April 29, 2019

RE: Applications by Williams/Transco (Transcontinental Gas Pipe Line Company LLC) for the Northeast Supply Enhancement Project (NESE)

LAND USE FILE NO.: NJDEP File No. 0000-01-1001.3
CSW180001 Coastal Wetland, FHA180001, FHA180002 Flood Hazard Area, WFD180001, and WFD180002 Waterfront Development

DWS&G FILE NO.:
1342D Temporary Dewatering Permit – Borough of Sayreville
1343D Temporary Dewatering Permit – Old Bridge Township

To all parties concerned:

I attended the NJ DEP public hearing meeting last year held at the Franklin High School. I spoke at the event and a copy of my testimony is provided at the end of this letter. Being an engineer by training, I meant to make people aware of the inherent danger of piping systems, particularly those that have been in service for decades. This happens to be the case for the Northeast Supply Enhancement (NESE) natural gas pipeline project that includes the new compressor station CS206 added to this existing pipeline. According to Williams Transcontinental, many segments of this piping system traversing central New Jersey are decades old. Numerous sections are even 50 to 60 years old. The latest section was installed approximately 30 years ago and it is the section that runs along the length of the stone quarry at Trap Rock Quarry.

Having been an engineer that designs, among other systems, piping systems for infrastructure services, (i.e. water, natural gas, steam, wastewater), I have been trained from the very beginning of my career to understand that eventually, all piping systems leak.....and for natural gas, that presents and increases risks as the pipeline ages for explosive and catastrophic events. Like all other aging and ignored infrastructure in our country, piping systems that carry gas have a tendency to leak with time. Reports from two MIT professors who traveled to Washington DC to survey the condition of street gas manholes revealed that 6000 of them were leaking and 19 of these had concentrations as high as 500,000 parts per million or equivalent to one molecule of air to one molecule of gas. https://pangea.stanford.edu/news/nearly-6000-gas-leaks-discovered-under-washington-dc Needless to say, these conditions were considered explosive and luckily no unbeknownst citizen found him/herself unlucky enough to light up a cigarette in the vicinity of any of these manholes that he might have caused a catastrophic event such as the ones we have witnessed too many times in NJ and NYC.

My mentioning of the survey in Washington DC is made to remind ourselves of the current fragile state of our infrastructure, similar to the aging infrastructure to which this compressor station is expected to be connected. https://www.usatoday.com/in-depth/news/nation/2018/11/01/natural-gas-cast-iron-pipeline-explosion-fire-leak-safety-phmsa/1362595002/ According to USA Today, "More than 2.2 million miles of pipelines run below our streets carrying natural gas into our homes and businesses. Much of that infrastructure is old, outdated, or damaged, and leaks or ruptures could have catastrophic consequences."

Translation - if the numerous segments of pipelines A and C traversing through central New Jersey that are 50+ year old are not fully assessed and remediated, adding additional capacity to the A and C will potentially lead to a statistically-anticipated catastrophic event.

In Lawrence, MA, the excess pressure exhibited by the aging distribution pipeline caused a catastrophic explosion. The pressure built to more than a dozen times the level the system was built for. Individual home gas pressure regulators are incapable of tolerating such high pressures. Who is to say that this scenario could not occur in Franklin Township? How many regulators would fail when exposed to a probable rise in pressure due to the compressor station interconnection as a result of sensor failure as it occurred in Lawrence, MA? Are we willing to take that risk for the larger pipelines of NESE which have higher pressure and a Potential Impact Radius of at least 820 feet?

Beyond recognizing the inherent dangers in adding capacity to lines A and C from CS206, there is a second component about this exercise that exacerbates the problem and it is this. The decades-old pipeline to be used by the compressor station has been patinated internally by a layer of residue that safeguards the pipe from corrosion and/or erosion. This layer has been permanently deposited inside the pipe and acts as a barrier to further damage but does so provided the pipe does not see an increase in mass flow. If there is an increase in mass flow because larger volumes of gas are introduced, then that increase in mass flow creates an unexpected shear force on the protective layer, thereby removing it and exposing the metal below it to the corrosive action of condensation. This in turn allows for the accelerated damage of the individual joints which would in turn exhibit leakage and ultimately the likelihood of an explosive event. Recall that the gas pipe in Franklin Township and South Brunswick runs approximately 50 feet away from residential homes, and the existing and proposed pipeline in Old Bridge and Sayreville is even closer to residents in apartment complexes. There is no telling how many of these homes would be destroyed in the event of such an explosion. I am afraid that due to the number of precedents regarding catastrophic events that have accumulated in the gas and oil industry, https://www.ohio.com/article/20160506/NEWS/305069193 that a scenario such as this one might not have already been discussed in the risk management department of the proposing entity and a cost already allocated for casualty resolution.

