Appendix A: PHMSA-Supported Research and Development Projects and the Competitive Academic Agreement Program

PHMSA conducts and supports research to encourage regulatory and enforcement activities and to provide the technical and analytical foundation necessary for planning, evaluating, and implementing the pipeline safety program. PHMSA sponsors research and development (R&D) projects focused on providing near-term solutions that will increase the safety, cleanliness, and reliability of our Nation's pipeline system.

PHMSA also supports innovation through its Competitive Academic Agreement Program (CAAP). CAAP is a grant program for university students that funds research aimed at developing future pipeline safety improvements and that can support PHMSA's core R&D program.

The following are recent PHMSA-supported R&D projects focused on developing technologies to reduce the frequency and severity of pipeline excavation damage incidents, preventing releases caused by such incidents, and improving pipeline damage prevention. Additionally, copies of posters depicting CAAP projects on excavation damage may be found at the end of this appendix.

- Lever, E. *Approaches for Preventing Catastrophic Events.* (DTPH5615T00001L, Award Year: 2015, End FY: 2016). Grant amount: $199,857.00. Retrieved from: http://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=638.
- Rose, S. *White Paper on Risk Tolerance.* (DTPH5615T00002L, Award Year: 2015, End FY: 2016). Grant amount: $176,384.00. Retrieved from: http://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=639.
- Pett, T. *Pipeline Damage Prevention Radar*. (DTPH5615T00017L, Award Year: 2015, End FY: 2017). Grant amount: $760,196.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=652.
- Droessler, M. and Jarnecke, D. *Intrinsically Locatable Technology for Plastic Piping Systems*. (DTPH5615T00019, Award Year: 2015, End FY: 2017). Grant amount: $468,118.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=654.
- Droessler, M. and Ziolkowski, C. *Combined Vibration, Ground Movement, and Pipe Current Detector*. (DTPH5615T00020, Award Year: 2015, End FY: 2018). Grant amount: $299,030.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=655.
- Kothari, K. *Subsurface Multi-Utility Asset Location Tool*. (DTPH56-13-T-000001, Award Year: 2013, End FY: 2014). Grant amount: $125,998.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=490.

- Droessler, M. and Kothari, K. *Real-Time Multiple Utility Detection During Pipe Installation Using Horizontal Directional Drilling (HDD) System.* (DTPH56-13-T-000002, Award Year: 2013, End FY: 2016). Grant amount: $512,119.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=493.
- Olson, L. *Application of non-destructive evaluation techniques in pipeline inspection.* (End FY: 2009). Grant amount: $417,150.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=260.
- Farag, A. and Ziolkowski, C. *GPS-Based Excavation Encroachment Notification*. (DTPH56-08-T-000017, End FY: 2012). Also see summary below: *Virginia One Call Technology Pilot Project*. Grant amount: $390,601.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=249.
- D'Zurko, D. and Fabiano, A. *Advanced Development of PipeGuard Proactive Pipeline Damage Prevention System*. (DTPH56-10-T-000019, End FY-2012). Grant amount: $268,492.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=364.
- Droessler, M. *Acoustic-based Technology to Detect Buried Pipes*. (DTPH56-10-T-000020, End FY: 2011). Grant amount: $279,773.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=365.
- Frish, M. *Advanced Learning Algorithms for the Proactive Infrasonic Pipeline Evaluation Network (PIGPEN) Pipeline Encroachment Warning System*. (DTPH56-10-T-000021, End FY 2014). Grant amount: $267,000.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=366.

Summary of Conclusions and Recommendations from Completed R&D Projects

This section looks at completed R&D projects from the list above and attempts to provide a summary of the conclusions and recommendations, as applicable.

- Lever, E. *Approaches for Preventing Catastrophic Events*. (DTPH5615T00001L, End FY: 2016). Grant amount: 199,857.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=638.

This project was completed and the final report submitted to PHMSA in 2016.

Project Goal:

The goal of this project was to present a thorough and critical review of approaches for preventing catastrophic events within and outside of the natural gas industry. This review will allow for the selection of the most appropriate approach(es) and model(s), their further development, and the ultimate issuance of guidelines for effective implementation in risk models and integrity management programs.

This review examined an extensive list of approaches and methodologies, each of which might have a unique scope or objectives, address different sectors or stakeholders (policy makers, researchers, operators, etc.), use distinct applied techniques and standards, and/or have unique qualifications for quantifying risk. The aim of this project was to develop a structured review of existing methodologies, identify gaps, and facilitate the adoption and/or development of suitable approaches.

Project Conclusions/Recommendations:

Industries in both the United States and Europe use a wide variety of sophisticated and mature methodologies to identify and assess risks associated with hazardous system components. Industrial accidents still occur in spite of this, sometimes with devastating consequences.

Careful investigation of dozens of major events revealed a complex web of causal factors covering all aspects of human organization and endeavor. It seems that the path to solving the problem of complexity with unfamiliar risks might lie in embracing diversity and bringing it into processes at all levels of systems and culture. Diversity here means multidisciplinary approaches involving all stakeholders, allowing local autonomy of decision-making while enforcing communication between the lowest and highest strata in an organization and its surroundings.

These techniques need to become familiar, everyday activities. We need to accept that our styles of management and regulation may have to change dramatically as we become more aware of and better understand the likelihood and consequences of extremely rare events and the ways in which we can reduce their probability of occurring.

Training curricula need to reflect this shift in perception and facilitate the necessary cultural changes to address the prevention of catastrophic events in our technological systems.

- Rose, S. *White Paper on Risk Tolerance*. (DTPH5615T00002L, Award Year: 2015, End FY: 2016). Grant amount: $176,384.00. Retrieved from: http://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=639.

This project was completed and the final report submitted to PHMSA in 2016.

Project Goal:

Pipeline organizations must rethink and redesign their risk management practices as systems age and non-design-basis scenarios develop. Most operators, who must make risk-based decisions regarding operations and maintenance, use some type of risk model or tool to help determine inspection intervals and prioritize maintenance schedules. Many use these models to provide a basis for decisions concerning additional preventive and mitigative measures. These risk models are individualized for each operating company and rules for risk-based decision-making are generally based on the company's risk tolerance. The objective of this project was to study risk tolerability practices used by pipeline operators, other relevant industries, and government agencies to serve as a basis for comparison and guidance for the pipeline industry.

Project Conclusions/Recommendations:

This paper provided a table (Table 1 of the paper) listing the advantages and disadvantages for the use of different risk tolerability criteria techniques. It summarized that, ultimately, those considering the development of risk criteria need to clearly define the basis behind these criteria, match the scope of the risk assessment with the criteria, be able to make reasonable decisions using the criteria, communicate those decisions to stakeholders, and avoid bias in the manner that risk-based decisions are made. The paper also provided tables summarizing the risk tolerance practices for both individual risk and societal risk of the various countries studied, as well as detailing the results of the study of risk criteria development in the countries examined.

- Kothari, K. *Subsurface Multi-Utility Asset Location Tool*. (DTPH56-13-T-000001, Award Year: 2013, End FY: 2014). Grant amount: $125,998.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=490.

This project was completed and the final report submitted to PHMSA in 2014.

Project Goal:

The goal of this project was to determine parameters critical to assure detection of multiple pipes in a vertical underground stratum. PHMSA funded an earlier project to develop an acoustic technology to detect buried pipes, resulting in an operational and commercially available device called Ultra-Trac® available acoustic pipe locator (APL) that successfully detected metallic and non-metallic pipes buried under concrete, asphalt, and grassy surfaces. With limited data on multiple pipe detection, it was thought that the APL might have difficulty resolving the separation of multiple pipes. The parameters critical to identify separation of pipes are related to pipe diameters, the separation distance between pipes in both horizontal and vertical planes, and the stepping or scan distance during data collection. This project was designed to collect additional data with the APL to develop guidelines for its use in detecting multiple pipes and reducing third-party excavation damages.

Project Conclusions/Recommendations:

A fully integrated and commercially available APL was used in a series of field tests under various soil conditions and field environments. Numerous operating modalities and test parameters were used to validate the overall APL system's performance. Field test results showed very good system performance and robustness in overall system operation.

Overall, the average pipe detection accuracy of the APL system was shown to be well within 9 inches. The system was able to resolve multi-utilities with spacing less than 15 inches for a stepping distance of 6 inches. In general, the accuracy of the overall system detection performance was well above 80 percent for detection criteria of ±18 inches. The test results were validated by utility markers, mapping information, and visual inspection methods.

- Droessler, M. and Kothari, K. *Real-Time Multiple Utility Detection During Pipe Installation Using Horizontal Directional Drilling (HDD) System.* (DTPH56-13-T-000002, Award Year: 2013, End FY: 2016). Grant amount: $512,119.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=493.

This project was completed and the final report submitted to PHMSA in 2016.

Project Goal:

This project was designed to integrate acoustic and radar technologies to detect buried pipes/objects in front and adjacent to the drill head during the installation of pipes using the horizontal directional drilling (HDD) machine. Those two technologies had been under

development, but it was expected that in a combined system the acoustic technology could provide an alert to activate the ground-penetrating radar (GPR), allowing operators to accurately locate buried pipes and providing an opportunity to stop or modify the drilling operation. The project plan was to refine the acoustic system, perform tests at a commercial facility site, ruggedize and integrate the acoustic and GPR systems, and conduct field trials.

Project Conclusions/Recommendations:

It was determined that use of downhole sources—which are cumbersome and may not meet with widespread commercial acceptance—may not be adequate for consistent results. In addition, the working range of the current noise source may be limited, making obstacle detection at long-range in front of the drill difficult or impossible. This working range needs to be defined and the potential limitation made clear to equipment users.

Ultimately, the best controlled acoustic noise source may be one that is on the surface, making the sensor system independent of the drill. In this configuration, the source could be engineered to provide an optimal random waveform and could be moved to illuminate ground well ahead of the drill. One disadvantage of this configuration is that it becomes unworkable if the surface is inaccessible.

Acoustic wave propagation is highly frequency dependent, with lower operating frequencies providing greater range. Engineering a source that uses lower frequencies might enhance the system's operating range; however, this generates longer wavelengths that may cause detection issues due to the limited size of the sensor array/aperture. Longer wavelengths also limit the smallest size obstacle that, theoretically, can be detected.

The overall processing used to generate solutions has been operational for some time and with some success. It may be valuable to revisit some of the processing steps, however, especially if lower frequencies and larger sensor apertures are used. The solution algorithm should also be evaluated to see if the probability of detection can be increased and the false alarm rate reduced.

The current method of coupling sensors to the ground is attractive in that it is rapid and easy to accomplish. However, further improvements to sensor coupling might reduce potential false alarms, increase repeatability, and increase operating range.

Finally, the condition of the buried targets needs to be considered. The two buried pipes in this study had been in place for about one year and had probably filled with a water/mud mixture. It is possible that the acoustic impedance mismatch responsible for acoustic reflections was reduced, resulting in weaker or non-existent reflected energy. This could, in turn, have reduced the system's operating range and degraded algorithm performance. It may be valuable to change the targets to a set of pipes known to be air filled, thus providing the maximum possible impedance mismatch.

Outside of hardware and software improvements, future system enhancements can be made by a defined operation guide for the detection system and noise source deployment. One of the operational improvements that can be applied for better detection results is direct feed of the drill head position to the acoustic system. Configurable local area tests, using well-defined field layouts, assorted soil compositions, and "pipe farm" installations could all be valuable for fine-tuning system performance and field evaluation.

- Olson, L. *Application of non-destructive evaluation techniques in pipeline inspection.* (End FY: 2009). Grant amount: $417,150.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=260.

This project was completed and the final report submitted to PHMSA in 2008.

Project Goal:

This project involved the performance of an extensive literature review on available non-destructive evaluation (NDE) techniques in pipeline inspection, which include GPR, Magnetic Particle Inspection, Magnetic Flux Leakage, Eddy Current, Acoustic Emission, Infrared Thermography, Ultrasonic Testing, and Fiber Optic Sensors. It also identified issues related to further research on pipeline inspection and maintenance.

Project Conclusions/Recommendations:

Combining two or more NDE methods for pipeline inspection allows for more accurate results, as each method analyzes defects with varying degrees of precision. Further research is still required, especially regarding the relationship between material properties and recorded NDE signals.

- Farag, A. and Ziolkowski, C. *GPS-Based Excavation Encroachment Notification*. (DTPH56-08-T-000017, End FY: 2012). Also see summary below: *Virginia One Call Technology Pilot Project*. Grant amount: $390,601.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=249.

Project Goal:

The goal of this project was to develop, demonstrate, and commercialize a GPS-based system to provide an early warning of encroachment on underground facilities and facility right-of-ways (ROW). The objective for the system was to reduce excavation damage to underground facilities by warning inspectors about excavation activity occurring in an area without a valid One-Call ticket and alerting excavators and operators to the proximity of excavation equipment to underground facilities.

Project Conclusions/Recommendations:

The project successfully demonstrated the ability to track excavation activity and to report one-call violations and underground facility encroachment through use of the technology. User feedback supported the concept of the technology and provided suggestions for improvements to turn it into a commercial product with the potential for nationwide adoption. The project contractor plans to work with current technology providers to further this technology for implementation States other than the pilot state (Virginia).

User acceptance of the technology will be the primary barrier to implementation, with additional support and motivation needed to encourage adoption. An increased regulatory focus and enforcement related to excavation damage prevention will provide some of the required motivation for adopting advanced locating, mapping, tracking, and warning technologies. However, some other specific mechanisms for encouraging the adoption of the technology are noted.

It is expected that the excavation community will embrace this technology if the cost of the equipment is low and the system is easy to use. To accomplish this, the project contractor plans to continue to develop the technology separately, with the understanding that one-call violation monitoring will be more feasible for rapid and widespread adoption due to its lower cost. The contractor will continue to solicit participation for additional pilot projects in Virginia and other States, allowing new technologies to be deployed and tested and creating the awareness and market pull that will encourage further innovation and lead to cost savings. Funding to support pilot projects and the capital investments required to implement this technology will likely be necessary to encourage further adoption.

- D'Zurko, D. and Fabiano, A. *Advanced Development of PipeGuard Proactive Pipeline Damage Prevention System*. (DTPH56-10-T-000019, End FY-2012). Grant amount: $268,492.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=364.

This project was completed and the final report submitted to PHMSA in 2012.

Project Goal:

This project was designed to develop an in-ground warning system that uses advanced security technology to proactively warn against encroachment on gas/liquid transmission and gas distribution pipelines. This could be accomplished by improving on Senstar's PipeGuard™ technology, which was designed to provide an early warning to operators when an excavating event occurs in the vicinity of a buried pipeline. The objective of this project was to develop a pre-commercial, proactive, in-ground warning system that uses advanced security technology to warn against encroachment on transmission and distribution pipelines.

Project Conclusions/Recommendations:

The project proved that geophone sensors can reliably differentiate actual digging events from background clutter when combined with advanced digital signal processing hardware and smart algorithms. Some constraints involving excavation distance from the pipeline and response times were noted, along with the acknowledgement that desired response times may depend on the response strategy employed.

The primary benefit of utilizing this technology to detect unauthorized digging near buried gas lines is to reduce the risk of damages associated with third-party excavations. The main features that make the PipeGuard product particularly well-suited for short to medium pipeline lengths are its flexibility, ease of deployment, and performance in differentiating actual digging events from background noise over and around the pipeline.

- Droessler, M. *Acoustic-based Technology to Detect Buried Pipes.* (DTPH56-10-T-000020, End FY: 2011). Grant amount: $279,773.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=365.

This project was completed and the final report submitted to PHMSA in 2011.

Project Goal:

The Gas Technology Institute (GTI) and its support partners previously developed an acoustic technology to detect buried natural gas pipes, with an emphasis on detecting buried polyethylene (PE) pipes. The objective of this project was to improve performance of the GTI's technology to enable it to detect multiple buried pipes, integrate components into a pre-commercial device, and test the technology at gas utility sites. Improved detection, especially of PE pipe, would support improved pipeline identification prior to excavation, thereby reducing third-party damages.

Project Conclusions/Recommendations:

An integrated, portable, acoustic pipe inspection system was developed, built, and field-tested. Field test results showed very good system performance and simple operation. The resulting detection system was compact, portable, and robust in overall system operation for all kinds of soil conditions and surface coverings. The next step noted was to transfer the technology to a commercial partner, after which it is believed the commercial system would be available within 12 months.

- Frish, M. *Advanced Learning Algorithms for the Proactive Infrasonic Pipeline Evaluation Network (PIGPEN) Pipeline Encroachment Warning System*. (DTPH56-10-T-000021, End FY 2014). Grant amount: $267,000.00. Retrieved from: https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=366.

This project was completed and the final report submitted to PHMSA in 2014.

Project Goal:

This project was designed to advance the development of self-training algorithms supporting seismic sensor systems that provide real-time warning of unauthorized ROW encroachment or excavation activity near a pipeline. The expected outcome would enable the sensor system to optimize its intruder detection algorithms based on learned characteristics of its local environment. Field tests were expected to demonstrate better than 97 percent alarm reliability with few false alarms.

Project Conclusions/Recommendations:

Detection of anomalous seismic activities using self-training algorithms was studied using a signal acquisition system based on modification of the Physical Sciences Inc. (PSI) Proactive Infrasonic Gas Pipeline Evaluation Network (PIGPEN) autonomous distributed seismic sensor system. The project work scope was completed but led to conclusions that discouraged near-term commercialization of the technology.

Although previous work demonstrated intruder detection ability in controlled test scenarios, the challenging real-world tests conducted in this project revealed many practical difficulties. The research and commercialization teams recognized that addressing and overcoming these difficulties would require significant additional, sustained, and focused R&D to achieve the envisioned robust commercial product.

CAAP PROJECT POSTERS

Application of Amorphous Metals for Plastic Pipeline Detection

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*Corresponding Author E-Mail: cmartin@undeerc.org
[2]Metglas, Inc., Conway, SC, www.metglas.com

Main Objective

This project was awarded to the University of North Dakota Energy & Environmental Research Center and Metglas, Inc., in order to evaluate the potential for using amorphous metal foil to enable the belowground detection of plastic pipelines.

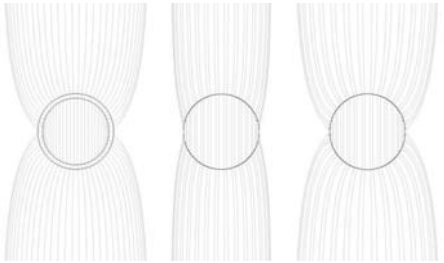

Figure 1. Comparison of the magnetic field distortion caused by conventional iron pipe and pipe wrap and an amorphous-based wrap.

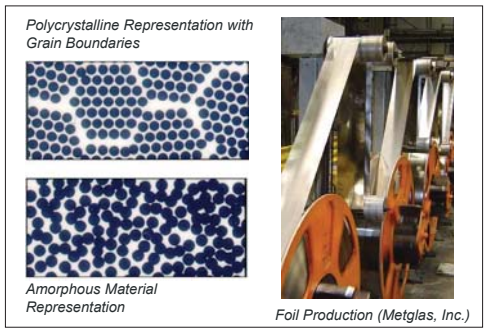

Figure 2. Left visualization comparing crystalline and amorphous atomic structure; right the production line for amorphous ribbon.

Project Approach/Scope

- Parametrically investigate the properties of amorphous metal with experimental measurements of Earth's magnetic field distortion.
- Validate a magnetostatic model for amorphous metals and use it to design a pipe detection prototype.
- Produce and evaluate the prototype design and explore industry interest.

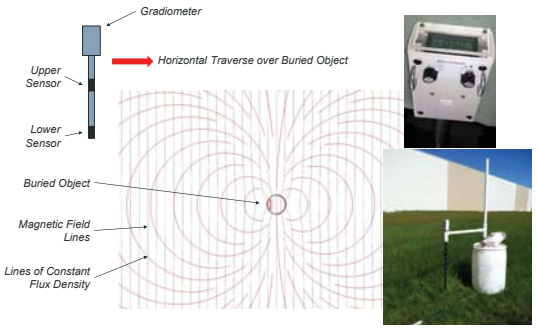

Figure 3. Left: schematic of differential gradiometer operation; right: the gradiometer and fixture used for data collection.

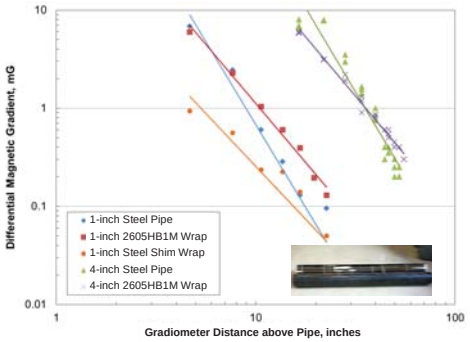

Figure 4. Gradiometer readings versus distance above pipe targets.

Expected Results or Results to Date

- Developed an understanding for the use of amorphous metal foils for pipe detection by exploring the parameters of:
  - Metal composition.
  - Foil pattern geometry.
  - Earth's magnetic field orientation.
- Determined that using the foil as a separate, detectable locating tape would result in a stronger and more consistent detection signal compared to direct pipe attachment.
- Identified that vertical tape orientation is preferred, which might be conducive for marking trenchless installations.

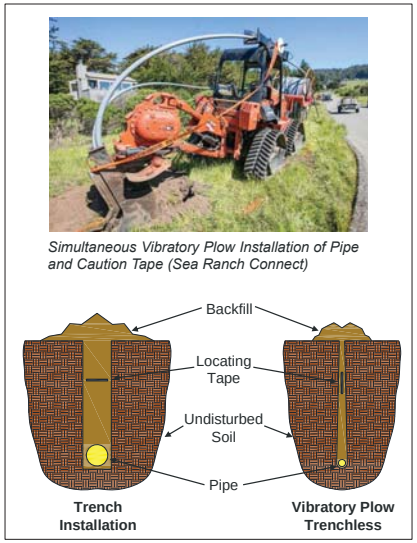

Figure 5. Trenchless installation details.

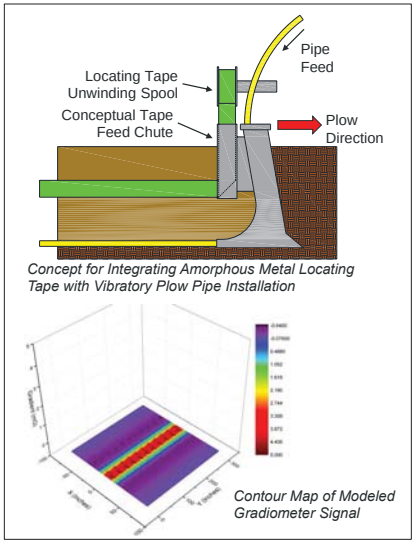

Figure 6. Conceptual installation method and modeled signal for an amorphous metal-based locating tape.

Acknowledgments

This project is funded by DOT/PHMSA's Competitive Academic Agreement Program with in-kind material and technical support from Metglas, Inc.

Public Project Page

Please visit this URL for much more information:
https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=629

EMBEDDED PASSIVE TAGS TOWARDS INTRINSICALLY LOCATABLE BURIED PLASTIC MATERIALS

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MAIN OBJECTIVE

Pipeline is considered as one of the safest means of transportation. However, there are still risks of incident that can occur due to natural and man made events especially for plastic pipes.
Accurate and reliable locating, identifying and characterizing the buried plastic pipes from ground surface can reduce the likelihood of happening such event.

- Design and development of passive harmonic radar RF tags.
- Investigate on-tag sensing capabilities and efficient data transmission.
- RF tag must be able to withstand high temperature processing of plastic and stress involved with horizontal tunneling/drilling of buried pipes.
- Develop a learning based pipeline hazardous prognostics methodology using discrete sensing data.

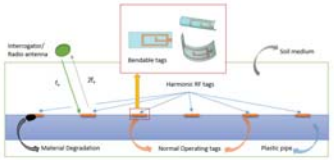


Fig.1 Bendable RF tags embedded on plastic pipe

PROJECT APPROACH/ SCOPE

- A new harmonic radar (frequency doubling) RF tags can be embedded on the buried plastic pipes.
- The low-cost, small and efficient passive RF tags are highly sensitive to their surroundings as well as detectable from ground surface. It helps reduce clutter.
- The tag response can be translated into location, identification and characterization of the buried plastic pipe.

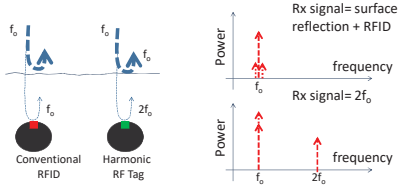


Fig.2 Harmonic radar frequency doubling

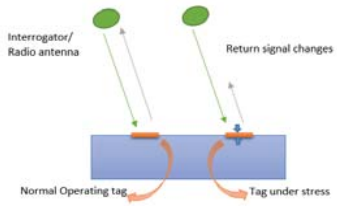
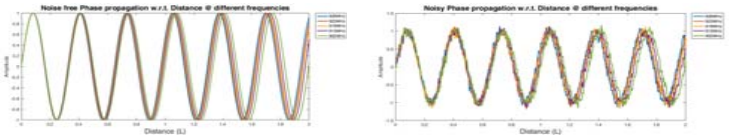


Fig.3 On-tag sensing capabilities

- The passive tag has a very long lifespan. With the modern day technology and in right environmental conditions a tag can last for a decade or more.
- The harmonic radar approach eliminates the reflection interference from different objects and cross-coupling between integrators.
- The burial depth of the tag can be computed by extracting phase from the harmonic signal.
- The transmission of signal at few different frequencies gives a linear phase shift in a linear medium, which could be used to calculate the distance from the source. Time gating can also be used.
- Various experiments and simulations of frequency response with soil medium needs to be performed in order to select the operating frequency band.



FREQUENCY	NOISE FREE PHASE	NOISY PHASE
928-MHZ	67.2°	63.94°
923-MHZ	54.84°	52.27°
919-MHZ	46.0°	47.32°
913-MHZ	30.83°	33.23°
902-MHZ	4.8°	1.28°

g.4 Signal phase @ different frequencies

- A few common reasons for failure of any buried plastic pipes are: material degradation, leakage, assembly defects and impingement.
- The response from tag could vary in accordance to the above mentioned failure reasons or may not respond due to any serious condition.

RESULTS TO DATE

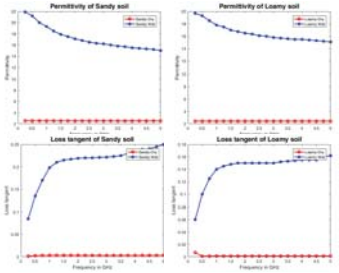


Fig.5 Frequency vs dielectric permittivity and loss tangent in dry and wet conditions

- A few common soil types have been studied to understand the electromagnetic behavior. Soil is the mixture of different minerals, organic matter, liquid and many more different thing whose concentration continuously changes with the change in location, depending upon the weather conditions or human involvements.
- The tracking operation in dry environment is way more easier than wet conditions. The increase in frequency, conductivity and loss factor also increases dispersion.
- A simulation of power transmission is performed using COMSOL. The relative permittivity (2) and conductivity (0.002 S/m) are set for dry conditions.

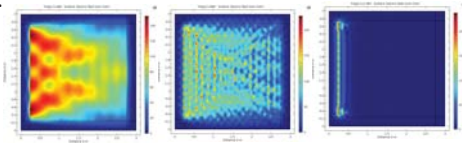


Fig.6 Field strength vs Distance for 0.3, 0.9 and 2.4 GHz

- The passive harmonic RF tag is designed based on a double slot antenna.
- A new harmonic radar (frequency doubling) RF tags can be embedded on the buried plastic pipes.

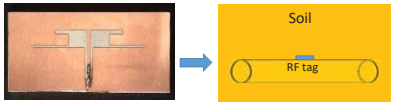


Fig.7 2.5 & 5 GHz RF tag design

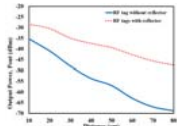


Fig.8 Output vs Distance at 2.5 GHz

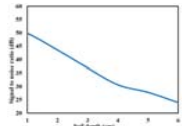


Fig.9 SNR vs Depth

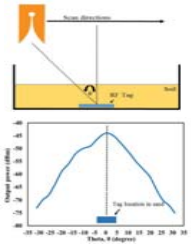


Fig.10 Tag detection along axis

- The field strength and SNR falls off with distance shown in Fig. 8 and Fig. 9.
- The buried tag is located by interrogator with a very low received power but the receiving antenna has acceptable signal-to-noise ratio.
- The experiment of second harmonic power reception at different moisture levels, confirms the previous statement.

Fig.11 5-ft long container for experiments and 915 MHz T_xR_x with tags

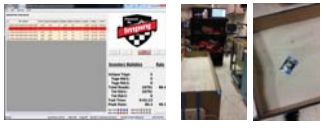


Fig.12 Identified tags at 5-ft depth

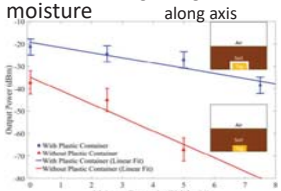


Fig.13 Second harmonic power vs moisture at 2.5 GHz

Acknowledgements

This project is funded by DOT/PHAMSA's Competitive Academic Agreement Program (project manager- James Merritt)

References

[1] Van Dam, R.L., Borchers, B., Hendrickx, J.M.H., Methods for prediction of soil dielectric properties: a review. Detection and Remediation Technologies for Mines and Minelike Targets X, vol. 5794. SPIE, Orlando, FL, pp. 188–197, 2005.
[2] L. Weiand W. D. Qi, Closed-form, robust and accurate multi-frequency phase unwrapping: frequency design and algorithm, arXiv:1604.08845[cs.IT], 2016.

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Advancement in the Area of Intrinsically Locatable Plastic Materials

Jonas Kavi, Udaya B. Halabe, Hota V. S. GangaRao
Constructed Facilities Center
Department of Civil and Environmental Engineering
West Virginia University

Main Objective

This project was awarded to West Virginia University in order to develop, investigate, and compare alternative strategies for creating easily locatable advanced composite pipes using Carbon and Glass fiber Reinforced Polymers – CFRP and GFRP - (with metallic or carbon nanoparticles in the resin for GFRP pipes). Investigation of pipe detectability will be done using above ground sensory technologies such as Ground Penetrating Radar (GPR) and Infrared Thermography (IRT).

Figure 1. GPR equipment setup.

Figure 2. IRT equipment.

Project Approach/Scope

Major tasks to achieve the objective of the project are:

- ❖ Wrap plastic and GFRP pipes with metallic or carbon fabric strips for easy detection
- ❖ Wrap plastic and GFRP pipes with metallic or carbon fabric rings for easy detection
- ❖ Create CFRP and GFRP pipes with metallic or carbon nanoparticles in the resin
- ❖ Investigate and compare the detectability of the above pipes (buried) using GPR and IRT

Figure 3. PVC pipe with CFRP rings and GFRP pipe with Aluminum rings.

Figure 4. Pipe samples being buried.

Expected Results or Results to Date

1. Results To-Date:
   - i. Preliminary GPR data revealed many of the 3“ diameter pipes buried at 2' depth.
   - ii. Site was relatively wet, with soil dielectric constant of 19.75 and 21.65 at 2‘ and 4‘ depth respectively.
   - iii. 400 MHz radar antenna produced significantly better result compared to 900 MHz radar antenna for buried pipe detection.
2. Expected Results:
   - i. Detection of deeper pipes (4‘ depth) when the soil is relatively dry.

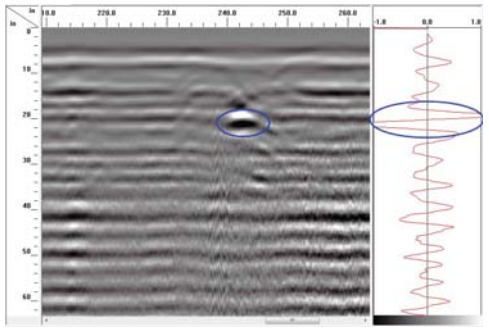

Figure 5. Sample cross-sectional GPR scan (left) and A-scan (right) over pipe wrapped with CFRP fabric.

