize the importance of understanding the complexities utilities face worldwide, preparing students to tackle future challenges in the industry. Our courses are designed to instill a deep understanding of underground infrastructure management, from utilities to large tunnels, ensuring that future leaders are well-equipped to manage critical infrastructure effectively.

Communication and Leadership

Effective communication is at the heart of successful utility management, a fact well recognized by Greg Toth at Logansport Utilities. As Brian explains, Greg Toth's ability to articulate the utility's needs to the public, the city council, and the utility service board has been crucial in securing the necessary support and funding for essential projects. This leadership approach, which prioritizes clear and persuasive communication, has been instrumental in moving the utility forward, especially in the face of significant infrastructure challenges and unfunded mandates. By inviting board members to tour facilities and see the issues firsthand, Greg has effectively communicated the urgency of their needs, fostering a collaborative environment where strategic plans can be developed and implemented with broad support.

Jackson and Brian's commitment to preparing for the future, through both education and strategic leadership, underscores the importance of proactive planning in utility management. Their efforts are not just about addressing current challenges but about ensuring that the next generation of leaders is ready to continue this vital work, equipped with the knowledge and skills necessary to sustain and improve our critical infrastructure systems.

Reflections and Lessons Learned

The Value of a Strong Team

During our visit to Logansport

Utilities, one theme consistently stood out: the critical importance of having a strong, dedicated team. Brian and Jackson emphasized that their ability to successfully manage the the stormwater and wastewater treatment systems, particularly in the face of significant infrastructure challenges, stems from the commitment and expertise of their workforce.

Brian reflected on his long tenure, noting that many of the people he started working with have since retired, and those who remain are the backbone of the operation. "It's hard getting people into this business," he admitted, pointing out that the demanding nature of the work, especially for general laborers, makes recruitment difficult. The plant operates 24/7, requiring staff to work through all kinds of weather, often during night shifts and weekends. This level of commitment, as Brian noted, is increasingly rare.

Jackson has implemented various strategies to ensure employee retention and morale. He mentioned that under his leadership, he directly oversees 12 employees, with whom he has established strong relationships. He motivates them and enhances their engagement and job satisfaction by giving them responsibility and autonomy in planning and executing tasks.

For instance, he provides directives and sets clear objectives for his two working foremen but allows them to choose how to accomplish the tasks. He believes that this approach makes employees feel validated in their work and strengthens their sense of belonging, as they are not just carrying out orders but are actively involved in the planning and execution process.

By giving his working foremen responsibility and the freedom to plan and execute tasks in their own way, Jackson has fostered a sense of ownership and pride among his employees. "I validate them by giving them responsibilities for the week or the month," Jackson explained, "and then I step back and let them figure out how to complete the task at hand."

Following Jackson's efforts, Omar Gonzalez also plays a crucial role within the team. As the head of operations and maintenance, Omar's technical expertise and leadership make him indispensable in the daily operations of the company. Brian specifically mentioned that Omar is a highly trusted colleague, excelling in handling technical challenges and ensuring the team's efficiency. Omar's

contributions have not only advanced the technical aspects of Logansport Utilities but have also significantly impacted team morale and employee satisfaction.

Moreover, Jackson emphasized the importance of performing most tasks in-house, which not only significantly reduces costs but also enhances the skills and experience of the staff. He mentioned that Logansport Utilities has managed to keep the cost of the water lead service line replacement project well below the national average, partly due to their ability to perform much of the work internally rather than relying on external contractors.

Learning from Experience

The practical lessons learned from implementing the asset management plan at Logansport Utility have been invaluable. Brian and Jackson both highlighted the balancing act required between reactive and proactive work. While day-to-day operations often demand immediate, reactive responses to issues, the long-term asset management plan provides a guiding framework to ensure that the utility remains on track with its strategic goals.

The asset management plan has also been instrumental in justifying necessary rate increases to fund critical infrastructure projects. As Jackson noted, while the plan may not directly influence day-to-day operations, it plays a crucial role in shaping the utility's future direction. "the Asset management plan keeps you aligned with your long-term goals," he said. "It gives you that north star to guide you back on track."

Brian added that the plan has helped prioritize projects and budget more effectively. "We've already got our rates set for the first five-year capital plan," he said, "which was based primarily on reactionary things and the asset management plan." Moving forward, the plan will be used to set new priorities for the next phase of infrastructure improvements, ensuring that Logansport Utilities can continue to meet the needs of its community.

Looking Ahead: A Vision for the Future of Utility Management

As our visit progressed, it became clear that the team at Logansport Utilities is committed to not just meeting current demands but also anticipating future challenges. Brian DeWitt and Jackson Wiseley, along with their colleagues, have demonstrated a proactive approach to managing their infrastructure, driven by a deep understanding of the critical

balance between operational needs, financial constraints, and regulatory mandates.

One of the key takeaways from our discussions was the importance of forward-thinking leadership in the utility sector. Brian emphasized the necessity of having a comprehensive asset management plan, stating, "Our leadership team just had a strategic planning session at the beginning of the year, putting together the strategic plan for the utilities for the next five years. One of the things that we saw as a weakness was our need to be able to recruit and get new blood in here to carry this on further down the road."

The introduction of new technologies, like GIS mapping and automated metering systems, is part of their strategy to stay ahead of the curve. Jackson explained how these innovations are gradually transforming their operations, making them more efficient and better equipped to handle the complexities of modern utility management. However, both Brian and Jackson acknowledged that the path forward is fraught with challenges, particularly in balancing reactive maintenance with the need for proactive infrastructure upgrades.

Looking ahead, the efforts of Brian, Jackson, and their partners in other departments at Logansport Utilities are likely to serve as a model for other small towns facing similar challenges. Their commitment to innovation, combined with a deep understanding of the complexities of utility management, positions them well to continue providing reliable and efficient services to their community for years to come.

Call to Action

As the challenges of utility management continue to

grow, it becomes increasingly important for professionals in the field to stay informed and engaged with the latest advancements and strategies. The insights shared by Brian and Jackson during our visit to Logansport Utilities' wastewater treatment plant highlight the value of innovation, leadership, and collaboration in tackling complex issues such as asset management, infrastructure upgrades, and regulatory compliance.

We invite readers, especially those working in utilities, water management, and related sectors, to reflect on the learnings from this interview. Consider how the approaches discussed—ranging from proactive infrastructure planning to the integration of new technologies—can be applied within your own organizations. Engage with these ideas, explore how they might benefit your operations, and take action to implement strategies that not only address immediate challenges but also set the foundation for long-term success. By doing so, you contribute to a more resilient and efficient utility infrastructure that better serves your community.

Author: Wei Liao, Editor, BAMI-I Journal

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Changing Buried Asset Management Landscape.

Due to the critical infrastructure that pipelines provide to modern society, system reliability is of critical importance regardless of the pipeline materials and construction methods used. A broad range of pipeline inspection and health monitoring solutions exist, including direct inspection using cameras, smart In-line Inspection tools (PIGS), and dynamic models that aim to capture upset pipeline conditions with traditional instrumentation. There are significant and continual advancements of technologies and methods in the asset management space. Many of these inspection solutions are developed to assess the failure modes in metallic piping systems, often providing a periodic snapshot in time of the asset's health. As compliance and regulations continue to become more stringent, will traditional methods for inspection be able to adapt and innovate quick enough to keep up?

Regulatory Requirements on Top of Regulatory Requirements. Pipeline health and risk monitoring varies significantly in its importance, requirements, and objectives. One trend that remains persistent is the increasing stringency of requirements for leak detection, asset damage, and tracking emissions for energy assets. As these requirements become more stringent, there are opportunities for innovation with a wide range of approaches currently being pursued.

BrainDrip's Health and Risk Monitoring Solution (HRMS). The HRMS developed by BrainDrip leverages a combination of advanced sensors, available instrumentation, and Machine Learning/A.I. based software platforms to create a comprehensive asset management solution. The HRMS is compatible with any composite

liner system and is suitable for traditional buried asset types where health and risk monitoring are important (E.g., cast iron, concrete, etc.). In addition, the HRMS can be deployed with other polymer-based liner products, traditional steel pipes, and even for tubular storage assets such as Type IV stationary ground storage.

Distributed fiber optic sensing methods and associated algorithms form the core of continuous monitoring within the HRMS, and provide unparalleled insights into the system and surrounding environment. Distributed fiber optic sensors probe the fundamental vibrations in the system and environment, temperature conditions, and monitor extremely small changes to the system at the speed of light. As these fundamental conditions change, the HRMS interprets the changes and makes determinations of when the changes warrant action. Where fiber optic installation is needed in an existing asset such as a steel pipe, BrainDrip's complimentary robotic Fiber Optic Deployment Tool (FODT) can be used to instrument the system for health and risk monitoring. For assets that require only a portion of the full HRMS capabilities, individualized solutions can be provided as BrainDrip provides customized solutions for unique and challenging applications.

Addressing Diverse Market Needs. BrainDrip's HRMS has been designed for compatibility across the diverse buried pipeline markets that exist today. HRMS is critical for flammable gas pipeline systems where a disruption of service has large consequences for customers, gas leaks pose an environmental emissions threat, and the risk of a combustion event and catastrophic failure becomes high. In addition, for assets going through a fuel transition, such as the progressive decarbonization of natural gas through gas blending of hydrogen, the HRMS must

be designed for compatibility and the introduction of any new potential failure modes. Similarly, for water or waste water transmission systems, disruption of service can have large consequences for the community, and system failures can create significant localized environmental damage and repair costs. Finally, applications such as stormwater sewers and even liquid petroleum product pipelines have unique considerations, risks, and consequences that BrainDrip's HRMS is designed to mitigate.

