June 6, 2016

The Honorable Representative Jimmy Dixon, Co-Chair ERC
300 N. Salisbury Street, Room 416B
Raleigh, NC 27603-5925

The Honorable Representative Chuck McGrady, Co-Chair ERC
300 N. Salisbury Street, Room 304
Raleigh, NC 27603-5925

The Honorable Senator Trudy Wade, Co-Chair ERC
300 N. Salisbury Street, Room 521
Raleigh, NC 27603-5925

RE: Clarifications Regarding Plastic Pipe Subsidy Legislative Initiative.

Dear Senator Wade and Representatives Dixon and McGrady:

I am writing to you on behalf of the NC Water Quality Association (NCWQA). The NCWQA comprises publicly-owned water, sewer, and stormwater utilities statewide. Our members also include many of the leading environmental engineering and consulting firms statewide.

The NCWQA members greatly appreciated the Environmental Review Commission’s (ERC’s) decision not to propose legislation giving a market preference to plastic pipe manufacturers. In the event this issue comes up at a future time, we want to provide the following perspective on pipe selection considerations by North Carolina’s public utilities in the hope that you will continue to find that a legislative plastic pipe preference is both unnecessary and inappropriate.

- The Initiative is part of a nationwide effort by a national chemical company trade association to get states to legislate a market advantage for manufactured polyvinylchloride (PVC or Plastic) pipe in water, wastewater, and stormwater applications.
- Significantly, the plastic pipe advocates don’t mention that PVC pipe already dominates the market for many applications. Our member, the City of Raleigh, for example, reports that PVC installed for wastewater applications represents approximately 60% of all pipe installed for
potable water or wastewater collection applications over the last 10-years. In Charlotte the numbers are 76% PVC for water and 65% PVC for wastewater applications. Nationwide, we understand that plastic pipe comprises approximately 74% of pipe installed in the same timeframe. These numbers clearly belie any anti-competitive bias against plastic pipe.

• Plastic pipe advocates further make no mention nor complaint that a chief competitor of plastic pipe - unlined Ductile Iron Pipe (DIP) - is often prohibited by utilities in corrosive wastewater collection system applications. The NCWQA members would resist a legislative command to consider DIP in those applications in the very same manner we are concerned about being forced to consider plastic pipes in applications that are not appropriate.

• The Plastic Pipe Report only focuses on plastic versus ductile iron installation costs rather than life-cycle costs. Even then, not all of the plastic pipe installation costs are considered (such as the need for tracer wire, stone backfill, stone hauling, and increased inspections for plastic pipe installations). These additional costs are not implicated when DIP is used. Thus, we don’t believe an apples-to-apples comparison was presented. Further, by limiting the comparison to installation costs rather than life-cycle costs the Report avoids a true economic comparison. Lifecycle cost evaluations typically favor DIP because it is usually credited with a 100 year-plus service life.

• The Plastic Pipe Report ignores the sound engineering reasons to specify pipe material other than PVC for certain applications such as potable water distribution or stormwater conveyance. For example, material strength is a critical design component. When looking at differences in tensile and impact strength, material fatigue rates and deflection rates, many materials have advantages over plastic. Compounding this is a concern regarding relaxed design standards for PVC pipe in guidance effective in 2007. Twenty-one specific advantages of DIP over plastic pipe in potable water applications are provided in the attachment for your consideration.

• The Chemical companies’ report, titled “Comparison of Water Main Pipe Installation Lengths and Costs in North and South Carolina: Raleigh, Charlotte, and Spartanburg/Greenville” (Plastic Pipe Report) and subsequent testimony by the chemical companies before the ERC contains inaccuracies and fails to properly articulate the sound engineering reasons for piping material selection for North Carolina potable water, wastewater, and stormwater projects.

The plastic pipe manufacturers appropriately enjoy very significant (if not dominant) market share in North Carolina and nationwide. We believe the playing field is level and are committed to keeping it level with changing pipe technologies. However, imposing a legislative mandate to consider plastic pipe (or DIP) in inappropriate applications is not in the public interest either financially or from a provision of critical public utility service perspective. Accordingly, we appreciate the ERC’s confidence in North Carolina’s public utility managers and their consultants when the ERC declined to recommend plastic pipe preference legislation. We hope utility managers statewide will continue to have the ERC’s and General Assembly’s confidence in the future should this issue arise again.

