

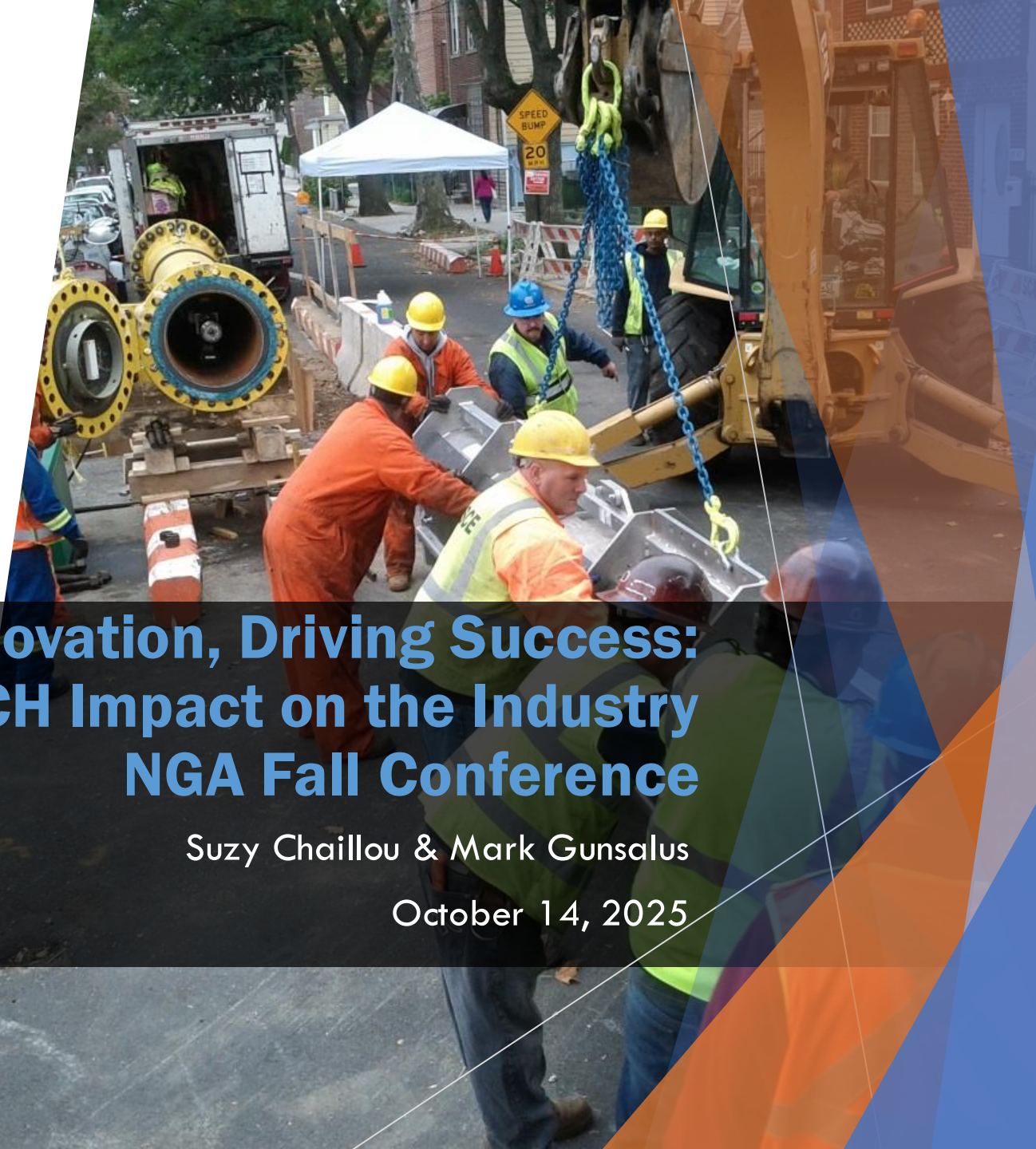


NYSEARCH RD&D
Division of the **NORTHEAST GAS ASSOCIATION**

Powering Innovation, Driving Success: NYSEARCH Impact on the Industry NGA Fall Conference

Suzy Chaillou & Mark Gunsalus

October 14, 2025



NYSEARCH Vision & Mission

- ▶ We **empower natural gas industry leaders** to identify and investigate research opportunities focused on **product development and deployment** making delivery of natural gas safer, more reliable & efficient and cleaner.
- ▶ Our **premier team** of project and program managers connect our members with technology providers in both academia and industry, excelling in **delivering value add and new technologies**.
- ▶ We lead with the values of **honesty, integrity and commitment**; creating a positive experience with coworkers, clients and partners.