Innovative Liner Products Enable Innovative Monitoring Solutions. While offering unique solutions to the market, composite liner systems materials construction and properties significantly differ from traditional metallic pipeline assets. By designing the continuous health and risk monitoring systems to capture the risks and potential failure modes of the pipeline product, reliability can be maximized while also minimizing or eliminating the need for costly periodic inspection methods. This strategy applied to BrainDrip's innovative composite liner products (Innervated Tubular Composite, ITC) forms the basis for BrainDrip's HRMS. These material differences translate to different potential failure modes, although many of the threats to the system remain the same. Due to the unique construction of composite liner systems, advanced sensor systems can be integrated into the product and provide superior health and risk monitoring performance. BrainDrip's HRMS accomplishes this by integrating acoustic, strain, and temperature based distributed fiber optic sensing into its pipeline liner assembly. Third-party threats such as encroachment and digging in proximity to the asset are identified through acoustic sensing, providing preventative measures against potential system damage. Ground move-

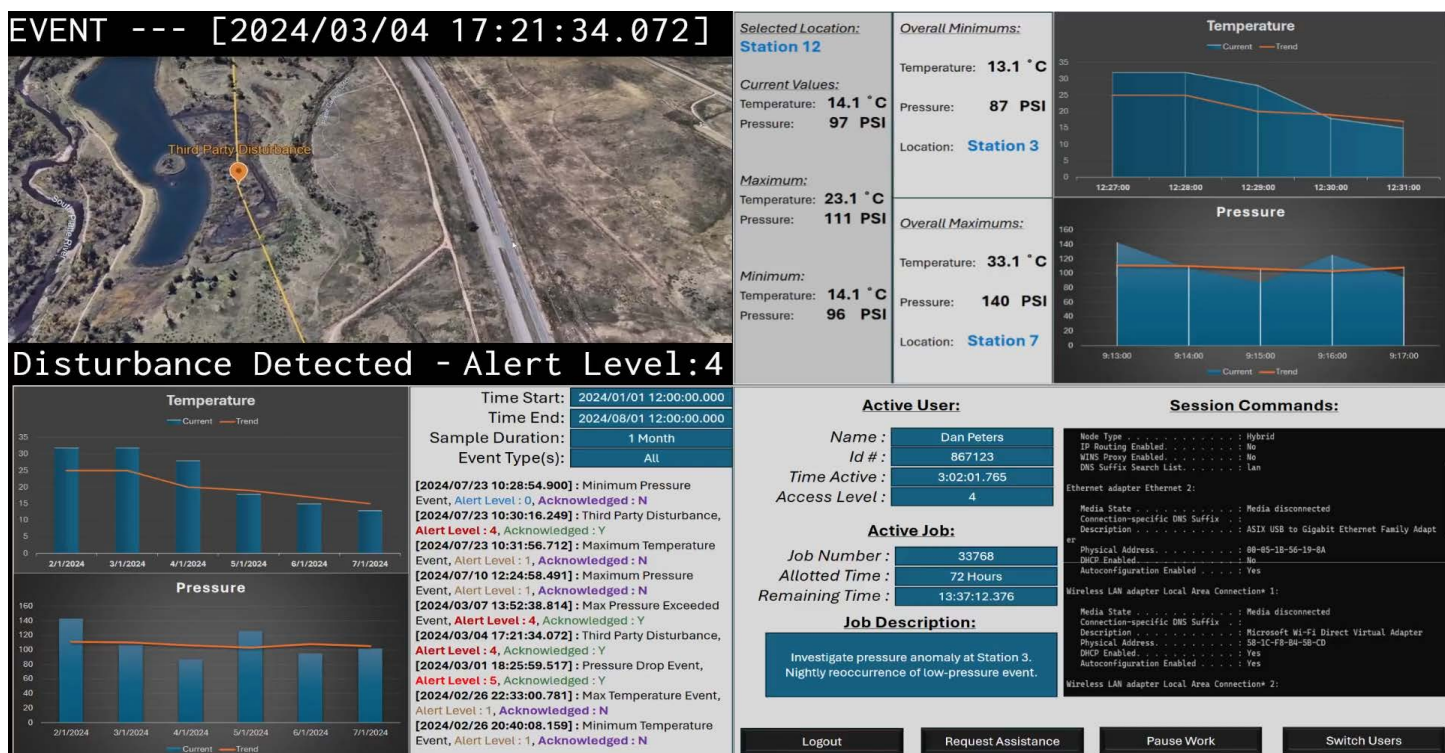


Figure 1. One of BrainDrip's HRMS interactive display interfaces, providing configurable event notification and real-time and historical summary results.

ment-based threats to the system such as landslides are identified in real-time, accompanied by continuous product damage assessment and event localization. With continuous monitoring of the composite reinforcement, early indicators of accelerated degradation or failure provide an opportunity for mitigation, significantly reducing the risk of a catastrophic event. Finally, leaks and other potential failures in containment are rapidly identified and pinpointed within the system.

Confidence Where You Need It, When You Need It. When combining the HRMS with BrainDrip's mobile-onsite liner production method and quality assurance/quality control practices, a comprehensive strategy is formed to ensure that the product meets specifications and performs throughout its expected lifetime. In addition to preventative threat avoidance, event detection, and consequence mitigation, the HRMS also provides system performance metrics such as current operating pressure and temperature statistics and historical summaries. Through adaptability in the installation process, monitoring resolution can be tailored to the application, providing high resolution monitoring in sensitive environmental areas, waterways and crossing points, higher risk location classes, and other high consequence areas. HRMS events are localized on the scale of feet to meters, providing

precise dispatch for further assessment when necessary. By integrating distributed fiber optic sensors into the product, direct assessment of product risk is obtained, rather than by proxy such as buried acoustic systems installed adjacent to the asset. Finally, by integrating the embedded distributed fiber optic systems with select traditional sensors and machine learning algorithms, events and out-of-bounds operating conditions are identified with a high degree of precision and accuracy.

Intuitive and Comprehensive Results. Events triggered through BrainDrip's HRMS system provide critical information to the asset operator in real-time so that decisions can be made quickly. For instance, a third-party threat such as heavy equipment operating in area is identified and categorized, providing insight to the type of threat. Additional information such as the initial time that the equipment came into proximity of the asset, periodic updates in event time duration, and the geospatial location range of interest are included in the notification and can be customized through the user interface. Similarly, if a ground movement event such as a landslide were to occur, the anomaly is categorized, providing insights to the type of threat. Additional information such as the initial time of the landslide, updates in the duration of the land movement, and geospatial location range

of interest are included. In addition, if this type of event were to damage the asset, supplemental notifications are provided that could include temperature change warnings, reinforcement integrity notifications, overpressure notifications, and/or leak notifications. With a well designed and safe system, events become infrequent and the HRMS continues to deliver additional value through high-resolution real-time and historical performance data. Information such as pipeline operating pressure, temperature, and even long-term multi-year composite reinforcement performance tracking are provided.

BrainDrip – Your Pipeline To Safe and Reliable Assets. Whether you are seeking to retrofit/rehabilitate an outdated buried pipeline asset, seeking to future-proof pipeline assets for a changing market, install a greenfield pipeline asset, or add robust health and risk monitoring to an existing asset, BrainDrip provides a suite of innovative and customizable solutions. Our HRMS provides superior performance to ensure that your buried asset remains in peak operating condition throughout its expected lifetime and minimizes or eliminates costly inspection practices and potential downtime. To learn more about BrainDrip's HRMS, our composite pipeline liner systems, or even our large-scale composite energy storage products, please visit us at <https://braindriptech.com>

Author: BrainDrip LLC Team

PRESERVING CASPER'S INFRASTRUCTURE:

A LARGE-DIAMETER TRENCHLESS PIPELINE REHABILITATION PROJECT

BRIEF HISTORY OF THE NORTH PLATTE SANITARY SEWER INTERCEPTOR

The City of Casper owns and operates an extensive wastewater conveyance system that includes the North Platte Sanitary Sewer Interceptor (NPSSI). The NPSSI was designed and constructed in four phases from 1980 to 1983 and ranges in diameter from 24" to 54". The NPSSI was part of an effort by the City to regionalize treatment of wastewater within the Casper Metropolitan Service Area (CMSA). The total length of the NPSSI is approximately 48,200 feet and is constructed of unlined reinforced concrete pipe (RCP). Its locations along the North Platte River is shown in Figure 1. Concerns with observed corrosion associated with hydrogen sulfide (H₂S) prompted the City to undertake a carefully constructed condition assessment program. Although initially designed for significant planned growth, actual daily flows had increased only marginally since its construction and daily flow rates through the NPSSI have resulted in lower than expected velocities and very elevated levels of H₂S within the NPSSI.

Currently the NPSSI remains "oversized" for current and projected average and peak flows. With future velocities remaining well below fps, this means that very elevated levels of hydrogen sulfide (H₂S), particularly in the ambient air (head) space within the NPSSI, can be expected. The highest concentrations of atmospheric H₂S are in the lower/downstream portions of the system. Consequently, the H₂S and associated sulfuric acid formation became very

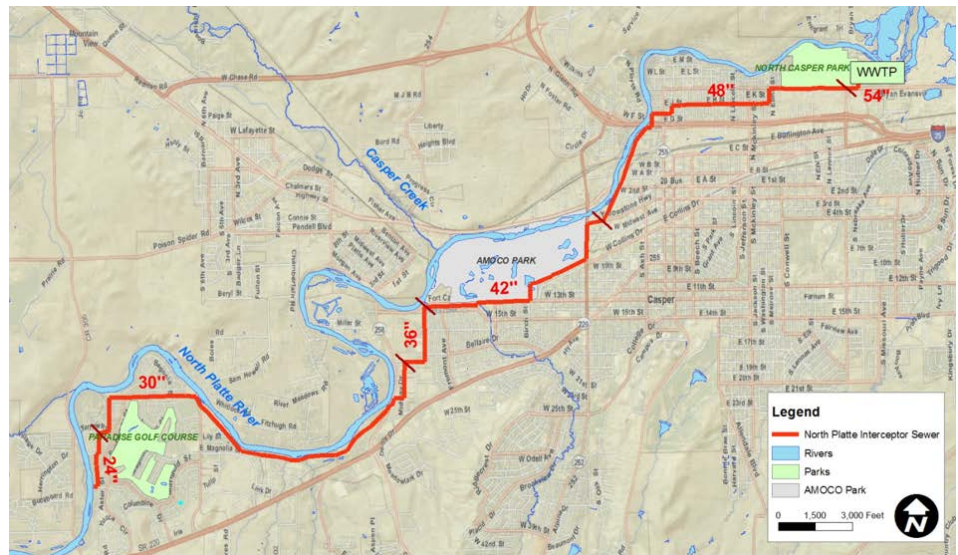


Fig. 1. Approximate Location of the NPSSI

problematic almost immediately after its construction along the entire interceptor alignment, causing serious deterioration of the NPSSI. Examples of corrosion are illustrated in Figure 2 and its impact on the reinforcement of the RCP infrastructure.

and assessment work, a risk-based asset management plan was then created by the project team. This finally led to the first major pipeline restoration and rehabilitation project that addressed nearly all of the high-risk sections of the NPSSI.