Because the Cities of Raleigh and Greensboro were specifically called out in the Plastic Pipe Report, their utility departments have provided some clarifying information in the attachment should you wish to understand more fully the pipe selection facts in those communities.
Thank you for considering this information. Please do not hesitate to contact me if you should have any questions or require additional information.

Sincerely,

F. Paul Calamita
General Counsel

Attachment.

C: Members, the North Carolina Environmental Review Commission
ATTACHMENT

CLARIFICATIONS TO PLASTIC PIPE REPORT REGARDING RALEIGH & GREENSBORO EXAMPLES

Background

Having failed to convince a number of Professional Engineers and water, wastewater and stormwater Utility Managers that PVC pipe is an “equal” or “suitable pipe material alternative” in such applications as potable water and stormwater conveyance, and expressing frustrations that water, wastewater and stormwater construction standards in some communities did not allow PVC as a material option in all categories, the PVC pipe manufacturing industry chose the legislative process to obtain a competitive advantage in the marketplace.

Representatives of the American Chemistry Council (ACC) have provided presentations to the legislative bodies of several states, including one to the North Carolina General Assembly’s Environmental Review Commission (NCGA-ERC), attacking local decision making with a report titled “Comparison of Water Main Pipe Installation Lengths and Costs in North and South Carolina: Raleigh, Charlotte, and Spartanburg/Greenville” from BCCJ Research. There are a number of issues with this testimony and supporting Report that warrant clarification.

Legislating a Market Advantage for PVC pipe is Unnecessary and Inappropriate

PVC pipe already dominates the market for many utility applications. In Raleigh, for example, PVC installed for wastewater applications represent 60% of all pipe installed for all applications. Raleigh has installed nearly one million (1,000,000) feet of PVC pipe within its sanitary sewer system (nearly 200% more than DIP) over the past 10 years. Raleigh specifies PVC pipe or lined DIP pipe in the sanitary sewer system because it has superior corrosion resistance than ductile iron alone, and that is highly important in a high hydrogen sulfide/sulfuric acid environment. In Charlotte over the past 10 years, 76% of water lines installed (387 miles of 508 miles) and 65% of wastewater lines installed (320 miles of 491) are PVC pipe. Nationwide, it comprises 74% of pipe installed as of 2004.

Such market dominance in North Carolina and nationwide belies any argument that open competition is lacking. Moreover, the Legislature should tread carefully before intruding into complex cost and risk management balancing decisions by public utility managers.

The Plastic Pipe Report Requires Clarification

The report titled “Comparison of Water Main Pipe Installation Lengths and Costs in North and South Carolina: Raleigh, Charlotte, and Spartanburg/Greenville” (Report) and subsequent testimony used a cost extrapolation tool to estimate pipe material costs which grossly over estimates material differential costs for projects within the City of Raleigh service area.

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1 Uni-Bell Study 2004
The Report states that the pipe material costs were extrapolated from total construction costs using a “tool” that “compares pipe costs to total installation cost, assuming in-road construction in an urban area, based on pipe diameter, using data collected”. This is not a practical or appropriate means to determine [or reverse calculate] pipe material costs per project. The pipe material and installation costs of a project are relatively small compared to the overall construction costs, representing approximately 45% on a relatively simple project compared to 25% or less on an extremely complicated project; with the majority of the costs of a project found in the equipment and labor to install the pipe.

In Raleigh, actual construction costs of 6-8” water lines in urban setting can range between $75 to $400/linear foot depending on excavation environmental conditions such as proximity to other utilities, traffic, depth of bury, subsurface conditions, etc. The Report fails to distinguish between urban project or site specific conditions. Using small data sets, such as those found in the Report, allows results to be skewed by one or more complicated projects such as Raleigh’s Hillsborough St. or Lenoir/South St. conversion where unit prices were extremely high due to construction difficulty [also known as “constructability issues”].

