September 25, 2017

On Friday August 25, 2017, NASSCO Incorporated (Inc.), issued a public statement regarding our cured-in-place-pipe (CIPP) safety study published on July 26, 2017 in the peer-reviewed journal *Environmental Science and Technology Letters*, an American Chemical Society publication. Our study was funded by the U.S. National Science Foundation (Grant No. CBET-1624183), Purdue University, and public donations. Additional information about this study can be found at the website http://CIPPSafety.org.

NASSCO, Inc.'s statement made many incorrect assertions. Below we address some of those assertions.

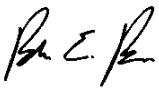
As we have offered before, the Purdue University researchers desire to work with those interested in better understanding and improving worker and public safety at and near CIPP water pipe repair sites. Additional investigations should be conducted to understand emissions from CIPP installations, and to determine the occupational, public health, and environmental risks. Persons who install CIPP should contact the National Institute for Standards and Health (NIOSH) to request Health Hazard Evaluations: https://www.cdc.gov/niosh/hhe/. Also, persons who visit CIPP worksites such as municipal employees and consulting engineer employees, separate from CIPP companies, should also contact NIOSH for assistance. CIPP technology could likely be used without endangering human health or the environment if appropriate safeguards are instituted.

Questions about this letter can be directed to Andrew Whelton at awhelton@purdue.edu.

Sincerely,

Andrew J. Whelton, Ph.D.

John A. Howarter, Ph.D.



Brandon E. Boor, Ph.D.

Jeffrey Youngblood, Ph.D.

Jonathan Shannahan, Ph.D.

Chad T. Jafvert, Ph.D.

**Response to NASSCO Incorporated's August 25, 2017 Public Statement**

**The following primary documents pertain to this communication:**

- NASSCO, Inc. certified letter to Dr. Whelton dated February 23, 2016
- NASSCO, Inc. public statement posted on their website August 25, 2017
- Purdue University CIPP safety study published in the peer-review journal *Environmental Science & Technology Letters* of the American Chemical Society. This study is entitled *Worksite Chemical Air Emissions and Worker Exposure during Sanitary Sewer and Stormwater Pipe Rehabilitation Using Cured-in-Place-Pipe (CIPP)* and its associated PDFs and video files are available free of charge at http://pubs.acs.org/doi/10.1021/acs.estlett.7b00237 and http://CIPPSafety.org

**Claim:** "…Dr. Andrew J. Whelton, Assistant Professor of Engineering at Purdue University, recently released a report completed by his students titled…."

Of the 11 co-authors, six were faculty, five were students. Dr. Whelton was the Principal Investigator, but five other professors were also Principal Investigators and contributed significantly. These professors are leading experts in their fields and were not Dr. Whelton's students.

- Professor Jeffrey Youngblood, School of Materials Engineering, 21 years of experience in polymer chemistry, composites, and surface science.
- Professor Chad T. Jafvert, Lyles School of Civil Engineering and Division of Environmental and Ecological Engineering, 32 years of experience in chemical and physicochemical fate processes of anthropogenic substances in natural and engineered environments.
- Professor Jonathan Shannahan, School of Health Science, 10 years of experience in toxicology, assessment of hazards associated with environmental and occupational exposures, and cardiopulmonary immune toxicology.
- Professor John A. Howarter, Materials Engineering and Environmental and Ecological Engineering, 14 years of experience in polymer characterization, polymer degradation, polymer-water interactions in the environment.
- Professor Brandon E. Boor, Lyles School of Civil Engineering, 8 years of experience in indoor air quality, aerosol/particulate matter, and human exposure.
- Professor Andrew J. Whelton, Lyles School of Civil Engineering and Division of Environmental and Ecological Engineering, 16 years of experience in infrastructure rehabilitation technologies, environmental chemistry, and polymer materials.

**Claim:** "…it is clear that NASSCO guidelines and specific quality and safety protocols were not utilized during the testing performed. This is of great concern to NASSCO and other organizations aligned to our industry that continually use, monitor, and evaluate the effectiveness and safety levels of CIPP technology."

It is unclear what NASSCO, Inc. quality and safety protocols were not followed by the CIPP contractors because NASSCO, Inc. has not provided details. The professional CIPP contractors, who are members of NASSCO, Inc., were responsible for their quality of care and reported to the organizations who supervised and funded the CIPP installations: Purdue Utilities, California Department of Transportation (CALTRANS), and California State University at Sacramento.