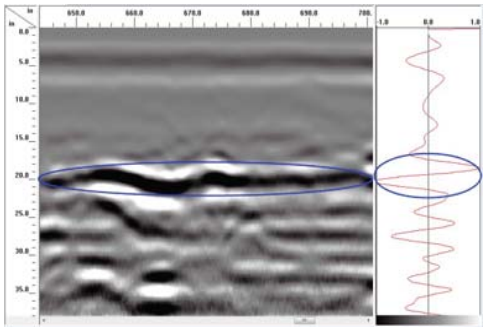

Figure 6. Sample longitudinal GPR scan (left) and A-scan (right) over pipes buried at 2‘ depth.

Acknowledgments

This project is funded by DOT/PHMSA’s Competitive Academic Agreement Program (Project # DTPH5615HCAP09).

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Rawls, G. and Adams, T. (2004). “Fiber Reinforced Composite Pipelines.” *Savannah River National Laboratory (SRNL),* June 2014.

Bowders, J. J. Jr., Koerner, R. M., Lord, A. E. Jr. (1982). “Buried Container Detection Using Ground-Probing Radar.” *Journal of Hazardous Materials.* 7:1-17.

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Electromagnetic Strategies for Locatable Plastic Pipe

U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

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Laura J. Waldman[1], Jordan Trewitt[2], Ravi Venkata[3]
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The University of Tulsa
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THE UNIVERSITY of TULSA

Main Objective

Plastic utilities pipes are difficult to locate with traditional detection systems. This research seeks to study two approaches for intrinsically detectable plastic pipe. The first approach is to impregnate the plastic with microencapsulated magnetic materials.. The second approach is to develop multilayer pipe that has an intrinsic response to RFID, which would allow the pipe to carry data about its contents and surrounding pipes.

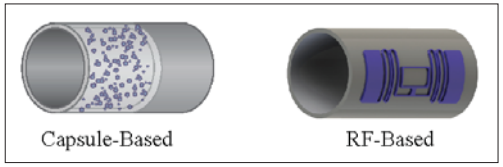

Figure 1: Schematics of the capsule-based approach (left) and RF-based approach (right).

Figure 2: Microcapsules with an approximate diameter of 100 µm.

Project Approach and Scope

Samples of polyethylene compounded with metal flake or magnetic microcapsules will be tested for material properties and electromagnetic properties. Pipes will also be developed with various radiofrequency identification tags on the surface of the pipes. To test the viability of both methods, a physical simulation will be conducted using polyurethane foam doped with titanium dioxide and graphite to simulate various ground conditions.

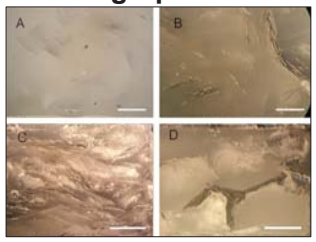

Figure 3: Cross sections of metal flake-polymer mixtures at A) 1.25 wt%, B) 2.5 wt%, C) 10 wt% of flake mixed in melt, D) 10 wt% of flake mixed in compression.

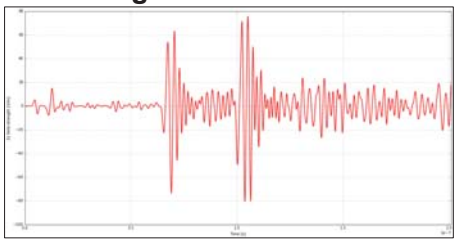

Figure 4: Simulation of A-scan. This indicates what a single frame of the GPR will see varying with Voltage and time.

Expected Results and Results to Date

Material property tests will provide data on how the compounding of magnetic materials affects the behavior of the polyethylene. The magnetic field of the materials will also be tested. A Finite-Difference Time-Domain (FDTD) software from gprMax simulates how Ground Penetrating Radar (GPR) interacts with soil conditions and pipes in order to properly understand conditions quickly before tuning an accurate test bed. Electromagnetic Finite Element Analysis through HFSS verifies FDTD simulations and RFID antenna shapes. Simulations investigating other RF approaches are ongoing.

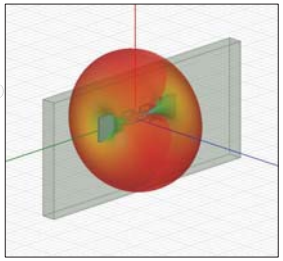

Figure 5: HFSS antenna directivity simulation of RFID tag.

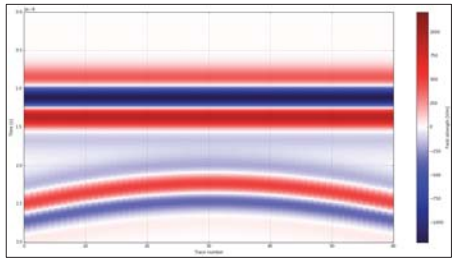

Figure 6: Simulation of B-scan with basic pipe. This indicates what the GPR will see with the gprMax simulation software.

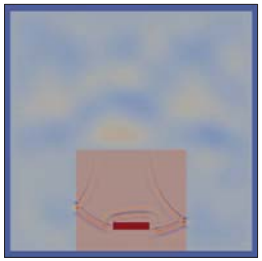

Figure 7: Simulated cross-section of ground with radar pulse bouncing off of plate in a simulated environment.

Acknowledgments

This project is funded by DOT/PHMSA's Competitive Academic Agreement Program.
Other assistance for this project has been provided by Matt Crall and Douglas Jussaume, The University of Tulsa.

References

Warren, C., Giannopoulos, A., & Giannakis I. (2016). gprMax: Open source software to simulate electromagnetic wave propagation for Ground Penetrating Radar, Computer Physics Communications (http://dx.doi.org/10.1016/j.cpc.2016.08.020)

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November 30, 2016

Annmarie Robertson
Program Manager
U.S. Department of Transportation
East Building, 2nd Floor
1200 New Jersey Ave., SE
Washington, DC 20590

Dear Annmarie:

I have attached CGA's response to PHMSA's invitation to contribute to study on improving existing damage prevention programs through technological improvements, as required by the PIPES Act of 2016. The CGA enlisted its Technology Committee to lead the gathering and presentation of information. The committee formed Study Teams to address each of the five study requirements. It conducted a survey of interested stakeholders, compiled and aligned the results with the study requirements, and applied the knowledge and experience of the members to provide context and recommendations.

The attached report is the result of that effort. Please keep in mind that any opinions expressed therein are those of the volunteer CGA members participating in this project, and not necessarily the result of CGA's consensus process.

We appreciate the opportunity to participate in this study. If we can do anything further to assist PHMSA please do not hesitate to ask.

Sincerely,

Robert R. Kipp
President, Common Ground Alliance

CGA Response to PHMSA Damage Prevention Technology Study

Submitted: November 30, 2016

Background

The CGA was invited by PHMSA to participate in a Congressional Study as per Section 8 of the 2016 PIPES act. This study will support a report from PHMSA to the Committee on Commerce, Science and Transportation of the Senate, and the Committees on Transportation and Infrastructure on Energy and Commerce of the House of Representatives.

PHMSA's "Invitation to Participate" included the following language. *PHMSA invites the CGA to address each of the study requirements from a CGA perspective. PHMSA also encourages the CGA, to the extent possible, to provide recommendations that include the consideration of technical, operational, and economic feasibility, on how to incorporate into existing damage prevention programs technological improvements and practices that help prevent excavation damage, per the Congressional requirement. PHMSA welcomes supporting data, charts or other resources as part of the CGA contribution.*

The 5 study requirements are:

(1) an identification of any methods to improve existing damage prevention programs through location and mapping practices or technologies in an effort to reduce releases caused by excavation;

(2) an analysis of how increased use of global positioning system digital mapping technologies, predictive analytic tools, public awareness initiatives including one-call initiatives, the use of mobile devices, and other advanced technologies could supplement existing one-call notification and damage prevention programs to reduce the frequency and severity of incidents caused by excavation damage;

(3) an identification of any methods to improveexcavation practices or technologies in an effort to reduce pipeline damage;

(4) an analysis of the feasibility of a national data repository for pipeline excavation accident data that creates standardized data models for storing and sharing pipeline accident information; and

(5) an identification of opportunities for stakeholder engagement in preventing excavation damage.

CGA Participation Overview

The CGA enlisted its Technology Committee to lead the gathering and presentation of information. This report is a combination of input from the Technology Committee members and submissions from a survey of the entire CGA membership. The survey included the following questions:

- What type of improvement are you reporting?
- Provide a short title or name for the opportunity.
- Briefly describe the engagement opportunity including the benefit it provides.
- Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
- Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
- Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
- Which stakeholder group or groups have or could benefit from the improvement?
- If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Survey and Results: The CGA will provide PHMSA with a separate link and unique username/password to access a complete list of all survey responses. This will include all responses to questions and any supporting documentation but will not include specific contact information unless provided by the submitter. If PHMSA has additional questions related to a survey response, PHMSA can request additional contact information through CGA.

Appendix A contains excerpts from the survey submissions with expanded thoughts and comments from Technology Committee members. If a survey response applies to multiple study requirements it is included in each requirement area that it applies to.

Executive Summary

Emerging technologies are rapidly coming to the forefront in this industry to support our commitment to reducing damages in the US. Technology that assists in providing clarity around the location of pipelines before excavation, and the utilities that may be in conflict, can provide additional opportunities for damage avoidance through planning and identification of potential hazards. It is critical that this technology is used responsibly and under no circumstances negates the 811 process at any stage of the excavation cycle. The investment in developing more accurate data as well as its integration with technology will reduce excavation damages and strengthen our commitment to the communities we serve. PHMSA should continue to look for new technologies and solutions for damage prevention through relationships with sponsored technology agencies, standardizing evolving technologies and practices and their programs with academia.

CGA also invites PHMSA to utilize information from the CGA's Technology, Best Practices, OCSI and Data Committees. CGA welcomes the opportunity to collaborate with and assist PHMSA in using technology to reduce excavation-related damages.

Overall, the CGA sees great advantages to having excavators and operators working closer together. At a high level, this can be looked at with the following basic concepts; knowing what is in the ground, knowing the location of what is in the ground and the sharing of this data. This knowledge and sharing should facilitate increased safety, better coordination, lower damages and overall lower costs.

Study Requirement 1

(1) an identification of any methods to improve existing damage prevention programs through location and mapping practices or technologies in an effort to reduce releases caused by excavation;

Table 1 – Location and Mapping Practices and Technologies

Survey Submission #	Type of Improvement	Description
5	Technology	Vermeer® Projects
11	Practice	GPS Shots
33	Technology	Electronic Sketching
41 / 31 / 107	Technology	Enhanced Positive Response EPR
42	Practice	Records Verification & Correction
44	Technology	Use of Electronic Marking System and RFID technology for marking buried utilities.
46	Practice	Locator includes material and diameter
54	Technology	Utility locating, survey, mapping and visualization of underground infrastructure in 3D
62	Technology	Gas & Water Service Line Tracer
63	Technology	Gas Main Tracer
64	Technology	Directional Entry Tool
67	Technology	Usage and location logging for continuous improvement and data analysis
68	Technology	Ambient Interference Measurement
70	Practice	Safety sweep before excavation
94	Practice	Improved Construction Inspector Practices
112	Technology	Electronic Marking Wand
113	Technology	Damage Prevention Suite
114	Practice	GPS Data Collection (Mapping)
119	Technology	Integration of GPS and Locator devices
123	Practice	Independent Review of Locator Training

Recommendations for Requirement 1

CGA recommends that all technologies focused on GPS data points deliver a final product that is at least within one meter of accuracy, which most closely matches the locate mark parameters. All GPS data is not "good data". The industry must guide everyone involved to provide accurate data to see a reduction in damages.

We also recommend that there be a documented process to verify the accuracy of the records before a utility modifies or updates that data set.

New technologies that have previously focused on accurate locating with the use of electromagnetic devices have demonstrated reduced risk associated with excavating. As a new technology becomes available we recommend the manufacturers capture and provide supporting data to demonstrate the overall benefit and their ability to provide measurable reductions in damages.

Study Requirement 2

(*2) an analysis of how increased use of global positioning system digital mapping technologies, predictive analytic tools, public awareness initiatives including one-call initiatives, the use of mobile devices, and other advanced technologies could supplement existing one-call notification and damage prevention programs to reduce the frequency and severity of incidents caused by excavation damage;*

This section is addresses the topics listed in the requirement in order. For all the technologies, tools, and initiatives described below, CGA recommends that PHMSA include the following specific legislative or regulatory recommendations in the final report to congress. Any federal regulations or funding mechanisms aimed at preventing excavation damage should also specifically reference or require consideration of all applicable CGA Best Practices, particularly those related to Mapping, Public Awareness, and Project Coordination.

GPS Digital Mapping Recommendation

Many aspects of the damage prevention process will benefit from a nationwide focus on improving the accuracy, quality, and consistency of geospatial information related to underground assets. This includes capturing or reporting geographic location in a common coordinate system, capturing accurate facility depth, and aligning facility records with a common land base. It also includes the ability to continuously improve geospatial data accuracy anytime underground facilities are located in the field (during the locate process, or any other activities that expose underground facilities such as repair, close interval surveys, in-line inspections, new installations, etc.). This will require significant investment to achieve.

Table 2A – Digital Mapping Technology Submissions

Survey Submission #	**Description**
5	Capturing geospatially key jobsite and drill plan information
31 / 41/ 107	Enhanced Positive Response
44	Use of Electronic Marking System and RFID technology for marking buried utilities.
54	Utility locating, survey, mapping and visualization of underground infrastructure in 3D
62	Gas & Water Service Line Tracer
63	Gas Main Tracer
64	Directional Entry Tool
67	Usage and location logging for continuous improvement and data analysis
68	Ambient Interference Measurement
74	Encroachment Notification Device on Excavation Equipment

Predictive Analytics Recommendations

There are multiple opportunities throughout the damage prevention process to apply predictive analytic techniques (objective risk assessment) to more efficiently allocate limited resources to minimize the probability or consequences of excavation damage. This type of risk assessment would be most useful if it were to be made available as part of the locate notification sent from each one call center to the underground facility owners. It should also be capable of incorporating data collected from all participants in the damage prevention process, including the locator, who performed the locate, and underground facility owner.

Table 2B – Predictive Analytics Technology Submissions

Survey Submission #	**Description**
16	Excavation Damage Risk Assessment Engine
35	Plant At Risk (PAR)
40	FieldCheck™
41 /31 / 107	Enhanced Positive Response EPR
71	Potholing to locate and identify potential buried conflicts before engaging in HDD or other Trenchless activities
76	Cross Bore Risk Model
101	All 811 tickets are being processed through a Risk analysis engine. Those deemed as high risk are assigned additional on-site activity.
111	Mechanical Damage Reliability and fault Tree Model enhancements

Recommendation for Public Awareness Initiatives, including one-call initiatives

Experience shows that highly successful public awareness initiatives are targeted to the intended audience. High impact target audiences include the agricultural community, excavators, landscapers and homeowners. Proposed tactics to reach these audiences include 811 labeled excavation equipment (including rental equipment), 811 information at permitting offices, targeted 811 internet awareness campaigns, Spanish language materials, and 811 information at do-it-yourself retail stores.

We recommend the review and application, where applicable, of as many of the One Call Center and Public Education and Awareness r practices contained in Chapter 3 and 8 of the CGA Best Practices as is practical for each location.

Table 2C – Public Awareness & One Call Initiatives

Survey Submission #	Description
8	Require Positive Response
17	Lowes Home Improvement - Tree Wrap
18	One Call Membership Requirement
20	Consistency in One Call Locating Laws by State
28	Translation for Non-English Speakers
34	Gopher State One Call's Partnership with the StarTribune
38	Pre-planning of large infrastructure projects
43	Standardizing Damage Prevention letters
45	Eliminate/Reduce Municipal Exemptions to One-Call Membership Requirements
51	No One Call Ticket Report The 811 center accepts reports of digging with no visible marks, confirms via ticket search that no ticket exists, complete a 'no one call' ticket and transmit it to the member utilities as excavation in progress.
53	Class B (in TX - water, slurry, sewage) operators should be required to be members so that utilities are marked
73	Utilizing Google marketing tool to increase the effectiveness of one call messaging and awareness
75	Standardizing the GPS Format for Mapping Software
77	Map Based One Call Online Ticket Processing
78	All Point Delivery for Polygons
81	Geo-fencing
82	Auto streaming updated One Call and Project information
85	National standard for all one call notification centers - excavator proposed project/excavation information
86	National Standard - Emergency One Call Information
87	National Standard - One Call Information - Project Change
88	National Standard - One Call - Project Length/Scope
89	Conduct a study on cost effective communication methods that might be used by stakeholders to communicate/distribute/transmit updated information
90	Conduct R& D to determine feasibility of creating a system to automatically notify Excavators of safety issues and enforcement
91	Perform R&D to determine if an automatic alert can be instituted for one call notification expiration to allow for updating and responding with new information
92	R&D to determine which public awareness messages should be disseminated via Public Safety Announcements or Advertisements on TV, Radio, Social Media and Internet platforms
93	Perform R&D on best methodology and language on how to distribute information to contractors/subcontractors employees
100	Information Packets at Permit Offices
101	All 811 tickets are being processed through a Risk analysis engine. Those deemed as high risk are assigned additional on-site activity
106	Base Maps Improvements
107 / 31 / 41	Enhanced positive response

Mobile Device Recommendations

Any technology investments that are being encouraged, mandated, or funded at the federal (or state) level should require or enable use of mobile technology wherever applicable, including "internet of things" concepts (mobile sensor technology).

Table 2D – Mobile Device Technologies

Survey Submission #	Description
14 / 15	Bore Assist and "Projects"
24	GIS and asset management
27	One Call Ticket software
33 / 42	Electronic Sketching
40	Auditing of Locates
48	One Call Ticket Management software and One Call apps
54	Tablet used to display 3D SUE drawings
59	Tablet used to track One Call Tickets
81	Geo-Fencing
94	A short video of proper techniques can be sent to all the people involved working around the trench prior to proceeding.
116	Aerial Patrol Data Collection

Other Advanced Technologies

Table 2E – Other Advanced Technologies

Survey Submission #	Description
15	Gas Line Slitting: a pulling device pulls a blade, slitting the old pipe, while the expander opens the bore path to allow for the new pipe to be installed.
65	Fleet/Edge is an on-rig telematics system that collects and reports information about the operational values of the horizontal directional drill

Study Requirement 3

(3) an identification of any methods to improve excavation practices or technologies in an effort to reduce pipeline damage;

Table 3 – Methods to Improve Excavation Practices

Survey Submission #	Type of Improvement	Description
5	Technology	Capturing geospatially key jobsite and drill plan information
8	Practice	Require positive response
10	Practice	Provide better quality locates
11	Technology	Technology improvements in mapping
12	Practice	Subsurface Utility Engineering
14	Technology	Mapping/GIS
15	Technology	Gasline Slitting
16	Technology	Excavation Damage Risk Assessment Engine
17	Engagement	Lowes Home Improvement - Tree Wrap
18	Practice	Require one-call membership
19	Technology	Electronic White Lining
21	Practice	Gold Shovel Standard
23	Practice	Tracking/reporting hits/near misses
24	Technology	Mapping/GIS
25	Engagement	Monitoring Excavation and Backfill Activities
27	Technology	Mobile Device/Data Collection
31 / 41 / 107	Engagement	Enhanced positive response
33	Technology	eSketch / Virtual manifest
35	Technology	Plant At Risk (PAR)
36	Technology	Virtual White Lining™
37	Practice	Potholing/hydrovac excavation
39	Practice	Preconstruction locating of all sewers
40	Technology	FieldCheck technology/ electronic locate documentation
42	Practice	Records Verification & Correction
44	Technology	Electronic Marking System and RFID technology
45	Engagement	Eliminate/reduce muni exemptions
47	Engagement	Abandoned Utilities Can Be Repurposed
49	Engagement	Communicating with the Excavator/preconstruction meetings
50	Practice	Subsurface Utility Engineering
53	Practice	Require Class B operators to be 1-call members
54	Practice	Subsurface Utility Engineering
55	Practice	Improved Vacuum Excavation and Soil Recycling system
56	Practice	Vacuum excavation
57	Practice	Open Communications with Locating Companies
58	Practice	Use of pull back cameras after pneumatic boring
59	Technology	811 #'s tied to Job Briefings
61	Practice	NiSource Cross Bore Elimination Process
62	Technology	Gas & Water Service Line Tracer

63	Technology	Gas Main Tracer
64	Technology	Directional Entry Tool
65	Technology	on-rig telematics system re: HDD info
67	Technology	Usage and location logging
69	Practice	Drill-To tracking (projecting depth)
70	Practice	Safety sweep before excavation
71	Practice	Potholing before HDD
72	Engagement	Municipal requirement to locate facilities
74	Technology	GPS Based Dig-In Prevention System for Excavation Equipment
76	Technology	Generation of risk models for legacy cross bores
79	Technology	Secure and disseminate facility positional information
80	Technology	Facility positional marking information
81	Technology	Geo-fencing
82	Technology	Auto streaming updated 1-call and Project information
83	Technology	Improving methodology for "white lining"
84	Practice	Learnings to develop procedures/practices
85	Practice	National Standard - Excavator One Call Information
86	Practice	National Standard - Emergency One Call Information
87	Practice	Create national criteria for excavators to provide notification of change in scope of project or project schedule
88	Practice	R&D on feasibility of creating national criteria for length of one call notification
90	Practice	R& D to determine feasibility of creating a system to automatically notify Excavators of safety issues and enforcement
96	Technology	Air Excavation and Vacuum Soil Extraction
98	Technology	Air Excavation and Vacuum Soil Extraction
99	Technology	Sure-Lock All Pro Utility Line Locator
104	Technology	Investigating the use of standard communications fiber optics cable into a linear array of discrete vibration sensors for possible third party intrusion
105	Practice	Improved processes around Supervision during excavation
106	Technology	Base Maps Improvements
108	Technology	Near miss reporting tools
109	Practice	Improved excavation procedure (set-back zones, soft/vacuum excavation, etc.
110	Practice	Optimal Slab design
111	Practice	Mechanical Damage Reliability and fault Tree Model enhancements
112	Technology	GPS-enabled Electronic Marking
113	Technology	Comprehensive platform that facilitates communication among excavators, locators, facility owners, regulators, and 811 personnel
114	Technology	GPS Data Collection (Mapping)
120	Practice	Trenchless Excavation Best Practices

Analysis and Recommendations for Requirement 3

Accurate and effective communication between operators, locators and excavators throughout the excavation cycle is imperative. The cycle starts with clearly defining the "dig area" or "work scope" and effectively communicating the information thru the 811 Center to the Facility Owners/Locators.

Scheduling Pre-construction meetings (see CGA Best-Practice 5-4) with the excavators, operators and locators on major or large projects offers an effective forum to discuss the flow of the job. These meetings open all lines of communication and enable the contractors involved to get the job done faster, safer and more importantly reduces the likelihood of a damage occurring.

Operator personnel monitoring the excavation and backfill activities helps ensure that the job is completed consistent with the owner's requirements. The Best Practices Committee recently passed a new practice titled "Facility Owner Provides a Monitor During Excavation." This practice was approved in November 2016 and will appear in the next version of the Best Practices. A copy of the practice is available upon request.

Tracking, reporting and related recordkeeping for all facility hits and near misses provides documentation of vital information enabling improvements by operators, locators, and excavators.

Technological developments, especially with regard to mobile devices, are constantly changing the game to the betterment of damage prevention. Excavation contractors are increasingly relying on mobile technologies that provide "real time", on-site data and information gathering and dissemination opportunities.

Study Requirement 4

(4) an analysis of the feasibility of a national data repository for pipeline excavation accident data that creates standardized data models for storing and sharing pipeline accident information;

There are no survey responses relating to this study requirement.

CGA believes that a data repository as described in the PIPES Act of 2016 is feasible, and in fact. already exists, is widely used, and meets these objectives. CGA's Damage Information Reporting Tool (DIRT)DIRT was launched in 2003, and allows damage prevention stakeholders in the United States and Canada to submit reports of underground facility damages and near-misses into a database through a secure private web application.

DIRT uses a **standardized report form** (see CGA Best Practices 9-2, 9-6) that collects data relating to underground facility damages including but not limited to: date, location, affected facility (distribution, transmission, gathering), type of excavator, equipment used, work performed, and root cause. Reports can be submitted one-at-a-time or bulk uploaded. The data can be sorted in a variety of ways to hone in on the factors that contribute to damages, so that targeted improvement and education programs can be developed to reduce damages.

DIRT data is **stored** in a secure data center on secured servers in a multi-tiered secured network.

DIRT contains several features that allow for voluntary **sharing** of data between companies and organizations, and for analysis of the data.

Data Grants allows users to share and receive data access. A company can designate itself as a "Data Receiving" organization. These are typically One Call Centers, PUC/PSC's, industry associations, etc. These organization can send out "Data Grant Requests" asking other companies to share their data with it. Companies receiving a request can decline, share their data anonymously, or share their data and identity.

Virtual Private DIRT (VPD) applications allow stakeholders to have their own version of DIRT customized for their company or organization. VPD's are hosted by an "Application Administrator" which, like Data Receiving Organizations, are typically One Call Centers, PUC/PSC's or industry associations (there are startup and annual maintenance fees involved). VPD's capture all the data collected by DIRT, but additional "flex fields" can be added. The visual appearance of the screens can be customized to match the organization's color schemes. Other companies can choose to participate in VPD through the registration process. Participating companies need only enter their DIRT data once and it is automatically shared with the VPD hosting organization and with the CGA.

Query Wizard allows stakeholders to sort data in various ways and produce spreadsheets, or pie or bar graphs. This allows analysis of DIRT data at a localized level. Each company that submits data has access to its own data. In addition, data receiving organizations also have access to the data of companies that have shared it. VPD host application administrators also have access to the data of the companies participating in the VPD.

Participation in DIRT has steadily grown in subsequent years. Over 363,000 reports were submitted for 2016, including over 75,000 reports involving natural gas facilities. DIRT has approximately 170 registered companies from the Natural Gas stakeholder group, but CGA believes there are many more natural gas companies that could participate but are not yet doing so.

CGA's Data Reporting and Evaluation Committee produces an annual DIRT report analyzing the data. In conjunction with release of the DIRT Annual Report for 2015, CGA released an interactive dashboard, powered by Tableau software and accessible from CGA's website, that allows users to view and filter certain elements of the DIRT data that are of most interest to themselves. CGA has also produced supplemental reports specifically for the natural gas distribution industry for years 2011 through 2014.

In summary, CGA is seeing that DIRT is already being used by many pipeline operators successfully and believes that it can be **a national data repository for all pipeline excavation accident data that creates standardized data models for storing and sharing pipeline accident information.**

CGA welcomes the opportunity to work with PHMSA to accomplish the objectives of the legislation through use of DIRT.

Recommendation for Requirement 4

CGA believes a national data repository for pipeline excavation accident data that creates standardized data models for storing and sharing pipeline accident information is feasible through the use of DIRT.

Study Requirement 5

(5) an identification of opportunities for stakeholder engagement in preventing excavation damage.

Table 5: Opportunities for Stakeholder Engagement

Survey Submission #	Description
6	Enhance the use of and uniformity of use of Excess Flow Valves on gas service and branch lines
7	The Gladys Kravitz Marketing Plan
9	Utilize unused or abandoned lines for other purposes
13	Material handling with Vacuworx lifting machines
17	Lowes Home Improvement - Tree Wrap
20	Consistency in One Call Locating Laws by State
25	Monitoring Excavation and Backfill Activities
28	Spread awareness of 811 and safe dig practices.
31	Enhanced Positive Response (EPR)
34	Gopher State One Call's Partnership with the Star Tribune
38	Pre-planning of large infrastructure projects
45	Eliminate / Reduce Municipal Exemptions to One-Call Membership Requirements
47	Abandoned Utilities Can Be Repurposed
49	Communicating with the Excavator
66	Incomplete submission - no re-entry or clarification offered
72	Municipal requirement to locate facilities
73	Utilizing Google marketing tool to increase the effectiveness of one call messaging and awareness
89	Conduct a study on cost effective communication methods that might be used by stakeholders to communicate/distribute/transmit updated information.
90	Conduct R& D to determine feasibility of creating a system to automatically notify Excavators of safety issues and enforcement.
91	R&D to determine if an automatic alert can be instituted for one call notification expiration to allow for updating and responding with new information.
92	R&D to determine which public awareness messages should be disseminated via Public Safety Announcements or Advertisements on TV, Radio, Social Media and Internet platforms.
93	R&D on best methodology and language on how to distribute information to contractors/subcontractors employees (full time/part time).
100	Information Packets at Permit Offices
102	Positive confirmation during permitting
103	Mobile Damage Prevention Education
118	New Stakeholder Group – Digital Services
121	Mock Strike Event
122	American Locator and Planet Underground TV

Recommendation for Requirement 5

As public right of ways become even more congested with the introduction of new or the addition of "overbuild" utility lines, utility operators, locate technicians, and excavators are presented with new challenges along with increasingly complex work sites requiring better communication in order to work safely and efficiently.

Effective damage prevention requires a proactive approach, a sense of ownership responsibility, and a genuine commitment on the part of everyone involved – excavator, locator, one call center (811), and the utility operator. These stakeholders have a tradition of leadership in this area. Much of this comes from their active participation in all damage prevention processes, particularly through knowledge and use of Best Practices. However, the excavation industry has an opportunity to further that commitment to safety and damage prevention. We recommend each state review and eliminate as many exemptions as possible (see Best Practice 5-1). The CGA DIRT Report for 2013 showed that 18 states with five or more exemptions had a report rate of 7.32 damages per thousand tickets, while 18 states with 4 or fewer exemptions had a report rate of 3.5 damages per thousand tickets.

Fortunately, new methods or technologies are now being developed and deployed, which improve the speed and accuracy of communication among all parties. Ultimately this will lower the costs and aid in efficiency and safety. Our recommendation would be for PHMSA to take the time to review each submission to the survey, study the concept and data presented, and seek further information as necessary.

Appendices

Appendix A contains:

- List of survey submissions and which study requirement(s) they apply to.
- Written analysis on predictive analytics and the use of vacuum excavation.
- Submissions with added comments from members.

Appendix B contains:

- Other identified technologies and practices.
- Possible challenges for PHMSA.
- Subjects PHMSA may want to examine further.

Appendix A

Survey Submission #[1]	**Type of Improvement**	**Apply to Study Requirement**	**Description**
5	Technology	1,2,3	Capturing geospatially key jobsite and drill plan information
6	Engagement	5	Enhance the use of and uniformity of use of Excess Flow Valves on gas service and branch lines
7	Engagement	5	The Gladys Kravitz Marketing Plan
8	Practice	2,3	Require positive response
9	Engagement	5	Utilize unused or abandoned lines for other purposes
10	Practice	3	Provide better quality locates
11	Practice Technology	1 3	Technology improvements in mapping
12	Practice	3	Subsurface Utility Engineering
13	Engagement	5	Material handling with Vacuworx lifting machines
14	Technology	2,3	Mapping/GIS
15	Technology	2,3	Gasline Slitting

[1] Submissions 1 – 4 were test survey responses.