Who is NYSEARCH & Value We Offer

- 
- A photograph of an industrial facility, likely a gas processing plant, at night. The image shows several tall distillation columns and a network of pipes, all illuminated by warm yellow lights. In the foreground, there is a large, white, cylindrical storage tank. The background is dark, suggesting a night sky. The overall scene conveys a sense of industrial activity and energy.
- ▶ The NYSEARCH Committee is a voluntary sub-organization within the Northeast Gas Association. In 1996, it revolutionized its business model to an all-voluntary program. As a result, the benefits of being a NYSEARCH member are:
 - Ability to **address specific company project needs** while working collaboratively with other professionals in the energy industry.
 - **Direct control and input** on project activities, specifications, and approach for problem solving.
 - **High value for the R&D dollars through collaboration** and co-funding with other gas companies in NYSEARCH's membership and outside co-funders such as DOT/PHMSA, manufacturers and others.
 - **Practical product development** that are usable by gas operators because members are highly involved in their definition, development, and/or pre-commercial testing.

Who is NYSEARCH & Value We Offer (cont'd)

- We focus on **developing innovative products** that improve gas safety, reduce costs, improve worker health, productivity, and the environment.
- Ability to **seek and attract premier technology providers** on a project-by-project basis with reputable, high-quality technical project management and program administration.
- NYSEARCH **handles all the heavy lifting** for our members with planning, project management, contract management and intellectual property administration.
- NYSEARCH has **expertise in technology transfer** for implementation within your operation.



How NYSEARCH Differentiates from Other R&D Consortia

- **Strong and diverse** member base in North America with small, medium and large sized utilities
- Members have **direct access** to the NYSEARCH leadership and project management team – we are an extension of your internal team
- Access to experienced Project Managers with expertise across a wide range of topics from AI to thermodynamics
- NYSEARCH is **nimble and efficient** – we have an industry reputation for getting projects complete and methods/products deployed
- **Agile and collaborative** organization with versatile program areas, currently expanding into LNG and Geothermal initiatives
 - Expansive LNG experience and can take on projects to assist your operation in this technical space
- **Voluntary funding model** allows for flexible, **member-driven** project development
- **Commercial partnerships** with Enetics & Intero including royalties for funding members