The Report states that “extracting pipe costs from overall costs presented a challenge for some of the data we collected, because, pipe costs were not broken out explicitly in every instance”. For this document, the City of Raleigh Public Utilities Department (CORPUD) generated actual costs for installing PVC pipe versus DIP using a former construction estimator for a large utility contractor located in the Raleigh region. These numbers are also based on actual quotes received from two utility suppliers located in the Raleigh area.

The table below shows a reflection of true costs to install PVC and Ductile Iron Pipe (DIP):

<table>
<thead>
<tr>
<th>PVC*</th>
<th>Unit Price</th>
<th>DIP</th>
<th>Unit Price</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>6” C900 DR14</td>
<td>$10.12/FT</td>
<td>6” PR350</td>
<td>$11.59/FT</td>
<td>$1.47/FT</td>
</tr>
<tr>
<td>8” C900 DR14</td>
<td>$13.83/FT</td>
<td>8” PR350</td>
<td>$15.46/FT</td>
<td>$1.63/FT</td>
</tr>
<tr>
<td>12” C900 DR14</td>
<td>$23.92/FT</td>
<td>12” PR350</td>
<td>$25.50/FT</td>
<td>$1.58/FT</td>
</tr>
<tr>
<td>16” C900 DR14</td>
<td>$44.95/FT</td>
<td>16” PR250</td>
<td>$41.09/FT</td>
<td>$3.86/FT</td>
</tr>
</tbody>
</table>

*Includes tracer wire ($2.50/LF), stone backfill to spring line [variable $5 depending on pipe size], stone hauling [variable $$ depending on pipe size], and full time inspection minus what would be required for partial ductile iron inspection ($1.49/LF) all of which are not backfill requirements for ductile iron. C900 DR14 is the type of PVC and thickness specified by Charlotte Water.

Note in the previous example that PVC pipe installation costs actually exceed the DIP installation for a 16 inch pipe.

The second paragraph in the Report states that costs for Raleigh for 8-12” waterlines are on average $155,900 per mile more expensive than Charlotte. Using the actual quoted numbers from the Raleigh market in the example above for a 12” waterline would cost $8,342 per mile more for DIP than PVC pipe. This number reflects the actual difference in costs as opposed to the estimated cost in the Report and supports a position in favor of DIP pipe material selection when one considers life cycle costs (discussed below).
As additional confirmation, a recent (May 2016) Greensboro Water Resources Department spot check of material supplier purchase pricing for 12" (TJ PR 350) DIP and 12" (C900 DR 14) PCV revealed the cost per foot differential was higher for DIP at $9/LF ($26.52 vs. $17.47) or $47,784 per mile of purchased pipe for pipe material costs only. With the addition of labor costs, all ancillary PVC installation costs such as tracer wire ($2.50/LF), stone backfill to spring line (variable $$ depending on pipe size), stone hauling (variable $$ depending on pipe size), and higher installation inspection costs than for ductile iron pipe the installation differential falls significantly lower than the $155,900 value cited in the report.

As earlier noted, the Report indicates it is based on pipe material costs only and does not evaluate total installation costs such as stone bedding requirements, tracer wire, and other appurtenances that would be required with PVC pipe but not with DIP. It thus appears the Report fails to properly include these costs when providing the “apples to apples” cost comparison.

The “pipe costs” for Charlotte were very similar to those of Spartanburg water, which requires ductile iron pipe. In one case, Spartanburg DIP installation costs appear to be lower than Charlotte PVC pipe costs for 6" water lines. If the “pipe costs” in this Report are accurate, one can conclude that the differences in pipe costs are more reflective of market and site conditions as opposed to material specifications. Spartanburg is less than 75 miles away from Charlotte and could certainly be considered in the same construction market, with the same contractors bidding on the work. Raleigh, on the other hand, is greater than 165 miles away from Charlotte and would be represented by different market conditions such as availability of contractors, quantity of work in the private sector, labor rates, etc.