16	Technology	2,3	Excavation Damage Risk Assessment Engine
17	Engagement	2,3,5	Lowes Home Improvement - Tree Wrap
18	Practice	2,3	Require one-call membership
19	Technology	3	Electronic White Lining
20	Engagement	2,5	Consistency in One Call Locating Laws by State
21	Practice	3	Gold Shovel Standard
23	Practice	3	Tracking/reporting hits/near misses
24	Technology	2,3	Mapping/GIS
25	Engagement	3,5	Monitoring Excavation and Backfill Activities
26	Practice	2	One Call Ticket Auditing
27	Technology	2,3	Mobile Device/Data Collection
28	Engagement	2,5	Spread awareness of 811 and safe dig practices.
30	Technology	2	Predictive Analytics/Risk Assessment
31 / 41 / 107	Technology Engagement	1,2,3 5	Enhanced positive response
32	Practice	1	Measuring Volume of Open Work VS On Time Reporting
33	Technology	1,2,3	eSketch / Virtual manifest
34	Engagement	2,5	Partnership with Local Paper
35	Technology	2,3	Plant At Risk (PAR)
36	Technology	3	Virtual White Lining™
37	Practice	3	Potholing/hydrovac excavation
38	Practice	2,5	Pre-planning of large infrastructure projects
39	Practice	3	Preconstruction locating of all sewers
40	Technology	2,3	FieldCheck technology/ electronic locate documentation

42	Practice	1,2,3	Records Verification & Correction
43	Practice	2	Standardizing Damage Prevention letters
44	Technology	1,2,3	Electronic Marking System and RFID technology
45	Engagement	2,3,5	Eliminate/reduce muni exemptions
46	Practice	1	Locator include diameter and material
47	Engagement	3,5	Abandoned Utilities Can Be Repurposed
48	Technology	2	Ticket Managing Software
49	Engagement	3, 5	Communicating with the Excavator/preconstruction meetings
50	Practice	1,3	Subsurface Utility Engineering
51	Practice	2	No One Call Ticket Report
53	Practice	2,3	Require Class B operators to be 1-call members
54	Technology Practice	1 2, 3	Subsurface Utility Engineering
55	Practice	3	Improved Vacuum Excavation and Soil Recycling system
56	Practice	3	Vacuum excavation
57	Practice	3	Open Communications with Locating Companies
58	Practice	3	Use of pull back cameras after pneumatic boring
59	Technology	2	811 #'s tied to Job Briefings
60	NA		Incomplete submission - no re-entry or clarification offered
61	Practice	3	NiSource Cross Bore Elimination Process
62	Technology	1,2,3	Gas & Water Service Line Tracer
63	Technology	1,2,3	Gas Main Tracer
64	Technology	1,2,3	Directional Entry Tool
65	Technology	2,3	on-rig telematics system re: HDD info

66	Engagement	5	Damage Prevention
67	Technology	1,2,3	Usage and location logging
68	Technology	1,2	This technology measures noise on the locate site and determines best frequencies to use
69	Practice	3	Drill-To tracking (projecting depth)
70	Practice	1,3	Safety sweep before excavation
71	Practice	2,3	Potholing before HDD
72	Engagement	3,5	Municipal requirement to locate facilities
73	Practice Engagement	2 5	Utilizing Google marketing tool to increase the effectiveness of one call messaging and awareness
74	Technology	2,3	GPS Based Dig-In Prevention System for Excavation Equipment
75	Practice	2	Standardizing the GPS Format for Mapping Software
76	Technology	2,3	Generation of risk models for legacy cross bores
77	Technology	2	Map Based One Call Online Ticket Processing
78	Technology	1,2,3	All Point Delivery for Polygons
79	Technology	3	Secure and disseminate facility positional information
80	Technology	3	Facility positional marking information
81	Technology	2,3	Geo-fencing
82	Technology	2,3	Auto streaming updated 1-call and Project information
83	Technology	3	Improving methodology for "white lining"
84	Practice	3	Learnings to develop procedures/practices
85	Practice	2,3	National Standard - Excavator One Call Information
86	Practice	2,3	National Standard - Emergency One Call Information

87	Practice	2,3	Create national criteria for excavators to provide notification of change in scope of project or project schedule
88	Practice	2,3	R&D on feasibility of creating national criteria for length of one call notification
89	Engagement	2,5	Conduct a study on cost effective communication methods to communicate/distribute/transmit updated information.
90	Practice Engagement	2,3 5	R& D to determine feasibility of creating a system to automatically notify Excavators of safety issues and enforcement
91	Engagement	2,5	R&D to determine if an automatic alert can be instituted for one call notification expiration to allow for updating and responding with new information.
92	Engagement	2,5	R&D to determine which public awareness messages should be disseminated via Public Safety Announcements or Advertisements on TV, Radio, Social Media and Internet platforms.
93	Engagement	2,5	R&D on best methodology and language on how to distribute information to contractors/subcontractors employees (full time/part time).
94	Practice	1,2	A short video of proper techniques can be sent to all the people involved working around the trench prior to proceeding
95	Practice	1,3	Improved Construction Inspection Processes
96	Technology	3	Air Excavation and Vacuum Soil Extraction
98	Technology	3	Air Excavation and Vacuum Soil Extraction
100	Engagement	2,5	Information Packets at Permit Offices
101	Technology	1,2,3	Locate Risk Assessment
102	Engagement	5	Positive confirmation during permitting
103	Engagement	5	Mobile Damage Prevention Education

104	Technology	3	Investigating the use of standard communications fiber optics cable into a linear array of discrete vibration sensors for possible third party intrusion
105	Practice	3	Improved processes around Supervision during excavation
106	Technology	2,3	Base Maps Improvements
108	Technology	3	Near miss reporting tools
109	Practice	3	Improved excavation procedure (set-back zones, soft/vavuum excavation, etc.
110	Practice	3	Optimal Slab design
111	Practice	2,3	Mechanical Damage Reliability and fault Tree Model enhancements
112	Technology	1,3	GPS-enabled Electronic Marking
113	Technology	1,3	Comprehensive platform that facilitates communication among excavators, locators, facility owners, regulators, and 811 personnel
114	Practice Technology	1 3	GPS Data Collection (Mapping)
115	Practice	3	GTI Trenchless Construction Best Practices provides a number of considerations for trenchless construction operators to prevent damage
116	Technology	1,2,3	Aerial Patrol Data Collection
117	Technology	1	Locate Performance QA/QC
118	Engagement	5	New Stakeholder Group – Digital Services
119	Technology	1	Integration of GPS and Locator devices
120	Practice	3	Trenchless Excavation Best Practices
121	Engagement	5	Mock Strike Event
122	Engagement	5	American Locator and Planet Underground TV
123	Practice	1	Independent Review of Locator Training

Written Analysis

Predictive Analytics Tools – Analysis from Technology Team

Damage Risk Assessment

Several vendors offer software systems capable of assessing the probability and/or consequences of excavation damage associated with each one call ticket, or with each notification (locate request) sent from a one call center to underground utility operators. See for example Submission #16, #35, and #101. The results from this type of risk assessment can be used in various ways to more effectively allocate limited resources throughout the damage prevention process. Actual field use of this concept by a utility in 2015 contributed to a 30% reduction in damages per 1000 locate requests across a state-wide service territory.

Some of the damage prevention processes that can make use of a risk score include:

- **Ticket Screening** - in a high consequence scenario such as gas distribution, a utility may choose to locate high risk tickets that might have otherwise been cleared in the office (screened). In addition, in a low consequence scenario such as a telecommunications drop, the utility owner may choose to avoid the cost of locating on low probability tickets, allowing them to focus more damage prevention resources on higher risk tickets.
- **Locator Assignment** - high risk locate requests might be assigned to a different locator company or crew (or assigned for in-house locating rather than a contractor).
- **Advanced Locating Equipment** - use of more advanced (and possibly more expensive or time-consuming) locating equipment could be justifiable when locating high risk dig sites.
- **Locate Quality Control** - post-locate quality control techniques ("check the marks") can be applied on high risk locate requests. See for example Submission #40.
- **Excavator Contact** - Excavators can be notified in various ways prior to the work start date that the site has been assessed with a high risk. This notification can range from automated e-mail or text messages, phone calls, pre-excavation site meetings (Submission #49), a smart-phone application, or specific messages returned via Enhanced Positive Response (Submission #31, #41, and #107), or having a representative physically present when excavation is occurring ("stand by").
- **Modified Excavation Practices** - excavators may voluntarily choose to employ different means of excavation at high risk digsites, including vacuum excavation (Submission #56, #96) , pot-holing (Submission #71), or hand-digging to expose the underground facilities.

One call center operators may be best-positioned to host such a risk assessment system, for use by all stakeholders (member utilities, contract locators, excavators, and the public). The one call center can act as a common repository for data used by the risk assessment engine (ticket history, damage history, and underground utility asset records). Locate requests (notifications) sent to member utilities can then include a risk assessment, similar to a credit score provided on a loan application. All stakeholders involved in the damage prevention process can then use that risk score to help allocate limited resources in a more effective way.

Event Tree Modeling

Event Tree Analysis or Fault Tree Analysis are common methods to model all possible outcomes of a system or process, in order to establish the best (most efficient) way to reduce overall risk. At each stage of the process, the likelihood of each possible outcome is modeled as accurately as possible. The final outcomes or outputs are also assigned either a relative or absolute consequences (e.g., in terms of total cost, lives lost, etc). Chaining together the probabilities leading to each

possible outcome (damage prevented or damage occurs) allows one to understand which process steps have the greatest impact on total risk (expected cost of likely damages). For one example of this type of approach, see Submission #111.

To extend this concept further, the industry, or particular stakeholder groups, could establish and agree upon a common model for the damage prevention event tree, allowing the results to be applied consistently to all one call tickets. The results of such a system could be used in much the same way as the other risk assessment engines described above. In fact, the vendors who provide those systems would likely have the expertise (and commercial desire) to help establish and experiment with a full event tree model.

Collection and Use of Near Miss Data

Near-Miss data (where process mistakes happened but damage did not actually occur) can provide another valuable process quality indicator, and could even be incorporated into a statistical model for predicting the likelihood of future damages. Interstate pipeline operators, in particular, seem to collect near miss data in a format that might be useful (See for example Submission #108). If there is an industry-wide effort to establish a nationwide data repository for pipeline excavation accident data (as suggested by Section 8 of the 2016 PIPES Act), then "near-miss" data should be included in the design of that repository. CGA may also wish to consider adding this type of data to the DIRT repository and report (if not already present).

Cross Bore Risk Assessment

At least one vendor (Submission # 76) has established a methodology and experimental procedures to generate a risk model for legacy cross bores. The model produces a relative risk associated with possible legacy cross bores by geographic area (map grid) based on data extracted from GIS, work management, insurance claims, customer dispatch, or other systems. It incorporates both probability and consequences of a cross bore in each geographic area. The model can also be updated and tuned over time as more cross bores are discovered.

The results from such a system can be used to prioritize activities within a legacy cross bore inspection program (justify inspection resources and deciding where to send the cameras next).

Encroachment Detection and Notification

Several groups are experimenting with technology that can detect when excavation equipment or excavation activity may be in proximity to underground assets. See for example Submission #104. In addition, the Gas Technology Institute also has an active research project on Excavation Encroachment Notification Technology that is nearing the stage of commercial viability.

Vacuum Excavation – Analysis from Technology Team

Vacuum excavation, when used appropriately, is an effective alternative to hand digging within the tolerance zone. (see CGA Best Practice 5-32).

"Hydro" vacuum excavation process safely exposes buried utility lines to daylight. This potholing or daylighting is used in many facets of the undergrounding of Pipelines and utilities. It offers a Quality Level A part of the SUE process according to ASCE 38-02. This is used in design work, verifying z values or depths, verification of top side markings, verification of the lines actual existence and that it is correctly marked on maps and in plans. As the ground is precisely

excavated, the utility is carefully exposed with the less damaging elements of air and water as opposed to steel and heavy machinery. A vacuum system simultaneously removes the debris and pulls it into a large capacity storage tank onboard the truck.

Key components of this technology include a positive displacement vacuum blower allowing for the safe and efficient excavating over (45') vertically, (400') horizontally and the removal of debris up to (24") in diameter. Variable water pressure and specially designed oscillating nozzles allow for exposing sensitive lines in a variety of soil conditions (i.e. clay, sand, sandy loam, hardpan, caliche, etc.). Neoprene covered debris hose and wand tips provide extra protection when digging around fiber optic cables and pipeline coatings.

The soil generated by the use of hydro-vac equipment needs to be properly handled either on-site or disposed of at a permitted disposal facility. Recycling "de-watering" technologies are emerging as an environmentally benign and cost-effective alternative to off-site disposal.

Vacuum technologies using just "Air" as a means of loosening the ground also exist. While similar to hydro in its practical use for potholing utilities, the primary benefit of using air as opposed to water allows for the "reuse" of the excavated material to backfill the pothole. Size and depth of holes, more difficult soil conditions as well as the time required to excavate are limiting factors with this technology.

Survey Submissions with added comments from members

CGA Survey Submission #11 - GPS Shots

The collection of information about what is actually under the ground and is georeferenced is of significant benefit to both the contractor, locator and the Utility. If shared amongst the stakeholders it can be used to assist all parties to proactively prevent damage.

The collection of information about what is actually under the ground and is georeferenced is of significant benefit to a municipality that has a higher potential for future need and use of that information. This information should be considered helpful for future planning purposes; however, it should not be used to circumvent the 811 process as the data captured may be outdated when future work is actually conducted.

CGA Survey Submission #95 - Improved Construction Inspector Practices

I've seen anecdotal evidence where 'turfed' technicians have significantly better damage rates than those that don't have intimate knowledge of the facility. Many utility technicians actually saw the facility when it was being installed. That type of tribal knowledge is super if you can get it. I do think that is hard to institutionalize and reproduce though in the form of a best practice. Folks retire, get new jobs, field workforces are always pushed for efficiencies and then there's job restructuring from specialization to one man out etc. Difficult to do but there's nothing like a tech who knows their turf.

CGA Survey Submission #42 - Records Verification & Correction

Any technology that automates and streamlines communication and updates a facility operators maps would be beneficial. There needs to be a verification process prior to changing any records – not sure if I see that called out here. Also – concerns over IT Security keep popping up…

CGA Survey Submission #70 - Safety sweep before excavation

I agree! Safety sweeps are being utilized all over the country and I have seen real results. We could reach out to National Grid because I recall them having a strict policy on safety sweeps that have proven results. Take it a step further and GPS it if something is found that wasn't identified in the initial locate once it is verified!

I would say it's a method that should be utilized. Remember that in other parts of the world they practice ***avoidance****. The person doing the digging is given the last records or "as-builts" of the undergrounds lines location. They then do the locate themselves. They also "sweep" the area as a final check after the locate. If the plans they are given indicate that no utility line is present then they still sweep the area in Passive mode to look for any unknowns. In my opinion having excavators in the US do more to check the marks and do passive sweeps is an easy way to prevent damages. We have street lights that control traffic, yet we still look both ways before we cross a street.*

CGA Survey Submission #114 Method - GPS Data Collection (Mapping)

Any technology that develops more accurate records is beneficial. Our experience with this type of technology has been getting any two mapping or GIS data sets to match is very difficult. Great concept, just hasn't been practical for us.

CGA Survey Submission #5 - Capturing geospatially key jobsite and drill plan information

I am always a fan of gathering as much information as you can that is correctly managed and stored for future excavation projects.

Any technology that provides better on site management, documentation of potential conflicts, and enhanced planning would be beneficial.

CGA Survey Submission #64 - Directional Entry Tool

I have never seen a real way to locate live gas lines that were non locatable until Jameson launched a real solution in their stuffing box with a locatable rod. Adding a camera is just going to increase its effectiveness and I can't wait to see the results as utilities pick up the use of these two tools.

I have seen this technology. This is a key piece to locating utilities both water and gas utilities accurately.

From what I've seen this is a credible tool for locating difficult to locate gas lines. I don't see it as a mainstream tool to use in production locating but it seems like one of the better methods going to locate the unlocatable.

This is a good alternative in many situations when coupled with GPS or some other means of enhancing long-term traceability.

CGA Survey Submission #67 - Usage and location logging for continuous improvement and data analysis

I believe that utilizing the data from an actual locating tool could change the way we train locate and educate the workforce moving forward. Understanding how we can teach the locate technicians to better would be a great data point for all of us in preventing damages. We could use this technology to actual prevent a damage before it occurs by changing habits that certain data could pinpoint. Of course this is all base of the fact that the data is accurate and we have all the data points needed to determine or identify "bad" behavior.

Sounds like it could have potential for new techs- would like to hear more about how practical and convenient this is from current users.

CGA Survey Submission #54 - Utility locating, survey, mapping and visualization of underground infrastructure in 3D

It has been our observation that a lack of good GIS records is a significant burden on the damage prevention process – globally. Having quality information collected while in the field and having this information regularly updated means that any peripheral processes or technologies that can leverage this will benefit significantly also. For example: if the utility has accurate records they can screen the ticket in/out. If the locator has accurate records they can improve their locate. If the contractor can receive a copy of these records they can make better design decisions.

The creation and persistence of this information is critical to the overall damage prevention process.

In many instances when we train people on using locate equipment we always says to refer to your as builts. In many instances that information is not available or highly inaccurate.

As a minimum new lines installed should be mapped in x,y,z, I would imagine that newer technologies are pushing the envelope to make this more financially viable for legacy facilities.

Technology that assists in to provide better planning, locate verification, and coordination to prevention damage during the excavation phase is beneficial; however, it should not be used to circumvent the 811 process as the data captured may be outdated when future work is actually conducted.

CGA Survey Submission #41- Enhanced Positive Response EPR

In operations outside of the USA, having a single repository for a dig ticket compiling all information from both the contractor and the Utilities significantly improves the communications about the work site.

It reduces the amount of wasted time in clarifying the work site and also the location of the physical assets and significantly improves the ability to resolve post excavation issues – if they are present.

This technology is also applicable within the USA as it eliminates the need for an excavator to go "searching" for the response information. In addition, it is very applicable to those states that have no means to provide positive response data to any stakeholder.

Technology that assists in providing clarity around the location of excavation and the utilities that were located that may be in conflict provides additional opportunity for planning damage avoidance through planning and identification of potential hazards, including locate marks that have been destroyed.

CGA Survey Submission #68 - Ambient Interference Measurement

I have seen this tool be very effective in the field and believe it could be utilized in many hard to locate areas in the US.

CGA Survey Submission #63 - Gas Main Tracer

I have never seen a real way to locate live gas lines that were non locatable until Jameson launched a real solution in their stuffing box with a locatable rod. Hands down should be in the hands of any gas utility that has tracer wire with plastic lines.

This is a good alternative in many situations when coupled with GPS or some other means of enhancing long-term traceability.

CGA Survey Submission #62 - Gas & Water Service Line Tracer

This is a good alternative in many situations when coupled with GPS or some other means of enhancing long-term traceability.

CGA Survey Submission #44 - Use of Electronic Marking System and RFID technology for marking buried utilities.

Utilizing markers after locating a live gas line with a Jameson stuffing box offers a real solution in the field and will protect the utility long term. I have seen non locatable lines turn into locatable with markers on many different sites in the US. I believe these markers do not replace electronic magnetic locating but they are an accessory that is a real solution when combined with GPS Mapping within one meter. Very beneficial to the locating community.

A great solution for facilities that are not locatable by traditional means; however, the technology has serious limitations with depth relative to the placement of the system.

CGA Survey Submission #112 - Electronic Marking Wand

I think the technology benefit ties into the positive response and the information provided to the contractor- similar to the submissions above.

CGA survey submission # 41 - Enhanced Positive Response

This information provides a comprehensive overview of the work site and conditions, allowing excavators to plan resource allocation for the job. Included with each email is a survey link that allows for immediate stakeholder feedback. The survey helps to improve the EPR process and keep everyone working safely. EPR provides trust and accountability for all stakeholders in the Damage Prevention community. EPR reduces damages and provides a safer, more efficient work environment.

CGA survey submission # 65 - Fleet/Edge

This information provides the HDD Operator with data that would provide insight to potential "strike" conditions. Designed to be used as an analytical tool, near real time, it could lead to faster response time for a strike. Not really a prevention tool but one that could be used to identify cross bore strikes if that condition was encountered.

CGA survey submission # 6 - Enhance the use of and uniformity of use of Excess Flow Valves on gas service and branch lines

Actually a very good idea. Accelerate the requirement to install these on gas distribution as specified under PHMSA standards.

CGA survey submission # 9 - Utilize unused or abandoned lines for other purposes.

I'd agree more info is needed, but I think I agree with the concept.

One thing to consider is that if you reuse a line it makes it difficult to identify the true line. For example if you run a fiber optic line through an old gas line it protects the fiber but looks like a gas line the next time it is potholed. This may negate Subsurface Utility Engineering and ASCE 38-02 efforts if this practice is widely adopted.

CGA Survey Submission # 41 - Is an advanced technology to reduce damage to utility infrastructure from excavation activities

This technology is applicable within the USA as it eliminates the need for an excavator to go "searching" for the response information. In addition, it is very applicable to those states that have no means to provide positive response data to any stakeholder.

I'm in favor of anything that increases/enhances positive response.

CGA survey submission # 7 - The Gladys Kravitz Marketing Plan

T*his submission has merit as any device, program, technology, and etc., that helps with engagement activity, needs further review and study to determine all effective means of communicating stakeholder advocacy.*

CGA survey submission # 17 - Lowe's Home Improvement - Tree Wrap

Great idea and way to engage a stakeholder not always in the loop.

CGA survey submission # 34 - Gopher State One Call's Partnership with the Star Tribune

Advantage Audience Network is a network that allows ad placements to filter out into other websites, not just the newspapers. They also used geo-fencing which targets a certain geographical area. In her case they targeted the large Minnesota State fair so anyone looking at websites about the fair might see an ad regarding Damage Prevention and/or directing people to their booth. Looks like blanket coverage to me.

CGA survey submission # 45 - Eliminate / Reduce Municipal Exemptions to One-Call Membership Requirements

All municipalities should adhere to the call before you dig laws to protect the community. The general public does not understand the dangers until an unspeakable event is documented on the evening news or Twitter. It is our obligation to serve and protect the community by mandating full participation from anyone that has any utility in the ground.

An issue constantly on the minds of gas contractors...muni participation is imperative and yet often exempt.

CGA survey submission # 49 - Communicating with the Excavator

Big supporter of pre-construction meetings - operators have to show up.

CGA survey submission # 66 - Damage Prevention through training all employees on the common sense procedures in place to prevent utility damage and allowing more time to train new employees

Actually a very good idea. Training on the CGA Best Practices can be done on each stakeholder group or as a package. In addition, training on the NULCA Competency Standards for locating covers the items necessary for locating all utility types as well as bringing attention to Operational Qualifications (OQ) for gas distribution as required under PHMSA standards.

Hard to argue that training on CGA BPs does not encourage stakeholder engagement...I support this.

CGA survey submission #72 - Municipal requirement to locate facilities

Actually a Best Practice is stated in BP 13.0, 4-21: Service Lines whereby "A service Line is marked in response to a locate request to the operator who uses the service line to pursue a business that derives revenue by providing a product or service to an end-user customer vis the service line." What is missing is adoption of the best practice by all states and an effective enforcement mechanism.

CGA survey submission #73 - Utilizing Google marketing tool to increase the effectiveness of one call messaging and awareness

All tools that can be used for communication and marketing of ideas or processes should be fully utilized. However, some "standard" should be developed and used to ensure uniformity.

CGA survey submission #89 - Communication method opportunities

See Enhanced Positive Response (EPR) for an example of an effective tool that could be used as the communications device.

CGA survey submission #90 - Communication method opportunities

A good idea so as to drive uniformity and education particularly in the age of technology.

CGA survey submission #91 - Communication method opportunities

Another idea that could be easily incorporated into a number of existing platforms (currently in use) which could send data to the stakeholders stated email address or fax number.

CGA survey submission #92 - Communication method opportunities

Worthy of a study and investigation into effective means or tools to disseminate information quickly and effectively.

CGA survey submission #93 - Communication method opportunities

Training on the CGA Best Practices can be done on each stakeholder group or as a package. In addition, training on the NULCA Competency Standards for locating covers the items necessary for locating all utility types as well as bringing attention to Operational Qualifications (OQ) for gas distribution as required under PHMSA standards. Developing a method to disseminate the information and record to whom, when, and where it was distributed is necessary. In addition, conversion to multiple languages would pose no real roadblocks with technology available today.

CGA survey submission #100 - Information Packets at Permit Offices

This could be implemented nationwide with coordinated effort by Utility Coordinating Councils, local CGA chapters, and industry support groups like NUCA, ASCE, and etc.

This is a great concept worthy of further review and perhaps a Best Practice.

CGA survey submission #102 - - Positive confirmation during permitting

Would require a feasibility study to determine how best to implement and enforce. This is a great concept worthy of further review and perhaps a Best Practice.

CGA survey submission #118 – New Stakeholder Group – Digital Services

A good example for changing with the times. As we delve into new and creative technologies, the CGA must adapt to include these concepts and technologies into the Best Practices. This will result in additional engagement by groups either previously overlooked or emerging.

CGA survey submission #121 – Mock Strike Events

This was a very powerful and motivating event!

Appendix B - Additional Information and Resources

Other Identified Technologies and Practices

These are additional technologies and practices identified by the committee that may not have been mentioned or explained fully in the study above. These listed here as an overview of those the committee feels PHMSA should be aware of.

Technology related to managing and visualizing data:

- GIS (Geospatial Information System)
- BIM (Building Information Modeling)
- CAD Software
- Various proprietary software vendor options

Some other areas where data acquisition technology has, or currently is improving and changing:

- Better Imagery – Helps enhance HCA analysis and provides better pipeline centerline data.
    - UAVs (Drones with various sensors)
    - Land and aerial LIDAR surveys
    - Satellite Imagery (Possibly nano Satellites in the future)
    - Higher Res Aerial Imaging
    - Synthetic Aperture Radar
    - Aerial Hyperspectral imaging
    - Thermal Imaging
    - Augmented Reality/Virtual Reality/ 3D Visualization
- GPR (Ground Penetrating Radar)
    - Multi Frequency
    - Hand cart
    - Mobile vehicles
- Sensor Fusion (The internet of things)
- 3D Radar Tomography
- RTK GPS
- Passive EM Locating

- Increased EM Locating Depth Accuracy
- Big Data Storage and Analytics
- Data logging devices with imagers and lasers
- Mobile devices

Some Methods or Practices that are evolving

- Subsurface Utility Engineering
- Predictive Analytics
- Use of mobile and web enabled devices to interact with 811
- Pre and Post HDD Inspections to avoid cross bores

Possible Challenges for PHMSA

Data exists in many forms, has varying degrees of quality and comes from many sources. Managing the data is challenging. Vital data may come from:

- ILI inspections (Smart Pigs in the pipeline)
- External checks (Corrosion testers)
- Field Crew reports from hand held data capturing devices (Loggers, Lasers, Cell phones, Cameras, Pads, etc.)
- Change Detection analysis (Aerial planes or Satellite imagery)
- Encroachment analysis
- Elevation and Cartography data
- Data to improve emergency responses – Pipeline location, Area terrain, depth of cover, HCA analytics, etc.
- Legacy data is very important and needs to be entered in the system alongside new data with spatial input. Older data is expensive to update:
    - Paper records
    - Memory
    - Legacy data in Excel and Access data sheets

Pipeline operators use data for design, planning, project management, construction, operations, maintenance, integrity management, risk assessment, emergency response and regulatory compliance. It is challenging to review, evaluate and test technological advancements in capturing, storing, analyzing, communicating and updating data for inclusion into a centralized system.

Subjects PHMSA may want to examine further for possible future improvements

- The relatively recent trend of acquiring more information about what is underground before digging begins
- Information exchange between Excavators and Operators
    - Better data sharing
        - Possible liability reductions/protections
        - Protections of proprietary information within a centralized database
- GIS development – More accessible, wider use and user friendly

    - Mapping **ALL** transmission and distribution lines and promote the use of those maps
        - Add more weight to mapping data when operators are audited
        - Share with emergency first responders
        - Examine how other countries share mapping information with excavators
- Increased Collaboration
    - Use the 811 system as a conduit of information between excavators and operators. CGA's Best Practices committee currently has a task team reviewing a practice being used in Maryland and Virginia that allows for increased communication. This transaction record team is referred to as TR 2015-03, Enhanced Positive Response.
    - Better maintenance of local ROWs
        - Coordinated line maintenance in a set area for all utilities
        - Remove, identify or replace abandoned assets before new utility alignments are approved
    - Increased Collaboration with the Insurance Industry

TOPIC	SUGGESTION/IDEA
Technology	Conduct R&D on how to appropriately secure and/or disseminate pipeline positional information (e.g. GPS points of pipeline asset, highly accurate geospatial map and metadata) for use by government/public officials, excavators and/or the general public. Any technology solution to advance damage prevention must address security risks and threats.
	Study different types of methodologies that may be considered for more effective communications between aerial patrol personnel and office/field operations personnel.
	Conduct R&D on the feasibility of developing pipeline marker signage that will provide/transmit more effective, secured information automatically to government/public officials, excavators and pipeline operators.
	Conduct a study to create an Excavator App with specifics for each state's damage prevention laws and enforcement. Possibly include information on what to do if damage occurs. Could also include best practices and videos showing details of those practices.
	Conduct R&D on potential use of geo-fencing to determine if a national geo-fencing program can be instituted to allow stakeholders' cellphones/tablets, machinery and/or locating equipment to automatically download secured one call ticket information and underground facility location. Geo-fencing program to provide excavators with additional data such as pipeline size, type of product(s), contact information, etc. with a standardized database of information to access and for reporting.
	Research and study a Proof of Concept for the usage of UAS (Unmanned Aircraft Systems) for targeted pipeline patrol missions.
	Perform R&D on the possible auto streaming of updated excavator information and/or underground facility information on the various devices.
	Research and study a Proof of Concept for PSAP Centers to have access to State One Call member data and or NPLMS data as an overlay to emergency responders mapping systems to provide utilities/pipeline locations and contact information.
	Perform R&D on improving methodology for "white lining" (pre-marking) and providing information to all stakeholders automatically.
	Perform R&D for technology for One Call centers to provide enhanced positive response information to excavators.

Procedure/Practice	Perform R&D to determine if a national standard for all State 811/one call notification centers could be used for providing excavator proposed project/excavation information.
	Conduct R&D on the feasibility of creating national criteria to be used for all State One Call Centers for emergency tickets, short notice tickets and project design tickets.
	Perform research on State excavation damage databases and reports to look for learnings that might be useful in improving procedures and practices either in the State or possibly nationwide, if feasible and to be able to extract Pipeline specific data/near misses
	Conduct R&D on feasibility of creating national criteria for excavators to provide notification to all underground facility owners/operators of change in scope of project or project schedule.
	Conduct R&D on feasibility of creating national criteria for length of one call notification.
Communications	Conduct R& D to determine the feasibility of creating a system to automatically notify underground utilities of Excavators with safety and enforcement issues.
	Conduct a study on cost effective communication methods that might be used by stakeholders to communicate/distribute/transmit updated excavation or damage prevention information.
	Perform R&D to determine if an automatic alert can be instituted for one call notification expiration to allow for updating and responding with new information.
Public Awareness	Conduct R&D to determine which public awareness messages should be disseminated via Public Safety Announcements or Advertisements on TV, Radio, Social Media and Internet platforms
	Perform R&D on best methodology and language on how to distribute information to contractors'/subcontractors' employees (full time/part time).
	Perform study to see where farmers get their information and why they don't consider their activities as excavation. The study should also explore if this group should be a separate stakeholder group.

DCA
DISTRIBUTION CONTRACTORS ASSOCIATION

November 18, 2016

Annmarie Robertson
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
East Building, 2nd Floor
1200 New Jersey Ave., SE
Washington, DC 20590

Dear Ms. Robertson,

The Distribution Contractors Association (DCA) represents contractors, suppliers and manufacturers who provide construction services including installation, replacement and rehabilitation of gas distribution and transmission pipelines as well as water, sewer, fiber optic, cable and duct systems in communities across the country. Ensuring safety and damage prevention to underground utilities is at the forefront of the operations DCA members during their everyday work. Damage prevention is a shared responsibility among excavators, facility operators and many other stakeholders, and we offer the following input for PHMSA consideration as the agency develops the study report required by Section 8 of the "Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016," which was signed into law on June 22, 2016.