**Claim:** "Purdue University then proceeded to publish the same disputed information and additional findings without any apparent peer review"

Both claims are incorrect. The new Purdue University study, which reported new air monitoring data for Indiana and California (Sacramento) CIPP installation sites, was subjected to peer-review by the American Chemical Society's journal *Environmental Science and Technology Letters*. This periodical is a well-respected peer-reviewed journal (i.e., impact factor of 5.3). Publication of this study was conducted in accordance with the rigorous standards of the journal, which included reviews from eminent scientists in the field.

The American Chemical Society's journal Editor-in-Chief has stated:

> *"The manuscript was reviewed by three experts who looked at the originality and scientific importance of the topic, the quality of the work performed, and the appropriateness for the journal, and based on their recommendations and the consideration of the Editor, the manuscript was accepted for publication. – Dr. David Sedlak, Editor-in-Chief, Environmental Science & Technology and Environmental Science & Technology Letters"*

During the preparation of the new Purdue study, no peer reviewed CIPP air monitoring studies were found. Because prior data was lacking, these non-peer reviewed CIPP air monitoring investigations were cited in the "Introduction Section". These included:

(1) a non-peer reviewed doctoral dissertation from the University of New Orleans,
(2) a non-peer reviewed company site testing report from Canada,
(3) a non-peer reviewed conference proceedings paper written by an engineering company, and
(4) a non-peer reviewed report prepared by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR).

**Claim:** "…. Further, there was still no communication with NASSCO or, to our understanding, other organizations that could have provided excellent feedback and supportive data to provide a more accurate portrayal of CIPP technology."

Sponsored research is often published by peer-review with knowledge of the sponsor. NASSCO, Inc. did not fund the research. The project was funded in large part by the U.S. National Science Foundation (Grant No. CBET-1624183). It is, and was not, the author's responsibility to provide NASSCO, Inc. a chance to review the scientific study before it was subjected to peer-review by the American Chemical Society's journal *Environmental Science and Technology Letters*.

**Claim:** "…and did not include the resources readily available from NASSCO."

Information about CIPP used in the new study was obtained from a number of sources: NASSCO, Inc. Inspector Training and Certification Program CIPP training course and its manual, American Society for Testing and Materials (ASTM), North American Society of Trenchless Technology (NASTT), files obtained through Freedom of Information Act (FOIA) requests from municipalities, information learned from discussions with CIPP contractors, among other sources.

**Claim:** "A review of the data released in the initial Purdue study indicated a number of inconsistencies that had not been experienced or documented previously in the industry. This is

based on extensive testing performed around the world. To our understanding, these data were not considered before coming to a final conclusion or publication of the report. This research comes from a number of reliable sources, including studies performed by leading industry contractors and other organizations in Europe, Canada, and the United States, as well as several large agencies, including Caltrans. Overall, the extensive scientific data provide no consistent evidence for a link between exposure to styrene and cancer in humans."

As mentioned previously, peer-reviewed studies about CIPP emissions are lacking. If NASSCO, Inc. has data then they should make it all publicly available in its current form. Since the July 2017 study was published other organizations have publicly requested this information, but to our knowledge, no new data has been made publicly available. This information, if it exists, may help clarify the broader context of emissions and worker exposures identified in the Purdue University study. We have and continue to encourage additional studies. Any new data should be made publicly available, and hopefully peer-reviewed.

Second, the NASSCO, Inc. statement on styrene and cancer appears to be a non sequitur. NASSCO, Inc. also implied that CALTRANS evaluated the link between styrene exposure and cancer in humans. CALTRANS has not conducted such a study. Styrene was not the focus of the Purdue University study. Nonetheless, the U.S. National Toxicology Program has classified styrene as "reasonably anticipated to be a human carcinogen based on limited evidence of carcinogenicity from studies in humans, sufficient evidence of carcinogenicity from studies in experimental animals, and supporting data on mechanisms of carcinogenesis" (U.S. National Toxicology Program, *Report on Carcinogens, 14th Edition,* November 3, 2016, Accessible at https://ntp.niehs.nih.gov/pubhealth/roc/index-1.html).