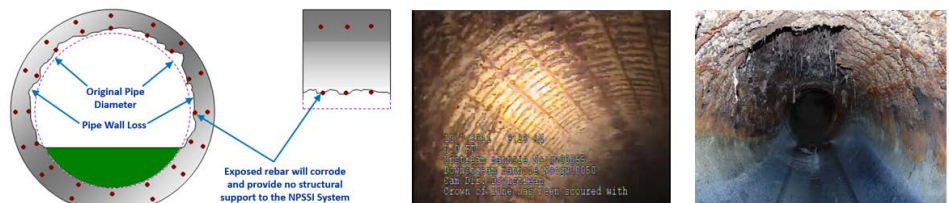


Fig. 2. Example of H₂S Wall Corrosion Observed by Remote CCTV Inspection in the NPSSI

The focused work associated with the assessment and rehabilitation needs of the NPSSI began in earnest in 2011 over a three-year planning period. Following a series of phased/progressive inspection

This work was completed in early 2023. These sections of City's NPSSI were fully rehabilitated and restored with the confidence that it will be worry-free system for the next 75-100 years. The project team



Fig. 3. The Envirosight Quickview® System Used for Initial Top-Side Inspection of NSPPI

that studied, designed, and provided construction management services over this 12-year period included Jacobs, CEPI, and BlueWater Solutions Group.

This current article is the first of a two-part series that presents the strategic plan developed by the project team and implemented by this same team so that the stage could finally be set for what will be presented in the second article, specifically the long-awaited \$7.0 trenchless rehabilitation project to improve and restore the most critical sections of the NPSSI beginning in mid-2022 and wrapping up in early 2023. This project included 7,600' of 48-54" of trenchless pipe rehabilitation along with numerous point repairs, new junction structures, and improved river siphons and inlet/outlet structures.

Despite record-setting winter weather conditions and numerous site challenges that were encountered almost daily, the project was completed on time and under budget. The NPSSI project demonstrates that the successful renewal of a large-diameter wastewater interceptor within a stream-sensitive aquifer and under harsh winter conditions can be done using trenchless renewal in the best way possible. Finally, this current article (and an additional one to appear in the next quarterly BAMI-I journal) will present the strategic approach that was developed by a committed program team to design, bid, fund, and rehabilitate this severely deteriorated, but critical, wastewater conveyance asset using advanced but sensible cost-saving technologies. It was by all measures a phenomenally successful outcome.

OVERVIEW OF TWO-PART INSPECTOR, CONDITION

ASSESSMENT, AND RISK ANALYSIS OF THE NPSSI SYSTEM

In 2011 the NPSSI program team members developed a cost-saving tiered (and phased) approach to assess the current condition of the NPSSI. This strategic plan evolved from a series of workshops and presentations to all project and NPSSI stakeholders, including those who would be engaged in the funding of the program outcomes. Once a formalized Project Work Plan (PMP) was developed, the team was ready to mobilize to the field and begin. Under Phase 1, an initial inspection of the NPSSI manhole structures and pipeline assets was conducted using top-side internal inspection technologies that included the Quickview® system (shown in Figure 3). The goal of this first phase was to (a) avoid entry into the NSPPI and use top-side and remote tools and technologies to conduct an initial higher-level assessment of pipelines, structures, connections, and maintenance-related conditions.

At the same time a short term strategy was developed and implemented to monitor seasonal impacts of wastewater flows through the NPSSI, since these would also impact the choice and method to rehabili-

tate the NPSSI and its structures. In addition, monitors were placed at key manhole and access structure locations along the entire interceptor to continuously record atmospheric H₂S levels and where they may be highest (see Figure 4). Data from both flow and H₂S meters were then combined into a hydraulic/corrosion model that became a key component to the following assessment phase and ultimately the final risk assessment and final rehabilitation program.

Results of this Phase 1 top-side inspection and assessment project concluded that additional internal inspections and assessments were needed to under a subsequent phase to get a better technical understanding the conditions of the entire NPSSI before a final risk model and asset management plan could be developed. To add to that, the project team also determined that the excessive build up and corrosion that had accumulated over the past 40 years need to be removed using a process that would not impact the remaining structural integrity of the pipeline.

These issues moved the project into Phase 2 for further preparation, inspection, investigations, and assessment using more advanced internal inspection and asset management tools. To accomplish this a pre-cleaning program under Phase 2 was needed. Consequently, the project team retained a subcontractor to design and build a "cleaning platform" using a pontoon and hydraulic and remotely control jetting system that would concentrate the follow-up CCTV inspection in the area of the pipe crown. This cleaning effort and results are shown in Figure 5, and it was, as they say, "a game changer" and provided the specific condition assessment information that the project team needed to assess the entire NPSSI.



Fig. 4. The Envirosight Quickview® System Used for Initial Top-Side Inspection of NSPPI



Fig. 5. Cleaning Pontoon Fabricated with Controllable Jet Nozzles Tethered to Remote CCTV System Inside NPSSI

Following this pre-cleaning effort, a CCTV inspection crew was deployed to the NPSSI, and this began a challenging phase of navigating the NPSSI using a robust CCTV inspection platform with steerable and live controls. This was essential, since this was the first time that the NPSSI had been cleaned to a level that would allow unhindered wastewater flow through the high-priority areas. This inspection platform is shown in Figure 6.

RESULTS, CONCLUSIONS, AND RECOMMENDATIONS FOR REHABILITATION OF THE NPSSI:

Finally, these Phase 2 assessment results were evaluated on the basis of risk as the City needed to determine which sections of the NSPPI should be rehabilitated based on both likelihood of failure (LOF) and consequence of failure (COF). There was simply not enough funding to address all red and yellow pipelines and assets.



Fig. 6. Robust CCTV Crawler System Deployment Into the NSPPI

Once this internal inspection work was completed, the project team developed a systematic approach to creating a scalable scoring process that would have enough granularity in asset scores but still categorize each of the 155 pipe segments into manageable quantities. Given the fact that no assessments of the pipeline were made of the NSPPI below the flow line, it was decided that three scoring categories would be used, assuming that conditions below the flowline would be captured as part of the pre-construction phase. The description and narrative for each of the categories (or buckets as the team referred to them) and the location and quantity within each of the categories are shown in Table A and Figure 7.

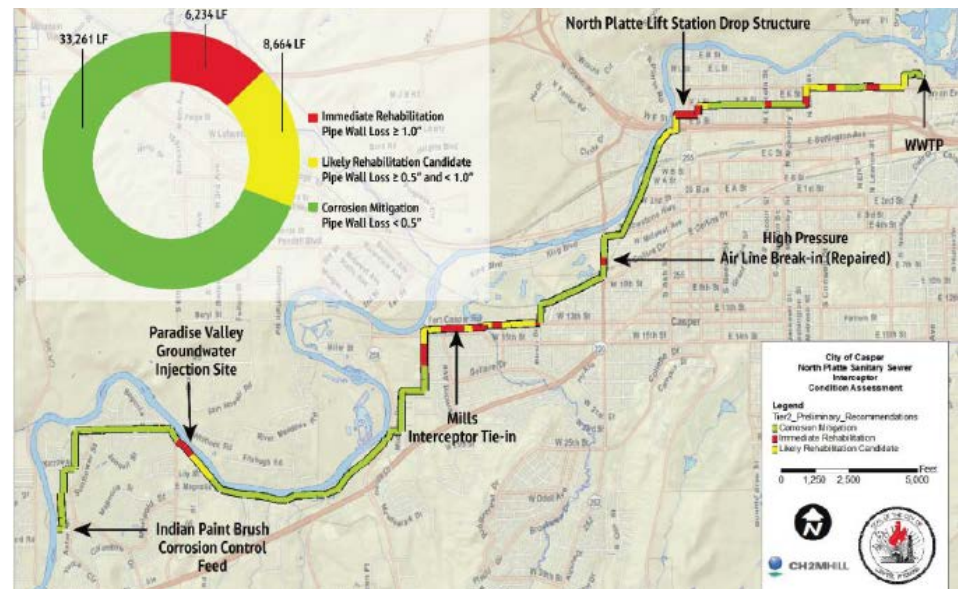


Fig. 7. Results of Risk Assessment and Prioritization of NSPPI Pipeline

| Category Description | Color | Pipe Wall Loss | Footage |
|--------------------------------------|--------|----------------|----------------|
| Immediate Rehabilitation | Red | >1.0" | 6,200' |
| Likely Rehabilitation in Near Future | Yellow | 0.5 – 1.0" | 8,700' |
| No Rehabilitation Required | Green | >0.5" | 33,300' |
| Total Inventory of NSPPI | | | 48,200' |

Table A – Results of Phase 2 Risk and Condition Assessment

By developing a risk score and updating the mapped results shown in Figure 7 for each asset of the NPSSI (pipelines, access structures, and cross-connections) the project team then created a full and prioritized list of all NPSSI assets in order of its Aggregated Score (or Asset Grade), recommended reinspection frequency, and planning-level costs as shown in Figure 8.

The City also determined that the first major CIP effort would need to be capped at around \$7.0 million with the expectation that this initial program would represent the greatest impact to the overall operation of the NPSSI over the design life of the capital improved planned for the future (75-100 years). On that basis the project team finally prepared and submitted for the City’s approval the “NPSSI Asset Management Report” in 2020. That particular report became the basis for the work to come.

Results of the inspections also indicated that a very significant cost savings could be achieved over a 50-year lifecycle by actually implementing two side-by-side programs at the same time. The first was a long-term infrastructure rehabilitation program for those portions of the NPSSI system that required rehabilitation and

the second (and parallel) program was the implementation of a corrosion control program that focused on infrastructure for chemical addition to those portions of the NSPPI that would represent lower risk scores and reduce and slow down deterioration of those NPSSI with lower asset grades and scores.