The PIPES Act requires PHMSA, in consultation with stakeholders to conduct a study on improving existing damage prevention programs through technological improvements in location, mapping, excavation, and communications practices to prevent excavation damage to a pipe or its coating, including considerations of technical, operational, and economic feasibility and existing damage prevention programs. The resulting report will address following study requirements:

1. an identification of any methods to improve existing damage prevention programs through location and mapping practices or technologies in an effort to reduce releases caused by excavation;
2. an analysis of how increased use of global positioning system digital mapping technologies, predictive analytic tools, public awareness initiatives including one-call initiatives, the use of mobile devices, and other advanced technologies could supplement existing one-call notification and damage prevention programs to reduce the frequency and severity of incidents caused by excavation damage;
3. an identification of any methods to improve excavation practices or technologies in an effort to reduce pipeline damage;
4. an analysis of the feasibility of a national data repository for pipeline excavation accident data that creates standardized data models for storing and sharing pipeline accident information; and
5. an identification of opportunities for stakeholder engagement in preventing excavation damage.

The threat of cross bores, or intersections of existing underground utilities by a second utility during installation, is an enduring problem that carries potentially disastrous consequences and are constantly on the minds of those installing gas distribution facilities. Over the past several years,

DCA has garnered support for a range of initiatives involving several damage prevention stakeholders in an effort to prevent cross bore situations and mitigate those encountered in the field. DCA respectfully submits the following material for PHMSA consideration while identifying "methods to improve excavation practices or technologies in an effort to reduce pipeline damage" and "opportunities for stakeholder engagement in preventing excavation damage."

- DCA position paper describing practices and actions used to raise awareness of, prevent, and mitigate cross bore scenarios and facility damages. The paper contends that participation is needed not only by contractors but *all* facility operators, including municipal governments, to effectively prevent cross bores situations.
- Study entitled "Analysis of Cross-Bores in Unmarked Sewer Service Laterals," provided on behalf of the American Society of Civil Engineers.
- Industry position paper by several associations representing natural gas and hazardous liquid pipeline operators and excavation contractors calling for balanced enforcement and reduction/elimination of exemptions in the damage process.
- Letter sent to several congressional committees calling for equitable criteria for PHMSA damage prevention grants based on municipal exemptions to membership requirements.

PHMSA has indicated that the report will include recommendations that include the consideration of technical, operational, and economic feasibility, on how to incorporate into existing damage prevention programs technological improvements and practices that help prevent excavation damage. DCA hopes PHMSA will consider this material, which is supported in the abovementioned material by gas and oil pipeline operators, excavation contractors, locators and organized labor when evaluating recommendations to state damage prevention programs.

DCA appreciates the opportunity to provide this information. If you have any questions about this or any part of DCA's Cross Bore Initiative, please contact Eben Wyman, DCA's Washington Representative, at (703) 750-1326 or at eben@wymanassociates.net.

Best regards,

Robert G. Darden CAE, CMP
Executive Vice President

Distribution Contractors Association Position Paper
Cross Bore Mitigation

Construction activity continues to increase across the country, underscoring the need for steadfast dedication to prevent damages to underground facilities. Cross bores, or intersections of existing underground utilities by a second utility during installation, are enduring problems carrying potentially disastrous consequences. When analyzing the underlying causes of cross bores, as well as alternative ways to address and reduce them, a lack of consistency and clarity is evident among the key stakeholders.

Close working relationships between contractors and their customers in the gas distribution industry can go a long way to reduce cross bores. However, further action is needed by gas utilities, local and state governmental agencies, as well as the federal government to ultimately turn the reduction of cross bores in to total prevention. The DCA believes the following practices and actions will collectively help raise awareness and prevent cross bore scenarios and facility damages across the country.

Contractor

Contractors utilize a wide range of methods and procedures to recognize and prevent cross bores. These measures may be required by law, job permits and regulations or by mandate of internal/external company policy. While cross bores of sewer laterals are of primary concern, this can also occur on sewer mains. Due to the difficulty of locating non-metallic sewer systems, some contractors do not currently employ these practices – but may find them useful in the future. Others have been utilizing many of these methods for years depending on project-specific criteria. Accordingly, we believe all contractors should consider the following actions to prevent underground facility damages and cross bore situations:

- Call 811 prior to excavation and adhere to all related “call before you dig” requirements.
- Consider Common Ground Alliance (CGA) best practices and related resources when practical.
- To the extent possible, ensure that underground facilities owners who are not members of the one-call system are notified of planned excavation.
- Utilize all job site drawings to establish locations of underground facilities, including information related to depth, position, shape and type of facility.
- Investigate thoroughly, including: on site interviews, evaluation of plat maps, excavation permits, one-call tickets, photographs of related equipment, excavations, facility marks.
- “Pothole” to locate underground facilities when appropriate or required.
- Use subsurface utility verification when practical (Camera inspection, Ground Penetrating Radar, Acoustic, etc…)
- Maintain supporting documentation (“as-builts,” plat sheets, GIS information, etc…)
- Stop excavation when unsure of existing underground facilities and consult with facility operator(s).
- Communicate and report underground facility hits according to state law.

Gas Utility

There are several procedures and types of equipment used to identify buried utility systems that could be applicable to locating sewer laterals. Because these systems are generally composed of non-metallic material, they tend to be difficult to locate using traditional methods. Technologies such as surface ground penetrating radar (GPR), acoustic/seismic measures, traceable wire, electronic markers or closed-circuit television (CCTV) camera inspections are often necessary to complete the job. While the responsibility to locate and mark underground facilities typically lies with the facility operator, contractors who perform work for the utility companies may be in a better position to locate sewer laterals. Discussions during the bidding process among all parties involved with cross bore mitigation, as well as cost recovery language in gas pipeline agreements, provides the opportunity for contractors to ensure all responsibilities are met in an equitable fashion.

State and Local Government

Unmarked sewer laterals remain the single largest cause of cross bores. While state law generally requires underground facility operators to locate and mark their infrastructure prior to excavation, the responsibility for marking and locating sewer laterals continues to be a contentious issue. Municipalities, who generally own and operate the water and sewer systems, are often exempt from one-call membership requirements. This exemption effectively relieves them of their responsibility to locate their sewer systems. To make matters worse, because these laterals generally exist on private property, municipalities often place the responsibility of locating and marking sewer laterals in the hands of unknowing property owners.

It is unrealistic to expect landowners to be aware of, understand, or fulfill the responsibilities associated with locating sewer laterals on their property. Municipalities, who derive revenue from the sewer systems, are best equipped to locate and mark them. This is consistent with best practices developed by the Common Ground Alliance (CGA), who maintains that the “service line is marked in response to a locate request to a governmental entity that provides a product or service to an end-use customer via the service line.”

Federal Government

The Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011 included language restricting federal dollars from being allocated to state damage prevention programs that exempt municipalities and their contractors from one-call notification requirements. While DCA supports all efforts to reduce exemptions from one-call and damage prevention statutes, the association believes the 2011 pipeline act stopped short of ensuring ‘shared responsibility’ in damage prevention by not including one-call membership in eligibility requirements for federal pipeline grant assistance. As described above, municipal exemptions to one-call membership compromise damage prevention. All municipal facilities need to be included in the one-call process. Therefore, we believe federal damage prevention grant eligibility requirements should apply the same restriction to state programs exempting municipalities from having to belong to their respective 811 one-call center.

Analysis of Cross-Bores in Unmarked Sewer Service Laterals

Samuel T. Ariaratnam, M.ASCE[1]

Abstract: With an increase in trenchless methods being used for the installation of natural gas lines in urban areas, unmarked sewer service laterals present a risk of accidental and unknown cross-bores with these distribution lines. Although the physical damage to underground facilities is always unwanted, a cross-bored plastic natural gas distribution pipeline in a sewer is vulnerable to mechanized sewer cleaning tools that may be used in the event of a backup, with potential explosive consequences. Mainline sewers and storm sewers are also at risk from cross-bores; however, the scope of this paper is sewer service laterals. Although good practices exist for operators of horizontal boring equipment, these assume that the existing underground structures are marked and/or located. State legislation mandates the marking and locating of underground infrastructure; however, the question of who assumes responsibility for marking and locating sewer service laterals is a contentious issue. Sewer system owner/operators generally place the responsibility of locating and marking in the hands of unsuspecting property owners claiming that the laterals are on private property. In reality, property owners lack the expertise and equipment to mark and locate these service laterals. This paper describes the challenges with respect to natural gas cross-bores in unmarked sewer service laterals and presents data obtained from a survey of 43 contractors involved in the distribution contracting industry. The results further support the need for immediate action related to unmarked underground sewer service laterals. DOI: 10.1061/(ASCE)PS.1949-1204.0000156.

Author keywords: Trenchless technology; Cross-bores; Natural gas; Utilities; Damage.

Introduction

The underground utility industry is facing some unique challenges as a result of unmarked sewer service laterals. With an increase in trenchless methods, such as the use of horizontal directional drilling (HDD) and pneumatic piercing tools, unmarked laterals present a risk of accidental and unknown natural gas cross-bores with distribution lines (Bruce 2012). Although the physical damage to underground facilities is always unwanted, a natural gas distribution line that intersects a sewer lateral is vulnerable to mechanized sewer cleaning tools that may be used in the event of a backup, with potential explosive consequences. Fig. 1 illustrates a typical cross-bore of a natural gas line in a sewer service lateral from a closed circuit television (CCTV) camera inspection.

Good practices exist for operators of horizontal directional drilling equipment; however, these assume that the existing underground utilities are marked and/or located. The question of who assumes responsibility for marking and locating sewer service laterals is a contentious one. State damage-prevention statutes and legislation mandate the marking and locating of underground infrastructure (CGA 2012). Most state statutes have language to the effect of "The owner or operator of an underground facility is responsible for locating the approximate horizontal location of that facility." There is much debate about who is responsible for locating and marking service laterals. Should the responsibility lie in the hands of the property owners who have legal title to the laterals, or the municipalities, the entity that generates revenue, or perhaps the contractor? Most municipalities claim that they do not own the service laterals past the property line, and therefore should not be responsible for locating and marking them. Others feel that property owners do not possess the expert knowledge to address the marking of laterals. In other words, owners of homes and businesses will rarely have knowledge of the route of the lateral, the expertise to locate it, or the equipment to perform the locate. Therefore, the municipality or organized sewage district, as the operator, would likely be in the best position to perform lateral locates. This paper describes the challenges with respect to natural gas cross-bores in unmarked sewer service laterals and presents the data obtained from a survey of 43 individuals involved in the distribution contracting industry.

Current State of Practice

As mentioned previously, there has been an increase in the use of trenchless methods such as horizontal directional drilling (HDD) and pneumatic piercing tools for the installation of polyethylene natural gas distribution lines in congested urban environments. These are necessitated by the need to create minimal disruption to surface activities in urban settings and a desire to adopt lower-cost installation methods. A major concern facing contractors today is the issue of the responsibility for locating and marking of sewer service laterals. Fig. 2 shows a typical scenario facing natural gas distribution contractors. The lack of locating and marking with regard to sewer service laterals was identified as a major issue by contractors that participated in *Underground Construction* magazine's "2003 Annual Contractors Roundtable" (Carpenter 2003).

A typical One Call ticket involves the marking of utilities in the area of proposed construction including, in most cases, telecommunications, water, wastewater, gas, cable, and electrical lines (CGA 2012). The real issue is the sewer service laterals, which are

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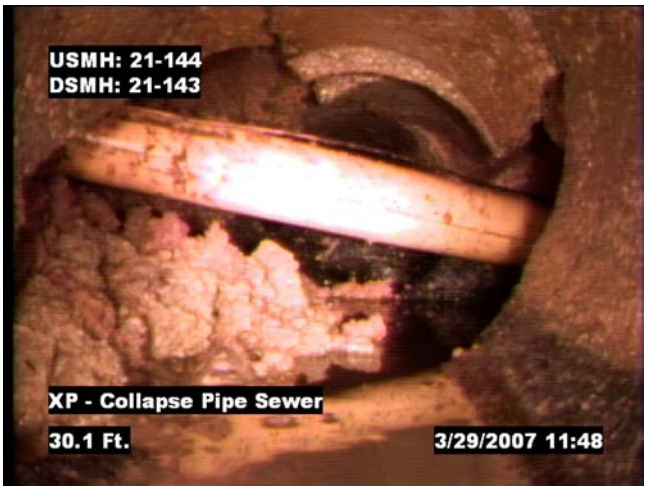

Fig. 1. Cross-bore of a natural gas distribution line in a sewer service lateral

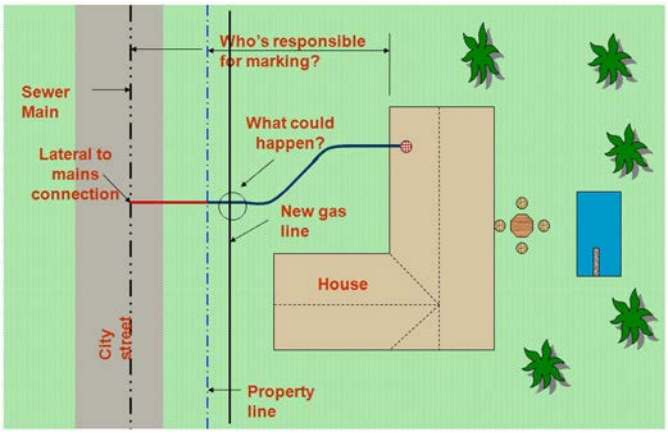

Fig. 2. Typical scenario involving sewer service laterals on private property

exempt from marking by most One Call statutes. The thinking is that these are on *private* property and as such are not the responsibility of the sewer system owner/operator. Municipalities, government agencies, trailer park owners, and other owner/operators are often hesitant to mark the location of laterals because of added costs and lack of proper as-built records; however, this poses a significant risk to public safety. One exception is the city of Mesa, Arizona, which provides the marking of sewer service laterals in the public right-of-way. City personnel diligently research available records to try and identify current service lateral locations. These are then shared with the respective contractor. Currently, several Arizona municipalities have agreed to undertake pilot projects to evaluate the viability of providing locates.

Overview of Current Underground Facility Damage Prevention Laws

By state statute, excavators are responsible for notifying their respective One Call center before excavation to have all buried utilities in the area of excavation located and marked. Once marked by the utility owner, it is then the responsibility of the excavators to operate in a safe and prudent manner by taking actions to protect those existing buried utilities and to ensure no damages are caused through negligence on their part. For example, various state statutes have minimal separation distances for operating mechanized equipment. Furthermore, best practices for exposing and verifying marked utilities before excavation or trenchless construction are outlined in various documents (NULCA 1997; NTSB 1997; USDOT 1999; Bennett and Ariaratnam 2008). The National Telecommunications Damage Prevention Council developed a "Model State One-Call Bill" as part of the Underground Facility Damage Prevention and Safety Act (NTDPC 2002). The intent was to provide minimum recommended guidelines for uniform state One Call legislation. To date, all 50 states follow various recommendations of the guidelines.

For example, in Arizona, State Statute ARS 40-360.28(C) states that "If the owner or operator fails to locate or incorrectly locates the underground facility, pursuant to this article, the owner or operator become liable for resulting damages, costs, and expenses to the injured party." It is unreasonable to hold excavators responsible for striking a buried utility that they have no knowledge of, nor the expertise to locate. In reality, facility owners or operators working with their as-built drawings and locators are in the best position to locate sewer service laterals and to make a record of these laterals for the future, as in the case of Mesa, Arizona.

In 2005, an arbitrator in the state of Washington ruled in favor of an excavator who filed a claim against a municipality for failing to provide locate marks to denote the location of a sanitary sewer service lateral that was subsequently damaged during excavation (Scoccolo 2005). The arbitrator felt that, because the municipality requires permits to be issued and as-built drawings to be provided to the municipality upon completion of any additions or modifications to the their sanitary sewer system, they were in the best position to manage the information and to provide it to excavators through the One Call system. The municipality argued that they only owned the sewer mainline and that the laterals were actually owned by the private property owner. This argument is a contentious one, because that would indicate that all property owners are responsible, by law, to subscribe to the One Call system. Consequently, all residents would be breaking the law and should be liable for the costs to repair any damage to their own laterals from third-party excavators. In reality, the intent of One Call regulations is not to include private property owners.

As stated in Section 1(10) of ORS 757 in the state of Oregon, *operator* means any person, public utility, municipal corporation, political subdivision of the state, or other person with control over underground facilities. According to Jack Dent, Oregon's public utility commissioner, "The intention here was the operator of the sewer main (municipality or organized sewage district) would have the best knowledge of where the lateral would be (they controlled the installation) and they would have the expertise and equipment to perform the locate. If it is an 'unlocatable' facility, they could provide the best information available to assist in its location."

Distribution contractors would be wise to be proactive and reach out to legislators, encouraging them to pass laws requiring operators of sewer systems to be deemed responsible for marking and locating sewer service laterals. Certainly, a less-than-proactive approach could be to sit back and allow the courts to decide. One such example is the case of *Wycon Construction Company* (a corporation, Plaintiff-Appellant), *v. Wheat Ridge Sanitation District* (a quasi-municipal corporation, Defendant-Appellee), April 8, 1998, heard in the state of Colorado, Court of Appeals. In this case, a contractor brought action for declaratory judgment that a municipal sanitation district had statutory duty to mark individual sewer

service laterals in a public thoroughfare before the contractor commenced any excavation work. The District Court of Jefferson County entered judgment in favor of the District, resulting in an appeal by the contractor. The Court of Appeals held that the District had a duty to mark *all* individual sewer service laterals before any excavation of public thoroughfare under the state's Excavation Requirements Article. The ruling further stated that the municipal sanitation district, rather than private property owners, had a duty under the Excavation Requirements Article to mark individual service lines, as well as main sewer lines and taps. Although both District and property owners fit the statuary definition of underground facilities owner, individuals lack specialized knowledge to mark a route through the thoroughfare to where their lines attach to the main line. In addition, the two-day notice from the excavator required under state statute One Call laws would be unrealistic for most property owners, but not for the District, to locate and mark lines.

The state of Georgia Utility Facility Protection Act was revised through Senate Bill 274 that called for an amendment to Chapter 9 of Title 25 so as to revise comprehensive provisions relating to utility facility protection; to add provisions regarding sewer laterals; to revise provisions relating to design locate requests; to revise provisions relating to the responsibilities of excavators and facility owners or operators; to provide for responsibilities of sewer system owners or operators with regard to sewer laterals; to provide for attempted location of utility facilities and sewer laterals by excavators in certain circumstances; to provide for installation of sewer laterals in a manner to make them locatable; to provide for use of a locator; to provide for the standard of care for trenchless excavation; and for other purposes. Section 25-9-2 requires that the location of sewer service laterals be made known to persons planning to engage in excavating operations. This could be done through the use of a permanent marker, which is defined as "a visible indication of the approximate location of a utility facility or sewer lateral that can reasonably be expected to remain in position for the life of the facility."

Currently, regulations in 40 states place the responsibility of locating the approximate horizontal location of an underground facility on the owner or operator of the facility. Ten states have interesting interpretations of underground facilities. These include New Jersey, New Mexico, Oklahoma, Rhode Island, Texas, Virginia, Missouri, California, Kansas, and Vermont. For example, in Kansas and Vermont, a sewer line is not designated as a *facility*. In California, nonpressurized lines are exempt from the state locate laws, as are privately owned sewer and water lines in Missouri. Table 1 presents the statute language of eight states that exempt sewer laterals from local locating laws, whereas Table 2 contains the statute language of three states with unclear language subject to interpretation.

It is anticipated that more states will adopt changes in their current legislation, making the responsibility for marking and locating sewer service laterals on private property to the entity that collects revenue from the facility. This would prevent facility owners and operators from placing the responsibility of marking sewer laterals on private citizens. Regardless, more clarity is definitely warranted in interpreting damage-prevention legislation.

Table 1. States That Exempt Sewer Laterals from Locating Laws in Underground Facility Statutes

State	Language
California	Excludes nonpressurized lines
Kansas	Sewers not included in list of items designated as facilities
Missouri	Sewer lines owned solely by the owner or owners of the real property to which such lines provide service shall not be considered underground facilities
New Jersey	Includes only forced-sewage lines; does not include gravity sewers
New Mexico	Sewers not included in the list of public utilities
Rhode Island	Sewers not included in the list of public utilities
Texas	Water, slurry, and sewage lines are excluded
Vermont	Only gas, electricity, and telecommunications are included

Table 2. States with Unclear Language in Underground Facility Statutes

State	Language
Connecticut	Only public utilities are required to mark the approximate location.
Kentucky	"Operator" means any entity or individual owning underground facilities to service the public::: operator shall provide temporary markings:::.
Oklahoma	Operators of municipally owned sewage::: need only notify the excavator::: that they have facilities located in or near the proposed area of excavation. No exemption from notifying/locating is given for private lines in the right-of-way.

Available Methods for Locating Sewer Service Laterals

Most sewer service laterals are composed of nonmetallic pipe material, thereby making them challenging to detect using conventional technology. There are several methods either used or considered for identifying buried utility systems that could be applied to sewer service laterals. These include (1) surface ground penetrating radar (GPR); (2) traceable wires/electronic markers; (3) acoustic signatures; (4) seismic; and (5) CCTV camera inspection. Ground penetrating radar has proven to provide an indication of the presence of an underground object; however, geological ground conditions often pose a limitation on the technology (Peters et al. 1994). Conditions such as clay soils often interfere with the signal and may result in inaccurate readings. The use of traceable wires or electronic markers provides a detectable way of locating nonmetallic sewer service laterals. New legislation passed in the state of Arizona mandates that all new and active underground facilities installed after December 31, 2005, include a *detectable* underground location device. This bill was unanimously passed 30-0 by the state legislature and was signed into law by the governor. Although this legislation addresses only new construction, a committee has been formed to address existing underground facilities and other related issues that have arisen.

CCTV camera inspection systems provide an excellent method of visually confirming the condition and location of sewer service laterals. Systems with a smaller scope camera can be deployed through a manhole in the mainline sewer and capture valuable lateral data. These are often used in conjunction with sondes to transmit the location and depth of the CCTV equipment. Approximate costs for deploying camera systems range from $75 to $175 per lateral, depending on the sewer main diameter, cleaning requirements, and laterals per setup (Ariaratnam and Kemper 2006).

Distribution Contractor Perspectives

A survey questionnaire (Appendix S1) was developed and distributed to 43 contractors involved in the natural gas distribution

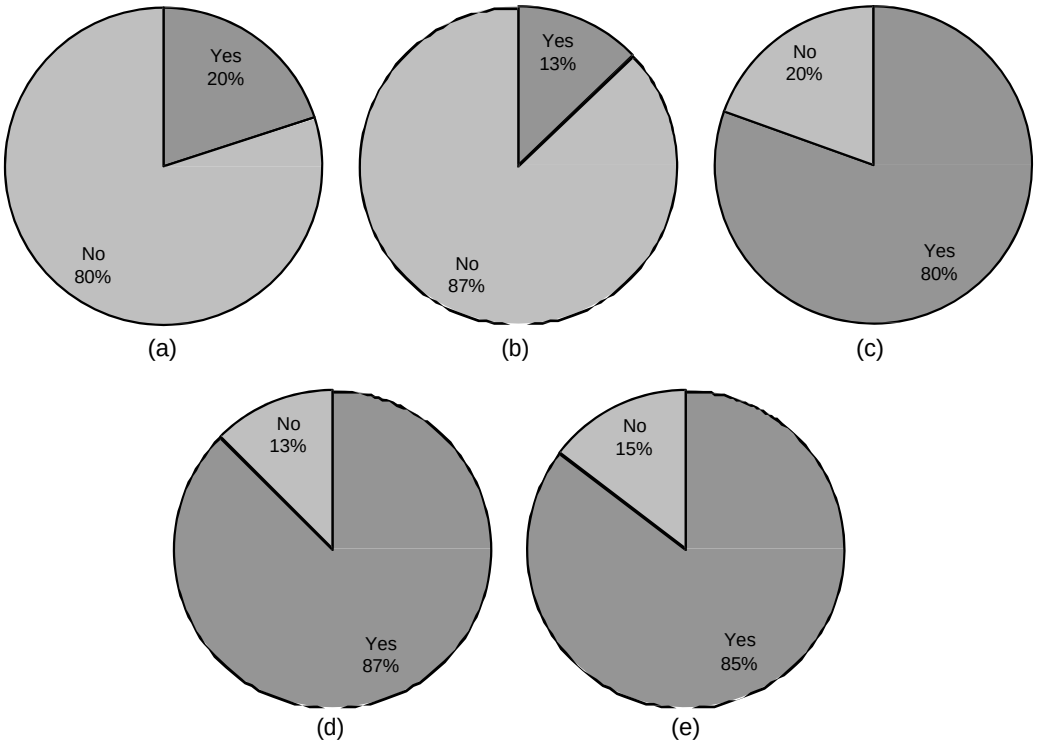

Fig. 3. (a) Owner marking requirements (water); (b) owner marking requirements (sewer); (c) owner marking requirements (electrical); (d) owner marking requirements (natural gas); (e) owner marking requirements (communications)

construction industry. A 100% survey response was achieved through followup. Using a Likert scale of 1 (lowest) to 10 (most important), the respondents rated the issue of unmarked sewer laterals as being a critical consideration in their daily business, with an average score of 9.29. All of the respondents agreed that there is a pressing need for better enforcement. This further supports the need for better allocation of responsibility for locating and marking sewer laterals.

The respondents were asked about their experiences with owners of underground infrastructure in areas where they did business with regard to marking their utilities. Fig. 3 provides a percentage breakdown of requirements for locating and marking based on (1) water to the building (20%); (2) sewer to the building (13%); (3) electrical to the building/meter (80%); (4) natural gas to building/meter (87%); and (5) communication to building (85%). Not surprisingly, owners of electrical, natural gas, and communication infrastructure were typically required to mark their facilities. However, it is alarming that owners of water and sewer infrastructure were generally not required to mark their facilities. Sewer service laterals are typically composed of nonmetallic material, subsequently creating an additional challenge for locating and marking. It is also more difficult to detect the presence of a crossbore in a water or sewer service lateral compared with electrical and communication lines where the end user would immediately notice an interruption in service.

The surveyed contractors were asked about the annual number of One Call tickets that the company typically requests. As illustrated in Fig. 4, most (43.9%) indicated requesting 1,000 to 5,999 tickets per year, followed by 26.8% requesting less than 1,000 tickets per year. Of those contractors, 78% stated that they had to pay a fine or claim resulting from striking an existing underground utility that was not required to be marked either by state statute or regulation. Fig. 5 shows that 62% of the respondents had between 1 and 10 claims over the past 5 years as a result of striking an existing utility. Another 16% indicated having between 11 and 25 claims during the same timeframe. Over the same 5-year period, 71% of the respondents indicated facing repair costs of over $25,000 for striking underground lines. As show in Fig. 6, 16.1% incurred total repair costs of over $200,000. Eighty-eight percent of the respondents indicated having at least one single repair claim in excess of $100,000. Overall, the highest reported claim cost was $1,750,000 with an average of $130,697 for the 43 surveyed contractors. The types of utilities cross-bored by the respondents were sewers (29%), water (18%), communication (16%), natural gas (14%), electrical (13%), and TV cables (10%), as illustrated in Fig. 7. Examples of such incidents are as follows:

1. In one case, property damage occurred as a result of striking an unmarked sewer lateral during an HDD operation; drilling mud migrated to the basement of the residence resulting in a claim from the property owner;

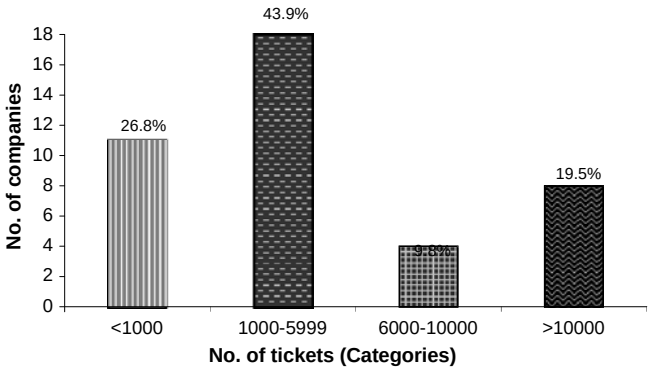

Fig. 4. Number of tickets requested annually

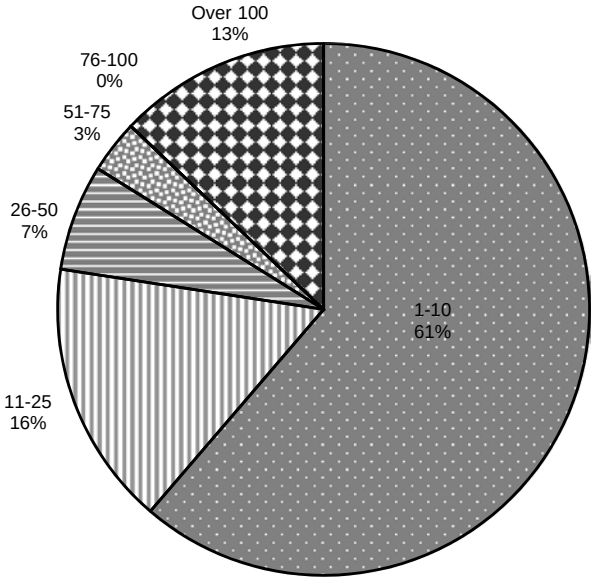

Fig. 5. Number of times a claim occurred

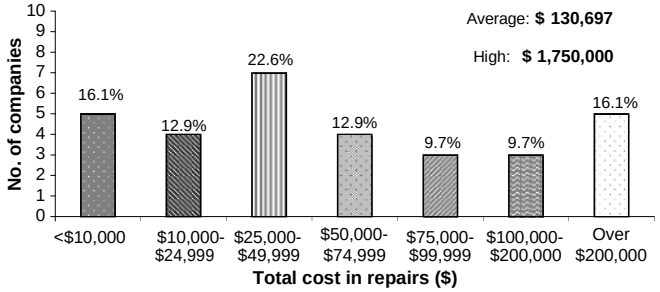

Fig. 6. Total cost incurred in repair to a struck line in a 5-year period

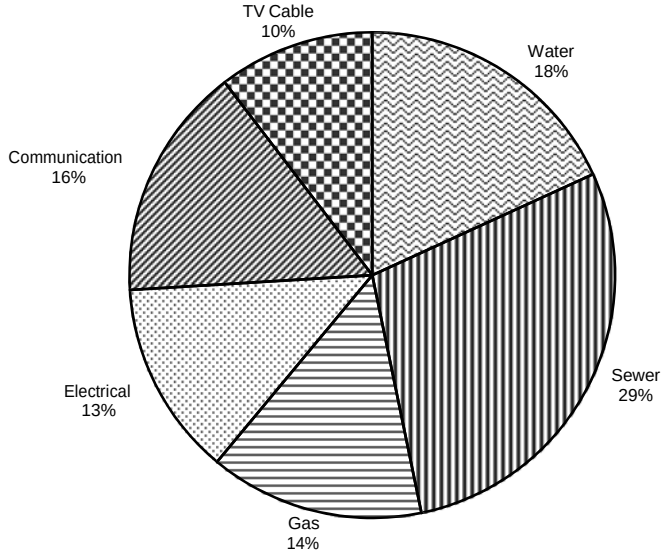

Fig. 7. Types of cross-bored utilities

2. A sewer lateral was cross-bored during the installation of a natural gas distribution line that was installed several years previously; a plumber attempted to dislodge the blocked line using a mechanical tool resulting in a fire;

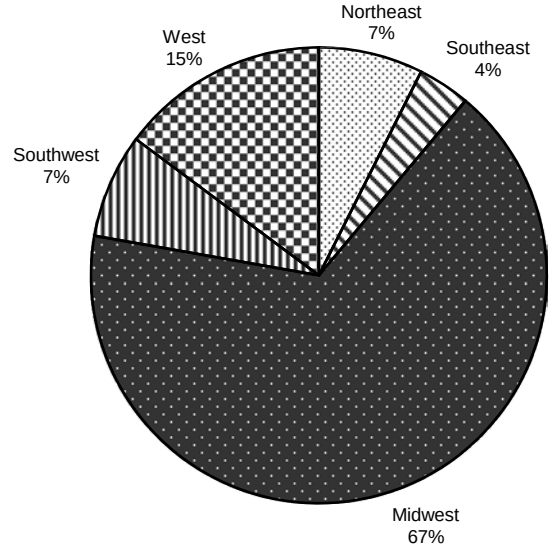

Fig. 8. Geographic location of recorded cross-bore incidents in the United States

3. Several sewer laterals were cross-bored during an HDD installation of natural gas lines; and
4. A sewer lateral in a private trailer park was cross-bored during the installation of a natural gas line, resulting in a fire that damaged three trailer homes.