A narrow focus on styrene emission and exposure is concerning because it ignores the other materials discovered during the Purdue University study. Hazardous air pollutants, suspected endocrine disrupting chemicals, a variety of compounds with limited toxicological data, and unidentified chemicals were found. Other compounds, their presence in mixtures, and the resulting exposures to the complex multi-phase mixture, or parts of that mixture, could potentially be more hazardous than exposure to a single compound. Additional research is needed as we have previously recommended.

**Claim:** "While there are questions regarding the presence and source of these organics (whether their origin is the actual CIPP product, another substance present in the CIPP process, or contained in the existing environment)…" Of additional concern is the lack of information confirming that a baseline study was performed before the steam discharge was tested…."

The emissions were not ambient background, nor did they emanate from groundwater or soil. Emissions occurred when the CIPPs were installed. Air was sampled from the exhaust and surrounding areas both prior to (via photoionization detection (PID)) and during installation and curing (via PID, tedlar bag, and condensate capture). Each air sample was automatically or manually time-stamped. Notably, emission characterization was made directly at the location of the CIPP chemical plume discharge to the ambient air. The effluent was positively pressurized relative to the surrounding air, ensuring that trace air contaminants from ambient air would not interfere with the quantification and speciation of chemicals sampled at the discharge location. The new study made clear that non-styrene materials were present in the uncured resin tubes and were extractable by pure water and solvents. Controls were used.

**Claim:** "Also, the quantity of organics discharged and impact, if any, on workers, the general population and the environment has not been determined.

The concentration of organics in the exhaust was quantified. The total amount discharged was not quantified. The total impact of these discharges on human health and environment has not yet been quantified. But we have stated previously and NASSCO, Inc. implies, there is a need for additional research in this arena.

Also, the CIPP emissions cannot be called "non-toxic" or "harmless". Toxicity (cell death) was observed when mouse lung cells were exposed to some of the emitted and collected materials. We recommended that additional work be conducted to understand the variability in materials emitted as well as their occupational and public health risks, and impact on the environment.

**Claim:** "…hereby puts in motion the review of all available industry data and, further, will purpose the preparation of an independent study and research program that will be properly peer reviewed to challenge and/or confirm the information developed and published previously. To ensure objectivity in data collection, evaluation and conclusions we suggest a study be conducted by a third-party group consisting of a professional testing company in conjunction with an institution of higher learning that has a background and experience in CIPP technology."

CIPP has been used for 30+ years, thousands if not more people may have been chemically exposed at worksites, in their homes, offices, schools, and day care centers. Since the July 2017 study was published there have been several CIPP related chemical contamination incidents to include at an elementary school and homes. In the interest of worker and public safety, a complete disclosure of all CIPP installation emissions studies held by NASSCO, Inc. and its members should occur immediately, if any exist.

We recommend, at the minimum,

1. CIPP companies request the NIOSH investigate the types and magnitude of materials emitted from CIPP installations and occupational exposure risks. NIOSH has experience in occupational exposure monitoring in the composites industry (i.e., fiberglass boat manufacturing, turbine blade manufacturing, etc.). https://www.cdc.gov/niosh/hhe/

2. CIPP companies (a) immediately notify their current and former employees that several non-peer reviewed CIPP safety industry claims were proven false by the new peer-reviewed Purdue University study, and (b) explain to their current and former employees how to contact NIOSH to request a health hazard evaluation (HHE) https://www.cdc.gov/niosh/hhe/.

3. CIPP companies contact all current and former clients (e.g., municipalities, consulting firms) and notify them that, at the present time, short- and long-term health risks associated with CIPP related exposures cannot be ruled out.

4. NASSCO, Inc. notify all persons who have completed their CIPP Construction Inspector course and notify them that, at the present time, short- and long-term health risks associated with CIPP related exposures cannot be ruled out.

**FOR IMMEDIATE RELEASE**

*For questions or additional information please contact Ted DeBoda, P.E. at 410-442-7473 or director@nassco.org.*

**NASSCO's Response to Purdue University's Findings on Cured-in-Place Pipe (CIPP).**

(Marriottsville, Maryland – August 25, 2017) The mission of the National Association of Sewer Service Companies (NASSCO) is to set standards for the assessment, maintenance and rehabilitation of underground infrastructure. Representing over 500 construction, engineering, professional, municipal and academia member companies and organizations, NASSCO works with all facets of the underground infrastructure industry to ensure full representation by every segment of user and owner groups. NASSCO encourages cooperation by all member groups – and the industry as a whole – to achieve the highest standard levels of uncompromised quality in the work our members provide for the communities they serve.