Fig. 8. Results of Asset Prioritization Based on Asset Scores and Grades

SUMMARY AND A PEAK INTO THE NEXT PHASE – FIXING THE NPSSI WITH TRENCHLESS REHAB TECHNOLOGIES:

With a final CIP implementation plan and funding in place, the project team moved into the next phase of the project and getting the highest priority sections of the NPSSI rehabilitated for the long-haul. And there were, for sure, several major challenges yet to be managed, including the development of bid-ready plans and specifications that would open up the project to a wide range of renewal pipeline technologies while ensuring that the final outcome of the program would result in a sustainable and reliable pipeline for the next several decades. Part 2 of this phase of the project will be published in the next edition of BAMI-I in February, 2025. There is broad consensus that the NPSSI rehabilitation project was successful at several levels and shows the importance of well-planned and executed inspection and planning-level work, effective communication and collaboration will

all stakeholders, and the use of innovative trenchless technologies to rehabilitate the critical sections of the NPSSI resulted in outcomes beyond expectation. Part B will show how this happened and why these sections of the NPSSI now show they represent a wastewater conveyance system for the next 75-100 years (and even longer)! As an added note, this project was awarded the Rocky Mountain North American Society of Trenchless Technology (RMNASTT) Project of the Year Award in 2023.

ACKNOWLEDGMENTS

We would like to acknowledge Tom Brauer and Krista Johnston of the City of Casper and project team representatives from CEPI and Jacobs, for their contributions to this manuscript. Quite frankly, they are the real reason that this project was a total success including the means and methods developed and implemented to deal with the challenges that are always encountered when rehabilitating buried pipeline assets.

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FACILITY YARD PIPING CONDITION ASSESSMENT

Facilities face an out of sight issue, the condition of their buried yard piping. Much of process piping may remain in service continuously without interruption since installation. Adding to this issue is trying to cost effectively implement needed improvements. In response to these challenges, risk analysis using indirect and direct condition data can prioritize piping for implementing appropriate management actions. In California alone, there are over 1,100 wastewater treatment plants (WWTP) and over 699 potable water treatment plants (WTP). This article presents an example use case for the many facilities in the nation to consider when developing and implementing a multi-year project to repair, rehabilitate, or replace piping, or portions of piping, which are highest priority based upon criticality and/or observed physical condition.

RISK-BASED PRIORITIZATION

Yard piping can include process pipes that carry gas, liquids, sludge, air, steam,

and other process streams to and from the various treatment areas. Piping may range up to 144-inch diameter and be comprised of many materials such as reinforced concrete pipe, ductile iron pipe, or welded steel pipe. A risk-based framework can be developed for the specific facility to prioritize condition assessments along with guidelines for conducting condition assessments of various pipe materials and sizes. A condition assessment plan can then be developed that provides a prioritized list of critical piping for inspection, inspection protocol recommendations based on the selected piping attributes, and opinions of remaining useful life to determine when to perform inspections.

Prioritization and other planning efforts can use compiled historical data, such as geographic information system (GIS) layers, computerized maintenance management system (CMMS) exports, historical photos, past reports or studies, and record drawings. Properly managed data can allow results to be presented in a way for future reference. Data managed within a central data repository such as the

GIS or CMMS can help lead to better data access for all users and better future data trending like asset deterioration rates.

Weighted risk factors can be used to determine the likelihood of failure (LOF) and consequence of failure (COF) for yard piping. Depending upon identified pipe risk, inspection protocols and desired levels of inspection detail can be determined. A risk analysis framework can define and evaluate the various mechanisms influencing piping risk of failure, allowing each pipe to be compared in an objective way to highlight areas to focus condition assessments. Example risk factors are shown in Table 1, broken down by risk category. Based on the LOF and COF scores, risk categories can be established, such as the examples listed below from the International Infrastructure Management Manual:

- Like new condition
- Minor defects only
- Moderate deterioration
- Significant deterioration
- Virtually unserviceable

| LIKELIHOOD OF FAILURE (LOF) | | CONSEQUENCE OF FAILURE (COF) | |
|-----------------------------|---|------------------------------|--|
| | Physical Characteristics | | Physical Cost / Impact |
| 1 | Material | 1 | Pipe Size & Flow |
| 2 | Age | 2 | Proximity to Adjacent Facilities |
| | Exposure Factors | 3 | Type of Fluid/Gas |
| 3 | Type and/or Corrosivity of External Environment | 4 | Repair Cost |
| 4 | Type and/or Corrosivity of Internal Environment | | Environmental Impacts |
| 5 | Soil Type | 5 | Proximity to Environmentally Sensitive Areas |
| | Pipe Condition & Performance | 6 | Compliance with Regulations & Permits |
| 6 | Interior Condition | | Social Impacts |
| 7 | Exterior Condition | 7 | Community Impact |
| 8 | Joint Integrity | 8 | Image Impact |
| 9 | Leaks/Failures (Reliability) | | Operational Impacts |
| 10 | Cathodic Protection System | 9 | Disruption to Service/Service Reliability |
| | Pressure & Load Carrying Capability | 10 | Redundancy |
| 11 | Internal Structural Capability | 11 | Ability to Return to Service |
| 12 | External Structural Capability | 12 | Safety Incidents |
| | Maintenance Effectiveness | | |
| 13 | Maintenance Activity/Level | | |

Table 1. Risk Categories and Criteria



Topside Inspection



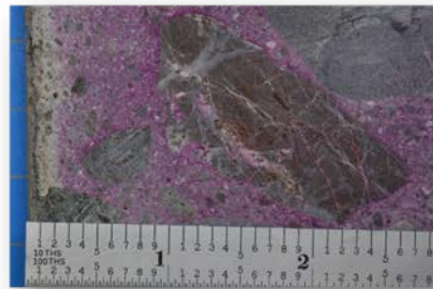
Multi-Sensor Inspection (wet pipe)



Multi-Sensor Inspection (dry pipe)



Confined Space Inspection



Sample Testing



Non-Destructive Testing

Figure 2. Yard Piping Assessment Methods

CONDITION ASSESSMENT PLANNING & EXECUTION

Where condition assessment is needed, such work can have two objectives: (1) to determine when improvements or other management decisions need to be implemented, and (2) to determine what types of improvements or management decisions need to be implemented. The ability to achieve both objectives depends on data resolution, such as if indirect or direct condition data are available. Indirect data only infers piping condition and may not provide sufficient information for detailed rehabilitation or replacement planning and design, but can support prioritization of buried piping for actions such as where to collect direct condition data or where to implement rehabilitation or replacement depending on the appropriate piping risk category and supporting data. Direct condition data verifies existing condition and may include high-resolution data for design specifications.

Process piping are generally buried and cannot be taken out of service without disruptions to treatment operations, so it is inherently difficult to assess their condition. Assessments typically involve pro-

cess shutdown and/or isolation, draining and dewatering, flow bypassing, and pot-holing or excavation. Pipes can be chosen for inspection during any given year based on their relative risk and planned facility shutdowns, as well as the status of other concurrent facility projects. Considering background information, such as pipe materials, sizes, alignment characteristics, and access, a plan can be developed for process shutdowns, where possible, as well as take advantage of opportunities where certain piping or processes are planned to be taken out of service for maintenance or rehabilitation, either directly or indirectly.

Outage or service interruption requests can be prepared for review, allowing solicitation of critical feedback to successfully execute the inspection. Requests can have details regarding the shutdown purpose, work areas, roles and responsibilities, safety procedures, schedule, required access, and approach for conducting the work. Work plans can be developed to collect the highest resolution data while executing field work in the safest manner possible and with the least impact to operations. It is critical that all facility stakeholders are involved early and of-

ten throughout the planning process to communicate the shutdown, operating scenarios, and access requirements. This can help leverage planned shutdowns for repair and maintenance activities and already installed temporary bypass piping to effectively execute onsite activities and utilize facility resources. Overall, it is important to remember the planning process may be iterative so the best opportunity to obtain the highest resolution data can be achieved.

Figure 3 shows example methods to assess buried yard piping. From a programmatic standpoint, attempts can be made to capture consistent data per pipe type. For piping greater than or equal to 36-inch diameter, methods like confined space entry inspection can allow a thorough visual inspection to be performed along with the ability to obtain complementary data such as non-destructive testing and sampling for laboratory testing. While methods like physical entry can provide comprehensive data, major considerations for personnel safety and operational constraints need to be considered. Where piping cannot be taken out of service or dewatered, various multi-sensor inspection (MSI) platforms

are available depending on the process stream type. For piping less than 24-inch diameter, options are more limited. Closed-circuit television (CCTV) inspection and potholing with non-destructive testing can be used to obtain condition data on smaller pipes.

FOOD FOR THOUGHT

Besides the initial items discussed, listed below are various considerations for those at various stages of a yard piping management program:

- **Preparation is Key:** Comprehensive plans identifying priorities and methods with well-documented reasons can limit costs during field activities. Due to the latest market conditions, emergency and unforeseen conditions can cost substantially more to address than 5 years ago.

- **Be Flexible:** Certain activities may not proceed as initially planned. Whether it is fewer contractor bids than expected, working around other active facility projects, or discovering undocumented utilities, remember to remain calm and think creatively.

- **Take Photos:** Witness field activities and document observations with photos. A picture is worth a thousand words when showing someone else how a pipe was accessed, assessed, rehabilitated, or replaced.

- **Organize Data:** Master data repositories can mitigate internal data silos. Allowing data access for all appropriate users can support regular asset data updates and recording institutional knowledge. If documented asset history is available, this information can be used to update lifecycle projections and optimize maintenance programs.

- **Make Data-Back Decisions:** Defining risk criteria identifies what condition data to collect in the future and supports development of prioritized capital and operation and maintenance programs. An initial risk model based on available records can successfully focus resources to collect field data to calibrate the risk model and determine deterioration rates to consider when to prioritize recommendations. Combining multiple data sources may be needed to identify condition trends and root causes of deterioration or damage. Understanding budget costs for various management actions (e.g., replacement, rehabilitation, monitor and inspect, no action) can help inform which is the appropriate choice depending on the piping's associated risk.