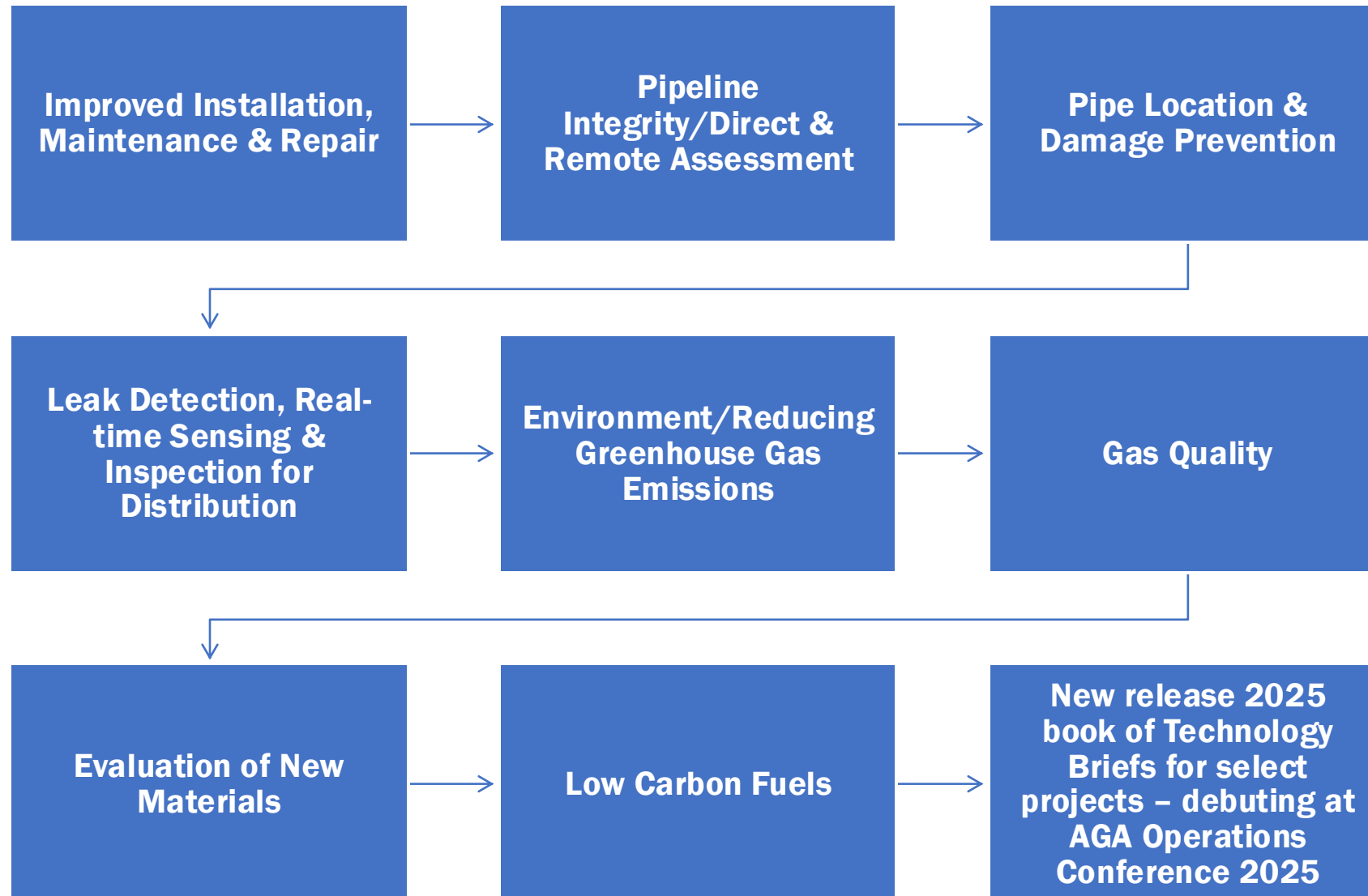
LNG Project Capability

- ▶ Decades of internal experience in LNG operations, engineering, security and compliance.
- ▶ NYSEARCH utility member LNG plant experience includes;
 - ▶ NGRID, ConEd, PECO, BG&E, Delmarva, Avangrid, Enbridge, Orange & Rockland, Atlanta Gas Light (AGL), Elizabethtown Gas and Spire
- ▶ NYSEARCH has a relationship with a host of partners specializing in LNG operations, engineering and compliance including;
 - ▶ PHMSA's LNG Center of Excellence
 - ▶ The Northeast Gas Association staff, members and partners
 - ▶ Quality Integrated Services, Inc
 - ▶ Partners we work with in Europe including NaTran and NaTran R&I
- ▶ This experience along with strong partnerships build the foundation to lead complex projects in the field of LNG research, operations and engineering.

Intellectual Property & Commercialization Capabilities

- ▶ NYSEARCH has a team of experts to navigate the “intellectual property” and “commercialization” process for our members including;
 - ▶ A Legal team to develop and navigate the intellectual property and patent processes
 - ▶ A proven structure developing LLC business structure yielding royalties to funding members (Robotics LLC \$700k in 2024 and growing)
 - ▶ Expert contract management to ensure solid language for IP and partnerships
 - ▶ NYSEARCH does all this work for our members adding significant value

Program Areas





Annual Membership Benefits

- ▶ Seats at the table during NYSEARCH quarterly meetings to develop projects that work for your operation
- ▶ You will learn the progress and high-level results on all NYSEARCH projects (*even the ones not funded because you have a seat at the table*)
- ▶ Cost sharing with other member utilities – keeping costs low – maximizing quality through partnerships
- ▶ NYSEARCH seeks federal funding of projects and handles the entire application and review process
- ▶ NYSEARCH brings expertise to you - maximizing the intellectual property and patent processes
- ▶ Our team is nimble and experienced and provides maximum value to your operation – allowing you to focus on your important daily operations
- ▶ At NYSEARCH we understand the importance of your utility operations and work hard to make your job easier – we are here to serve **YOU**

NYSEARCH Projects

Improved Installation, Maintenance & Repair

Low Carbon Fuels

Leak Detection, Real-Time Sensing, & Inspection for Distribution

New Business - Smart Corrosion Test Station

Explorer Robot Technology

- ▶ Wireless and tether-less
- ▶ Collapsible modules
- ▶ Fully self-articulating
- ▶ Independent locomotion
- ▶ Real-time feedback and control
- ▶ Can negotiate unpiggable pipelines
- ▶ Can launch/receive through live hot-tap fitting