In terms of geographic region where the respondents had knowledge of cross-bores, an overwhelming majority (67%) occurred in the Midwest region of the United States (Fig. 8). In one inspection program in an undisclosed midwestern municipality, approximately 11,000 sewer laterals were inspected using CCTV cameras. During the inspection, 250 cross-bores were uncovered. Although comprising only 2% of the inspected system, this is a low frequency, but highly consequential situation. Unnoticed natural gas cross-bores are ticking time bombs that could result in catastrophic circumstances. Another Midwestern town revealed 24 cross-bores during an inspection of a single four-block area. Fifteen percent of the respondents had knowledge of cross-bores in the Northeast region. The geographical representation of the survey respondents was fairly evenly distributed among the East (30%), Midwest (33%),

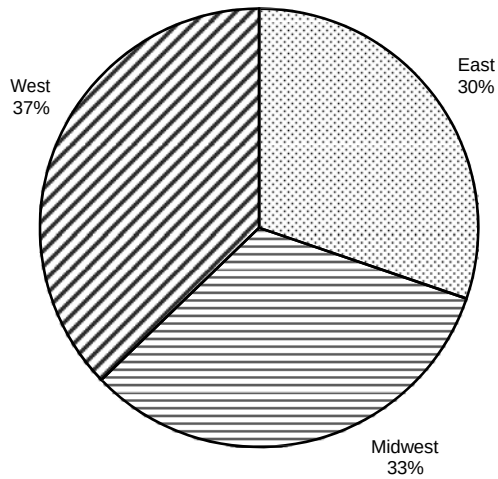

Fig. 9. Surveyed contractors' geographic work area (general)

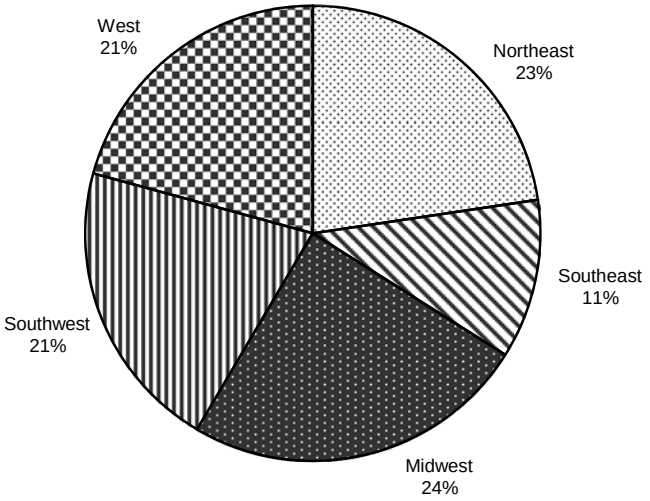

Fig. 10. Surveyed contractors' geographic work area (detailed)

and West (37%) regions, as illustrated in Fig. 9. A further detailed breakdown of these regions is shown in Fig. 10.

Conclusions and Recommendations

The issue of responsibility for locating and marking sewer service laterals is critical and must be addressed. Although the physical damage to underground facilities is always unwanted, a major concern facing distribution contractors are catastrophic losses resulting from utility lines that are exempt from locating laws. In a survey of 43 natural gas distribution contractors, they considered unmarked sewer laterals as being a critical consideration in their daily business with an average score of 9.29 out of 10 (most important). Even the most prudent contractors are being held liable for hitting these unmarked, unknown lines. Seventy-eight percent of the surveyed contractors indicated that they had to pay a fine or claim resulting from striking an existing underground utility that was not required to be marked either by state statute or regulation. Not surprisingly, the most prevalent utilities cross-bored by the contractors were sewer (29%) and water (18%) lines, given that these two utilities had the lowest requirements for locating and marking at 13 and 20%, respectively, in their areas of business. Additionally, public safety is paramount to this controversial issue, given the potential consequences of natural gas cross-bores with sewer service laterals. A closed circuit television (CCTV) camera inspection of 11,000 sewer service laterals in a midwestern municipality uncovered natural gas distribution cross-bores in 2% of the system. This is a low frequency, but highly consequential situation. Unnoticed natural gas cross-bores are ticking time bombs that could result in catastrophic circumstances. This paper contributes to the overall body of knowledge by providing empirical data obtained from 43 natural gas distribution contractors, who related to their experiences with cross-bores in existing utilities. The information presented further validates the need for immediate action related to unmarked underground sewer service laterals.

Over the past few years, several states including Arizona, Minnesota, Georgia, and Oregon have passed legislation requiring new sewer lateral installations to be locatable from the surface. Additionally, Oregon and Minnesota require the system owner/operator to mark the location of all sewer service laterals in the public right-of-way. The intent is to place the responsibility on the party that is in the best position to perform the locate. Currently, there are eight states that do not require sewer service laterals to be located or marked.

The initiation of clearer laws and regulations, and the development of better methods for locating nonmetallic pipes, are necessary to reduce the incidents of cross-bores. These efforts are imperative in the interest of underground damage prevention and public safety. Currently, the field of subsurface utility engineering (SUE) is becoming more prevalent during the engineering design phase because some state One Call laws fail to address the marking of all underground utilities. ASCE Standard 38-02 provides excellent guidance for the collection and depiction of existing subsurface utility data (ASCE 2002).

Supplemental Data

Appendix S1 is available online in the ASCE Library (www.ascelibrary.org).

Acknowledgments

The author would like to thank members of the Distribution Contractors Association (DCA) for their participation and invaluable contribution to the paper.

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INDUSTRY PERSPECTIVES ON STATE DAMAGE PREVENTION PROGRAMS

Excavation activity across the country is steadily rising due to recent increases in civic improvement projects, utility infrastructure renewal work, and federal projects funded by economic stimulus initiatives. The shale gas phenomenon has also played a significant role in certain parts of the country. This increase in excavation activity underscores the need for an effective process to prevent damages to underground facilities. Damage prevention requires that all stakeholders in the process understand and fulfill their responsibilities, and that enforcement of these responsibilities is provided by law and imposed as appropriate.

The Pipeline Inspection, Protection, Enforcement and Safety (PIPES) Act of 2006 authorized federal enforcement in states whose damage prevention laws are either inadequate or not sufficiently enforced. In response to that mandate, the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) recently released a Notice of Proposed Rulemaking (NPRM) describing the circumstances and parameters of a federal enforcement role of state damage prevention law. As states evaluate and adjust their damage prevention laws and enforcement practices in response to this pending regulation, we encourage policymakers to avoid implementing or increasing stakeholder exemptions to the extent possible. Any exemptions should be narrowly defined and justified in writing, as prescribed in PHMSA's NPRM. State authorities should also ensure there is effective and balanced enforcement of state damage prevention law.

In 1999, the Common Ground Study of One-Call Systems and Damage Prevention Best Practices was developed by virtually all stakeholders in the damage prevention process, including underground facility operators, excavators, locators, one-call centers, and others. The study states that "the underlying premise for prevention damage for underground facilities, and the foundation for this Study, is that all underground facility owners/operators are members of one-call centers, and that it is always best to call before excavation."

The responsibilities are clear: excavators must call 811 before they dig, wait the required time before excavating, respect facility markings and dig with care. Equally important, all underground facility operators must belong to their respective one-call center and ensure that facilities are marked accurately and in a timely manner (according to state law). Any exemptions or failure to hold all parties accountable for their responsibilities in this process only compromises safety, and state law should address that.

Further, enforcement of damage prevention laws is critical to the process and a catalyst for federal action on this issue. The PIPES Act calls for states to promote fair and consistent enforcement of the law. This is only possible if there is a fair and consistent enforcement mechanism in place. While this may seem simplistic, many state laws lack an established entity to enforce damage prevention requirements or do not adequately enforce specific stakeholder responsibilities despite their inclusion in the statute. An effective enforcement mechanism should not be measured exclusively by the amount of fines issued or penalties levied. Other examples of enforcement actions could include mandatory training and warning letters issued.

We encourage states to evaluate their damage prevention laws and current enforcement practices, bearing in mind that damage prevention requires that all stakeholders meet their responsibilities. Exemptions from fundamental responsibilities have the potential to severely undermine the entire process. Further, legitimate enforcement of damage prevention responsibilities by all stakeholders is

central to having an effective state damage prevention program. We are available to provide educational materials from model state programs and to answer questions about how a state program can be improved.

September 28, 2015

The Honorable John Thune
Chairman, Committee on Commerce, Science, and Transportation
United States Senate
Washington, D.C. 20510

The Honorable Bill Nelson
Ranking Member, Committee on Commerce, Science, and Transportation
United States Senate
Washington, D.C. 20510

Dear Chairman Thune and Ranking Member Nelson,

As the Committee develops legislation to reauthorize the nation's pipeline safety program, the undersigned organizations respectfully request you consider provisions that would enhance public safety by reducing exemptions for key stakeholders in the damage prevention community. Representing a range of industries that build, operate and protect the nation's underground infrastructure, we believe that federal policy should encourage the full participation by all stakeholders in state damage prevention statutes.

The Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011 included language that restricts federal damage prevention grant dollars from being allocated to state damage prevention programs that exempt municipalities and their contractors from one-call notification requirements. Unfortunately, the 2011 pipeline act stopped short of including one-call membership as part of that restriction. We ask that this year's pipeline safety bill include language that would apply the same restriction of federal dollars to state programs that exempt municipalities from one-call membership requirements.

Municipalities generally own/operate water and sewer systems. When they are exempt from one-call membership requirements, they are relieved of their responsibility to locate the sewer mains they operate. Municipal exemptions from one-call membership can contribute to a "cross bore," which is an extremely hazardous intersection of an existing underground facility by a secondary facility or structure, resulting in direct contact that compromises the integrity of either facility or underground structure.

In October, 2014 the Pipeline and Hazardous Materials Safety Administration (PHMSA) released its Study on the Impact of Damage Prevention on Pipeline Safety where PHMSA states that "[o]ne-call membership exemptions for sewer operators may contribute to unintentional cross bores of natural gas pipelines," and that "cross bores are more likely to occur when sewer operators are exempt from one-call membership requirements and don't have to mark their lines."

The 1999 Common Ground Study of One-Call Systems and Damage Prevention Best Practices was developed by virtually all stakeholders in the damage prevention process, including underground facility operators, excavators, locators, one-call centers, and others. The study states that "the underlying premise for preventing damage for underground facilities, and the foundation for this Study, is that all underground facility owners/operators are members of one-call centers, and that it is always best to call before excavation."

The 2011 pipeline safety act took initial steps to reduce exemptions from one-call notification requirements, stating that in order to qualify for federal damage prevention dollars, "a State one-call notification program may not exempt municipalities, State agencies, or their contractors from the one-call notification requirements of the program." For the abovementioned reasons, and in the spirit of

shared responsibility in damage prevention, we believe that state damage prevention programs that exempt municipalities from
one-call notification requirements should be subject to the same criteria. We support inclusion of language
to reflect that in the next pipeline safety reauthorization bill.

The fundamental responsibilities in damage prevention are evident: excavators must call 811 before they dig, wait the required time before excavating, respect facility markings and dig with care. Equally important, all underground facility operators must belong to their respective one-call center and ensure that facilities are marked accurately and in a timely fashion according to state law. Exemptions of responsibilities in this process only compromises safety, including municipal governments who operate water and sewer systems and oversee that infrastructure.

We thank you for your consideration.

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November 23, 2016

Pipeline and Hazardous Materials Safety Administration
Attn: Annmarie Robertson
1200 New Jersey Avenue, SE
Washington, DC 20590

In Re: 2016 PIPES Act §8 Study on Improving Existing Pipeline Damage Prevention Programs Including Technical, Operational, and Economic Feasibility

Dear Ms. Robertson:

In response to the Pipeline and Hazardous Materials Safety Administration (PHMSA) conducting a study of pipeline damage prevention programs pursuant to §8 of the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act, the Utility Workers Union of America (UWUA) offers the attached comments. These comments draw in particular on the experience of UWUA Local 132 members working in the gas utility sector, employed by Southern California Gas Company.

Maintaining, installing, repairing and excavating natural gas pipes throughout southern California, UWUA Local 132 members provide the following discussion of methods to improve excavation practices and reduce pipeline damage in the context of the California state regulatory system.

California System

In California, Government Code §4216(a), aka "dig-alert," requires all contractors to utilize a toll-free 8-1-1 system which notifies all utilities that an excavation is going to take place near underground facilities. Methodologies and technologies already in practice to prevent damage during actual excavation include the direct, physical location of pipelines with instrumentation, consultation of maps of underground utilities, use of above-ground marking, and the practice of pot-holing - the location of an underground substructure using only hand tools to excavate exploratory holes.

Challenges to Pipeline Damage Prevention:

Unfortunately, in spite of California's existing system, and despite widely used technologies and practices that can be, and are, used to successfully locate and prevent damage to pipelines, economic, human, and construction realities still often lead to damage occurring. Examples of these challenges include:

1) Time Pressure

The most significant obstacle to preventing damage to subsurface installations is rarely due to pipelines being mismarked, or not marked at all. In the experience of UWUA Local 132 members, damage to Southern California Gas gas lines frequently occurs to pipes that are actually correctly marked. However, excavation contractors often would rather run the risk of hitting a line than slow down production. Digging test locating holes by hand, for example, can be time-consuming. Due to construction deadlines, contractors often seek to push work forward in an effort to complete projects quickly. Under pressure to finish the job, excavation goes ahead with insufficient precautions and underground structures are damaged.

2) Cost-benefit analysis

Again, due to pressure to complete work, contractors may also do an informal, on-the-spot cost/benefit analysis of the risks of excavation. That is, if there is a perception that it is simply more cost effective to risk damage and the possibility of monetary damages and/or fines, excavation may press ahead.

3) Lack of Effective Enforcement

In the case of small contractors, they may not possess sufficient resources to warrant litigation to recover damages, effectively allowing them to act without consequence. Further, small contractors can simply change their corporate identity, making recovery sufficiently legally complex to be unwarranted and, again, elude responsibility. The lack of sufficient penalties and enforcement for existing dig-alert laws, particularly for repeat offenders renders them easy to ignore. Large fines are rare, and there is no real risk to a contractor's license, making on-the-ground decisions based on time and monetary pressure tip in favor of excavating first and dealing with any damage later.

4) Pressure to Secure Future Work

Small contractors, in an effort to continue receiving excavation work from larger companies or even local or tribal governments will be biased in favor of completing work on-time, and keeping construction deadlines moving. This perception of possible lost future work provides further incentive to push forward with excavations.

<u>Proposed Preventive Measures:</u>

To truly improve the prevention of damage to subsurface installations, real consequences for irresponsible actions in failing to abide by already established best practices and regulatory systems must exist. Mapping, marking, and locating underground structures can be, and is, normally done. The issue is whether structures, once marked, will be respected or simply excavated blindly in favor of external pressures of time and costs. To this end, we suggest a number of pro-active preventive measure to strengthen existing systems:

1) Loss of business/contractor license. Particularly for repeat offenders, raising the consequences as high as possible – complete loss of the legal right to operate must be on the table to push in-the-moment cost/benefit decisions in favor of responsible excavation.

2) Loss of operator's license for individuals. Workers operating heavy equipment must also be incentivized to dig responsibly, particularly for repeat offenders, by having the option to revoke their operator's license entirely. Again, this tips in-the-moment decision-making in favor of responsible digging.

3) Tracking successor companies. To prevent companies evading responsibility by simply changing their corporate identity, requests to change corporate names should be checked against a database of outstanding excavation violations.

4) Stand-by personnel. Any excavation involving known underground substructures should only be carried out with a representative of the substructure's owner/operator on site. This is currently the case for high-pressure gas lines but, is also a practice that should be extended to all known substructures to ensure maximum marking effectiveness, damage deterrence, and emergency response in the event damage does occur.

5) Enhanced training on underground service alerts. The Ground Common Alliance should provide comprehensive, holistic training on how to use the 811 system both as a condition of obtaining a license to operate, and as a remedial measure for companies that have violated the system, resulting in damage.

6) Capturing the institutional knowledge of senior pipeline maintenance personnel. As a part of collective bargaining agreements, utilities should create a job category of high seniority workers who work with all internal entities – mapping/planning, engineering, policy, field – within a company to ensure internal gas safety policies are updated, consistent company-wide, and implemented in the field. These personnel could also act as trainers and mentors to apprentices and journeyman workers in a positive, learning environment, rather than in the usual, discipline-driven management style.

At the UWUA, the issue of workplace safety is among our top priorities. Given the risk to lives and property inherent in damaging natural gas pipes, the monetary damages caused, and the disruption to customer service, it is our position that the consequences of failing to comply with existing systems must be increased, made widely known, and followed through in order to fully realize the industry-wide safety culture necessary to a truly effective pipeline damage prevention program.

Should you have additional questions, or wish to discuss these issues at greater length, particularly as they pertain to southern California, please feel free to contact myself at the email or phone given below, or Eric Hofmann at UWUA Local 132 at erichofmann@verizon.net, or 951-333-5879.

Sincerely,

Lee Anderson
Government Affairs Director
Utility Workers Union of America, AFL-CIO
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Appendix F: CGA Survey Responses

Submission 5
Submission 6
Submission 7
Submission 8
Submission 9
Submission 10
Submission 11
Submission 12
Submission 13
Submission 14
Submission 15
Submission 16
Submission 17
Submission 18
Submission 19
Submission 20
Submission 21
Submission 22
Submission 23
Submission 24
Submission 25
Submission 26
Submission 27
Submission 28
Submission 29
Submission 30
Submission 31
Submission 32
Submission 33
Submission 34
Submission 35
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Submission 99
Submission 100
Submission 101
Submission 102
Submission 103
Submission 104
Submission 105
Submission 106
Submission 107
Submission 108
Submission 109
Submission 110
Submission 111
Submission 112
Submission 113
Submission 114
Submission 115
Submission 116
Submission 117
Submission 118
Submission 119
Submission 120
Submission 121
Submission 122
Submission 123

Submission#: 5

Please select your stakeholder group(s).

Equipment Manufacturer

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mapping/GIS

Provide a short title or name for the technology improvement.

Capturing geospatially key jobsite and drill plan information

Describe technology, how it has been used and the benefit it provides.

Vermeer Projects, a web based jobsite management software for utility installations, makes it simple for operations managers to collect, organize and share important job documentation through the cloud. Projects provides a professional, electronic record of your job instead of a stack of papers.

Utilizing Projects +Mapping gives crew leaders the ability to visually capture the jobsite over a Google Maps image, including intended bore path, whiteline, pothole locations, locate positions, marked utilities and bore path as-built. Achieve even better accuracy by pairing your GPS-enabled smart device with an external GPS antenna (sold separately).

Add bore line mapping and rod-by-rod bore planning, with Projects +BorePlan. With settings for product pipe tolerance and drill rod bend radius, users can properly plan their HDD project within industry standards and communicate it easily to everyone involved with the job.

- Enhance and digitize the quality management methods for jobsite development, making it easier to complete the job records and required documentation, always seeking to satisfy customers' needs for a timely job completion.
- Support digital job record creation and keeping, so all relevant information can easily be added to a GIS-based record management system, helping to reduce cost, time and resource needs for organizing job data.
- Enhance the accuracy levels for any utility installation records with the use of GPS tools during the installation process and tying the job information to permanent latitude/longitude information.
- Improve the manual site inspections and job approval processes through the ability to understand the jobsite progress and also any job change requests in real time via a virtual site visit.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Available as needed

Submission#: 6

Please select your stakeholder group(s).

Other

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Enhance the use of and uniformity of use of Excess Flow Valves on gas service and branch lines

Briefly describe the engagement opportunity including the benefit it provides.

Line strikes, I do not believe, can ever be totally eliminated but our goal is to reduce them consistently on an annual basis based on good practice, uniformity of compliance and common sense. 49CFR192.381/383 sets the requirements for the use of Excess Flow Valves on residential service lines. Many lines installed prior to February 2010 do not have them as not required by PHMSA. Commercial installations are excepted. We need to push for installation on all and have a voice that is heard. EFV greatly reduce the loss of lives and property damage when a strike occurs. Life Safety and Property Protection should be at the top of our expected achievements.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

The installation of EFVs are at the direction of PHMSA and local utilities. CGA has no control except to be heard and recommend to know that we have tried. EFVs became mandatory in 2/2010 but were voluntary at customer cost before that time for residential application. Commercial exempted but should be required also.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

Yes

If applicable, please upload documentation supporting the opportunity.

EFV Evaluation.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2010

Geographically, where was this applied?

Throughout USA

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

I do not have the numbers butthey are available.

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Reduces the potential for loss of life and property when a strike occurs on fuel gas service line governed un 49CFR192.

Which stakeholder group or groups have or could benefit from the improvement?

- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Insurance
- Locator
- Public Works
- Road Builder
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Any residence whose gas service line was struck and had a properly installed EFV in the system.

Submission#: 7

Please select your stakeholder group(s).

One Call

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

The Gladys Kravitz Marketing Plan

Briefly describe the engagement opportunity including the benefit it provides.

Gladys Kravitz is a highly targeted direct mail outreach effort that sends a "Call Before You Dig!" postcard to homeowners near temporary marks at a neighbor's house who placed a One Call ticket. The postcard exploits the natural curiosity of someone asking "What's going on over there?"

The plan, and the concept, is described in the attachment.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Relevant ticket data that indicates a homeowner ticket. PA's ticket data is robust enough that we collect info on whether the caller is a homeowner - or not. The Gladys Kravitz Marketing Plan is targeted to homeowners who place one call tickets.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

Yes

If applicable, please upload documentation supporting the opportunity.

2012 Summer DPP - The Gladys Kravitz Marketing Plan.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2012

Geographically, where was this applied?

Pennsylvania

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Yes

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

The marketing plan increased awareness to homeowners who we traditionally did not reach - neighbors of folks who placed a One Call. In 2012, the effort increased homeowner tickets in PA by > 600. More homeowners placing tickets = less opportunity for a damage due to not calling.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Gas Distribution
- Gas Transmission
- Oil
- One Call
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Dan Lucarelli

Submission#: 8

Please select your stakeholder group(s).

Gas Transmission

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Communication

Provide a short title or name for the improved practice or methodology.

Require Positive Responce

Describe the practice or method including the benefit it provides.

All states should require positive response. The process would complete the process and confirm everyone is in the loop. Positive response back to the one call agency will document the process and allow audit ability for companies to document who is following the rules / laws. One call or web query can confirm who has responded and in emergencies will also help responders.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2010

Geographically, where was this applied?

Colorado, New Mexico and Michigan

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Each state can provide statistics

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

All states should require positive response. The process would complete the process and confirm everyone is in the loop. Positive response back to the one call agency will document the process and allow audit ability for companies to document who is following the rules / laws. One call or web query can confirm who has responded and in emergencies will also help responders.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric

- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 9

Please select your stakeholder group(s).
Engineering/Design

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Utilize unused or abandoned lines for other purposes.

Briefly describe the engagement opportunity including the benefit it provides.
"Abandoned" lines choke our rights-of-way leaving little room for replacement or new facilities. Repurposing unused or abandoned lines reduces the amount of new excavation required thereby reducing the opportunity for encountering existing active facilities.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Reluctance to "buy" someone else's "problems". Also, connecting on each end of the repurposed line to take it to the desired beginning and termination locations.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Oil
- Public Works
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 10

Please select your stakeholder group(s).
Road Builder

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Locating

Provide a short title or name for the improved practice or methodology.
More accurate and timely locates

Describe the practice or method including the benefit it provides.
Located are seldom on time or accurate. Locators should understand the cost to the excavator when they fail to do their job. Locators may have 100 or more locates on theirs schudle and they cannot possibly perform that many locates in the required time. Many states have allowed more time but locates have not improved. Locators need to increase their workforce and their training. Locators are the biggest problem in the system and the low hanging fruit to reduce damages

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
1986

Geographically, where was this applied?
North Carolina

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
Impossible to determine other than what the locators tell us

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
We back charge O/O for downtime associated with bad locates or lack of locates. We have only paid one damage in many years. The locators tell us that they know we document and pay special attention to our locate requests. Even so the locates are terrible and have gotten worse since USIC took so many

contracts. If we get special attention it's hard to imagine how bad the locates are for othe excavators. The key to damage prevention is in better locating.

Which stakeholder group or groups have or could benefit from the improvement?

Other

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Brad Barringer. 704-791-8887. brsbrad@ctc.net

Submission#: 11

Please select your stakeholder group(s).
Gas Distribution

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Mapping/GIS

Provide a short title or name for the technology improvement.
technology improvements in mapping

Describe technology, how it has been used and the benefit it provides.
GPS shots are taken anytime CU exposes electric, gas & water

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2015

Geographically, where was this applied?
Springfield MO - Greene County - USA

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
no

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
we hope to use this when excavator are using trenchless excavation around cu facilities

Which stakeholder group or groups have or could benefit from the improvement?
Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 12

Please select your stakeholder group(s).
Engineering/Design

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Subsurface Utility Engineering

Provide a short title or name for the improved practice or methodology.
Documentation of Abandoned Pipelines

Describe the practice or method including the benefit it provides.
Historically, Pipeline Operators have not maintained records of abandoned pipelines left in place. As such, the existing pipelines create confusion when encountered. Abandoned lines can be mistaken for active pipelines. A practice of maintaining (As-Built) records of abandoned underground facilities (even though the franchise or easements are no longer kept) will improve the Damage Prevention Process and provide locators with valuable information.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.
2015-08-03 Guide revised_Abandon Article 5_112514.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Engineering/Design

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 13

Please select your stakeholder group(s).
Equipment Manufacturer

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
material handling with Vacuworx Lifting machines

Briefly describe the engagement opportunity including the benefit it provides.
safe, precise, keeps workers out of dangerous situations, efficient, able to operate handling of materials in a small or limited space, doesn't damage the material being handled

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
unknown, don't understand, economics

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
Yes

If applicable, please upload documentation supporting the opportunity.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 14

Please select your stakeholder group(s).
Equipment Manufacturer

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Mapping/GIS

Provide a short title or name for the technology improvement.
On machine drill planning and drill head location viewing

Describe technology, how it has been used and the benefit it provides.
Vermeer BoreAssist lets the user load, edit or create a bore plan on the Aurora display. When coupled with LWD Live, a user can compare log-while-drilling data to the plan using BoreAssist. The drill operator can then follow the rod-by-rod plan to drill the planned bore. Using the LWD Live and BoreAssist applications combined helps the user to drill according to plan, reducing corrections needed throughout the bore.

BoreAssist is an on-rig application with these key functions:
- Load a plan from Vermeer Projects onto the rig
- Re-plan or adjust a bore on-rig
- Compare the log while drilling data to the plan
- On-rig rod-by-rod bore planning utilizing preloaded templates

Do you have any documentation/information supporting the technology improvement?
Yes

If applicable, please upload technology improvement documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
- Engineering/Design
- Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 15

Please select your stakeholder group(s).
Gas Distribution

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Other

Provide a short title or name for the technology improvement.
Gasline Slitting

Describe technology, how it has been used and the benefit it provides.
The technology consists of a slitting blade, a cable, and a pulling device. An excavation is made on either end of an existing service. Next, the cable is fed through the existing pipe. A blade, expander and the new pipe is attached to the end of the cable on the entry side. The pulling device is use to pull the blade into the pipe, slitting the old pipe, while the expander minimally opens the bore path to allow for the new product pipe to be installed. The process ensues until the new pipe reaches the exit pit. Re-connections are made, and the excavations are backfilled, completing the process. Please see attached link for additional information.

http://www.hammerheadtrenchless.com/en-US/NewsRelease.html?RefId=7f1d61ef-f236-403d-a430-c119da245832

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2013

Geographically, where was this applied?
Primarily NV, CA and GA

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
Not measured

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

When replacing existing gas lines, primarily plastic, the same path that the existing pipe is laid on is used. Since there is already a pre-existing path, the likelihood of a cross bore or damage to adjacent utilities is significantly reduced

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Distribution
- One Call
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 16

Please select your stakeholder group(s).
Equipment Manufacturer

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Predictive Analytics/Risk Assessment

Provide a short title or name for the technology improvement.
Excavation Damage Risk Assessment Engine

Describe technology, how it has been used and the benefit it provides.
Our software engine, Optimain xDR, is able to assess the probability and consequences of excavation damage associated with each outbound one call notification (locate request) with provable results. In multiple experiments, we can show that the probability assessment will rank tickets such that 50% or more of the actual damages occur on the top 10% of tickets. In addition, the bottom 50% of tickets lead to less than 10% of actual damages.

The product also supports a relative consequence score based on the actual assets found to be at risk from the underground facility owner's geographic information system.

Field use of the risk score to prioritize field damage prevention activities on the highest risk tickets has led to a measurable 30% reduction in damages per 1k locate requests across an entire state service territory. On going field use in several other states is expected to provide additional validation of the engine and the associated field activities that best prevent damages from occurring.

Do you have any documentation/information supporting the technology improvement?
Yes

If applicable, please upload technology improvement documentation for CGA reference.
OptimainxDR_Overview.pptx

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
Indiana

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Approx 30% year over year reduction in damages per 1k locates

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Allows more efficient use of limited damage prevention resources by focusing efforts on the highest risk tickets. Also provided rich statistical database that can be mined to drive pro-active damage prevention activities ("worst offenders", "best actors", etc.).

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Tracey Bryant, Vectren, tjbryant@vectren.com, (317) 776-5530

Submission#: 17

Please select your stakeholder group(s).
One Call

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Lowes Home Improvement - Tree Wrap

Briefly describe the engagement opportunity including the benefit it provides.
Lowes has committed to wrapping 1.5 million trees in 2017 with the "Safe Digging Partner" 811 logo. In addition, instructions provided to the person planting the tree begins with "calling 811 before digging." The benefit is in placing the message directly on the product that is to be installed. It is consistent and a nationwide effort.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Some retailers may hesitate to take a step like this because of a concern that the time delay may prohibit a sale. Costs were 0 to the stakeholders and only involved the commitment on the part of Lowes to add the information to their art work.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
Yes

If applicable, please upload documentation supporting the opportunity.
Lowes_Fruit_Spec_Tree_Wrap_811_2.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Unsure

In what year was the improvement first used or applied?
2017

Geographically, where was this applied?
USA

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
unknown

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

By encouraging excavators (homeowners) to call and at the same time educating them at point of sale.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- One Call
- Public Works
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 18

Please select your stakeholder group(s).
Excavator

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Locating

Provide a short title or name for the improved practice or methodology.
One Call membership Requirement

Describe the practice or method including the benefit it provides.
Require any facility owner to be a member of their states one call system. Require the facility owner to mark the buried facility within the prescribed timeframe determined in each state. NO EXEMPTIONS

Do you have any documentation/information supporting the improved practice or methodology?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 19

Please select your stakeholder group(s).
Gas Distribution

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Locating

Provide a short title or name for the technology improvement.
Electronic White Lining

Describe technology, how it has been used and the benefit it provides.
One Call Concepts electronic white lining application in their ITick internet application allow users to electronically white line the proposed excavation area.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2015

Geographically, where was this applied?
Louisiana

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
Don't know

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
LA One Call 811 users can electronically white line proposed excavation area when submitting a 811 ticket via the internet.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission

- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

One Call Concepts

Submission#: 20

Please select your stakeholder group(s).
Insurance

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
ConsistencyInOneCallLocatingLawsbyState

Briefly describe the engagement opportunity including the benefit it provides.
Consistency in notification periods to reduce workers' compensation claims.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?
Locator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 21

Please select your stakeholder group(s).
Gas Transmission

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Excavation

Provide a short title or name for the improved practice or methodology.
Gold Shovel Standard

Describe the practice or method including the benefit it provides.
http://www.goldshovelstandard.com/

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2010

Geographically, where was this applied?
California

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?
Gas Transmission

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 22

Please select your stakeholder group(s).