- **Be Proactive:** Programmatic inspections can identify and mitigate high-risk

areas from becoming future emergency responses and service disruptions. Forming a condition baseline and management program can improve system reliability and reduce current and future operation, maintenance, and replacement costs over the yard piping lifecycles.



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New Utah State University Water Main Break Report:

AN ASSET MANAGEMENT TOOL FOR UTILITIES



Please see below the press release issued by Utah State University regarding their latest water main break study. The report provides valuable information on water pipe condition and operation and can assist with asset management, water infrastructure planning, and pipe replacement decision-making. The goals are to control operating costs, reduce service level impacts, and minimize health risks to customers. The study is of interest to water utility professionals, policy makers as well as local lawmakers and enables utilities to benchmark pipe material performance.

New Report Says Lack of Funding for Critical Water Mains is \$452 Billion, Over 260,000 Breaks Annually

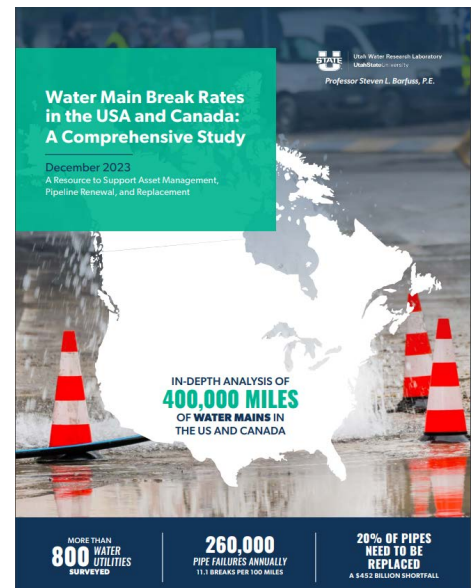
LOGAN, Utah -- Utah State Universi-

ty (USU) has published a third extensive study of commonly used water pipe materials titled, “Water Main Break Rates in the USA and Canada: A Comprehensive Study.”

According to primary researcher, Professor Steven L. Barfuss, P.E., one of the most important indicators for identifying failing pipelines is water main break rates. Pipe performance continues to be impacted by soil corrosivity, and the replacement of asbestos cement and cast iron pipe is creating a shift in predominant pipe materials.

“Our infrastructure is aging, causing water pipelines to deteriorate,” says Professor Barfuss. “Utilities can use this report to assist with asset management and facilitate water infrastructure planning and pipe replacement decision-making. The goals are to control operating costs, reduce service level impacts, and minimize health risks to customers.”

Over 800 utilities were surveyed and



almost 400,000 miles of pipe data were analyzed, representing 17% of the esti-

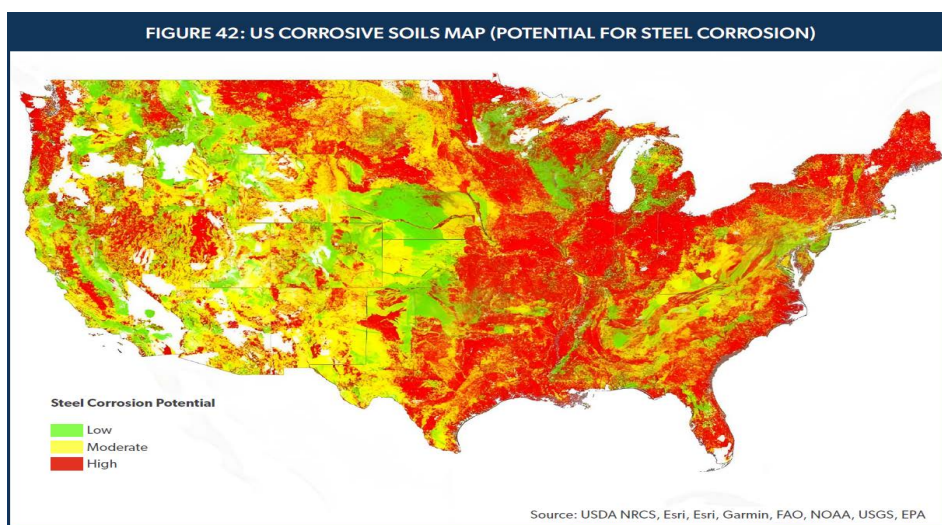
mated 2.3 million miles of water mains in the United States and Canada. This data set is large enough to provide accurate information on the characteristics of aging pipe infrastructure and the costs of repair and replacement.

“Notably, the report shows that 20% or 452,000 miles of water pipes in the US and Canada are beyond their useful lives and need to be replaced but have not been due to lack of funds. This represents a \$452 billion shortfall. In 2012, utilities reported that only 8% of installed water mains were beyond their useful lives, so this is a growing problem,” Professor Barfuss adds.

USU published similar studies in 2012 and 2018. The 2023 report references the previous studies to analyze changes over time. The sample size for this study is almost three times larger than the previous 2018 USU water main break survey. In terms of pipe mileage, this is the largest study in the US and Canada of its kind. Previous studies have been based on much smaller sample sizes and consequently may have reduced accuracy in data reporting.

Major findings and benchmarks include:

- The US and Canada experience 260,000 water main breaks annually, representing \$2.6 billion in annual repair costs.
- Utilities reported the average failure age of water pipe is 53 years. Notably, 33% of water mains are over 50 years old, representing 770,000 miles of piping.
- In 2018, cast iron and asbestos cement together represented 41% of all installed water mains. In 2023, the combined length for these materials is 33%, a reduction of almost 8%. PVC pipe length increased by 7% and ductile iron remained approximately the same.
- Material usage varies significantly across geographic regions, suggesting that selection of pipe materials is often based on preference.
- A total of 86% of cast iron pipe is over 50 years old and 41% of asbestos-cement pipe is more than 50 years old.
- The estimated average water loss to leakage is 11%.
- Overall failure rates decreased by 20% since 2018, which seems to correlate with reduced inventory of cast iron and asbestos cement pipe, both of which have the highest break rates.
- A reconfirmed major finding is



that polyvinyl chloride (PVC) pipe has the lowest break rate when compared to cast iron, ductile iron, steel, and asbestos cement pipes.

- Almost 86% of water pipes in the US and Canada are less than 12 inches in diameter.
- Smaller pipes (12-inch in diameter and less) fail five times more than larger pipes (14-inch and larger).
- A total of 75% of utilities reported corrosive soil conditions, which is consistent with the 2012 and 2018 USU studies – demonstrating the importance of corrosion mitigation for water pipelines.
- Ductile iron pipe has over six times more failures in highly corrosive soils compared to low corrosive soils.
- The percentage of utilities approving ductile iron has decreased by 8% from 86% in 2018 to 78% in 2023. Steel pipe has shown a 6% increase in acceptance from 38% to 44%. Acceptance rates for other pipe materials have remained about the same.
- Almost 44% of utilities conduct some form of regular condition assessment of water mains.

To view the full report, including the full set of key findings and its methodology, click here.

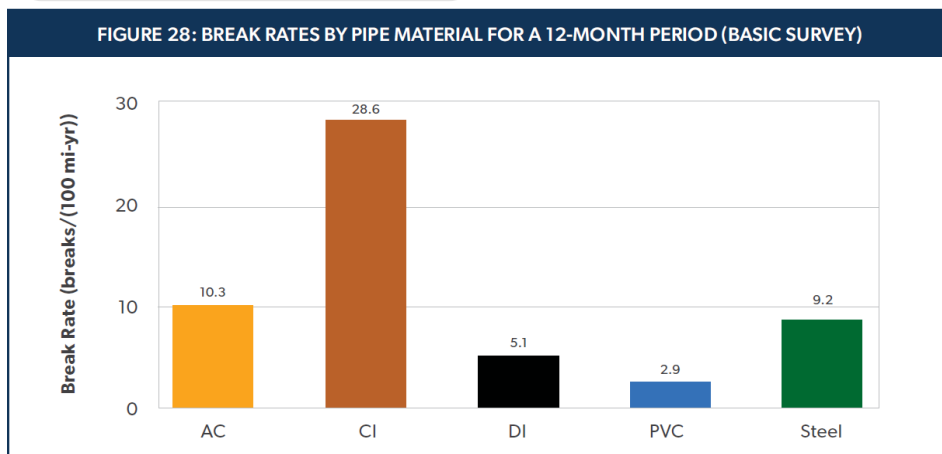
This comprehensive study contributes to the continuing efforts of the EPA’s Aging Water Infrastructure (AWI) research, the US Conference of Mayors’ Water Council, and the asset management and water infrastructure condition assessment efforts of the American Water Works Association (AWWA) and American Society of Civil Engineers (ASCE).



Author:

Steven L. Barfuss, P.E., is a Research Professor at USU in the Civil and Environmental Engineering Department and an Associate Director at the Utah Water Research Laboratory (UWRL), a world-renowned water research facility.

Professor Barfuss has over 37 years of research experience at UWRL and has published numerous peer-reviewed articles in national and international journals. He also has considerable experience in the hydraulics of pipelines and pipe failures.





The Pig that Saved the Pipeline: **GROUNDBREAKING FORCE MAIN INSPECTION**

In the ever-evolving field of pipeline maintenance and inspection, innovative technologies are leading the way. A recent significant project involved ultrasonic testing (UT) inspection of a 24-inch diameter wastewater force main in the U.S. The Acquarius, developed by Acquaint, is a UT-based inspection technology housed in a soft foam pig. Designed to traverse pipelines and gather comprehensive condition assessment data, this tool represents the cutting edge of inspection technology in the water/wastewater industry.

While the UT sensors are the headliner of the onboard technology, the tool includes other data collection devices such

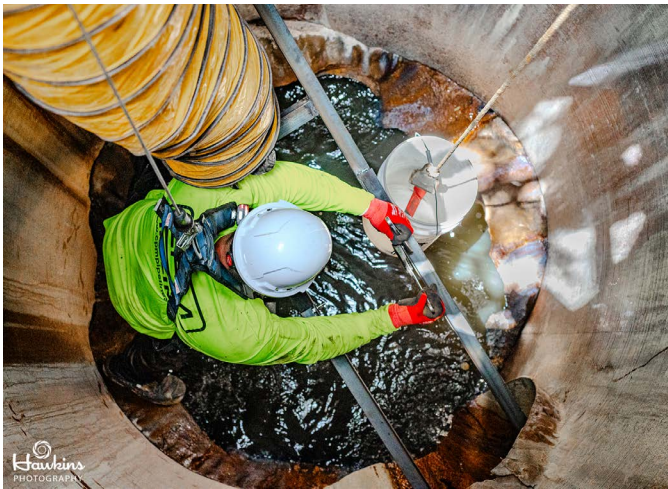
as a hydrophone for identifying leaks and gas pockets, as well as location tools to map the XYZ alignment with extreme accuracy. The results of the inspection provided invaluable insights into the structural integrity and overall health of the pipeline, ensuring its continued safe and efficient operation.