The Report and testimony focuses on initial installation costs, but Utility Managers evaluate life cycle costs, the cost associated with operation and maintenance for the full service life of the pipe. This model is becoming more of a “best management guide” as utilities are faced with aging infrastructure in their collection and distribution systems. In pressurized potable water applications, DIP has an anticipated service life of greater than 100 years. Concrete pipe has a similar expected service life in stormwater applications. Conversely, the published service life for plastic pipe ranges from 50-100 years. Raleigh has a 10" and 14" cast iron pipe still in service today that was installed in 1887 while PVC pipe has only been installed in North America since 1951 with many early iterations of that product having service life failures at a fraction of the service life of DIP. The many significant structural advantages of DIP, discussed more fully below, are additive to life cycle cost estimate for DIP, while the structural disadvantages of PVC pipe detract from life cycle cost estimates.

The report provides no analysis to support the contention that PVC pipe products should be used in all stormwater design projects, including those that require extremely large conveyance or structural integrity.

2 The performance of Ductile Iron Pipe extends over 50 years, and because of its close physical resemblance to gray Cast Iron pipe, the long-term record of Cast Iron can be used to predict the life of a Ductile Iron Pipeline. Approximately 621 U.S. and Canadian utilities are members of the Cast Iron Pipe “Century Club” for having Cast Iron pipe in continuous service for 100 years or more. At least 23 utilities have gained membership in the Cast Iron Pipe “Sesquicentury Club” for having Cast Iron pipe in continuous service for 150 years or more.
Finally, the Report also states that the City of Charlotte only installed 570’ of water main in 2013. That is extremely hard to believe which questions the credibility and accuracy of the Report. Assuming the more plausible numbers listed in 2014 and 2015 were close to accurate, that would mean that the 2013 numbers were 5200% off. If that number is off by that much, how accurate are the associated costs?

**There are Sound Engineering Reasons to Choose Pipe Material other than PVC for Certain Applications**

In North Carolina, as in other States, the design of a potable water, wastewater collection, or stormwater conveyance systems is the purview of licensed Professional Engineers for the protection of public health and safety. State law\(^3\) requires a Professional Engineer’s certification for initial design, construction permitting and verification of installation in accordance with approved plans and specifications. There is a well-founded logic for this requirement, as only Licensed Professional Engineers have the training, experience and certification to make such decisions that directly impact public health and safety as well as environmental protection.

The Professional Engineer, in turn, responds to the Utility Manager’s design criteria for durability, operation and maintenance, life cycle costs and compatibility with existing infrastructure. Not all pipe materials are equal, even if they might meet a voluntary, consensus technical standard regarding the manufacture and performance of pipe materials such as those published by the American Society for Testing and Materials (ASTM) or American Water Works Association (AWWA). These are minimally acceptable materials standards and are not a basis for equivalency determination for pipe material selection in all applications. Design engineers must consider many factors when designing a specific pipe project.

This leads to the decision by some Utilities to exclude unlined ductile iron pipe, for example, from material selection in sanitary sewer systems, where corrosive environments would lead to lower overall service life and higher overall life cycle costs. The City of Raleigh, for example, will not allow an unlined DIP to be installed on gravity sewer interceptors 12 inches or larger.

A similar professional decision has been made by some utilities to exclude PVC pipe from certain potable water design criteria when, in the opinion of the Profession Engineer and after considering the design criteria of the utility owner or manager, PVC pipe is judged to be unsuitable or inferior for site or project conditions. Such a determination has been made by the City of Raleigh and others identified in the Report. The failure to discuss the reasoning behind this decision is serious omission from the Report and testimony provided to the ERC.

Why do some utilities choose to specify DIP for potable water projects over PVC pipe?

- DIP has 8 times the tensile strength of PVC pipe;\(^4\)
- DIP has up to four times the hydrostatic burst pressure of PVC pipe;\(^5\)
- DIP has 13 times the impact strength of PVC which is important during handling or if rock falls on pipe during installation;

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\(^3\) 15A NCAC18C.0303, 15A NCAC027.0116, N.C.G.S. 330A-315, 130A-317, 143-215.1