- Locator
- Other

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Locating

Provide a short title or name for the improved practice or methodology.
Understanding Utility Construction

Describe the practice or method including the benefit it provides.
Majority of locators only look at the equipment and not at the surroundings or where utilities would most likely be placed. I can tell you how many times the GPR and EM equipment didnt find anything but looking for cracks in the road or a green strip of grass has given me a clue.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?
Locator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 23

Please select your stakeholder group(s).

Gas Transmission

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Excavation

Provide a short title or name for the improved practice or methodology.

Tracking and Reporting of Hits/Near Misses

Describe the practice or method including the benefit it provides.

This process assists in the evaluation of hits/near misses regarding whether they are critical or non-critical. The benefit to the operator is allow them the ability to allocate available resources to address critical events taking place on the ROW.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Near Miss and Hit Flow Chart - DRAFT.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

Throught the US where our assets are located

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

TBD

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

It should not be used as a supplement, but rather an enhancement in determining the types of hits/near misses that are taking place on the ROW. Please note we have two documents to upload, however, the system will only allow one. I will be happy to send the supporting Guideline document at your request.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Gas Distribution
- Gas Transmission

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 24

Please select your stakeholder group(s).

- Gas Transmission
- Locator
- Oil
- One Call
- Railroad
- State Regulator

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mapping/GIS

Provide a short title or name for the technology improvement.

Transparent Earth

Describe technology, how it has been used and the benefit it provides.

Transparent Earth® leverages modern cloud & mobile technology, open standards, and patented processes to create geospatial intelligence designed to improve asset management practices. Transparent Earth runs on any browser and provides users with geospatial intelligence including visualization, real-time situational awareness, pedigreed data, and precise geospatial location information. Transparent Earth Provides Unprecedented Visualization, Data Analytics and Situational Awareness to all stakeholders involved in a project. With ProStar's real-time connectivity and enterprise interoperability, data collection, processes and workflows can now be viewed, managed, shared and controlled by both office and field personnel.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

the ProStar hybrid cloud1 (003).pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2014

Geographically, where was this applied?

Roanoke, VA

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

TBD

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

In 2016, VA811 was awarded a PHMSA grant to implement a pilot project that would verify that the cloud and mobile solution they selected could address the criteria of the grant provisions as they relate to improving risk management processes. According to Rick Pevarski, CEO of VA811: "The objective of this project was to identify and implement a cloud and mobile-based geospatial solution to enhance and streamline industry business practices, including how we currently capture, manage, qualify and share data. We selected the only solution that we felt would provide the desired results and that solution was Transparent Earth® provided by ProStar Geocorp."

The PHMSA pilot project was launched in June. So far, it has yielded the desired results and is now recognised as a major success. Pevarski continued: "Given the recent passing of the PIPES Act by the US Congress, I feel that this project is now even more relevant to the pipeline industry and we see this as a major step in promoting compliance to the new regulations."

The PHMSA grant was proposed as a means of finding a way of enhancing risk management practices by improving the current methods of capturing and sharing asset location information from multiple sources and conflating this data into a comprehensive geospatial system. VA811 determined that Transparent Earth's ability to capture, display and share the location and nature of buried infrastructure would provide the integral pieces required to unlock the complex puzzle of effectively maintaining and preventing damage to oil and gas pipelines. The ProStar solution was chosen for the PHMSA project because it offered cloud and mobile platforms that would allow for capturing precise subsurface asset locations using modern pipe and cable locate tools, GPS/GNSS receivers and electronic forms enabled with auto-population of both attribute and precise asset location data. By including One Call ticket information, point addresses, property lines, public awareness data and combining this with the ability to capture geo-referenced photos and sketches, the solution enhances the entire risk management work flow processes, from proposed excavation site identification and planning, to project completion, facility maintenance and ultimate retirement of the asset.

Data captured with the GPS-GNSS receiver meets both the US and Canadian mapping standards provided by the ASCE 38-02, standard guideline for the collection and depiction of existing subsurface utility data and CSA S250-11, mapping of underground utility infrastructure standards. Data capture binds the information from the locate device, the precision GPS receiver, tablet and the user metadata in every transaction. This means photos and forms, measurable attributes, GIS and engineering project data are combined to get a clear picture of the subsurface asset context including the precision, pedigree and provenance.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission

- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Rick Pevarski <rpevarski@va811.com>, 1829 Blue Hills Circle, NE Roanoke, VA 24012, 540.283.2520

Submission#: 25

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Monitoring Excavation and Backfill Activities

Briefly describe the engagement opportunity including the benefit it provides.
I believe that more monitoring of excavation activities by stakeholders with critical facilities such as underground power lines and intrastate natural gas main and distribution pipelines would reduce the number of damages and hits by excavators.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Obviously the cost of additional personnel associated with monitoring the excavation around these critical facilities would be the largest obstacle. Also, scheduling would be a concern.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
1986

Geographically, where was this applied?

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Because interstate transmission pipelines monitor excavation and backfill activities, the number of damages to transmission pipelines is practically non existent.

Which stakeholder group or groups have or could benefit from the improvement?

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 26

Please select your stakeholder group(s).

- Gas Transmission
- Oil

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

One-Call - Ticket Entry and Tracking

Provide a short title or name for the improved practice or methodology.

One Call Ticket Auditing

Describe the practice or method including the benefit it provides.

Audit all marked ticket against company procedures and one call laws.
One Call Dashboard to provide audit results to all levels of the company including senior management.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

Across the U.S.

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

no

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Increase ticket documentation errors. Better compliance.

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Distribution
- Gas Transmission
- Locator

- Oil
- Public Works

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 27

Please select your stakeholder group(s).

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Public Works
- Road Builder
- Telecommunications
- Emergency Services

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mobile Device/Data Collection

Provide a short title or name for the technology improvement.

DigCheck Pro

Describe technology, how it has been used and the benefit it provides.

DigCheck is a mobile application that provides utilities as well as Excavators to get real-time access to locate requests, both open and closed over a period of 30 days. Closed locates provide additional information like work performed, locator notes, StreetView of the locate facility, as well as high resolution picture of the locates performed. All of this is available free of charge to both customers as well as Excavators to help them with damage prevention efforts - another tool in their arsenal.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

DigCheck - Combined Data Sheet.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

National

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Currently the excavator on the ground have no ability to access any information regarding the status of the locate ticket. Most of this information is available to the central office of the excavating company - the individual who created the One Call ticket. They also do not have access to post locate photos or any additional information on the facility that the locate was requested - Google StreetView gives them the ability to plan their work - or even some specialized equipment that they may be required to rent to complete their work - now they can do a remote reconnaissance of the excavation site from their mobile device and be better prepared. With the Post Locate photos available to them - it also helps them verify that all work that they require is completed prior to them showing up at site.

This application also allows the Facility Owners to be able to easily monitor and view all of this information easily across their footprint - especially their damage prevention teams.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Public Works
- Road Builder
- Telecommunications

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Multiple references from Utilities as well as Excavators can be provided. Please contact me directly at 813-843-6112 or email.

Submission#: 28

Please select your stakeholder group(s).

- Locator
- Oil

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Briefly describe the engagement opportunity including the benefit it provides.

Daily I work with contractors to spread awareness of 811 and safe dig practices.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

The biggest obstacle I encounter is language. Most construction workers I encounter only speak Spanish, not English.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

- Excavator
- Gas Distribution
- Gas Transmission
- Oil
- Road Builder
- Telecommunications

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 29

Please select your stakeholder group(s).
Gas Distribution

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Other

Provide a short title or name for the technology improvement.
Data gathering

Describe technology, how it has been used and the benefit it provides.
Provide assistance to those companies without adequate IT support to upload information into DIRT. The current process prohibits significant volumes of companies from reporting their data, due to their inability to comprehend the steps to upload the data.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 30

Please select your stakeholder group(s).

- Gas Transmission
- Oil

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Predictive Analytics/Risk Assessment

Provide a short title or name for the technology improvement.

Describe technology, how it has been used and the benefit it provides.

A GE tool was placed in a busy road construction area but the accuracy was poor; no technology in place for damage prevention at this time.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

- Excavator
- Gas Transmission
- Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 31

Please select your stakeholder group(s).
Locator

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Enhanced Positive Response (EPR)

Briefly describe the engagement opportunity including the benefit it provides.
Enhanced Positive Response (EPR) provides excavator access to locator site documentation upon completion of a locate request. EPR transmits a positive response to the "ticket owner / excavator." EPR serves to bridge the gap between the excavator and locator by providing two-way communications facilitating a safer more efficient excavation process.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Inconsistent adoption of positive response systems by all states.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
Yes

If applicable, please upload documentation supporting the opportunity.
UtiliQuest - EPR_10052016.pptx

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
VA, MD, DC, OH, CO, CA

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
67% reduction in damages (damages per 1,000 locates) - see attached documentation

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Enhanced Positive Response (EPR) provides trust and accountability for all stakeholders in the Damage Prevention community. EPR is designed to reduce damages and provide a safer, more efficient work

environment for all stakeholders. Emails containing a link to the documentation are generated and sent to the requester for every ticket created after completing a locate request.

Each link will contain:

A copy of your locate request;

A copy of the Virtual Manifest™ the locator created in response to your request;

An overlay of facility locations on an ortho-photograph of your excavation area;

Photographs of the locate marks placed to verify the locator marked the request and/or documented any anomalies observed at the site.

This information provides a comprehensive overview of the work site and conditions, allowing excavators to plan resource allocation for the job. Included with each email is a survey that allows for immediate stakeholder feedback. The survey helps to improve the EPR process and keep everyone working safely. EPR provides trust and accountability for all stakeholders in the Damage Prevention community. EPR reduces damages and provides a safer, more efficient work environment.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Scott Brown, WGL - (703) 750-4388

Submission#: 32

Please select your stakeholder group(s).

Gas Distribution

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Locating

Provide a short title or name for the improved practice or methodology.

Measuring Volume of Open Work VS On Time Reporting

Describe the practice or method including the benefit it provides.

Ensuring that we understand exactly how much work is open is a better leading indicator than how much work was completed on time. Incorporating these targets into contract incentives and penalties with locating companies ensures motivation to ensure staffing levels are planned and appropriate. Ensuring your ticket management system is capable of reporting in real time the status of your locate requests is a key technology that drives the ability to manage proactively.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2005

Geographically, where was this applied?

Colorado, Minnesota, North Dakota, South Dakota, Wisconsin

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Open Work percentage has a direct correlation to mislocate ratio

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Traditional methods of measuring whether or not a locate was completed on time is not enough of an adequate indicator for staffing and is not an adequate leading indicator for anticipated damages per 1000 damage ratios that.

Which stakeholder group or groups have or could benefit from the improvement?

Gas Distribution

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

alicia.e.berger@xcelenergy.com

Submission#: 33

Please select your stakeholder group(s).

Locator

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mapping/GIS

Provide a short title or name for the technology improvement.

eSketch™ / Virtual Manifest™

Describe technology, how it has been used and the benefit it provides.

The eSketch™ tool visually documents the location where the technician placed the utility marks. The output is a Virtual Manifest™ and is an unalterable electronic locate record displayed on ortho-photography. It provides on site validation of the technician (location, date, and time, via GPS) for the locate request. The final product is a visual and digital record with detailed GPS mapping of all locate work completed.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

eSketch_gas results_2016.pptx

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2009

Geographically, where was this applied?

FL, LA, MS, TX, GA, TN, SC, NC, VA, WV, MD, DC, DE, NJ, OH, PA, NY, CO, CA, NV, WA, and OR,

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

30% reduction in damages (Gas Clients - damages per 1,000 locates)

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Best Practices 13.0, 4-15: Documentation of Work Performed - "Careful documentation helps ensure that there is an accurate record of the work performed by the locator and helps eliminate confusion over what work was requested by the excavator."

Electronically documenting with the eSketch™ / Virtual Manifest™ technology allows locators to record their utility locating activities at a proposed excavation site on geo-coded ortho-photography. The resulting manifest documents the physical marks on site with American Public Works Association (APWA) color coded lines for each facility located. The technology includes documented measurements from fixed environmental or geographic landmarks per each facility located. The technology also allows for the integration of the Virtual White Lining™ technology, delivering to the locate technician a clear delineation of the proposed dig area. The resulting documentation is delivered to the excavator through the Enhanced Positive Response (EPR) application with the combined dig area (white line) and locate markings displayed.

A clear, visually displayed dig area provides the locator with additional specificity to the written marking instructions. This serves to remove uncertainty, reduce over notification and minimize industrial graffiti. The documentation of the locate is the foundation to enhanced damage prevention serving as the catalyst for EPR, Risk Assessment (Plant at Risk) and broadened locate audits through FieldCheck™. The integration of these technologies promotes effective communication and cooperation between stakeholders.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Ashley Donnini, NiSource - (804) 638-5718 or adonnini@nisource.com

Submission#: 34

Please select your stakeholder group(s).

One Call

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Gopher State One Call's Partnership with the StarTribune

Briefly describe the engagement opportunity including the benefit it provides.

The StarTribune (5th largest newspaper in the nation), based out of Minneapolis, MN gave us the opportunity to leverage a variety of tactics in order to achieve promotion of new ticketing software, build brand image and identity and bring awareness to 811 and the need to call before digging. The six month campaign included use of high-impact print, realty magazine, startribune.com, advantage audience network, and geofencing technologies.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Time, manpower and budget create obstacles for us every year. Gopher State One Call only employs two individuals so time and effort must be given to priority items and tasks.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

Yes

If applicable, please upload documentation supporting the opportunity.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- One Call
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Estelle Richard, estelle.richard@gopherstateonecall.org, 651-681-7303

Submission#: 35

Please select your stakeholder group(s).

Locator

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Predictive Analytics/Risk Assessment

Provide a short title or name for the technology improvement.

Plant At Risk (PAR)

Describe technology, how it has been used and the benefit it provides.

Plant At Risk assesses, in real time, facility risk associated with each locate request based on; work type, excavator damage history, utility operator facility record data, utility locator damage history and tenure. This assessment is performed both before and after underground locate activities take place. This technology allows the utility operator and utility locator to allocate resources, as needed, based on the risk level identified.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Plant At Risk_10052016.pptx

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2013

Geographically, where was this applied?

VA, DC, and MD

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

6.7% (1.35 to 1.26) reduction in damage ratio for WGL - system wide 2014 - 2016 (damages per 1,000 locates)

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Plant At Risk (PAR) is an automated program that uses ticket attributes, historical factors and facility records to analyze and predict damage risk. Risk engine algorithms calculate facility risk, based on work

type, excavator damage history, utility operator facility record data, utility locator damage history and tenure. PAR performs the analysis both before and after underground locate activities take place. A “risk potential score” is assigned to each locate request which enables the operator to know what facilities are at risk before the locate is performed. The application includes an automated method for notifying excavators of high risk locate requests. Communicating high risk or high profile conditions to the excavator enhances the working relationship between locators and excavators. This develops a sense of ownership for the facility that extends from the utility owner to both the locator and excavator.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Scott Brown, WGL - (703) 750-4388 or ssbrown@washgas.com

Submission#: 36

Please select your stakeholder group(s).

Excavator

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Excavation

Provide a short title or name for the technology improvement.

Virtual White Lining™

Describe technology, how it has been used and the benefit it provides.

Virtual White Lining™ indicates exact "excavator defined" dig area visually, on ortho-photography without the need for a site visit. The technology allows the excavator to identify for the locate technician a clear delineation of the proposed dig area.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Virtual Whiteline Study Virginia_10052016.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2009

Geographically, where was this applied?

VA and MD

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

23.88% reduction in damages (damages per 1,000 locates)

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Virtual white lining is a process whereby an excavator can delineate their proposed excavation site on an ortho-photography image that is communicated electronically to the utility locator. Therefore, virtual white lining aids in the overall utility marking effort by removing uncertainty around the excavation area. Providing better specificity through virtual white lining results in a lower ratio of damages, eliminates non-productive conversations between excavators and locators, and reduces the amount of wasted

paint being placed on the ground. This is accomplished at a nominal cost compared to conventional white lining costs without negative impact to the environment. By clearly defining the excavation area to a locator, they in turn produce a higher quality, more efficient locate.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Brandon Stussie, Lamberts Cable Construction, LLC - (252) 883-3553 or brandon.stussie@lambertcable.com

Submission#: 37

Please select your stakeholder group(s).

Excavator

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Excavation

Provide a short title or name for the improved practice or methodology.

potholing

Describe the practice or method including the benefit it provides.

hydrovac excavation is a very good method to get 100% verification of underground utilities

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

1992

Geographically, where was this applied?

nationwide capabilities

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

as evident by the DIRT report

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

hydro vac excavation provides 100% verification for underground utilities

Which stakeholder group or groups have or could benefit from the improvement?

Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 38

Please select your stakeholder group(s).

- Engineering/Design
- Excavator
- Locator
- One Call
- Telecommunications

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Locating

Provide a short title or name for the improved practice or methodology.

Pre-planning of large infrastructure projects

Describe the practice or method including the benefit it provides.

The one-call process has been overwhelmed when large infrastructure projects are implemented in communities. A common such project is the installation of fiber optic services for an entire city. These projects put sudden and large demand on the call center, facility operators and locators. This increases the risk for damages. Preplanning of such projects that involve all stakeholders have helped all stakeholders comply with the required call center and locate demands.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Unsure

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This preplanning reduces the surprise of large demands on the one call and locating services of a community thus increasing compliance with the one call laws of the state.

Which stakeholder group or groups have or could benefit from the improvement?

- Excavator
- Locator
- One Call
- Telecommunications

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 39

Please select your stakeholder group(s).

- Engineering/Design
- Excavator
- Gas Distribution
- Public Works

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Mitigating Cross Bores

Provide a short title or name for the improved practice or methodology.

Preconstruction locating of all sewers

Describe the practice or method including the benefit it provides.

Preconstruction location is he sensual to ensure that all sewers are located on the property prior to excavation or boring operations. Locating sewer is primarily through lateral launch capabilities from the main sewer line and then follow up camera location from the building back towards the sewer main allows for all components of the sewer To be located. This location includes depth. With this location companies can design your improvement better and contractors can reduce the risk of Cross-bores. Even if the contractor is still required to expose the proposed Crossing, preconstruction locating prior to Hydro excavation allows for maximum and minimum restoration.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2012

Geographically, where was this applied?

In 2012 we first started locating through lateral launch in the Mi. In 2006 we started locating mainline sewer is in the Midwest

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Not measured but we have seen a reduction in the number of CB's from a period where preconstruction locating was not available

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

One call system locate almost every utility except the private sewer. The private sewer is what is a key component in Cross-bores. Some contractors will attempt to locate sewers through cleanout or other visible structures. Issue is, that may not be the only sewer line on that property nor is it always accessible with above ground structures. Preconstruction located, utilizing the method that we have created, reduces the chance of Cross-bores by identifying all sewers prior to construction or engineering. It should be noted that post construction verification should still be required. This verifies that the contractor has used the preconstruction information to successfully navigate around the sewers. I'm available if you have anymore questions and then share additional documents and cremation. We provide the services or cross the country for contractors, utility owners, engineers and public works department.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Locator
- Public Works
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 40

Please select your stakeholder group(s).
Locator

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Locating

Provide a short title or name for the technology improvement.
FieldCheck™

Describe technology, how it has been used and the benefit it provides.
FieldCheck™ is a quality assurance application that utilizes electronic locate documentation (eSketch™ / Virtual Manifest™), utility operator facility record data, pre-excavation photographs, locate request (ticket), and etc. This interactive software utilizes advanced decision tree logic and algorithms to assess data associated with a completed locate request. Each assessment compares the documentation with user defined parameters to assign value for determining potential facility damage risk.

FieldCheck™ and the associated review process identifies risk and reduces damage potential by enabling real time quality auditing and immediate corrective action prior to the excavation due date.

Benefits:

100% internal quality assessment of each completed locate request.

Enables focused audits based on user defined parameters.

Provides for utility operator and regulatory agency compliance management.

Do you have any documentation/information supporting the technology improvement?
Yes

If applicable, please upload technology improvement documentation for CGA reference.
FieldCheck_10072016.pptx

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2010

Geographically, where was this applied?
FL, LA, MS, TX, GA, TN, SC, NC, VA, WV, MD, DC, DE, NJ, OH, PA, NY, CO, CA, NV, WA, and OR,

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
Since 2010, this application contributed to achieving a 30% reduction in incidents for our gas clients (per 1,000 locates).

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Best Practices 13.0, 4-18: Quality Assurance - "Underground facility owners / operators have a quality assurance program in place for monitoring the locating and marking of facilities."

FieldCheck™ is a key component of a comprehensive technology suite that leverages locate documentation (eSketch™ / Virtual Manifest™), utility operator facility record data, pre-excavation photographs, locate request (ticket), and etc. providing for real time quality assurance (post-locate and pre-excavation).

With the application, pre-assessment is accomplished programmatically prior to auditors reviewing the locate request documentation performed by a locator. The review compares site marking data, photos, facility maps, and the ticket scope of work (marking instructions) to evaluate the quality of the locate prior to the excavation due date.

After pre-assessment using real-time access to locating records and a dashboard display, this quality assessment tool enables auditors to validate the work performed by locators. Utilizing the Virtual Manifest™ created by eSketch™, auditors electronically view and verify the quality of the field work product. Auditors assess additional risk and information including locate quality and adherence to work product requirements. And most importantly, if the locate does not meet internal / external quality standards, immediate corrective action is taken.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications

- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Richard L. Krauss, UtiliQuest, LLC - (770) 238-6129 or richard.krauss@utiliquest.com

Submission#: 41

Please select your stakeholder group(s).
Gas Distribution

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Other

Provide a short title or name for the technology improvement.
Enhanced Positive Response EPR

Describe technology, how it has been used and the benefit it provides.
EPR provides the excavator with all the information that the utility operator maintains after the locate is performed. including maps, photos, GPS time and date stamps, Ortho photography of the job site, a white line that is the locators perception of the excavation area, and a copy of the dig request ticket.

Do you have any documentation/information supporting the technology improvement?
Yes

If applicable, please upload technology improvement documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
MD DC AND va

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
LOWEST DAMAGE RATIO IN COMPANY HISTORY 1.26 /1000

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
THE FUNDIMENTAL USE OF ALL INFORMATION AVAILABLE TO PREVENT DAMAGES. THIS TECHNOLOGY BULDOZES THE WALLS OF OPERATOR EXCAVATOR CONTENTION AND CREATES A RELATIONSHIP BUILT ON TRUST AND UNDERSTANDING, THAT WILL CREATE A SAFER WORK ENVIRONMNET AND REDUCE DAMAGES.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large
- Other

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?
SCOTT BROWN 703 750 4388 OR SSBROWN@WASHGAS.COM

Submission#: 42

Please select your stakeholder group(s).

Locator

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Mapping/GIS

Provide a short title or name for the improved practice or methodology.

Records Verification & Correction

Describe the practice or method including the benefit it provides.

Best Practices 13.0, 4-2: Corrections and Updates - "If a facility locator becomes aware of an error or omission, then the facility locator provides information for updating records that are in error or for adding new facilities."

Records Verification & Correction is a process validating the accuracy of existing gas service plant location records (plats) and then providing corrected data (as derived from the true physical plant location of the facilities) when errors are identified.

To mechanize this process, we utilize eSketch™ / Virtual Manifest™ and OmniLume™ applications to compare current facility records against actual plant location resulting in timely records correction. This technology provides immediate and accurate transfer of the data and creates an updated record.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Records Correction_42.pptx

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2013

Geographically, where was this applied?

VA, DC, and MD

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

520,000 service card records were verified with 11,400 corrected.

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Upon completion of a locate; the technician uses eSketch™ to document the location where the utility marks were placed. The output is a Virtual Manifest™, an unalterable electronic locate record displayed on ortho-photography. The final product is a digital and visual record with detailed GPS data points showing the completed locate markings.

The Records Verification & Correction process includes the use of OmniLume™, a records conversion and viewing application. This application places utility operator records in a common unified platform providing records comparison analysis to verified field conditions. When records corrections are necessary, the completed Virtual Manifest™ is mechanically transmitted to the utility operator via ortho-photography and .tif format. This allows for seamless updating of the operators plant records management system.

The same process is also used to validate the accuracy of, and document, building footprints and other un-mapped facilities (such as gas lights, anode fields, valves, meters, meter manifolds, and etc.).

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Scott Brown, WGL - (703) 750-4388 or ssbrown@washgas.com

Submission#: 43

Please select your stakeholder group(s).

Gas Distribution

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Communication

Provide a short title or name for the improved practice or methodology.

Standardizing Damage Prevention letters

Describe the practice or method including the benefit it provides.

Southwest Gas standardized six letters sent to excavators, homeowners, and other involved parties to streamline communication.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Unsure

In what year was the improvement first used or applied?

2016

Geographically, where was this applied?

Arizona, California, and Nevada

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

unknown

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Described above.

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Distribution
- Gas Transmission

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 44

Please select your stakeholder group(s).
Equipment Manufacturer

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Locating

Provide a short title or name for the technology improvement.
Use of Electronic Marking System and RFID technology for marking buried utilities.

Describe technology, how it has been used and the benefit it provides.
The use of Electronic Marking Systems is widespread among top gas utility operators and well documented. This technology offers advantages in particular cases over traditional electromagnetic locating processes in Accuracy, Simplicity, Long Life. Virtually all of the top Gas Operators in the US with top tier metrics as in damages/1000 locates use markers in some fashion.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
1975

Geographically, where was this applied?
Currently used worldwide

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
No specifics but it is a common practice among the companies with elete safety records.

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
The use of Electronic Marking Systems to identify buried assets is widespread and is used to mark points of special interest that may need to be excavated during the life of the facility for maintenance or construction. By their nature, these points are high risk and the need to clearly and accurately identify and locate them prior to excavation reduces the likelihood of excavation damage to the target and adjacent utilities present EM locating by its nature is well suited to path locating but not for point

locating, Electronic Marking fills this need with a simple, accurate solution that has been field proven over several decades.

Which stakeholder group or groups have or could benefit from the improvement?

Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

References available upon request at most of the largegas utilities in the US

Submission#: 45

Please select your stakeholder group(s).

Excavator

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Eliminate/Reduce Municipal Exemptions to One-Call Membership Requirements

Briefly describe the engagement opportunity including the benefit it provides.

Federal damage prevention grant dollars are restricted from state programs that exempt municipalities and their contractors from one-call notification requirements. Eligibility criteria should apply the same restriction to state programs exempting municipalities from having to belong to their respective 811 one-call center. This "incentive" will encourage full municipal engagement in the damage prevention process.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Unmarked sewer laterals remain the single largest cause of cross bores. While state law generally requires underground facility operators to locate and mark their infrastructure prior to excavation, the responsibility for marking and locating sewer laterals continues to be a contentious issue. Municipalities, who generally own and operate the water and sewer systems, are often exempt from one-call membership requirements. This exemption effectively relieves them of their responsibility to locate their sewer systems. To make matters worse, because these laterals generally exist on private property, municipalities often place the responsibility of locating and marking sewer laterals in the hands of unknowing property owners.

CGA Best Practice 4-21 states that the “service line is marked in response to a locate request to a governmental entity that provides a product or service to an end-use customer via the service line.”

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

Yes

If applicable, please upload documentation supporting the opportunity.

DCA Position Paper_Cross Bores_FINAL.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution

- Gas Transmission
- Locator
- One Call
- Public Works
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 46

Please select your stakeholder group(s).
State Regulator

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Locating

Provide a short title or name for the improved practice or methodology.
Diameter and Pipe Material

Describe the practice or method including the benefit it provides.
Pipeline locators should consistently include the diameter of the pipeline and the pipe material designation when marking an underground pipeline. A locator should make additional identification markings to show changes in pipe size and material changes of underground pipelines in the area of excavation.

Often an excavator will uncover an abandoned underground pipeline and not realize that the active pipeline is located underneath or in close proximity of the abandoned pipeline.

Do you have any documentation/information supporting the improved practice or methodology?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 47

Please select your stakeholder group(s).

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Other

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Abandoned Utilities Can Be Repurposed

Briefly describe the engagement opportunity including the benefit it provides.

Abandoned utilities clog our rights-of-way. Locators frequently find it difficult to distinguish between active and abandoned lines. Most abandoned lines are not mapped. Many are unlocatable.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Due to asbestos regulations and past pipeline content, many abandoned lines are difficult to repurpose.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design

- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large
- Other

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Lori Greco, City of Mesa, AZ, Lori.Greco@MesaAZ.gov, (480) 644-2503

Submission#: 48

Please select your stakeholder group(s).

Other

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mapping/GIS

Provide a short title or name for the technology improvement.

KorWeb One Call Ticket Management Software

Describe technology, how it has been used and the benefit it provides.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2005

Geographically, where was this applied?

Nationwide

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

N/A

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works

- Road Builder
- Telecommunications

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 49

Please select your stakeholder group(s).
Excavator

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Communicating with the Excavator

Briefly describe the engagement opportunity including the benefit it provides.
Preconstruction meetings with the utility operators and locators to discuss the flow of the job. Benefit is less time locating and more time being productive to the locator. The utility has a facility that is not damaged. The contractor can actually do their job on-time.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Utility operators do not want to burden themselves with communicating with many contractors. They are only interested in providing legal cover for themselves and their contract locators.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
Yes

If applicable, please upload documentation supporting the opportunity.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
No

In what year was the improvement first used or applied?
2009

Geographically, where was this applied?
Indianapolis, Indiana

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
99%

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Actually putting it in practice.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large
- Other

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Steve Sweet, ssweet@calumetcivil.com, 317-538-2885

Submission#: 50

Please select your stakeholder group(s).

Gas Distribution

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Subsurface Utility Engineering

Provide a short title or name for the improved practice or methodology.

Common Duct Run for fiber/phone/cable

Describe the practice or method including the benefit it provides.

If a common duct run were developed that most utilities could lay in there would be less need for constant directional drilling to install continuous upgrades to fiber/phone/cable/electric resulting in way fewer damages. The underground world is riddled with abandoned utilities, new utilities and the problem is only going to get worse unless there is some kind of solution like this implemented.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Public Works
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 51

Please select your stakeholder group(s).
One Call

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
One-Call - Ticket Entry and Tracking

Provide a short title or name for the improved practice or methodology.
No One Call Ticket Report

Describe the practice or method including the benefit it provides.
The 811 center can accept reports of digging where no markings are visible, confirm via ticket search that no one call ticket exists, collect information from the caller to complete a 'no one call' ticket and transmit it to the member utilities as excavation in progress. Since implementation in July 2016, 81 reports of digging with no one call ticket have been received.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.
YTD_NoOneCallLogBySerialNumber_2016_1014.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Unsure

In what year was the improvement first used or applied?
2016

Geographically, where was this applied?
Pennsylvania

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
undetermined

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
It provides a centralized location for the general public and members to report excavation activities when underground utility mark outs are not visible.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Gas Distribution
- Locator
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 52

Please select your stakeholder group(s).

Excavator

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Asset Management

Provide a short title or name for the improved practice or methodology.

Describe the practice or method including the benefit it provides.

As for us working in the ag industry we are not crossing transmission line anymore we will only run parallel to the lines . And since law allows the operators not to tell us depth of the line I am making them make sure when we cross the depth is safishant to carry are 200000 + lbs the weight of the tractor.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

Gas Transmission

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Pge of ca

Submission#: 53

Please select your stakeholder group(s).

Excavator

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Legislative

Provide a short title or name for the improved practice or methodology.

Law Change

Describe the practice or method including the benefit it provides.