The pipeline in question, a 19,000-LF long, 24-inch diameter ductile iron force main pipeline, is a critical component of the city's wastewater infrastructure. At the time of inspection, it had already experienced failures. A broken clock may still be right twice a day, but a broken wastewater pipe is wrong 24/7. Therefore, the line required a thorough inspection to evaluate its condition and identify and

prevent future complications. The Acquarius was up to the task as a versatile and effective tool for navigating pipelines of varying sizes and conditions while gathering an abundance of condition data.

Days 1-2: Clean the Line, Walk the Line

Early in the execution of the project, the best understanding of the pipeline's alignment is used to set preliminary markers at ground level every 300-ft or so. As you'll read, these markings are critical and will eventually be fine-tuned to provide an extremely accurate location of



pigs could easily fit into the 30-in side of the reducer and a 30-in blind flange was bolted on after the pig was inserted. The blind flange was modified to include a water intake port and a pressure gauge. After the pig was inserted and the flange bolted, water was pumped through a 6-inch centrifugal pump to build the necessary pressure to move the pigs through the wye and

visually determine how much debris, oil, grease, or other solids were dislodged during the run. When the soft foam pigs are retrieved, they are scrutinized for any evidence of issues along the main. This includes how clean the pigs are and if there are any gouges, rips, or other signs of damage that may pose a risk to further pigging. In the case of the 24-inch force main inspection, the first cleaning pig, while quite dirty, did not exhibit extremely worrisome damage. A second soft foam pig was launched through the pipeline and was in similarly good condition upon retrieval. The water ahead of the pig was relatively clean, as was the pig itself, and therefore the pipeline was deemed ready for the proving run after two days on-site.

the entire main.

The inspection process continues with a meticulous cleaning of the pipeline to ensure unobstructed passage for the foam pig and accurate data collection. The resolution of data provided from the sensors onboard the Acquarius is maximized when the ultrasonic waves make clear, unobstructed contact with the inner pipe wall. However, sending large cleaning pigs through any pipeline can be risky. It is an unavoidable truth that pigs can become stuck. In any pipeline, not to mention those having already experienced failures, more aggressive cleaning methods can also create or exacerbate issues and cause a failure. Therefore, the cleaning process always begins with the least intrusive, most nonaggressive approach – bare, soft foam pigs.

Soft foam pigs are an ideal starting point for pipeline cleaning for several reasons. First, they are extremely compressible and, while they can move debris out of the pipe perfectly well, they will also compress greatly to navigate unexpected reductions, harsh bends, or hard debris. Furthermore, they are easily destroyed. This may sound counterintuitive but when launching the first pig into a pipeline, one is at the mercy of accurate drawings and other record documents. There could be unknown changes to the pipeline where a pig can become stuck. Soft foam pigs can more easily dislodge, compress, or even shred apart when encountering such obstacles.

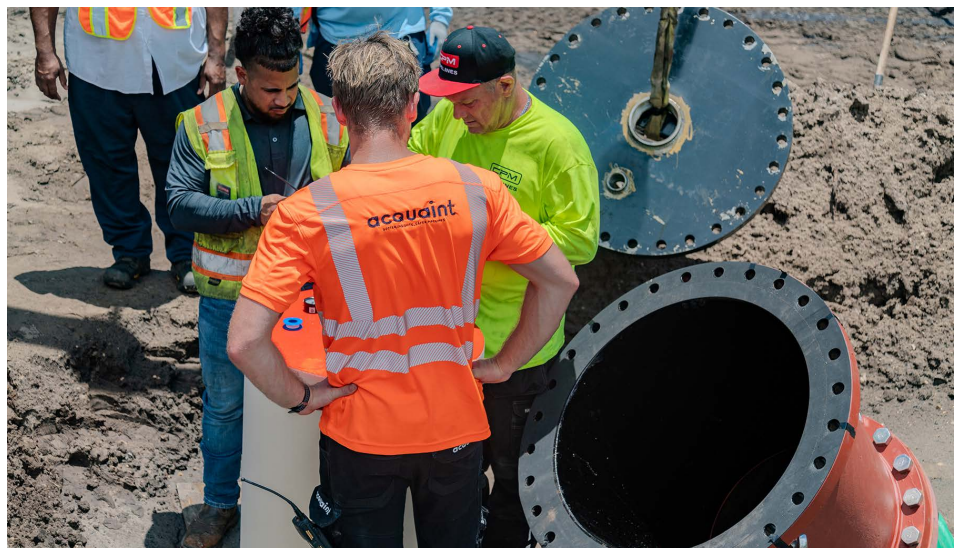
The first foam pig was launched, as with all subsequent cleaning pigs, from the force main lift station. Just outside the station, the owner installed a new wye fitting which allowed the inspection team to build upon it a launching assembly. In this case, the assembly consisted of a simple 24-in by 30-in reducer. The 24- to 25-in outside diameter cleaning

into the force main. All cleaning and inspection pigs are equipped with transmitters allowing them to be tracked from the surface. When the pigs are tracked through the wye and into the force main proper, the secondary pump is no longer needed, and the existing force main pumps push the pig through the remainder of the alignment. To aid in the tracking, which is done on foot with receiver units, the station pumps are dialed in to a flow velocity of roughly 1.5 feet-per-second. This is the target speed for the inspection pigs as well to optimize the wave pulses and maximize data quality. The velocity results in an approximate travel time of 3.5-hours, coupled with the setup and retrieval tasks, each pigging run took one workday.

The various pigs were collected at the bar screen of the downstream treatment facility (cleaning pigs) or the force main discharge manhole just upstream of the facility (proving and inspection pigs). As the foam pigs approach the retrieval point, the water is observed to

Day 3: Proof in the Pudding

With the pipe sufficiently clean, the next step in the Acquarius inspection process is to launch what is called a proving pig. The proving pig is the same size, weight, and has the same composition of soft and medium foam makeup as the Acquarius inspection pig. The difference? The proving pig does not contain the expensive sensor arrays and other technologies inside its hollow core. While it was confidently established that soft cleaning pigs could traverse the main without becoming lodged or damaged, the Acquarius is significantly longer and includes portions of medium density foam. As such, the proving pig (and thereby the Acquarius) are much less forgiving to bends and diameter changes. While all reasonable measures were taken to ensure the pipeline was free of obstruction, whether by debris, alignment, or diameter, the proving pig is a cautionary measure used to maximize the success rate of the Acquarius.



On the third day, aside from the creation of dry land, seas, and plants, the inspection team launched the proving pig. It was launched in the identical manner of the cleaning pigs before it (through the wye at the lift station) and took roughly the same 3.5 hours to reach the discharge manhole. Upon arrival, once again the pig was inspected for signs of damage or unusual wear, of which it had none.

Day 4: Subjection to Inspection

The previous three days of work, and weeks of planning, culminated in this event. The launch of the Acquarius UT smart pig. The line had been cleaned, an identical tool made it through the system unscathed, therefore the table was set. As the inspection process carried out, crowds grew with members of the city's engineering department, operations group, local consultants, and seemingly anyone who wanted to see a cutting-edge pipeline inspection tool do its thing.

On a rainy, humid, morning, with biblical levels of mosquitos, the Acquarius was constructed. As sophisticated as the tool is, it's assembly would seem relatively straightforward to an onlooker. However, taking a closer look to see the fine tuning, the modifications, measure-

ments, calibration, re-measurements, and quality control, one can understand how so much data can be provided by the technology. When the inspection team was satisfied with the tool's preparedness, there was only one thing left to do. The pig was loaded into the launch assembly, pumps activated, and off it went.

The Acquarius traveled the roughly 3.6-mile alignment coolly and calmly, tracked every foot of the way. The original alignment markings, one of the early steps in the process, are now adjusted to accurately represent the precise points of the main at ground level. The markings are included at every 300-feet and also at each bend. Who's kidding who, though, the alignment data is great. Outstanding. A means of bolstering existing GIS data and more accurately mapping the main. However, there's a treasure trove of data the Acquarius is collecting along its journey, and the team wants to open that chest.

The Acquarius arrived at the discharge manhole with about 100 eyeballs staring at it. The onboard hydrophone may listen for leaks and air pockets, but it was most likely picking up the thunderous applause as it landed safely into the manhole channel. The vessel was pulled out of the manhole with a crane truck (as

was now saturated with water, clocking in at around 450 pounds), and then...We wait.

The data logger is removed from the Acquarius, taken out of the field, and uploaded to Acquaint's cloud for an initial quality check. This process involves a preliminary look into the quantity and resolution of the data – essentially verifying the quality of information across the entire alignment. As a precautionary measure, no personnel, equipment, piping, fittings, vehicles, or hoses leave the project site until the data quality is confirmed. While the odds of needing another inspection run are extremely low, it's safer to keep everything in place until verification. Following the quality check, the data was reported as outstanding in both magnitude and quality, marking a successful completion of the inspection process.

This groundbreaking inspection of a critical force main exemplifies the successful collaboration between CPM Pipelines, Acquaint, and V&A Consulting Engineers. It demonstrates our shared commitment to providing asset owners with cutting-edge solutions that maintain vital pressure pipes, protect the environment, and serve communities.

Author: CPM Pipeline Team



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HDPE ELECTROFUSION PIPE JOINTS

Camille George Rubeiz, P.E., F. ASCE, Co-chair, HDPE Municipal Advisory Board senior director of engineering, Municipal and Industrial Division Plastics Pipe Institute, Inc. (PPI).