Explorer 6



Explorer 8



Explorer 10/14



Explorer 16/18



Explorer 20/26



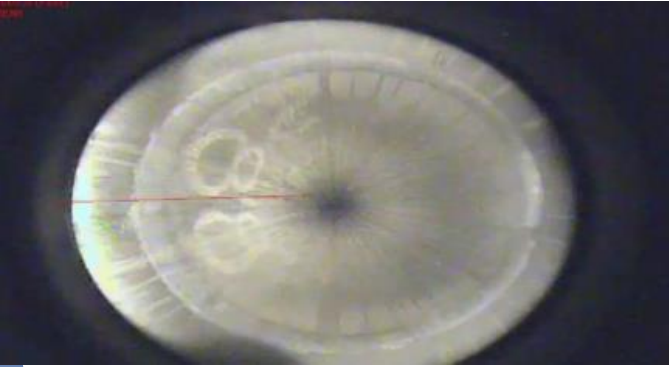
Explorer 30/36



Current Explorer Technologies

Video

Visual Inspection



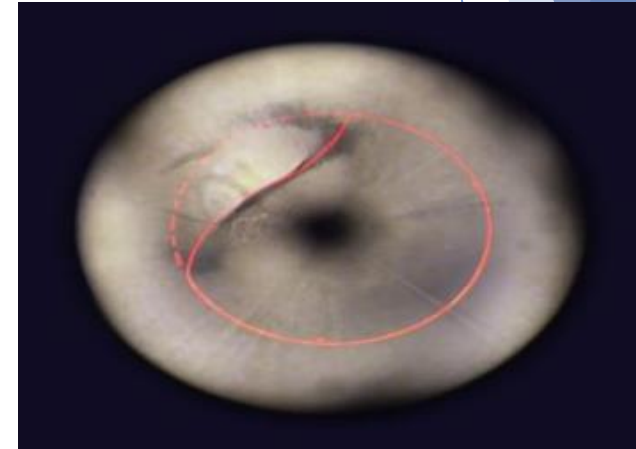
MFL

Metal Loss



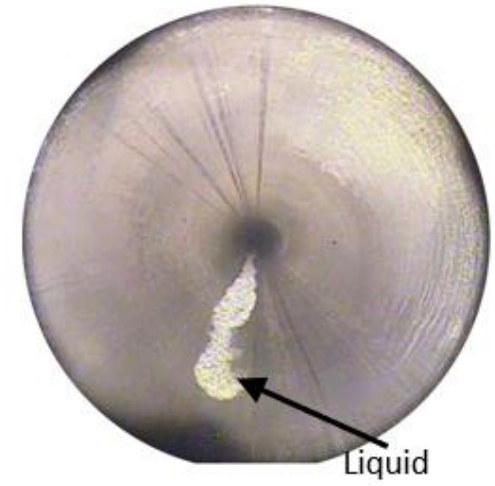
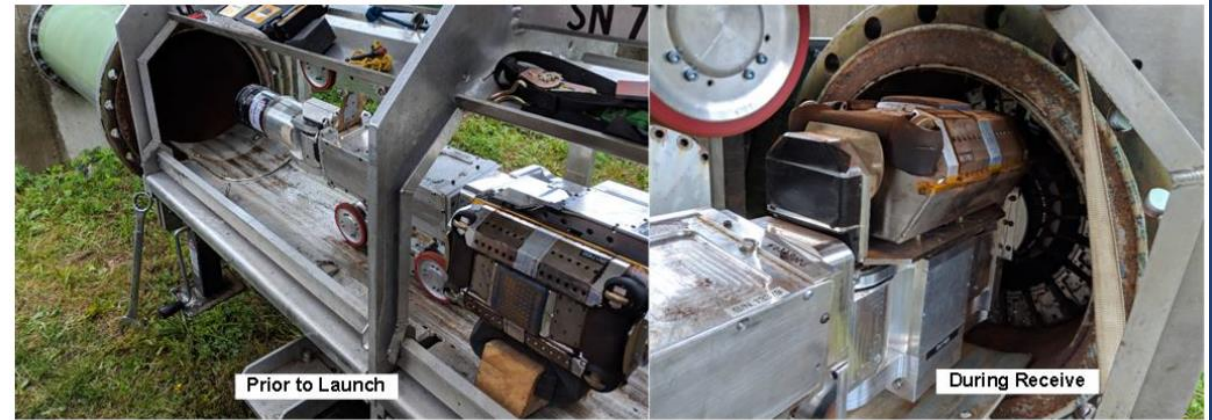
LDS (Laser Deformation Sensor)