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• DIP resists up to 8 times the crushing load of PVC pipe\textsuperscript{v}.
• Relatively shallow scratch depth has been shown to dramatically reduce PVC pipe resistance to cyclic stresses such as water hammer\textsuperscript{v}, if a scratch or gouge that is more than 10 percent of the wall thickness, ANSI/AWWA C605 recommends rejection of the damaged PVC pipe\textsuperscript{vi};
• DIP holds up very well in varying operating temperatures as opposed to PVC pipe, which has a high thermal expansion coefficient and is more susceptible to variations in temperature;
• DIP doesn’t have the stringent bedding requirements of PVC pipe and it does not need extensive lateral support of the surrounding ground to provide structural integrity under load;
• DIP has a greater joint deflection capability (5 degrees versus 3 degrees as an example for an 8” line), providing for more forgiveness of installation errors or pressure excursions\textsuperscript{xii};
• The strength of DIP is not compromised by time; DIP doesn’t experience material fatigue where PVC pipe loses strength over time;
• DIP has superior abrasion resistance over PVC pipe;
• DIP has direct tapping advantages for water services over PVC pipe,
• DIP retains corporation stops better than PVC pipe and is thus less vulnerable to cascading damage when service lines are damaged or deformed by third party right of way excavation;
• DIP is much more resistant to directional drilling equipment damage from third party utilities, which is becoming an increasing problem with the fiber boom;
• DIP doesn’t require the same special handling and storage as PVC pipe requires. For instance, PVC pipe cannot be stored in the sun for extended periods because UV radiation embrittles PVC pipe\textsuperscript{viii};
• DIP can be buried deeper than PVC pipe and is more forgiving of additional loading if cover depth changes;
• DIP has superior restraining mechanisms, improving system resiliency;
• DIP is easily located and doesn’t rely on a tracer wire that can easily be broken or corroded.
• DIP doesn’t have issues with permeation by hydrocarbons; PVC pipe has a known susceptibility to hydrocarbon contamination and an unknown susceptibility to contamination by numerous emerging groundwater contaminates (PFOS/PFOA, 1, 4 Dioxane, hydraulic fracturing fluids, nanomaterials, pesticides, pharmaceuticals, industrial compounds, personal care products, fragrances, flame retardants and surfactants, etc.). Urban settings are the most likely location for new and undiscovered existing groundwater contamination sites.

For some utilities, the material characteristics of DIP allow a lower level of construction inspection oversight;

• PVC pipe is buoyant, a concern when installing the pipe material in areas with high water table or trench flooding is likely to occur. To prevent damage through flotation, PVC pipe must be anchored\textsuperscript{vii}; and

• A 2007 change in PVC pipe wall thickness standards has left many design professionals uncertain of the validity of long term structure integrity claims from PVC manufactures.

• These 21 reasons provide a small window into the complex decisions which public utilities must make to ensure they use the right pipe balancing the lowest life cycle cost with the lowest likelihood of service interruption for these critical public utility services.
Finally, a similar list of considerations can be compiled for the choice of many materials in stormwater applications over PVC pipe.

Conclusion

Contrary to the assertions in the Plastic Pipe Report and certain testimony before the ERC, we believe there is open competition in pipe material selection, with plastic pipe enjoying dominant market share in North Carolina and nationwide for many appropriate applications. However, it goes without saying that no pipe material is the most appropriate for all water, sewer, and stormwater applications. Rather than mandating a legislative market preference for plastic pipe manufacturers, we urge the legislature to continue to defer to public utility managers statewide in selecting the most appropriate piping material for each particular application.

Respectfully;

City of Raleigh Public Utilities Department  City of Greensboro Water Resources Department

References

i "MATERIAL COMPARISONS: Ductile Iron Pipe vs. PVC", Ductile Iron Pipe Research Association, P.6 Nov. 2015
ii "MATERIAL COMPARISONS: Ductile Iron Pipe vs. PVC", Ductile Iron Pipe Research Association, P.6 Nov. 2015
iii "MATERIAL COMPARISONS: Ductile Iron Pipe vs. PVC", Ductile Iron Pipe Research Association, P.7 Nov. 20115
iv "MATERIAL COMPARISONS: Ductile Iron Pipe vs. PVC", Ductile Iron Pipe Research Association, P.8 Nov. 20115
vi ANSI/AWWA C605-94, Section 2.1.3.
vv AWWA M23, p. 34.
vvii AWWA M23, p. 7.
v vi AWWA C605-94, p. 4