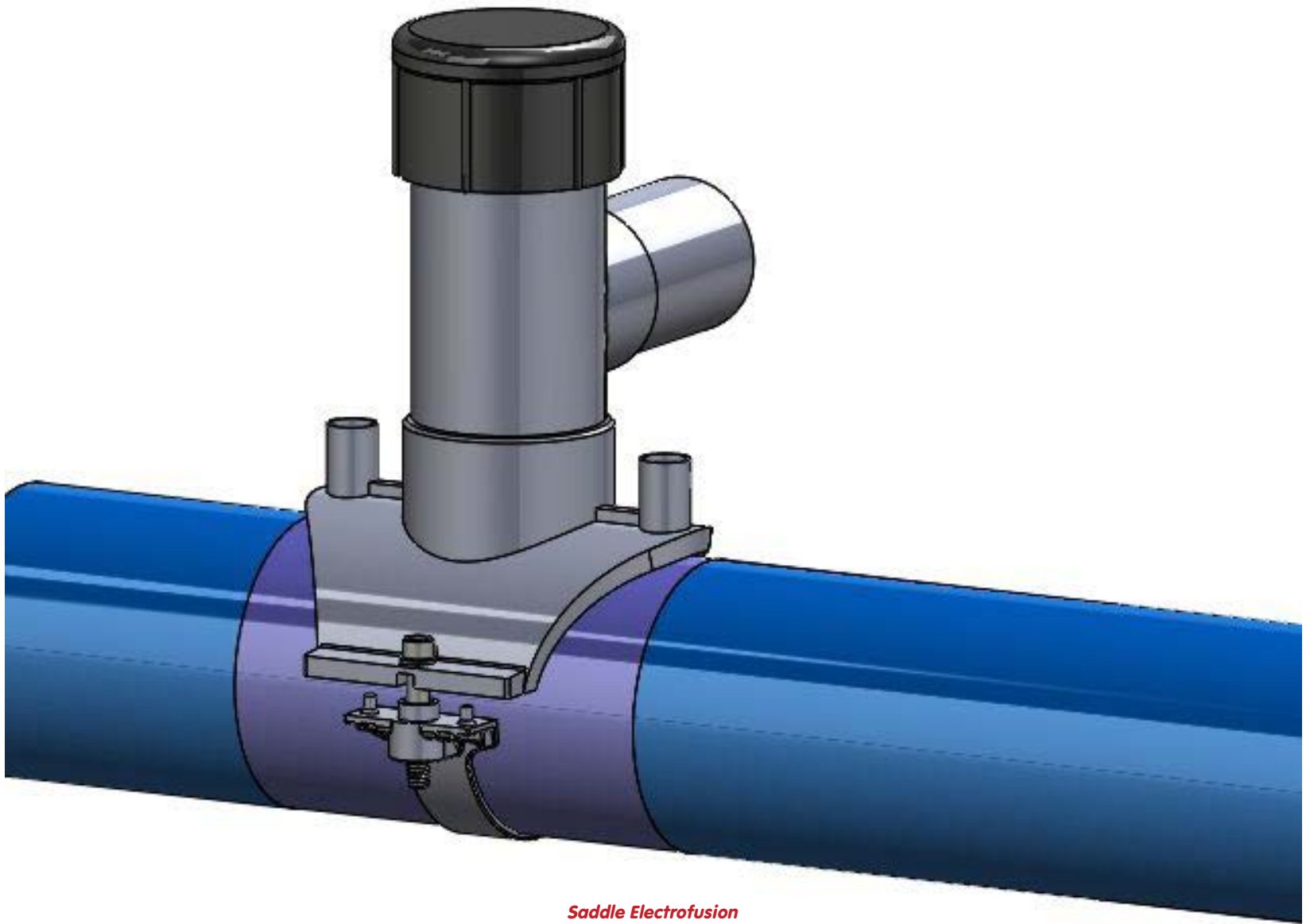
High-density polyethylene (HDPE) pipe has been used for municipal and industrial water applications for almost 50 years. HDPE's heat-fused joints create a leak-free, self-restraint, monolithic pipe structure. The fused joint will also eliminate infiltration into the pipe and ex-filtration into the environment. HDPE

pipe has other benefits including chemical, abrasion, fatigue, seismic and corrosion resistance, and is designed for water and wastewater applications meeting the latest AWWA C906 and ASTM F714 standards.

Heat fusion can be used to join sections of HDPE pipe, including high-performing PE 4710 pipe, while electrofusion is used to add couplings,

tapping tees, branch saddles and other fittings. Proven to be an extremely reliable joining system, an electrofusion joint is heated internally, either by a conductor at the interface of the joint or by a conductive polymer. Heat is created as an electric current is applied to the conductive material in the fitting.

For training, consult with the electrofusion manufacturers and/or



Saddle Electrofusion

attend the MAB four-day training class on HDPE Fusion and Electrofusion at the Northeast Wisconsin Technical College (NWTC) in Green Bay, WI. For details, visit the MAB website at <https://plasticpipe.org/MunicipalAdvisoryBoard>

Typical Electrofusion Joint

Both fusion joining methods require that there is no water flowing or standing in the pipe that can reach the fusion surfaces. Flowing water in contact with the fusion surfaces during the assembly or fusion cycle must be avoided as it can cause voids as the moisture turns into expanding steam during the fusion process. PE squeeze-off tools can be used to control the flow of water in

cases where a valve is not present or will not shut off completely - refer to ASTM F1041.

Electrofusion fittings are installed in ambient temperatures and can be installed within a temperature range of 14°F to 113°F . Contact the fitting manufacturer to verify.

Improper pipe preparation is overwhelmingly the leading cause of unsuccessful electrofusion joint. The goal of pipe peeling is to remove a thin layer of the outer pipe surface to expose clean virgin material beneath.

Pipe surfaces exhibit surface oxidation from the extrusion process, transportation, and outdoor exposure, and acts as a physical barrier and

therefore those surfaces cannot be heat fused. Simply roughing the pipe surface is not sufficient. In order to achieve proper electrofusion, this layer must be removed. Even new pipe must be properly peeled before an electrofusion will be successful. An adequate minimum amount of material that must be removed is just seven one-thousandths of an inch (.007") -- approximately the same thickness as two sheets of ordinary paper. Sandpaper, Emory cloth, or other abrasives should never be used to prepare a pipe surface for electrofusion. The only tools are those that are specifically designed for electrofusion peeling, which can peel the pipe surface to a controlled depth. Types of scrapers that are not



Electrofusion in Pit

recommended are “hand scrapers” such as wood rasps and metal files.

“Witness” marks should be made on the pipe surface prior to peeling with a permanent marker, such as a Sharpie® marker. Sharpie dries fast and contains no oils.

Avoid all possible recontamination of the prepared surface. This includes handling or even touching the peeled pipe surface or the inside of the coupling as body oils and other contaminants can affect fusion joint performance. If the surfaces become contaminated, clean thoroughly with a clean, lint-free towel and a minimum 90 percent concentration of alcohol isopropyl and allow to dry before assembling. Do not use alcohol with any additives other than water.

Gouges deeper than 10 percent of the pipe wall thickness require that the pipe section be cut out and replaced to maintain the maximum pressure rating of the pipe.

The MAB Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe (MAB-01-2022) guide has been updated by the Municipal Advisory Board (MAB) and is

available as a free download from the MAB website: www.plasticpipe.org/MAB-PUBS

About the Municipal Advisory Board:

The mission of the Municipal Advisory Board (MAB) is to improve the design, installation, and operation of municipal HDPE water piping systems through the creation of partnerships among utilities, researchers, designers, contractors, and the HDPE industry. MAB serves as an independent, non-commercial adviser to the Municipal & Industrial Division of the Plastics Pipe Institute, Inc.

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PURDUE UNIVERSITY STUDENTS SHINE AT 2024 UNDERGROUND INFRASTRUCTURE CONFERENCE

March 19-21, 2024, Oklahoma City Convention Center



The Underground Infrastructure Conference (UIC) is an annual major event in the field of underground construction, attracting industry experts, researchers, and practitioners from around the world. This year's conference aimed to provide a platform for attendees to share the latest research findings, technological advancements, and best practices, thereby promoting the development of the underground infrastructure industry.

A student delegation organized by Dr. Tom Iseley and Wei Liao from the Purdue/BAMI-I Underground Infrastructure team consisted of eleven Purdue University students representing the UCA (Underground Construction Association) and NASTT (North American Society for Trenchless Technology) chapters at the conference. These students had the opportunity to listen to industry leaders, participate in various interactive workshops and technical demonstrations, and gain hands-on experience with the latest

construction methods and equipment. These activities enriched their theoretical knowledge and provided them with invaluable practical experience. This is the third time Purdue and BAMI-I have jointly organized the "Developed Future Underground Leader" program. The program also includes organizing student visits to construction sites and other activities.

Corporate Sponsorship Empowering Student Growth

Collaboration between industry and educational institutions has a long and fruitful history. Many companies and organizations recognize that supporting students in attending industry conferences is an effective way to cultivate future professionals and promote the integration of academic research and practical applications. Companies such as CPM Pipelines, Midwest Mole, Ace Pipe Cleaning, Plastics Pipe Institute, Danby

PVC Lining, Jim Siebert-Consultant, Boyer, InfoSense Inc., KMCE. Inc and US HYDRO VAC generously sponsored Purdue University's student delegation's participation in this event.

These sponsorships covered the travel expenses and accommodation, allowing them to fully engage in the conference without financial concerns. The conference organizer, Underground Infrastructure Magazine, also generously provided free registration for the students. The motivations for these companies' sponsorships include:

- **Advancing the Industry:** By supporting student participation, these companies aim to promote the integration of academic research and practical applications, thus advancing the underground infrastructure industry.
- **Cultivating Future Talent:** Sponsoring students provides them with first hand industry knowledge and experience, laying a solid foundation for their future careers.
- **Enhancing Brand Visibility:** By sponsoring student activities, these companies enhance their visibility and reputation in the industry, demonstrating their commitment to education and industry development.
- **Fulfilling Social Responsibility:** Supporting education and talent cultivation is an important aspect of corporate social responsibility, showcasing their contribution to society and industry development.