Dent/Ovality/Mechanical Damage



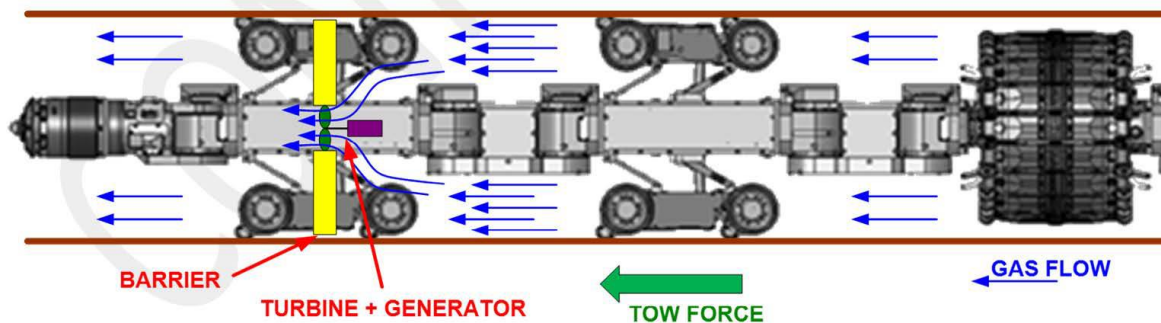
NYSEARCH – Funded RD&D resulting in Intero Commercial Products for NYSEARCH Robotics, LLC

- ▶ Completed in 2021
 - ▶ Commercialization of EXP 6 with MFL Sensor
 - ▶ First commercial deployment of 20/24 Energy Harvesting Module to expand inspection range
- ▶ Completed in 2022
 - ▶ Second commercial deployment of 20/24 Energy Harvesting Module
 - ▶ Field testing of Automation features (IMU mapping, automated drive through several pipe features, 3D camera)
- ▶ Completed in 2023
 - ▶ Commercialization of Liquid Resilient module to drive, scan, record data through accumulated liquid
- ▶ Completed in 2024
 - ▶ Commercialization seam weld crack sensor on 20-in and 16-in robot



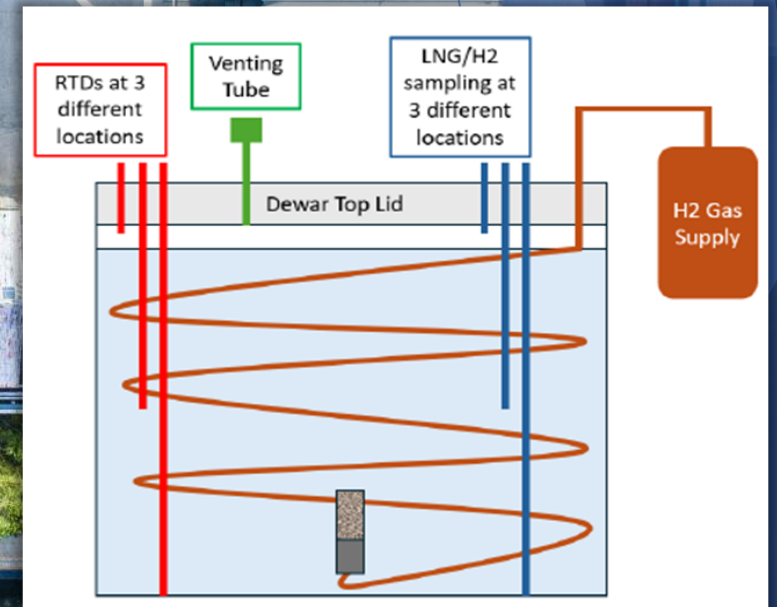
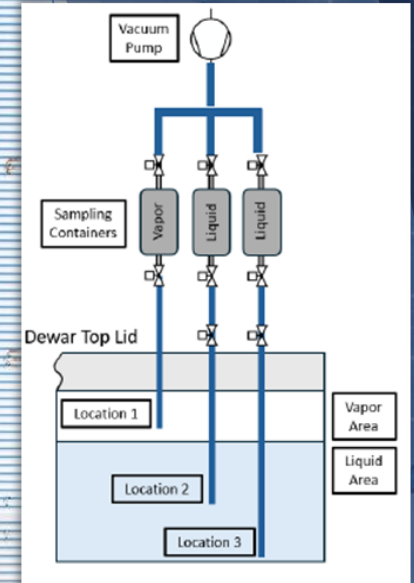
NYSEARCH Completed RD&D for commercial enhancement of extending range of Explorer