For over 35 years NASSCO has been proactive in the ongoing development and promotion of health and safety requirements for proper handling of the Cured-in-Place Pipe (CIPP) process. For the past decade NASSCO has been training inspectors on the proper health and safety measures for CIPP projects via the Inspector Training and Certification Program (ITCP). NASSCO's "Guideline for the Use and Handling of Styrenated Resins in Cured-in-Place-Pipe", first published in 2008, contains detailed information and has been in the process of update for the past several months. The release of the next edition will contain even more specifics regarding the proper handling of resins.

Dr. Andrew J. Whelton, Assistant Professor of Engineering at Purdue University, recently released a report completed by his students titled "Worksite Chemical Air Emissions and Worker Exposure during Sanitary Sewer and Stormwater Pipe Rehabilitation Using Cured-in-Place-Pipe (CIPP)." Published July 26, 2017 in the *Environmental Science & Technology Letters*, a publication of the American Chemical Society (ACS), it is clear that NASSCO guidelines and specific quality and safety protocols were not utilized during the testing performed, nor referenced in the study by the University.

This is of great concern to NASSCO and other organizations aligned to our industry that continually use, monitor and evaluate the effectiveness and safety levels of CIPP technology. It is difficult for us to understand how a representative team from a reputable University would not fact check their information and assumptions before publishing such critical information to the public.

NASSCO has been proactive in our willingness to provide quality information and feedback for these studies. In fact, on February 23, 2016, long before this report was published, NASSCO contacted Dr. Whelton regarding an earlier study to request a meeting to share information and discuss the research topic, as well as the disputed data, with the ultimate goal to share a joint understanding of the data that were developed by the research. Dr. Whelton did not respond to the invitation; however, he did attend an ITCP class in January 2017 where the CIPP process was

presented for inspection personnel. After the instructor presented to the class the current best practices for the safe installation of CIPP, no comments or suggestions were offered by Dr. Whelton on this subject.

Purdue University then proceeded to publish the same disputed information and additional findings without any apparent peer review, and did not include the resources readily available from NASSCO. Further, there was still no communication with NASSCO or, to our understanding, other organizations that could have provided excellent feedback and supportive data to provide a more accurate portrayal of CIPP technology.

A review of the data released in the initial Purdue study indicated a number of inconsistencies that had not been experienced or documented previously in the industry. This is based on extensive testing performed around the world. To our understanding, these data were not considered before coming to a final conclusion or publication of the report.

NASSCO takes accuracy of information very seriously and has uncovered much research pertaining to the CIPP installation process. This research comes from a number of reliable sources, including studies performed by leading industry contractors and other organizations in Europe, Canada and the United States, as well as several large agencies, including Caltrans. Overall, the extensive scientific data provide no consistent evidence for a link between exposure to styrene and cancer in humans.

There is concern that Dr. Whelton's team found certain other organic chemicals in the steam exhaust and other release points of CIPP installations where steam was used to heat the curing resin. While there are questions regarding the presence and source of these organics (whether their origin is the actual CIPP product, another substance present in the CIPP process, or contained in the existing environment), in the best interest of our members and communities, NASSCO will certainly investigate further.

Of additional concern is the lack of information confirming that a baseline study was performed before the steam discharge was tested. Previous testing performed by other organizations clearly indicated that chemicals found in the CIPP installation/cure water could not have possibly been contributed by the installation process. Most likely, the chemicals were contributed from the existing background levels. Also, the quantity of organics discharged and impact, if any, on workers, the general population and the environment has not been determined. A valid program should have been performed by an unbiased third-party testing institution fully knowledgeable and aware of relevant testing protocols.

As a standards leader in the industry, NASSCO, on behalf of its members, hereby puts in motion the review of all available industry data and, further, will pursue the preparation of an independent study and research program that will be properly peer reviewed to challenge and/or confirm the information developed and published previously. To ensure objectivity in data collection, evaluation and conclusions, we suggest a study be conducted by a third-party group consisting of a professional testing company in conjunction with an institution of higher learning that has a background and experience in CIPP technology.

We also continue to welcome a meeting with Dr. Whelton and his team to discuss the technology and what additional enhanced safety requirements and enforcement recommendations should be recommended for the CIPP industry if these concerns are confirmed through peer review.