Class B operators should be required to be members so that utilities are marked. Locators should indicate depth of utilities when inputting ticket so excavators will have that information. Change excavation laws to include private utilities to include but not be limited to yard sprinkler private Electric private gas anything Downstream the point of measurement to be performed buy excavator for hire someone with equipment and expertise. After excavations are complete all known public and private utilities should be tested. Set new rules for congested areas or high-risk areas to be Hydro excavated or other similar Technologies. In high congested areas use drop ball sondes and each utility has a dedicated frequency. Tie all city, state and local permits to 811 where Excavating will be performed. Educate the public buy pamphlet in water bills electric bills phone bills at cetera.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Sanders Plumbing Inc 817-293-6393. Philip Sanders 817-706-4664

Submission#: 54

Please select your stakeholder group(s).
Engineering/Design

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Subsurface Utility Engineering

Provide a short title or name for the improved practice or methodology.
utility locating, survey, mapping and visualisation of underground infrastructure in 3D

Describe the practice or method including the benefit it provides.
Although the CGA and the One Call at the respective states have done an incredible job to improve Utility Locating, One Call Awareness and communication between underground stakeholders one key component is still missing at the design and planning stages of a project. Subsurface Utility Engineering (SUE) has been around for decades but it is often perceived as a "Cadillac Service" which does not apply to smaller projects; as a result it is often dismissed. In addition, the results of a SUE investigation is often integrated into the design plans for a project and the results are rarely available to the on-site workers in the trenches. The Utility Locating and mapping professionals (SUE and "Utility Locate Professionals") still fail to provide the on-site workers, including but not limited to supervisors, machine operators, drillers, foundation excavators and labourers, with a non-paper based visualisation means to see the subsurface utility information in 2 and 3D which can enable site professionals make "informed decisions" regarding workers safety. The Vac Group design and provides an easy means to map the underground infrastructure and deliver a 3D visualizations for on site workers to make those informed decisions based on spatial awareness especially the precise location of buried assets. Providing workers with critic 3D information saves lives, reduces worker injuries, protects infrastructure and reduces accidents on site.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.
Vac Group 3D Visualization.jpg

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2008

Geographically, where was this applied?
Florida and Boston and Australia.

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

not documented due to the lack or reporting tools

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

The SUE industry provides 2D utility plans to designers but there is no mechanism in place to export this data to the on-site personal. the One Call responders never get to see the work and results of a SUE investigation on site. The results from SUE investigations rarely, if ever, make it back into an asset owners GIS (ESRI files). On site coordination between excavators and One Call responders rarely engage the SUE or Utility Locators to discuss the proposed work and the possible utility conflicts or critical work zones which may pose a risk. The benefit of new 3D visualisation delivery formats is that it does enable an easy to share visualisation on tablets and devices that can be shared and viewed on any device and without proprietary software.

Which stakeholder group or groups have or could benefit from the improvement?

Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

phone my Australia number 61 0447 005 902

Submission#: 55

Please select your stakeholder group(s).

Locator

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Locating

Provide a short title or name for the improved practice or methodology.

Improved Vacuum Excavation and Soil Recycling system

Describe the practice or method including the benefit it provides.

Although non-destructive vacuum excavation has been a Best Practice for the CGA for many years the commercially available industry systems have been dictated by the Vacuum Truck Manufactures and how best their products can be tailored to meet the industry needs. In contracts, the Vac Group has designed and built a focused Vac Truck which is much more productive, reliable and out-performs larger more expensive units.

The benefit of the Vac Group purpose built Vac Truck is the improved performance with decreased cost per hole and reduced cost per cubic meter for excavation. (SUE, Utility Locating, Directional Boring applications and Trench less Technology applications).

In addition the Vac Group has designed a soil recycling system that will recycle spoils from a Vacuum Excavation system and the benefit is the ability to reuse the spoils and water and reduces the spoil disposal costs dramatically.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

W433_VAC Group_OCT_2016_eBOOK.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

No

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

Brisbane Australia at the Vac Group location.

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Yes as it applies to exposing underground facilities for Utility Locating, Utility mapping and Utility Damage Prevention service

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

The Vac Group Vacuum excavation systems greatly reduces the costs of ownership, the cost of running and disposal costs and a reduction in labor costs for vacuum excavation services. The reduced cost will enable more entities, both public and private, to own and operate a Vacuum system and use non-destructive excavation on all small and large projects.

The soil recycling system will reduce the impact and cost of Vacuum excavation disposal cost and provide firms with a reduction in their carbon footprint.

Which stakeholder group or groups have or could benefit from the improvement?

Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Neil Costello, Vac Group 61 0407 466 460

Submission#: 56

Please select your stakeholder group(s).

- Gas Distribution
- Other

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Excavation

Provide a short title or name for the improved practice or methodology.

Vacuum Excavation - A Safer Way to Expose Utilities

Describe the practice or method including the benefit it provides.

Vacuum Excavation is a safer way to expose underground utilities and needs to be supported by CGA and all state One Call Systems. Not only can vacuum excavation be used to spot utilities prior to all excavation projects, but spotting of utilities should be mandated for all trenchless utility installations (exposing all crossing and near parallel utilities). This is currently a best practices in certain jurisdictions and by certain excavators and utility operators. This practice if followed by all will greatly reduce 3rd party damage when trenchless installation is used.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Trenchless Best Practices for Damage Prevention May 3 2016.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

1990

Geographically, where was this applied?

everywhere

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?

- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Road Builder
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Dennis Jarnecke, dennis.jarnecke@gastechnoloyg.org, 8475612954

Submission#: 57

Please select your stakeholder group(s).

Excavator

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Locating

Provide a short title or name for the improved practice or methodology.

Open Communications with Locating Companies

Describe the practice or method including the benefit it provides.

MP Technologies and USIC have developed a unique relationship between the two companies. A bi-weekly conference call is held between field supervisors from both companies. MP Technologies provides installation of electric and gas distribution for Xcel Energy. USIC is the contract locator for Xcel in a majority of the area MPT works in. Many of the projects are lengthy and require resources from USIC greater than a normal one call ticket might. MPT provides advance notice and maps to USIC for all projects it will be working on for Xcel in advance of the locate meet. MPT has attended nearly all USIC new hire training sessions this year along with Xcel Damage prevention to give an "excavator's perspective" to each class. This gives the locators a human face to the excavators who they are providing markings for. MPT discusses the challenges an excavator faces and lets the locators know that we are open to assisting them and keeping communication open at all times in the field. USIC management attends the annual MPT Spring Safety meeting and discusses locating challenges and stresses open communication to MPT employees as well. USIC also provides locating services for the CATV and Communications for most of the area they cover. This relationship has resulted in reduction of at fault locator and contractor damages and has increased productivity of both companies. Cell phone numbers of the field contacts for both companies are shared. MPT foremen have USIC supervisors and managers contact information. Any issues in the field are resolved quickly and professionally. Conflicts that normally are present between locators and contractors have been reduced to near zero. MPT also has close ties to other locating companies who are contracted with Xcel in the "outer" areas where MPT also conducts work. MPT believes that major project excavators for utilities could all benefit by establishing good working relationships with the locators who are contracted in their areas, and with having open and transparent communications, especially conveying future workload information. MPT works with USIC on un-locatable utilities or hard to locate utilities by assisting in opening equipment or vacuum excavation as needed.

Do you have any documentation/information supporting the improved practice or methodology?

Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

Minneapolis/St Paul, MN Metro area and greater MN

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

MPT has not had a direct at fault damage to Xcel plant in two years

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

The practice of two major players in the industry working closely together to help manage workloads and assure accurate locate information is available improves the efficiency and intent of the One Call System. By reducing the conflict between the two entities and encouraging communication between field staff who depend on each other to perform work that does not damage utilities the system can operate at full potential.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Locator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

USIC- Adam McAlpine 612-290-1904

Submission#: 58

Please select your stakeholder group(s).

- Gas Distribution
- Gas Transmission

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Mitigating Cross Bores

Provide a short title or name for the improved practice or methodology.

Use of pull back cameras after pneumatic boring

Describe the practice or method including the benefit it provides.

Upon completion of a pneumatic bore prior to installing the new gas service line, a camera is pulled back through the bore hole to verify there is no conflict with unmarked or unknown facilities. This video footage is then stored and shared with the Utility for verification purposes

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2014

Geographically, where was this applied?

Chicago Illnois

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

We have elimitated return trips to locations for repairs where this procedure was used

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Distribution
- Public Works

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 59

Please select your stakeholder group(s).

Excavator

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mobile Device/Data Collection

Provide a short title or name for the technology improvement.

811 #'s tied to Job Briefings

Describe technology, how it has been used and the benefit it provides.

Job Briefings are now tablet driven. Crew Leader must populate 811 field prior to submitting Briefing. If Briefing is not submitted, then payroll info can not be submitted via tablet. This simple chain drives the crew leader to confirm that the job has a valid 811 ticket prior to the start of the wok on any given day. Crew ill not be paid, if 811 is not confirmed.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2016

Geographically, where was this applied?

NYC

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?

Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 60

Please select your stakeholder group(s).
Excavator

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Briefly describe the engagement opportunity including the benefit it provides.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 61

Please select your stakeholder group(s).
Gas Distribution

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Mitigating Cross Bores

Provide a short title or name for the improved practice or methodology.
NiSource Cross Bore Elimination Process

Describe the practice or method including the benefit it provides.
NiSource put together a team from each of its operating states and contractors to enhance its Trenchless Technology procedures. Implementation includes 5 hours of training toi all employees. Once the training is complete and formalized QA/QC procedure is in place. This new process will increase the overall awareness of NiSource employees and its contractors in order to eliminate future cross bore incidents

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- State Regulator
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 62

Please select your stakeholder group(s).

Equipment Manufacturer

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Locating

Provide a short title or name for the technology improvement.

Gas & Water Service Line Tracer

Describe technology, how it has been used and the benefit it provides.

Jameson manufactures traceable conduit rodders and accessories. The Service Line Tracer is used to trace position and depth of non-conductive gas or wwater services. The Tracer is a long flexible rod made from a fiberglass core and a plastic protective jacket. The core has a copper wire embedded in it that carries a locator tone. The rod is inserted at the meter with use of a stuffing box to seal off against gas/water leaks. The rod is pushed inside the service line until it hits the main. The service can now be traced with conventional locating methods.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Live_Tracer_Gas_Service_Lines.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2011

Geographically, where was this applied?

All of US

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

No data

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Safe, one-man, non-invasive method for tracing non-conductive gas and water service lines.

Which stakeholder group or groups have or could benefit from the improvement?

- Engineering/Design
- Excavator
- Gas Distribution
- Locator
- One Call
- Road Builder
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Eric Swartley, UGI eswartley@ugi.com

Submission#: 63

Please select your stakeholder group(s).

Equipment Manufacturer

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Locating

Provide a short title or name for the technology improvement.

Gas Main Tracer

Describe technology, how it has been used and the benefit it provides.

The Gas Main Tracer is a fiberglass duct rodder with a copper wire embedded in the core. The copper wire becomes a traceable path when inserted into non-conductive gas and water mains. The rod is inserted by use of an electrofusion or mechanical insertion tapping tee. A stuffing box is also used to prevent leaking. Once the rod is inserted, it can be traced by conventional locating methods. The gas or water supply does not need to be turned off during this process. This process enables safe, fast, non-invasive tracing of gas and water mains.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Live_Tracer_Gas_Main.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2013

Geographically, where was this applied?

All of US

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

No data

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Safe, efficient, non-invasive, non-disruptive method for tracing gas or water mains with no leakage and no interruption of service.

Which stakeholder group or groups have or could benefit from the improvement?

- Engineering/Design
- Excavator
- Gas Distribution
- Locator
- One Call
- Public Works
- Road Builder
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 64

Please select your stakeholder group(s).

Equipment Manufacturer

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Locating

Provide a short title or name for the technology improvement.

Directional Entry Tool

Describe technology, how it has been used and the benefit it provides.

The Directional Entry Tool is a mechanical device that inserts a launching tube with an inclined internal profile into a live gas or water main as small as 2" IPS. The Tool installs on off-the-shelf branch saddles. The inclined "shoe" that is inserted enables a traceable rod or inspection camera to make the initial difficult 90° bend at entry. A stuffing box is used to prevent gas or water leakage. Once the rod or camera is inserted, the main can be traced or inspected. Some customers use the Tool to launch cameras to locate service tie-ins for avoidance when using HDD's. Abandoned service "taps" or "stubs" can also be located for proper management.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Directional Entry Tool_V14.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2016

Geographically, where was this applied?

Arizona, Texas

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

No data

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Safe, efficient, non-invasive, non-disruptive method for tracing or inspecting live gas or water mains with no interruption of service.

Which stakeholder group or groups have or could benefit from the improvement?

- Engineering/Design
- Excavator
- Gas Distribution
- Locator
- One Call
- Public Works
- Road Builder
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Jody Robles, SW Gas, jody.robles@swgas.com

Submission#: 65

Please select your stakeholder group(s).

Equipment Manufacturer

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Other

Provide a short title or name for the technology improvement.

Vermeer Fleet/Edge

Describe technology, how it has been used and the benefit it provides.

Vermeer Fleet/Edge is an on-rig telematics system that collects and reports information about the operational values of the horizontal directional drill including: thrust/pullback force and speed, rotational torque, rotation speed, drill string length, drilling fluid flow and pressure as well as GPS location and machine diagnostic information.

-These values are reported back to the customer in near real time, allowing for up to date monitoring of the parameters as well as historical review of any data collected and transmitted from the machine.

-Using these values, an analysis of the bore can be completed to determine if there were anomalies encountered during the bore such as: reduction of drilling fluid pressure, unexpected thrust forces, unexpected rotation forces or unexpected thrust or rotation speed changes. This information could be used to determine if further examination of a utility strike should take place based on values recorded during the bore.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Gas Distribution
- Gas Transmission
- Telecommunications

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 66

Please select your stakeholder group(s).

- Excavator
- Gas Transmission
- Oil
- Other

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Damage Prevention

Briefly describe the engagement opportunity including the benefit it provides.
Training all employees on the common sense procedures in place to prevent utility damage and allowing more time to train new employees.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
I believe time and organization are obstacles.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
Yes

If applicable, please upload documentation supporting the opportunity.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?
Tony Abbott Jr., tony.abbott.jrL@mnlimited.com, 763-262-7057

Submission#: 67

Please select your stakeholder group(s).

Equipment Manufacturer

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Building Information Management

Provide a short title or name for the technology improvement.

Usage and location logging for continuous improvement and data analysis

Describe technology, how it has been used and the benefit it provides.

Capturing and storing usage and location information on non-volatile memory within a locator, and retrieving that information for subsequent display and analysis. This has been used to assess the compliance of teams' working behaviors to corporate safety practices. It provides objective assessment of on-site behaviors to establish training requirements of operators and to allow intervention before poor practice is established. Over time it can also be used to assess effectiveness of training.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Radiodetection Usage and Location Logging.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

All States

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Confidential with our customers

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This technology is used to improve the quality of one call markings by ensuring operators are working to the highest standards.

Which stakeholder group or groups have or could benefit from the improvement?

Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Greg Jeffries gwjeff2@gmail.com 469-562-7719

Submission#: 68

Please select your stakeholder group(s).

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Public Works
- Railroad
- Telecommunications

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Locating

Provide a short title or name for the improved practice or methodology.

Ambient Interference Measurement

Describe the practice or method including the benefit it provides.

This technology measures noise on the locate site and determines best frequencies for the site.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Unsure

In what year was the improvement first used or applied?

2013

Geographically, where was this applied?

Globally

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This is a technology that can be added to the locate process using Subsite locators with this feature option. It can help the locate technician be more accurate in the locate process by identifying

frequencies that would work best in a particular locate area that may have other interfering signals.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Public Works
- Railroad
- Telecommunications

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 69

Please select your stakeholder group(s).

- Electric
- Gas Distribution
- Gas Transmission
- Oil
- Public Works
- Railroad
- Road Builder
- Telecommunications

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Mitigating Cross Bores

Provide a short title or name for the improved practice or methodology.

Drill-To

Describe the practice or method including the benefit it provides.

Drill-To tracking identifies the projected depth under the tracker when the tracker is placed in front of the drill head, giving the drill operator a chance to make corrections to the drill head position on a real-time basis. The tracker can be placed by an exposed crossing utility. The depth of the utility is known, projected depth is known.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2013

Geographically, where was this applied?

Globally

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Gas Distribution
- Gas Transmission
- Oil
- Public Works
- Railroad
- Road Builder
- Telecommunications

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 70

Please select your stakeholder group(s).

Equipment Manufacturer

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Excavation

Provide a short title or name for the improved practice or methodology.

Safety sweep before excavatiion

Describe the practice or method including the benefit it provides.

Safety sweep with a high frequency locator prior to digging - The last line of defense.

Fast, easy, affordable. See safety sweep video at www.pipehorn.com

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2010

Geographically, where was this applied?

Nationwide

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

15%+ reduction in 3rd party damages

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

CGA best practice 5.10 recommends excavators verify locate markings and, to the best of their ability, check for unmarked facilities.

We think a simple sweep with a high frequency locator is the best way to check for unmarked facilities.

Which stakeholder group or groups have or could benefit from the improvement?

- Excavator

- Gas Distribution
- Gas Transmission

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Vip Kapoor - Peoples Gas vkapoor@peoplesgasdelivery.cm

Submission#: 71

Please select your stakeholder group(s).
Equipment Manufacturer

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Excavation

Provide a short title or name for the improved practice or methodology.
Potholing to locate and identify potential buried conflicts before engaging in HDD or other Trenchless activities.

Describe the practice or method including the benefit it provides.
Because many so-called “as-built” records are not accurate and electromagnetic locating techniques can be prone to confusion or error in terms of accurately predicting both depth and positioning of buried infrastructure, the only sure way to avoid striking these potential conflicts along the bore or drill path is to expose them and visually identify and confirm the precise location of each. “Potholing” using vacuum excavation in the soft-scape, or by first employing keyhole coring technology methods to gain access through paved surfaces, are relatively inexpensive safeguards to avoid striking that buried infrastructure or causing damage, physical injury or even death. Not only is potholing safer but it is much less expensive than blindly relying on potentially inaccurate drawings or surface "locate" markings that only reflect a historic or electronic approximation of the location of the underground facility that may not be exactly where the drawing or the strongest electromagnetic field located from above ground suggests it is. Because “seeing is believing” both damage prevention "White Papers" of the American Gas Association (AGA) and the Gas Technology Institute (GTI) recommend potholing to visually expose every potential underground conflict before proceeding with horizontal directional drilling or boring and other trenchless technologies.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.
*FINAL AGA White Paper_Reducing Pipeline Damages from the Use of Horizontal Dir... copy.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
1990

Geographically, where was this applied?

North America

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Drilling contractors have known for years that the easiest and most direct way to verify the location of buried utilities, is by small excavations along the intended route where potential conflicts have been marked out on the surface by the owners of that buried infrastructure. This process is known as "potholing" or "daylighting" and is usually performed with vacuum excavation to minimize the risk of hitting or damaging utilities.

If the excavation confirms the location of the potential conflict and it presents no problem, the contractor can proceed to the next stage. If there is a large discrepancy and no utility if found, either additional trial holes must be dug, or alternative location techniques must be used until the "missing" utility is found and its exact location established. This involves visually identifying the precise plan and profile of a utility in all three dimensions.

Armed with this information the drilling contractor is then able to safely plan the drill route knowing that it is "clear of potential obstructions". If not, he can take steps to identify and design an alternative and safer route.

When the potential conflict is under a paved surface, either a roadway or sidewalk, an extra step of removing the pavement cover is required. When conventional excavation methods are used to do this, both the excavation and the repair can be expensive and potentially disruptive, and can also cause collateral damage.

In conventional excavation, jack-hammers or back-hoes are used to break up the pavement and the resulting spoil is trucked away for disposal. After the conflict has been identified, the hole in the pavement must be repaired, first with a temporary patch to allow traffic to resume and, later, with a full-strength permanent repair in accordance with municipal standards that may include cut backs, additional paving and special surface treatments.

Apart from the extra inconvenience to the public caused by this two-step repair process, the size of the repaving requirement often grows from a one or two square foot test hole to a paving job that extends from the curb to the centerline and a considerable distance up and down the road in each direction. These additional repair and repaving costs can easily swell the cost of potholing to $1,500 or $2,000 or more for each hole, eating into much of the economic advantages that directional drilling has over trenching.

As a result, many utilities and their directional drilling contractors across North America have adopted a new technology for cutting through pavement to identify potential conflicts. The process involves a specially designed truck-mounted or skid-steer-mounted coring unit that cores a 12 to 18-inch diameter hole through all kinds of asphalt, asphalt-concrete and reinforced concrete road systems and sidewalks,

to allow crews to vacuum excavate and view subsurface activity.

After the potential conflict has been exactly located and either its non-hazardous nature confirmed or appropriate design steps taken to avoid the conflict, the drilling operations can safely resume. At that point, the hole can be backfilled to the level of the base of the pavement and the core or “coupon”, that was originally cut from the pavement, reinserted back into the road surface with a special bonding compound called Utilibond™ that results in a permanent repair. Because the resulting mechanical bond between the core and the original pavement restores the performance capacity of the road to its pre-excavation levels, no further repaving or site visits are required. In just 30 minutes the reinstated core can support more than 50,000 pounds – five times the H-25 AASHTO standard – and the road can be safely reopened to traffic.

Because of these operational efficiencies “keyhole coring and reinstatement”, as it is known, is fast becoming an integral part of the "potholing" process and a standard practice on a growing number of projects where much of the planned drill route is found under pavement and in close proximity to existing utilities. Moreover, many public agencies recognize the value of this process and are adopting regulations that require potholing. Project owners and contractors too, are establishing their own policies specifying potholing before drilling begins.

Which stakeholder group or groups have or could benefit from the improvement?

- Engineering/Design
- Excavator
- Gas Distribution
- Insurance
- Locator
- One Call
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 72

Please select your stakeholder group(s).

Gas Distribution

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Municipal requirement to locate facilities

Briefly describe the engagement opportunity including the benefit it provides.

While municipal entities are required to be part of the One-Call system, there is a gap in a requirement to locate the laterals for water and sewer facilities. By not requiring the operator who derives the benefit of the service to not locate the facility, increases the opportunity to damage or create a cross-bore situation thru the facility.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

The municipals argument is the lateral is owned by the customer, and is not their responsibility. It is an unreasonable assumption that a homeowner should or has the capability to locate the facilities. The municipals have a vested stake to locate these facilities. If damage to a sewer lateral should occur, natural gas can not only migrate to that customer's premise, but also migrate thru the municipal facilities. Thereby increasing the chance for an incident to occur. Technology currently exists, and municipals should already own the tools to locate the facilities.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2012

Geographically, where was this applied?

Nationally

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Cameras, sondes, and newer locating devices can accurately locate the sewer facility. The CGA has a Best Practice to not only pot-hole a lateral or crossing when boring , but to camera the sewer after installation to identify any potential damage or cross-bore situation.

Which stakeholder group or groups have or could benefit from the improvement?

Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 73

Please select your stakeholder group(s).

- Gas Transmission
- Oil

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Utilizing Google marketing tool to increase the effectiveness of one call messaging and awareness

Briefly describe the engagement opportunity including the benefit it provides.

This tool can be used to increase the public's increased awareness of 'Call Before You Dig' program while browsing the net. The tool can advertise the One Call messaging to target relevant audience (for example if someone is browsing a hardware store for shovels, the tool could pop up a messaging promoting awareness of calling or visiting the regional one call office/website)

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Transmission
- Oil
- One Call
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 74

Please select your stakeholder group(s).

Gas Transmission

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Predictive Analytics/Risk Assessment

Provide a short title or name for the technology improvement.

GPS Based Dig-In Prevention System for Excavation Equipment

Describe technology, how it has been used and the benefit it provides.

The Gas Technology Institute, with funding from Operations Technology Development (OTD), has been collaborating with PG&E to develop a technology platform to help prevent dig-ins by excavation equipment on the gas transmission system. The technology uses GPS and motion sensor devices to monitor the real-time location and operating mode of excavating equipment and automatically send signals or alerts when equipment is performing dangerous actions close to transmission lines. The technology has been through several phases of development and pilot testing and its core capabilities have been proven. Currently, it is going through additional product development and testing with the goal of commercializing the technology in the near-term. Dig-ins are a threat to pipeline systems across the US, they threaten people's safety and cause millions of dollars in damages annually. This technology adds another layer to dig-in prevention strategies (in addition to 811 and safe digging practices) and has the potential to proactively prevent loss of life, service interruption and millions of dollars of damages due to dig-ins.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Equipment Manufacturer
- Excavator
- Gas Transmission
- One Call
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 75

Please select your stakeholder group(s).

One Call

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Mapping/GIS

Provide a short title or name for the improved practice or methodology.

Standardizing the GPS Format for Mapping Software

Describe the practice or method including the benefit it provides.

Suggested Best Practice: All ticket processing, receiving and management systems utilize the same map projection (i.e. NAD 83) when using GPS coordinates to define the proposed area of excavation. This would ensure consistency and that the accurate area of the proposed excavation is displayed on all ticket processing and receiving mapping software.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 76

Please select your stakeholder group(s).

Equipment Manufacturer

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Predictive Analytics/Risk Assessment

Provide a short title or name for the technology improvement.

Cross Bore Risk Model

Describe technology, how it has been used and the benefit it provides.

Opvantek has establlished a methodology and experimental procedures to generate a risk model for legacy cross bores. The model produces a relative risk resulting from possible legacy cross bores by geographic area (map grid) based on data extracted from GIS, work management, insurance claims, customer dispatch, or other systems. It incorporates both probability and consequences of a cross bore in each geographic area.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

CrossBoreRiskModel.pptx

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Unsure

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

Ohio

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

n/a

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

The results can be used to prioritize a cross bore inspection program (where to send the cameras next?). The model can also be updated and tuned over time as more cross bores are discovered.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Gas Distribution
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Scott Tustin, NiSource Gas Distribution, (614) 481-1270, stustin@nisource.com

Submission#: 77

Please select your stakeholder group(s).

One Call

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mapping/GIS

Provide a short title or name for the technology improvement.

Map Based One Call Online Ticket Processing

Describe technology, how it has been used and the benefit it provides.

Previous ticket entry systems have always taken the approach of building the locate request out of the textual information provided, saving the vital step of mapping the work site (and thus determining the notified utilities) for last. This online ticketing software reverses this approach, allowing the user to map the entire work site out in a visually driven, fully interactive interface.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2015

Geographically, where was this applied?

Missouri, Minnesota

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Allows for more precision and accuracy when defining the proposed area of excavation

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator

- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 78

Please select your stakeholder group(s).

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- Telecommunications

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

GPS

Provide a short title or name for the technology improvement.

All Point Delivery for Polygons

Describe technology, how it has been used and the benefit it provides.

One Call Concepts, Inc., mapping system has the capability to send all GPS coordinates to the end user to allow an exact replica of the fully enclosed dig site polygon to be displayed. This provides for a more accurate, all GPS points defined, dig site as compared to the rect hull version commonly found with other mapping systems.

Do you have any documentation/information supporting the technology improvement?

Yes

If applicable, please upload technology improvement documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2016

Geographically, where was this applied?

Multiple US states

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Provides for more precision and accuracy when defining the proposed area for excavation

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 79

Please select your stakeholder group(s).

Oil

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mapping/GIS

Provide a short title or name for the technology improvement.

Secure and disseminate facility positional information

Describe technology, how it has been used and the benefit it provides.

Conduct R&D on how to appropriately secure and/or disseminate pipeline positional information (e.g. GPS points of pipeline asset, highly accurate geospatial map and metadata) for use by government/public officials, excavators and/or the general public. Any technology solution to advance damage prevention must address security risks and threats.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 80

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Other

Provide a short title or name for the technology improvement.
Facility positional marking information

Describe technology, how it has been used and the benefit it provides.
Conduct R&D on the feasibility of developing pipeline marker signage that will provide/transmit more effective, secured information automatically to government/public officials, excavators and pipeline operators.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 81

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Other

Provide a short title or name for the technology improvement.
Geo-fencing

Describe technology, how it has been used and the benefit it provides.
Conduct R&D on potential use of geo-fencing to determine if a national geo-fencing program can be instituted to allow stakeholders' cellphones/tablets, machinery and/or locating equipment to automatically download secured one call ticket information and underground facility location.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 82

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Other

Provide a short title or name for the technology improvement.
Auto streaming updated One Call and Project information

Describe technology, how it has been used and the benefit it provides.
Perform R&D on the possible auto streaming updated excavator information and/or underground facility information on the various devices.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 83

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Excavation

Provide a short title or name for the technology improvement.
Auto streaming updated One Call and Project information

Describe technology, how it has been used and the benefit it provides.
Perform R&D on improving methodology for "white lining" and providing information to all stakeholders automatically.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Locator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 84

Please select your stakeholder group(s).

Oil

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Excavation

Provide a short title or name for the improved practice or methodology.

Learnings to develop procedures/practices

Describe the practice or method including the benefit it provides.

Perform research on State excavation damage databases and reports to look for learnings that might be useful in improving procedures and practices either in the State or possibly nationwide, if feasible.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 85

Please select your stakeholder group(s).

Oil

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

One-Call - Ticket Entry and Tracking

Provide a short title or name for the improved practice or methodology.

National Standard - Excavator One Call Information

Describe the practice or method including the benefit it provides.

Perform R&D to determine if a national standard for all State 811/one call notification centers to use for providing excavator proposed project/excavation information.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 86

Please select your stakeholder group(s).

Oil

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

One-Call - Ticket Entry and Tracking

Provide a short title or name for the improved practice or methodology.

National Standard - Emergency One Call Information

Describe the practice or method including the benefit it provides.

Conduct R&D on feasibility of creating national criteria to be used for all State One Call Centers for emergency tickets, short notice tickets and project design tickets.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 87

Please select your stakeholder group(s).

Oil

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

One-Call - Ticket Entry and Tracking

Provide a short title or name for the improved practice or methodology.

National Standard - One Call Information - Project Change

Describe the practice or method including the benefit it provides.

Conduct R&D on feasibility of creating national criteria for excavators to provide notification to all underground facility owners/operators of change in scope of project or project schedule.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Locator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 88

Please select your stakeholder group(s).

Oil

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

One-Call - Ticket Entry and Tracking

Provide a short title or name for the improved practice or methodology.

National Standard - One Call - Project Length/Scope

Describe the practice or method including the benefit it provides.

Conduct R&D on feasibility of creating national criteria for length of one call notification.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 89

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Communication method opportunties

Briefly describe the engagement opportunity including the benefit it provides.
Conduct a study on cost effective communication methods that might be used by stakeholders to communicate/distribute/transmit updated information.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Unknown

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 90

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Communication method opportunties

Briefly describe the engagement opportunity including the benefit it provides.
Conduct R& D to determine feasibility of creating a system to automatically notify Excavators of safety issues and enforcement.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Unknown

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 91

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Communication method opportunities

Briefly describe the engagement opportunity including the benefit it provides.
Perform R&D to determine if an automatic alert can be instituted for one call notification expiration to allow for updating and responding with new information.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Unknown

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 92

Please select your stakeholder group(s).

Oil

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Communication method opportunities

Briefly describe the engagement opportunity including the benefit it provides.

Conduct R&D to determine which public awareness messages should be disseminated via Public Safety Announcements or Advertisements on TV, Radio, Social Media and Internet platforms

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Unknown

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 93

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Communication method opportunities

Briefly describe the engagement opportunity including the benefit it provides.
Perform R&D on best methodology and language on how to distribute information to contractors/subcontractors employees (full time/part time).

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Unknown

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 94

Please select your stakeholder group(s).

Other

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Mobile Device/Data Collection

Provide a short title or name for the technology improvement.

Notification of standards immediately prior to proceeding.

Describe technology, how it has been used and the benefit it provides.

A short video of proper technics and managers can be sent to all the people involved working around the trench.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 95

Please select your stakeholder group(s).

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Public Works

What type of improvement are you reporting?

Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?

Mapping/GIS

Provide a short title or name for the improved practice or methodology.

Improved Construction Inspector Practices

Describe the practice or method including the benefit it provides.