- Objective: Develop, build, and test an onboard, power & tow generating module for Explorer 20/26Objective met!
- Two-part solution – battery/power requirements and wireless communication range
- We successfully developed a module to be integrated on the Explorer 20/26 robot that harvests energy from gas flow to generate power extending inspection range



IMPACT OF HYDROGEN ENRICHED NG (HENG) ON LNG LIQUEFACTION

- Completed initial analysis using a comprehensive thermodynamic software evaluating the effects H₂ may have on LNG liquefaction
- Completed literature review of plant materials for compatibility with 10% H₂
- Currently testing through experimentation, the effects of sparging H₂ through LNG and the effects H₂ has on 9% Nickel Steel



DOES HYDROGEN MASK THE DETECTION OF NG ODORANTS?

- **No obvious differences in the detection/recognition accuracy of TBM or Scentinel E were observed** in a matrix of pure nitrogen (control), 80% methane, 20% hydrogen, or blend of 80% methane and 20% hydrogen
- Contractor: Monell Chemical Senses Center
- Currently engaged in research of detection and recognition at higher H₂ blends and 100% hydrogen with standard NG odorants and blends



HYDROGEN – NATURAL GAS LIVING LAB IN SOUTHERN CA

► Investigate hydrogen blending impacts (at 25% and 35% H₂ blends) on

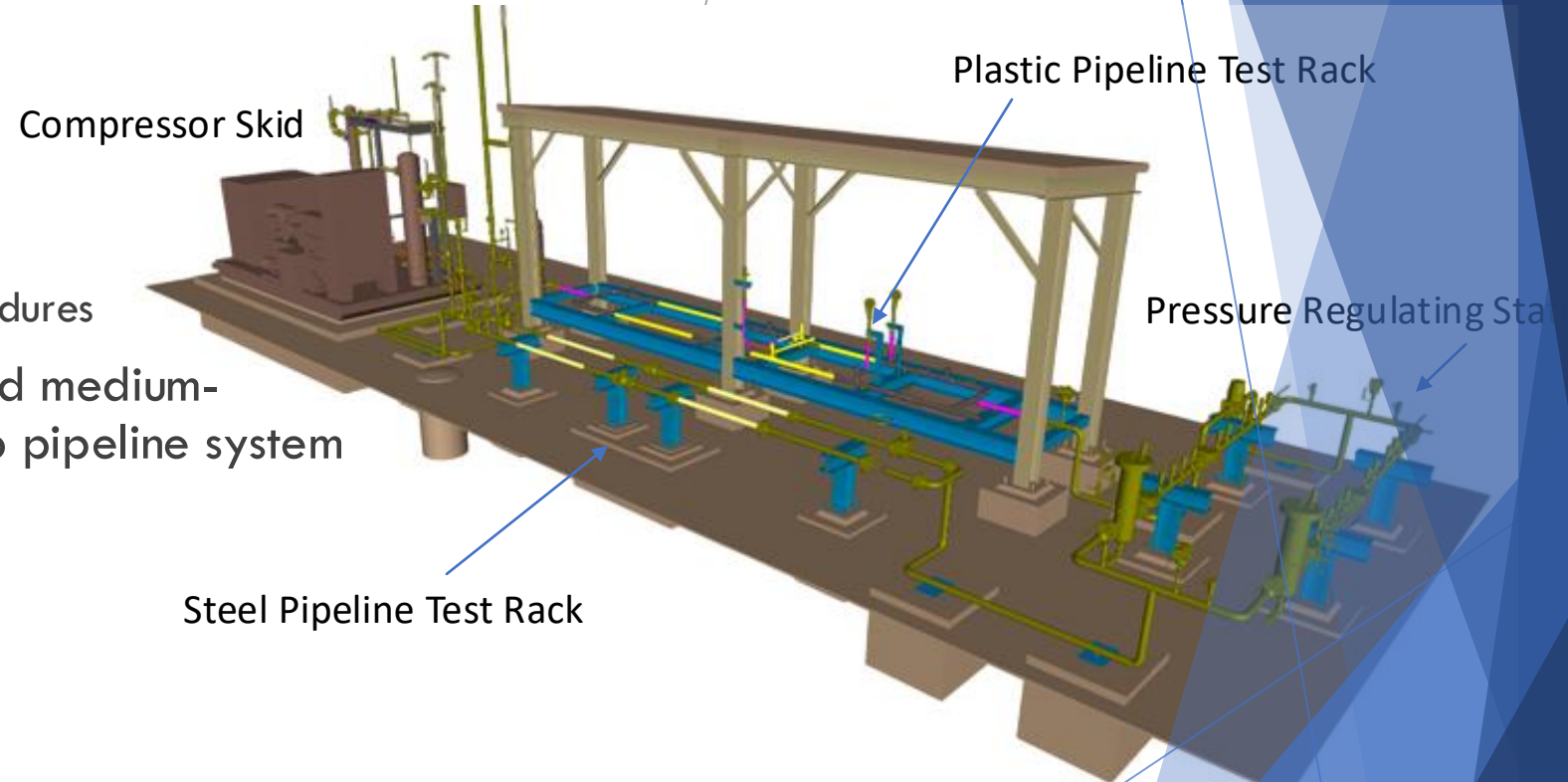
- pipeline integrity
- measurement accuracy
- regulatory compliance
- safety and maintenance procedures