# # #

About NASSCO:

Established in 1976 to represent contractors, the National Association of Sewer Service Companies (NASSCO) sets standards for the assessment, maintenance and rehabilitation of underground infrastructure through the development of specifications, information sharing through committee participation, and training programs such as PACP (Pipeline Assessment Certification Program) and ITCP (Inspector Training Certification Program). Focusing on trenchless, or "no-dig" technologies, NASSCO is also committed to ensuring the continued acceptance of growth of trenchless technologies through education, public relations, conference participation and member ambassador programs. NASSCO, a member-driven organization for professionals across North and South America who are involved in keeping underground sewer systems operating at optimum performance, fosters a non-competitive environment. NASSCO members include contractors who do the work, engineers who specify technologies, system owners (municipalities and other government organizations) who are responsible for the health of their underground systems, companies that manufacture or supply equipment, supplies or services, and individuals, educational institutions and other organizations with interests that align with NASSCO's mission.

2470 Longstone Lane, Suite M | Marriottsville, MD 21104 | Phone 410.442.7473 | Email info@nassco.org | www.nassco.org

*Certified Mail*

February 23, 2016

Andrew J. Whelton, Ph.D.
Purdue University
Lyles School of Civil Engineering
550 Stadium Mall Drive
West Lafayette, IN 47907-2051

Re: Presentation - *Chemical Air Emissions from Styrene Based Cured-in-Place Pipe for Sanitary Sewer Pipe Repair*

Dear Dr. Whelton:

I write on behalf of the National Association of Sewer Service Companies ("NASSCO"). NASSCO, mentioned multiple times in your presentation, is an industry association of contractors, engineers, material suppliers and governmental entities with the mission of setting industry standards for the assessment and rehabilitation of underground infrastructure, and assuring the continued acceptance and growth of trenchless technologies.

Among the many technologies employed by our members in trenchless rehabilitation, the rehabilitation of sewers and culverts by cured-in-place pipe ("CIPP") has been a popular, efficient and reliable method utilized throughout the world for forty-five years. In most applications, styrene is a key component of the resins used in the CIPP process.

NASSCO is aware that you have been soliciting governmental entities, including the cities of Los Angeles, CA, Alexandria, VA as well Citizens Energy Group (Indianapolis, IN) regarding alleged dangers of styrene as used in the CIPP process and requesting permission to conduct air monitoring on their projects. A number of the entities with whom you have met have expressed doubt and concern regarding your presentations and provided copies to our members.

Based on NASSCO members' extensive knowledge of CIPP, we disagree with much of the information included in your presentations and the conclusions you have reached. It is difficult for us to fully evaluate the validity of your findings since the complete methodology by which you assembled your data is not divulged. Many other studies demonstrate that styrene is not an intrinsically hazardous substance when properly used in the CIPP process. Moreover, NASSCO has developed guidelines for the use and handling of styrenated resins in CIPP, which you reference, and our members go to great lengths to specify safety measures and installation procedures that safeguard their employees as well as the public. To our knowledge, you have not attempted to discuss the purpose, basis or conclusions of your research with NASSCO, the

American Composites Manufacturers Association, other relevant industry groups, or any of our members.

It is our firm belief that you, our members and the public would benefit from a dialogue with us. NASSCO requests to meet with you at your convenience so that some of our technical experts from our relevant committees can discuss your findings and methodology as well as present data contrary to your conclusions for your consideration. A constructive dialogue between you and our association at this time may go a long way to educate both sides for the improvement of trenchless technologies and to ensure the public has the most reliable information regarding CIPP trenchless rehabilitation methods available.

Because your solicitations of the above named entities may actually be interfering with the existing contractual relationships of our members and their customers, we ask that you refrain from further meetings with owners who utilize or are considering the use of CIPP for sewer rehabilitation until we can develop a dialogue. Since we assume that the intent of your research and advocacy is well intentioned, we see this request as completely reasonable in light of the potential impacts any inaccuracies in your research could have on the business of our members and the cost to the public through funding of more expensive and less efficient means of sewer rehabilitation.

Finally, on behalf of our members, we respectfully demand that you immediately remove any pictures, names, logos, trademarks or other references to any of our members from your presentations as they are being used without permission and, as used in the context of your presentation, are disparaging to our members.

We look forward to meeting with you. Please contact me at (410) 442-7473 with your availability.

Sincerely,

NASSCO

By: 

Ted DeBoda, P.E.
Executive Director