The mapping and documentation of underground pipes, when performed by on-staff construction inspectors employed and trained directly by utility companies provides significant safety advantages as compared with the use of third-party contractors for carrying out this work. These advantages include:

o In-house personnel act as first responders when damage occurs, bringing deep institutional and personal knowledge of a utility's systems to an incident;

o In-house personnel provide greater accountability to the utility that employees them, and to the regulatory oversight body that governs utility practices;

o In-house personnel, working on a daily basis with a utility's systems build up an expertise and institutional knowledge regarding those systems that is not possible for third-party contractors who move from company to company, and which experience a greater degree of employee turn-over;

o Use of in-house personnel removes the profit incentive from the work of mapping, documenting, locating, and responding that third-party contractors possess. Rather than seeking to perform mass quantities of work to achieve certain profit levels, in-house personnel focus on safety, quality work, and customer service.

Do you have any documentation/information supporting the improved practice or methodology?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

1975

Geographically, where was this applied?

Nationwide

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This practice supplements existing programs by preventing damage from occurring at all, and by providing a faster response time when damage does occur.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- One Call
- Public Works
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Bernie Labelle, bernielabelle@uwua.net, 570-916-6784

Submission#: 96

Please select your stakeholder group(s).

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Public Works

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Excavation

Provide a short title or name for the technology improvement.

Air Excavation and Vacuum Soil Extraction for Excavating Utility lines

Describe technology, how it has been used and the benefit it provides.

Air excavation and vacuum soil extraction using compress air to break apart material and a truck vacuum to remove the soil from the resulting hole. This 'soft excavation' technology is safer than hand digging underground facilities in being far less likely to result in accidental damage to a line, damage which could occur from something as simple as striking line with a hand shovel. The process also allows workers to stay safe on the surface, eliminating the danger of trench cave-ins.

This process has several advantages over traditional digging, including:
Decreased likelihood of damage to the utility line;
Can be used on all utility systems;
Creates a small hole, limiting collateral damage to surface and other, unrelated infrastructure;
Cleaner work sites;
Less traffic congestion;
Simple backfill;
Cost effectiveness relative to heavy excavation equipment;
Air excavation does not require refilling or create unwanted run-off.

Air/vacuum excavation reduces risks to personnel and infrastructure, lowers costs, decreases disruption, and allows for quicker response and repair times when damage has occurred for other reasons.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

1980

Geographically, where was this applied?

Nationwide

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This practice supplements existing programs by allowing safer and quicker damage call responses, and excavations of utility lines generally, particularly when carried out by in-house utility crews working with the equipment on a daily basis, and familiar with the utility's underground systems.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- One Call
- Public Works
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Bernie Labelle, bernielabelle@uwua.net, 570-916-6784

Submission#: 97

Please select your stakeholder group(s).

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Public Works

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Excavation

Provide a short title or name for the technology improvement.

Air Excavation and Vacuum Soil Extraction for Excavating Utility lines

Describe technology, how it has been used and the benefit it provides.

Air excavation and vacuum soil extraction using compress air to break apart material and a truck vacuum to remove the soil from the resulting hole. This 'soft excavation' technology is safer than hand digging underground facilities in being far less likely to result in accidental damage to a line, damage which could occur from something as simple as striking line with a hand shovel. The process also allows workers to stay safe on the surface, eliminating the danger of trench cave-ins.

This process has several advantages over traditional digging, including:
Decreased likelihood of damage to the utility line;
Can be used on all utility systems;
Creates a small hole, limiting collateral damage to surface and other, unrelated infrastructure;
Cleaner work sites;
Less traffic congestion;
Simple backfill;
Cost effectiveness relative to heavy excavation equipment;
Air excavation does not require refilling or create unwanted run-off.

Air/vacuum excavation reduces risks to personnel and infrastructure, lowers costs, decreases disruption, and allows for quicker response and repair times when damage has occurred for other reasons.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

1980

Geographically, where was this applied?

Nationwide

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This practice supplements existing programs by allowing safer and quicker damage call responses, and excavations of utility lines generally, particularly when carried out by in-house utility crews working with the equipment on a daily basis, and familiar with the utility's underground systems.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- One Call
- Public Works
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Bernie Labelle, bernielabelle@uwua.net, 570-916-6784

Submission#: 98

Please select your stakeholder group(s).

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Public Works

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Excavation

Provide a short title or name for the technology improvement.

Air Excavation and Vacuum Soil Extraction for Excavating Utility lines

Describe technology, how it has been used and the benefit it provides.

Air excavation and vacuum soil extraction using compress air to break apart material and a truck vacuum to remove the soil from the resulting hole. This 'soft excavation' technology is safer than hand digging underground facilities in being far less likely to result in accidental damage to a line, damage which could occur from something as simple as striking line with a hand shovel. The process also allows workers to stay safe on the surface, eliminating the danger of trench cave-ins.

This process has several advantages over traditional digging, including:
Decreased likelihood of damage to the utility line;
Can be used on all utility systems;
Creates a small hole, limiting collateral damage to surface and other, unrelated infrastructure;
Cleaner work sites;
Less traffic congestion;
Simple backfill;
Cost effectiveness relative to heavy excavation equipment;
Air excavation does not require refilling or create unwanted run-off.

Air/vacuum excavation reduces risks to personnel and infrastructure, lowers costs, decreases disruption, and allows for quicker response and repair times when damage has occurred for other reasons.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

1980

Geographically, where was this applied?

Nationwide

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This practice supplements existing programs by allowing safer and quicker damage call responses, and excavations of utility lines generally, particularly when carried out by in-house utility crews working with the equipment on a daily basis, and familiar with the utility's underground systems.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Public Works
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Bernie Labelle, bernielabelle@uwua.net, 570-916-6784

Submission#: 99

Please select your stakeholder group(s).

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Public Works

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Locating

Provide a short title or name for the technology improvement.

Sure-Lock All Pro Utility Line Locator

Describe technology, how it has been used and the benefit it provides.

The Sure-Lock All Pro, manufactured by Heath Consultants is user-friendly, being plug and play with no programming required. The All Pro was designed with a focus on increasing locating accuracy and productivity. The All Pro consists of an integrated receiver and transmitter, allowing configuration of the optimal frequency to locate all underground utilities more quickly and more reliably.

The All Pro offers a broad spectrum of frequencies, accommodating audio, radio and ultra-high, allowing a search for targets such as cable and insulated pipe. The All Pro can locate poor conductors such as bare steel, cast iron, unbonded cable, broken tracer wire and can help to verify dead end utilities.

From the point of view of a field operator, the Sure-Lock All Pro is the best hand-held tool available for locating underground utility lines.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2010

Geographically, where was this applied?

Nationwide

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This practice supplements existing programs by providing the best hand-held tool available for locating underground utility lines.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- One Call
- Public Works
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Bernie Labelle, bernielabelle@uwua.net, 570-916-6784

Submission#: 100

Please select your stakeholder group(s).

- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Information Packets at Permit Offices

Briefly describe the engagement opportunity including the benefit it provides.
Vectren has implemented a new measure that provides informational packages at permit offices. This red envelop contains literature and safety information before excavating begins and is provided to excavators when they apply/acquire permits.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Biggest hurdle is getting the packages delivered and educating the permitting office.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
No

In what year was the improvement first used or applied?
2016

Geographically, where was this applied?
Vectren Service Terrirtory

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
No meatrics in place yet. TBD

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
It provides the ability to put educational info in the hands of the people doing the work at the time excavation planning process

Which stakeholder group or groups have or could benefit from the improvement?

- Excavator
- Gas Distribution
- Gas Transmission

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Cesar Lau, clau@vectren.com, (812) 4914667

Submission#: 101

Please select your stakeholder group(s).

- Engineering/Design
- Gas Distribution
- Gas Transmission

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Predictive Analytics/Risk Assessment

Provide a short title or name for the technology improvement.
Locate Risk Assesment

Describe technology, how it has been used and the benefit it provides.
All 811 tickets are being processed through a Risk analysis engine. Those deemed as high risk are assigned additional on-site activity.

Do you have any documentation/information supporting the technology improvement?
Yes

If applicable, please upload technology improvement documentation for CGA reference.
TRA PDF.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
Vectren Service Territory (IN and OH)

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
20% reduction in damages due to this and other implementations at Vectren

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Once a ticket is deemed as high risk, a child ticket is created and sent to a damage prevention specialist who then monitors and educate excavation risks at site.

Which stakeholder group or groups have or could benefit from the improvement?

- Engineering/Design
- Gas Distribution
- Gas Transmission

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Cesar Lau, clau@vectren.com, (812) 4914667

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Lowest damage ratio in company history 1.26 / 1,000 locates

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

This program serves as a great model for promoting and advocating best practices covering all aspects of the 811 process. By carrying the message out to job sites and subdivisions, educating excavators and homeowners alike, damage prevention methods and procedures are uniformly distributed.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large
- Other

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Scott Brown (703) 750-4388 or ssbrown@washgas.com

Submission#: 102

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Positive confirmation during permitting

Briefly describe the engagement opportunity including the benefit it provides.
State, County, City drawing/design reviews should require positive confirmation during permitting of any change. Example: new shopping mall with a pipeline in the area should not be allowed to move to the next permit step until the design is agreed to by the pipeline company. Each State, County, City location should be required to keep an updated one-call list to maintain consistency of affected companies in relation to the project and permit.

We have seen on multiple occasions where larger transmission companies that serve homes and infrastructure receive this treatment but oil distribution and interstate and intrastate pipeline companies do not. Often finding construction taking place before we are notified of the plans.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).
Ensuring all levels of design review (State, County, City, etc) keep updated listing of affected companies and build in approval gate for permitting.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Unsure

In what year was the improvement first used or applied?
2009

Geographically, where was this applied?
Fort Bend County, Texas

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Allows for affected companies to be notified earlier in the process of design development. Allow for early communication of effective safety measures for both the design and construction around pipelines. Can be used with the One-Call system early in the permitting process.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 103

Please select your stakeholder group(s).

- Gas Distribution
- Locator

What type of improvement are you reporting?

Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.

Mobile Damage Prevention Education

Briefly describe the engagement opportunity including the benefit it provides.

Through a joint partnership with UtiliQuest, LLC, Washington Gas Light Co. has purchased and deployed a vehicle dubbed the "Care-A-Van" which is "wrapped" with damage prevention information. In particular, the 811 logo, along with the Virginia State Corporation Commission and Maryland Damage Prevention Authority brands, are used as the subjects for damage prevention education. The vehicle is manned by active UtiliQuest Utility Locators. They travel to job sites and subdivisions in VA, MD, and DC performing outreach and education for excavators and homeowners. It is equipped with many communication tools in English and Spanish Including a Large screen TV, handouts, giveaways, snacks and bottled water.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

The time needed to educate or become educated has traditionally been an obstacle as has language barriers.

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?

Yes

If applicable, please upload documentation supporting the opportunity.

Picture1.jpg

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

Yes

In what year was the improvement first used or applied?

2014

Geographically, where was this applied?

VA, MD, and DC

Submission#: 104

Please select your stakeholder group(s).

- Gas Transmission
- Oil

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Predictive Analytics/Risk Assessment

Provide a short title or name for the technology improvement.

FIber Optic cables for thrid party intrusion monitoring

Describe technology, how it has been used and the benefit it provides.

Investigating the use of standard communications fiber optics cable into a linear array of discrete vibration sensors for possible third party intrusion (excavation, digging etc.) monitoring. The system also has a potential to be used as a leak detection tool.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Distribution
- Gas Transmission
- Oil
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 105

Please select your stakeholder group(s).
Gas Transmission

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Excavation

Provide a short title or name for the improved practice or methodology.
Improved processes around Supevision during excavation

Describe the practice or method including the benefit it provides.
- Mandatory supervision required during all planned excavation
- Extensive supervisor training with onsite evaluation. Curriculum Guide has been developed for this activity containing. Individuals are to plan & conduct excavations according to company procedures while ensuring the safety of all personnel, facilities, and equipment. The proficiencies and skill documentation outlines and describes the different types of competencies as well as complexity of work.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Unsure

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
Canada and US

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Distribution
- Gas Transmission
- Oil
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 106

Please select your stakeholder group(s).
One Call

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Mapping/GIS

Provide a short title or name for the technology improvement.
Base Maps Improvements

Describe technology, how it has been used and the benefit it provides.
In the last 3 years, OKIE811 has worked hard at improving the resources for mapping for our CSR's and web ticket users. We have updated our client mapping with new addresses, parcels, points of interest, aerials, streets and highways. For our web ticket users, they now have our internal base maps, as well MapBox's maps, terrain layer and satellite layer.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
Oklahoma

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
Oklahoma still does not capture this imformation

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
These improvements ensured that the dig site was most accurately marked by our system and the correct information was to the members, excavators and locators.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design

- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 107

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Communication

Provide a short title or name for the improved practice or methodology.
Enhanced positive response

Describe the practice or method including the benefit it provides.
Enhanced positive response back to ALL state one call center provides the communication handshake needed to ensure the excavator is well informed on their locate request and the one call system works. Excavators - especially novice excavators - can assume that no response from the utility means the underground facility is not present or within the scope of work. EPR will eliminate multiple phone calls, emails and/or faxes back to the excavator from each utility. Each time an excavator has to stop to take a call/make a call is a distraction as well as a frustration point. The practice should reduce no response notifications as well. The process should include the state suppressing members that have responded for more efficient ticketing, saving time for the center, the utility and the excavator. We should follow through with the "one call" concept that the excavator makes one call to request a locate and receives "one call" to be informed that the locate request has been completed.

Do you have any documentation/information supporting the improved practice or methodology?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works

- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 108

Please select your stakeholder group(s).

- Gas Distribution
- Oil

What type of improvement are you reporting?

Technology

What type of technology improvement are you reporting?

Predictive Analytics/Risk Assessment

Provide a short title or name for the technology improvement.

Near miss reporting tools

Describe technology, how it has been used and the benefit it provides.

Provide tools for underground facilities to report near miss incidents. Analytics of a region, excavation activity, trends by utility etc could produce results to know where to address root cause proactively instead of reactively. This method could speed up the process for better dig laws and best practices instead of waiting for analysis of the damages data then tackle the key issues.

Do you have any documentation/information supporting the technology improvement?

No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- Public Works
- Telecommunications

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 109

Please select your stakeholder group(s).
Gas Transmission

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Excavation

Provide a short title or name for the improved practice or methodology.
Improved excavation procedure

Describe the practice or method including the benefit it provides.
- More stringent (mechanical) excavation setback zones
- Two person sweep
- Wider use of hydrovacs and soft excavation

Consistently enforced company wide to ensure safer dig procedures

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Unsure

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
Canada and US

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?
- Gas Distribution
- Gas Transmission

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 110

Please select your stakeholder group(s).
Gas Transmission

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Asset Management

Provide a short title or name for the improved practice or methodology.
Optimal Slab design

Describe the practice or method including the benefit it provides.
Looked into effectiveness of slabs, as well as alternative material that could be used for slabs (e.g. steel or polyethylene) and the associated effectiveness. This also involved looking into different slab installation setups (slab and signage, slab and tape, slab only), comparison of relative effectiveness, and effectiveness of slabs when installed at different depths. This research has been implemented by the company when it comes to depth of slab installation, distance of slabs relative to the pipe, width of slabs, and the material used for slabs.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Unsure

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
Canada and US

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Transmission
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 111

Please select your stakeholder group(s).
Gas Transmission

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Asset Management

Provide a short title or name for the improved practice or methodology.
Mechanical Damage Reliability and fault Tree Model enhancements

Describe the practice or method including the benefit it provides.
This was a model developed/enhanced by the ESM group, to evaluate the potential for mechanical damage and the risk reduction achieved by addition of different protection measures. This has been partially implemented into out mechanical damage fault tree model.
The initiative was to house the probability of hit, Fault Tree model, in the same software as the probability of failure given hit in order to provide an automated auditable tool which would be less exposed to human errors.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Distribution
- Gas Transmission
- Oil
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 112

Please select your stakeholder group(s).
Other

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Locating

Provide a short title or name for the technology improvement.
CertusView Electronic Marking Wand

Describe technology, how it has been used and the benefit it provides.
The GPS-enabled Electronic Marking Wand reduces locate documentation time and enhances facility marking sketch accuracy by automatically capturing locate mark as the locate operation occurs.
The device:
- Documents the paint color is being sprayed
- Automatically records the GPS location, length, and time of every paint mark
- Allows the user to implement tie downs and landmark identification
- Seamlessly integrates with our e-Sketch system to visually map each captured paint mark
- Mapping output can be delivered to excavation equipment to control and guide digging

Additionally, the Electronic Marking Wand enables process guide steps to be incorporated into the operator interface. These process guide steps can direct the locator through the actions required to complete a high quality locate.

Do you have any documentation/information supporting the technology improvement?
Yes

If applicable, please upload technology improvement documentation for CGA reference.
CertusViewElectronicMarkingWandVideo.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2012

Geographically, where was this applied?
CA, GA, SC, VA

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Measurements are currently being collected against baseline data. The Electronic Marking Wand is in pilot.

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Using GPS technology, the electronic marking wand records the precise location of every paint spray, as well as color and time/date. This dataset is then transferred directly into the CertusView eSketch platform. The result is a comprehensive unalterable documentation package of each locate, verifying not only the presence of the technician but also the actual placement of paint on site.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Dennis Tarosky, UtiliQuest, dennis.tarosky@utiliquest.com, (770) 238-6136

Submission#: 113

Please select your stakeholder group(s).
Other

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Other

Provide a short title or name for the technology improvement.
CertusView Damage Prevention Suite

Describe technology, how it has been used and the benefit it provides.
The CertusView Damage Prevention Suite provides a comprehensive platform that facilitates communication among excavators, locators, facility owners, regulators, and 811 personnel involved in the damage prevention process. The suite consists of integrated location aware map-based applications that provide targeted functionality for each stage of the construction process. As outputs are created in individual applications, they are seamlessly made available as reference information to the next stage of the damage prevention process. The resulting output from this process is a visual, virtual, and verified record of the entire process that can be preserved in an inalterable state. The specific products that make up the CertusView Damage Prevention suite are: Virtual Whiteline, eSketch, OmniLume, FieldCheck, Plant at Risk, and EPR.

Do you have any documentation/information supporting the technology improvement?
Yes

If applicable, please upload technology improvement documentation for CGA reference.
CertusView Damage Prevention Suite.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2007

Geographically, where was this applied?
FL, LA, MS, TX, GA, TN, SC, NC, VA, WV, MD, DC, DE, NJ, OH, PA, NY, CO, CA, NV, WA, and OR

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

67% reduction in damages (damages per 1,000 locates)

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Virtual Whiteline -- eliminates the need for trips to the construction site to define the dig area. The white lining is performed remotely and virtually requiring no extra visits to the dig site. It also creates a digital record that can be layered with additional information for example what utilities were found in the dig area.

eSketch -- provides field-based workers with a high-resolution aerial photograph of the job site and allows the user to create a record of the finished work product while still on the jobsite.

OmniLume -- places utility operator records in a common unified platform providing records comparison analysis to verify field conditions.

FieldCheck -- aggregates in near-real-time work documentation created by the Virtual WhiteLine, eSketch, and OmniLume applications as it is generated by the field personnel. This information can then be compared against the 811 ticket information for completeness and accuracy. Any concerns can then be immediately communicated to the field personnel while they are still on site.

Plant At Risk -- assesses, in real time, facility risk associated with each locate request based on; work type,excavator damage history, utility operator facility record data, utility locator damage history and tenure. This assessment is performed both before and after underground locate activities take place. This technology allows the utility operator and utility locator to allocate resources, as needed, based on the risk level identified.

EPR -- provides the excavator with all the information that the utility operator maintains after the locate is performed. including maps, photos, GPS time and date stamps, ortho photography of the job site, a white line that is the locators perception of the excavation area, and a copy of the dig request ticket. Mapping output can be delivered to excavation equipment to control and guide digging. This data can be provided through the 811 system or directly to the excavator.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call

- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Dennis Tarosky, UtiliQuest, dennis.tarosky@utiliquest.com, (770) 238-6136

Submission#: 114

Please select your stakeholder group(s).
Locator

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Locating

Provide a short title or name for the improved practice or methodology.
GPS Data Collection (Mapping)

Describe the practice or method including the benefit it provides.
Best Practices 13.0, 6-16: Information Capture - “The facility owner/operator collects detailed mapping information." Emerging Technologies: "Combining orthographic and satellite imagery with an overlay of a line map, street names, addresses, and GPS coordinates of utility lines will allow one call centers, excavators, locators, facility owner/operators, and project owners to view the accurate and relative location of utility lines."

GPS Data Collection (Mapping) is a service/process by which geospatial and utility attribute data for underground plant is captured by locate/mapping technicians employing Trimble® Global Navigation Survey System (GNSS) equipment. The data is processed and posted subsequently to the facility owner/operators mapping (GIS) database.

This service/process allows any owner/operator to gather accurate location and attribute data for its new and legacy in service facilities. In turn, this aids in the accurate depiction of their facilities for enhancing pipeline safety and compliance, business processes and efficiency for employees, customers and communities (One Call polygon assignments, project planning, facility locating, material tracking and traceability, and etc.).

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.
GPS Mapping.pptx

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2015

Geographically, where was this applied?
VA and OH

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
Data would have to be provided by the Utility Owner / Operator

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Accurate location records allows for effective identification of underground utility location via grid/polygon assignments in One Call systems. This information aids in project planning and underground plant locating. It allows the locate technician to compare the plant records system via GPS, historical records to the physical plant location that is determined using electro-magnetic devices or other utility locating methods.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?
Ashley Donnini, NiSource - (804) 638-5718 or adonnini@nisource.com

Submission#: 115

Please select your stakeholder group(s).
Equipment Manufacturer

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Excavation

Provide a short title or name for the improved practice or methodology.
Trenchless Best Practice

Describe the practice or method including the benefit it provides.
GTI Trenchless Construction Best Practices document provides a number of considerations for trenchless construction operators to prevent damage. This document is in the final draft stage.

Do you have any documentation/information supporting the improved practice or methodology?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Could be used in damage prevention applications

Which stakeholder group or groups have or could benefit from the improvement?
Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 116

Please select your stakeholder group(s).
Oil

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Mobile Device/Data Collection

Provide a short title or name for the technology improvement.
Aerial Patrol Data Collection

Describe technology, how it has been used and the benefit it provides.
Aerial patrol pilots use a tablet to report aerial patrol conflicts. Emails are immediately sent to the field including pictures to investigate conflicts and tickets are created and automatically sent to the ticket management system. This system has eliminiated communication issues that were previously present with the pilots placing calls in the air to report conflicts to someone in the office who manually created tickets and notified the field. It is also safer for the pilots to not be on the phone while in the air.

Do you have any documentation/information supporting the technology improvement?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
No

In what year was the improvement first used or applied?
2015

Geographically, where was this applied?

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Allows for field to be notified immediately of work on the ROW (especially important for work found that is not associated with a current one call ticket).

Which stakeholder group or groups have or could benefit from the improvement?

- Gas Distribution
- Gas Transmission
- Oil

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 117

Please select your stakeholder group(s).
Other

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Locating

Provide a short title or name for the improved practice or methodology.
Locate Performance QA/QC

Describe the practice or method including the benefit it provides.
Presently the industry "hopes" that every locate and mark procedure is performed to best practice but there has been no way of assessing or measuring this critical part of the damage prevention process. The new technology will provide for the capture, qualitative analysis and replay of every single locate including the field tech's compliance to best practice. Integrated smart sensors and dedicated algorithms will dramatically improve the damage prevention process by finally creating a permanent electronic record of the locate and mark event. The resulting data will be used for the qualification and evaluation of the field tech's performance. Real time alerts and messaging of bad practice will be transmitted to stakeholders and directly to the field tech, training and operator qualification will be improved by post analysis of good v bad locate practice. Technology can be fitted to new or retrofitted into existing locate devices.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.
UTTO Locate Performance Metric UI.png

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Unsure

In what year was the improvement first used or applied?
2016

Geographically, where was this applied?
USA, Australia

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
Results presently proprietarily held with customers

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

By creating a permanent electronic record of the locate and mark event operations managers, locate field techs and training managers will have real time feedback as to the quality of all field locate operations and the application of best locate practices.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Will advise once NDA releases are complete with our customers

Submission#: 118

Please select your stakeholder group(s).
Other

What type of improvement are you reporting?
Opportunity to increase damage prevention engagement among stakeholders and the public

Provide a short title or name for the opportunity.
Digital Services - Add new Stakeholder Group to CGA

Briefly describe the engagement opportunity including the benefit it provides.
Presently there is no category that our company slots into within the CGA Stakeholder groups. We recommend adding "Digital Services" to the group. Digital Services encompass the transfer of data, processing and sharing of information without human intervention (or minimal) and we believe that as our industry transitions into the 21st Century this will become a critical area of the damage prevention process.

Presently there are members of CGA who actually use and develop Digital Services such as mobile apps, white lining tools and electronic communications but there is no common standard for these service or platforms. We feel that as smart devices and software tools begin to integrate with our industry and are adopted that we need to establish definitive standards and practices as they relate to Digital Services. This will bring the benefit of developers adopting common platforms, APIs and file sharing, communication standards and protocols that are easily ported between Excavators, Utilities, One Call Centers, Ticket Providers, Contract Locators, Training Organizations, Locator Manufacturers, Mapping Devices and other stakeholders.

Briefly describe any obstacles that discourage greater involvement in damage prevention activities (time, economics, etc.).

Do you have any documentation/information supporting the opportunity to increase damage prevention engagement?
Yes

If applicable, please upload documentation supporting the opportunity.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 119

Please select your stakeholder group(s).
Other

What type of improvement are you reporting?
Technology

What type of technology improvement are you reporting?
Mapping/GIS

Provide a short title or name for the technology improvement.
Integration of GPS & Locator Devices: Communication Standard

Describe technology, how it has been used and the benefit it provides.
Requirement is to establish an industry standard communication protocol that defines the structure of stored data outputs from pipe and cable locator devices. Presently locator devices & mapping activities are viewed as separate processes and activities. We believe that the next generation of locate technologies will incorporate smart sensors, low power mapping grade GPS and seamless wireless communication technologies that will merge these events into a single, seamless process for the field tech. This means that the billons of locate data points presently being “washed away” (paint and flags) will be captured and the resulting data used to reduce damages.

Do you have any documentation/information supporting the technology improvement?
Yes

If applicable, please upload technology improvement documentation for CGA reference.

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2014

Geographically, where was this applied?
USA

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
The requirement will be to have an industry standard definition and protocol that defines the communication specification and data packet content between the locator device and a cloud platform

or web service. This will assist developers and help the industry in the adoption and deployment of next generation damage prevention technologies.

Which stakeholder group or groups have or could benefit from the improvement?

Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 120

Please select your stakeholder group(s).
Gas Distribution

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Excavation

Provide a short title or name for the improved practice or methodology.
Trenchless Excavation Best Practices

Describe the practice or method including the benefit it provides.
Trenchless utility installations have become a popular alternative to open cut excavations. However, improper use of trenchless utility installations can damage crossing and/or nearby parallel utilities. Trenchless best practices should be followed and enforced to reduce the possibility of damaging underground utilities. The attached document is a best practice for performing trenchless utility installations

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.
Trenchless Best Practices for Damage Prevention May 3 2016.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2010

Geographically, where was this applied?

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?

Which stakeholder group or groups have or could benefit from the improvement?
Excavator

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 121

Please select your stakeholder group(s).
Other

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Public Awareness Initiatives (including one call initiatives)

Provide a short title or name for the improved practice or methodology.
Mock Strike Event

Describe the practice or method including the benefit it provides.
In the California 811 system we occasionally conduct a "Mock Strike Event". This is a reenactment of a gas line strike that is played out and narrated. Its purpose is to educate and show what happens when a gas line is hit and explodes due to damage prevention practices not being followed. Real utility workers, police and fire fighters donate their time to show a large audience what really happens when damages to underground infrastructure occur.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.
Mock Line Event SoCal.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?

In what year was the improvement first used or applied?
2015

Geographically, where was this applied?
California

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?
Not Known

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Education

Which stakeholder group or groups have or could benefit from the improvement?

- Electric

- Excavator
- Gas Distribution
- Gas Transmission
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- Emergency Services
- Public At Large

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Amber Dahl

Submission#: 122

Please select your stakeholder group(s).

- Electric
- Engineering/Design
- Equipment Manufacturer
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Locating

Provide a short title or name for the improved practice or methodology.
Education and Awareness

Describe the practice or method including the benefit it provides.
Ongoing education and awareness with media work surrounding underground prevention. The magazine "American Locator" and the projects in Planet Underground TV provide ongoing education and awareness for those working with underground utilities. For more information See - https://www.planetunderground.tv/planet-underground-tv/

Do you have any documentation/information supporting the improved practice or methodology?
No

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?

Which stakeholder group or groups have or could benefit from the improvement?

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

Submission#: 123

Please select your stakeholder group(s).
Locator

What type of improvement are you reporting?
Practice, Procedure, or Methodology

To what part of the damage prevention process does the improved practice or methodology apply?
Locating

Provide a short title or name for the improved practice or methodology.
Diamond Status - Nulca Accreditation

Describe the practice or method including the benefit it provides.
Provide for an independent review of Locator (Utility or Utility Contractor) training programs by NSF International Strategic Registrations (NSF-ISR) to ensure they meet the current Nulca Competency Standard. Provide accreditation for those entities whose programs that provide proof of their consistent training standards and training delivery methodology.

The Nulca Competency Standard has been recognized by the Common Ground Alliance (CGA) Best Practices Committee, which identify and validates those best practices that enhance safety and prevent damages to underground facilities. In order to earn the Nulca accreditation, an organization's program must be independently and confidentially reviewed by NSF-ISR auditors to verify all 10 components of the Nulca Competence Standard are met. The 10 components verified are:

1. Basic Locating Theory 6. Visual Observation Skills
2. Use of the Transmitter 7. Safe Work Practices and Regulations
3. Use of the Receiver 8. One Call Regulation, Requests and Documentation
4. Marking Procedures 9. Excavator and Customer Relations
5. Knowledge of Facilities 10. Locating Pipelines

Accreditation permits organizations and contractors to promote their Nulca accreditation demonstrating their commitment to the highest professional standards in the industry. This allows facility owners to demonstrate to regulators that they are not only meeting regulatory requirements, but taking proactive steps to assure public safety in their surrounding communities. Accreditation will depend on the training program meeting or exceeding the Nulca Competency Standard.

To date, 5 entities have achieved Nulca accreditation from NSF-ISR (ELM Locating & Utility Services, UtiliQuest LLC, Locating Inc., Olameter DPG, and Baker-Peterson LLC). In addition, 10 additional entities are in the process of achieving their own accreditation. The 5 that have already completed theirs are safely and accurately locating utilities throughout the lower 48 states in the U.S.

Do you have any documentation/information supporting the improved practice or methodology?
Yes

If applicable, please upload methodology documentation for CGA reference.

NulcaAccreditationProcess.pdf

Are you reporting something that has ALREADY been put to use with provable results or identifying a technology, practice or engagement opportunity that COULD be used for better damage prevention?
Has been used in damage prevention applications

Has this technology, practice or engagement opportunity grown in use over time?
Yes

In what year was the improvement first used or applied?
2015

Geographically, where was this applied?
The lower 48 states in the U.S.A.

If there was a measured reduction in the frequency or severity of excavation damage, what was the reduction?

Please briefly describe how this technology, practice or opportunity for engagement supplements existing one call and damage prevention programs?
Best Practices 13.0, 4 - 5: Locator Training - References proper training and documentation of same for locators. The Nulca Locator Training Standards and Practices represent an accepted model within the locate industry. This accreditation program, professionally executed by NSF International Strategic Registrations (NSF-ISF), provides for inspection and review of training programs to ensure they meet or exceed Nulca competency standards.

Which stakeholder group or groups have or could benefit from the improvement?

- Electric
- Engineering/Design
- Excavator
- Gas Distribution
- Gas Transmission
- Insurance
- Locator
- Oil
- One Call
- Public Works
- Railroad
- Road Builder
- State Regulator
- Telecommunications
- Emergency Services

If a stakeholder or the public has benefited from this improvement and is able to answer additional questions, please provide contact information for CGA reference?

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