► A high-pressure (100 psig) and medium-pressure (40 psig) closed-loop pipeline system

- a compressor
- a pressure regulating station
- a steel pipeline test rack
- a plastic pipeline test rack

► Located at SoCalGas Pico Rivera Base

► Operate on regular 8-hr workday & manual operation



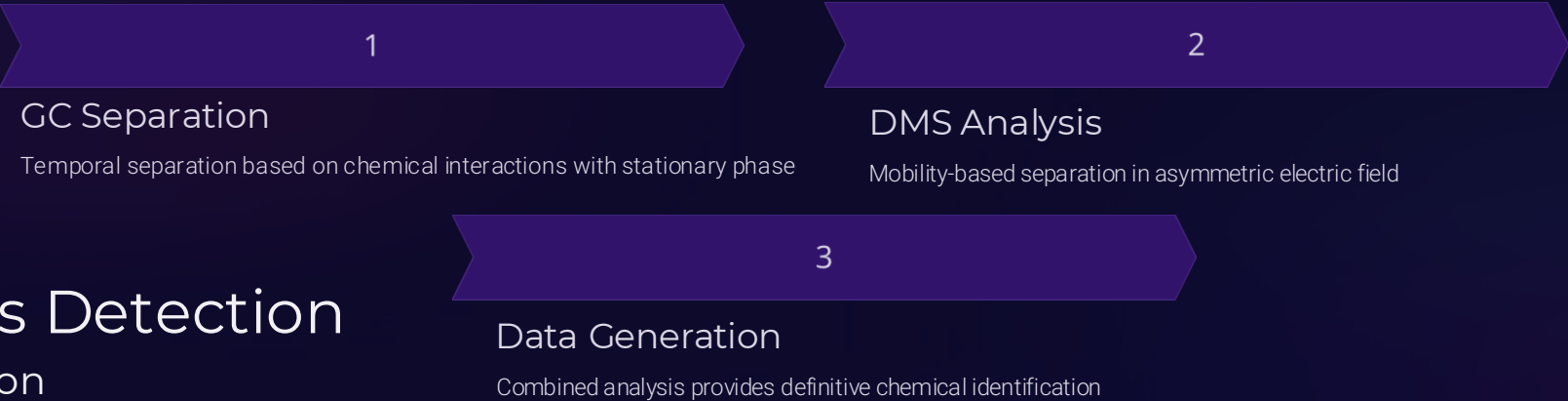
Development and Testing of Enhanced GC/DMS Mercaptans Sensor

The combination of Gas Chromatography and Differential Mobility Spectrometry creates a powerful two-dimensional separation system that leverages the complementary strengths of both techniques. This integration provides unprecedented selectivity and sensitivity for **mercaptans detection** in complex natural gas matrices.



Enhanced Performance Benefits

- **Orthogonal Separation:** GC separates by retention time while DMS separates by ion mobility, providing two independent dimensions of chemical information
- **Interference Rejection:** Compounds that co-elute in the GC dimension can be resolved in the DMS dimension, eliminating false positives
- **Wide Dynamic Range:** Combined system detects mercaptans from low ppb levels up to high ppm concentrations



Application in Mercaptans Detection

Real-World Use Cases for Gas Distribution

In-Line Monitoring

Continuous measurement of mercaptans concentration at key points in the distribution system ensures consistent odorization levels meet regulatory requirements and safety standards.

Emergency Response

Portable units enable rapid assessment of odorant levels during leak investigations, providing quantitative data to support emergency response decisions and public safety actions.

Quality Control

Laboratory and field verification of odorant injection systems ensures proper functioning and compliance with prescribed odorization rates across the distribution network.