**FUTURE UNDERGROUND CONSTRUCTION
LEADERS (FUCL)
DEVELOPMENT PROGRAM**



TOM ISELEY
Professor of Engineering Practice
UCA Chapter Faculty Advisor



DULCY ABRAHAM
Professor, Civil Engineering
NASTTT Chapter Faculty Advisor

| Purdue UCA of SME & NASTTT Chapter Officers for the 2023-2024: | |
|--|-------------------------|
| President: | Oluwatobi Osilaja |
| Vice-president: | Shubhang Gaur |
| Treasurer: | Alejandra Lopez Diaz |
| Secretary: | Paul Nikhilesh Chintala |
| Outreach (UCA of SME): | Ashutosh Suhas Mangle |
| Outreach (NASTTT): | Rishitha Reddy Kasarla |

To learn more about the program, please contact Tom Iseley at diseley@purdue.edu or 4043865667.

Rich Conference Activities and Interactive Engagements

The three-day conference featured a tightly packed schedule, including seminars, interactive workshops, and technical demonstrations. The conference themes included asset management, risk mitigation strategies, trenchless construction methods, and the latest advancements in underground infrastructure, attracting hundreds of attendees and underscoring its significance in the industry.

The one-hour seminars covered a range of topics, from small to large equipment, leak detection systems, and CIPP (Cured-In-Place Pipe) liners. Key discussion topics included asset management, preventive maintenance, and the role of women in construction. The interactive workshops provided hands-on training opportunities, allowing students to operate equip-

ment and apply techniques in real-world scenarios. For example, the electromagnetic detection demonstration for force main pipelines showcased the latest repair methods and technologies.

Over 100 exhibition booths displayed cutting-edge technologies and products in the industry, including horizontal directional drilling (HDD), wastewater management, CIPP technology, pipe repair methods, leak detection systems, and CCTV inspection. Exhibitors such as McElroy, Danby, and CPM Pipelines demonstrated their latest technologies and equipment, with some providing live demonstrations.

Student Delegation Preparation and Performance

The student delegation from Purdue University, comprising 11 students from various academic backgrounds, such as civil engineering, environmental engineering, and mechanical engineering, represented the UCA and NASTTT chapters.

To ensure the students fully benefited from the conference, Purdue CEM & BAMI-I associations organized a series of preparatory activities:

- **Technical Training:** Lectures and seminars introduced the main topics and the latest technological advancements, ensuring the students had the necessary knowledge before attending the conference.
- **Guidance and Support:** Professors Tom Iseley and Wei Liao as well as student leader Priyanka Kiran Andhale provided comprehensive guidance and support, maintaining close contact with the students, ensuring their smooth participation in various activities, and offering timely assistance and advice.

Through these preparations, the students gained a thorough understanding of the conference content and enhanced their overall capabilities, laying a solid foundation for active participation and learning during the conference.





Student Gains and Industry Impact

By attending the 2024 Underground Infrastructure Conference, Purdue University students gained valuable knowledge and experience, including:

- 1. Enhanced Technical Knowledge:**
 - Students attended multiple lectures and seminars on the latest technologies and practices. For example, Harsh Badole reported that students learned about drone technology for inspecting narrow and hazardous underground spaces, which could revolutionize maintenance and safety protocols.
 - Sihan Zhou attended a session on CIPP (Cured-In-Place Pipe) air emissions, learning about monitoring and protection measures for volatile organic compounds (VOCs).
- 2. Practical Experience:**
 - Students participated in various interactive workshops and technical demonstrations, gaining hands-on experience with new software tools and equipment. Venkata Chapala mentioned that the conference showcased the latest trenchless technologies and microtunneling projects, providing deeper insights into their practical applications.
 - Mahnoush Mohseni noted that students interacted with companies demonstrating innovative technologies such as acoustic sensing and pipe penetrating radar (PPR).
- 3. Professional Development and Networking:**
 - Students engaged extensively with

industry professionals, building valuable networks. Dhiraj Lalwani mentioned discussions with company representatives and experts on the latest advancements in trenchless technology and asset management.

- Rushabh Patil emphasized the numerous networking opportunities provided by the conference, helping students connect with peers and industry leaders.
 - Supporting students' participation in the conference positively impacted the industry by:
- 4. Integrating Academia and Practice:**
 - The conference provided a platform for students and industry professionals to discuss the latest technologies and best practices, promoting the integration of academic research and practical applications. Priyanka Andhale's report highlighted discussions on asset management and risk mitigation strategies, offering valuable knowledge and practical experience.
 - 5. Driving Technological Innovation:**
 - The conference showcased cutting-edge technologies such as automated drones, acoustic sensing, and pipe penetrating radar (PPR), which enhance underground infrastructure maintenance and management efficiency. Harsh Badole mentioned the potential revolutionary impact of drone technology on underground space maintenance.

Looking Ahead

The knowledge and experience gained from this conference will inspire students to apply advanced technologies and meth-

ods in future projects, promoting continuous innovation and development in the underground infrastructure field. The valuable lessons learned will help optimize and improve the organization and management of future student participation in such events.

Overall, the 2024 UIC Purdue Student trip was not only a feast of knowledge but also a milestone in career development. The students' rich harvest from this conference will undoubtedly contribute to their future work and studies, making meaningful contributions to the industry's development.

Special Thanks

"We are very grateful for the generous support from all the sponsors, which made our participation in this conference possible," Sihan Zhou mentioned in his report. "Without your support, this valuable learning opportunity would not have been possible." Dhiraj Lalwani expressed similar gratitude: "The conference not only enhanced my understanding of underground infrastructure challenges and solutions but also expanded my professional network. The connections made during this event will have a profound impact on my future career development."

Special thanks to Purdue University's UCA and NASTT chapters and all the generous sponsors of this event, including Underground Infrastructure Magazine, CPM Pipelines, Midwest Mole, Ace Pipe Cleaning, Plastics Pipe Institute, Danby PVC Lining, Jim Siebert-Consultant, Boyer, InfoSense Inc., KMCE. Inc and US HYDRO VAC. Your support made this invaluable learning opportunity possible and provided a solid foundation for the students' professional development.

Author: Wei Liao, Editor, BAMI-I Journal

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EVENT --- [2024/03/04 17:21:34.072]



Disturbance Detected - A

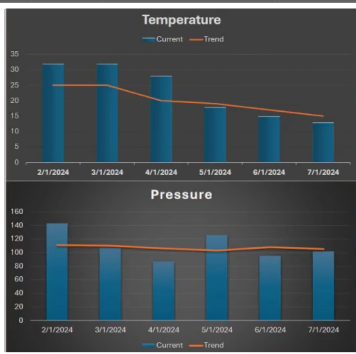
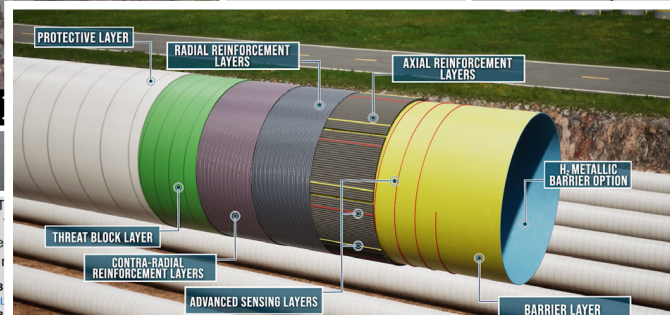
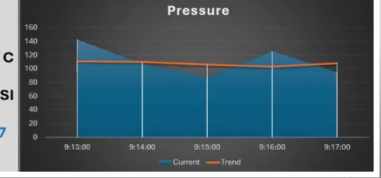
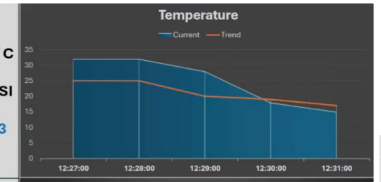
Selected Location:
Station 12

Current Values:
Temperature: **14.1 °C**
Pressure: **97 PSI**

Maximum:
Temperature: **23.1 °C**
Pressure: **111 PSI**

Overall Minimums:
Temperature: **13.1 °C**
Pressure: **87 PSI**
Location: **Station 3**

Overall Maximums:
Temperature: **33.1 °C**
Pressure: **140 PSI**
Location: **Station 7**



Sample Event

[2024/07/23 10:31:56.712]: Maximum Temperature Event, Alert Level: 1, Acknowledged: N

[2024/07/10 12:24:58.491]: Maximum Pressure Event, Alert Level: 1, Acknowledged: N

[2024/03/07 13:52:38.814]: Max Pressure Exceeded Event, Alert Level: 4, Acknowledged: Y

[2024/03/04 17:21:34.072]: Third Party Disturbance, Alert Level: 4, Acknowledged: Y

[2024/03/01 18:25:59.517]: Pressure Drop Event, Alert Level: 5, Acknowledged: Y

[2024/02/26 22:33:00.781]: Max Temperature Event, Alert Level: 1, Acknowledged: N

[2024/02/26 20:40:08.159]: Minimum Temperature Event, Alert Level: 1, Acknowledged: N

Active Job:

Job Number: 33768
 Allotted Time: 72 Hours
 Remaining Time: 13:37:12.376

Job Description:
 Investigate pressure anomaly at Station 3. Nightly recurrence of low-pressure event.

Logout Request Assistance Pause Work Switch Users

Session Commands:

```

Wired LAN adapter Ethernet 0:
  Media Type: Hybrid
  IP Routing Enabled: No
  DHCP Proxy Enabled: No
  DNS Suffix Search List: Lan

Ethernet adapter Ethernet 2:
  Media State: Media disconnected
  Connection-specific DNS Suffix: ASIX USB to Gigabit Ethernet Family Adapt
  Description: ASIX USB to Gigabit Ethernet Family Adapt
  Physical Address: 08-05-1B-56-19-0A
  DHCP Enabled: No
  Autoconfiguration Enabled: Yes

Wireless LAN adapter Local Area Connection 1:
  Media State: Media disconnected
  Connection-specific DNS Suffix: Microsoft Wi-Fi Direct Virtual Adapter
  Description: Microsoft Wi-Fi Direct Virtual Adapter
  Physical Address: 8B-1C-F8-B1-58-CD
  DHCP Enabled: Yes
  Autoconfiguration Enabled: Yes

Wireless LAN adapter Local Area Connection 2:
  
```

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