DEVELOPMENT OF UNMANNED SYSTEM FOR GAS LEAK DETECTION IN BUILDINGS

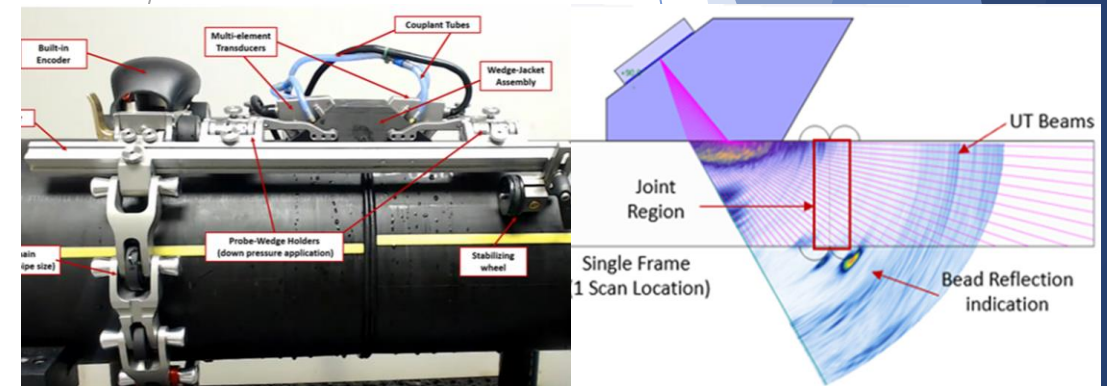


- ▶ Completed evaluation of methods for conducting initial 'front door' assessments to improve gas composition diagnostics and reduce risk to first responders
- ▶ Initial research indicated the major limitations for this project are IS certification and cost
- ▶ Contractor: Eagle Hawk
- ▶ Developing an unmanned response platform equipped with an AI assistant to guide first responders through safety protocols when entering a gas-filled structures
- ▶ Design incorporates advanced sensor technology housed within an enclosed "hamster ball" style enclosure for enhanced maneuverability and durability

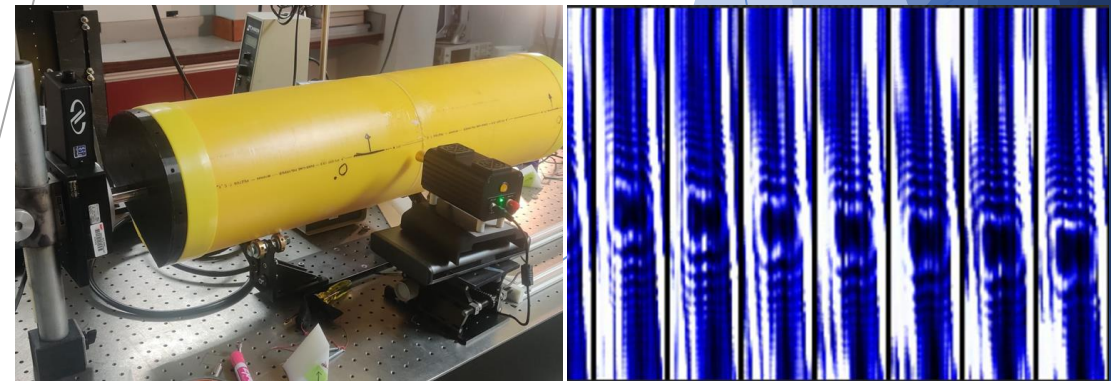
DEVELOPMENT OF PHASED ARRAY ULTRASONIC TESTING (PAUT) + TERAHERTZ (THZ) TECHNOLOGIES FOR NON-DESTRUCTIVE EVALUATION (NDE) OF PE PIPE FUSION JOINTS

- ▶ Acuren (Eclipse-Scientific) and New Jersey Institute of Technology (NJIT) have been developing PAUT + THz equipment and testing methods for performing NDE on butt fusion (BF) and electrofusion (EF) joints
- ▶ By analyzing perfect and flawed PE BF and EF joint samples, Acuren has been developing a PAUT AI inspection process for identifying anomalies
- ▶ Acuren is partnering with NJIT to enhance testing methods and develop a THz AI inspection process for identifying anomalies in PE BF joints
- ▶ Acuren has the lead for developing pre-commercialized PAUT and THz equipment for LDC field crews

PAUT



THz



R&D BREAKOUT



NYSEARCH RD&D
Division of the **NORTHEAST GAS ASSOCIATION**

NYSEARCH Website

NYSEARCH - Natural Gas RD&D



Thank You from our NYSEARCH Family

► For more information or questions please contact:

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