## Here is a little bit of information on internal corrosion in gas pipelines:

https://corrosion-doctors.org/Pipeline/Internal-corrosion.htm

Corrosion on the internal wall of a natural gas pipeline can occur when the pipe wall is exposed to water and contaminants in the gas, such as $O_2$, $H_2S$, $CO_2$, or chlorides. The nature and extent of the corrosion damage that may occur are functions of the concentration and particular combinations of these various corrosive constituents within the pipe, as well as of the operating conditions of the pipeline. For example, **gas velocity** and temperature in the pipeline play a significant role in determining if and where corrosion damage may occur. In other words, a particular gas composition may cause corrosion under some operating conditions but not others. Therefore, it would be difficult to develop a precise definition of the term "corrosive gas" that would be universally applicable under all operating conditions. (NTSB http://www.ntsb.gov/publictn/2003/PAR0301.pdf)

Corrosion may also be caused or facilitated by the activity of **microorganisms** living on the pipe wall. Referred to as microbiologically influenced corrosion (MIC), MIC type of corrosion can occur when microbes and nutrients are available and where water, corrosion products, deposits, etc., present on the pipe wall provide sites favorable for the colonization of microbes. Microbial activity, in turn, may create concentration cells or produce organic acids or acid-producing gases, making the environment aggressively corrosive for carbon steel. The microbes can also metabolize sulfur or sulfur compounds to produce products that are corrosive to steel or that otherwise accelerate the attack on steel.

Internal corrosion in a gas pipeline may be detected by any of several methods, including:

A. visual examination of the inside of a pipeline when it is opened,
B. external measurement of the pipe wall thickness with instruments,
C. evaluation of corrosion coupons or probes placed inside the pipeline, or
D. inspection of the pipe with an in-line inspection tool to identify areas of pitting or metal loss.

**Non-transparency:**

Since the details of inspections on Transco's existing mainlines A and C in New Jersey that would connect to components of the NESE Project were not provided when requested by FERC, **Williams/Transco has not proven that the NESE Project is safe**. Authorities having jurisdiction over the approval of the project should remain suspect of this condition. There has been no independent analysis to determine the status of internal corrosion [or erosion or both] on existing pipelines associated with NESE. We do not even know if some of the existing lines have been designed with the necessary infrastructure that would accept pigging maintenance operations. Additionally, Stress Corrosion Cracking (SCC) is not easily detectable with pigging and, according to pipeline engineer Richard Kuprewicz, SCC could be hastened by the bi-directional status of Transco's Mainlines and many of their other pipelines. Bidirectional adds another unknown shearing potential to mainlines A and C that is currently being installed. Information about inspections on all associated pipelines over the past ten (10) years at least, should be made available for public and township review, and the NJDEP should not rely on the very general "information" provided to FERC that did not detail information or data about the corrosion that exists on their pipelines. What we DO know is that Williams/Transco is facing over one million dollars in fines for shoddy safety practices which include lack of inspections, lack of timely action after abnormalities were discovered, and running pressure in pipelines too high. **Without reviewing data about the current condition of all associated pipelines, provided the compressor station installation project in Franklin Township wins approval, this becomes the Russian roulette we will be forced to play for years to come with only one possible outcome to be rendered.**

Internal corrosion may be kept under control by establishing appropriate pipeline operating conditions and by using corrosion-mitigation techniques. One method for reducing the potential of internal corrosion from occurring is to control the quality of gas entering the pipeline, i.e. low contaminants. Also, by periodically sampling and analyzing the gas, liquids, and solids removed from the pipeline to detect the presence and concentration of any corrosive contaminants, including bacteria, as well as to detect evidence of corrosion products, a pipeline operator can determine if detrimental corrosion may be occurring, identify the cause(s) of the corrosion, and develop corrosion control measures. Another method is to replace existing aging 50+ years old pipeline segments prior to installation of the compressor station. Williams Transcontinental has not provided any data resulting from claimed smart pig runs through the mainlines that are supposed to take place every 10 years, nor identified any data indicating risk to substantiate that they are actively mitigating this risk. As indicative from the fines levied on Williams Transcontinental, there is a high likelihood that this is being overlooked. Without any oversight from NJDEP, there is no way to ensure catastrophic events will not occur to the NJ residents.

## Further discussion on Natural Gas Pipeline Corrosion
## External Corrosion aided by Liquid Saturation of Steel from Internal Pipeline Products.

Miles Haukeness P.Eng (December 18, 2017)

Natural gas transmission pipelines are far more susceptible to external corrosive attack than similar operating oil pipelines. To explain the difference, it is proposed that the internal liquid content of the natural gas transmission pipeline may actually promote corrosive chemical reactions on the outside steel surface of the pipeline.

It is common knowledge that when given enough time, steel will eventually absorb a high concentration of hydrocarbon and other liquids within the grains structure itself. A welder that attempts to cut and weld "in-service" natural gas pipelines will realize that the steel contains contaminants that will react with the weld metal deposited and cause blisters and hard compounds to develop. Special weld procedures are developed with the most common remedy for mitigating this risk is to bake out the steel for several hours at high temperatures to evaporate most of the liquids/gas contained within the steel prior to welding.

Corrosion of underground natural gas and liquid petroleum pipelines occurs in a variety of forms and requires specialized mitigation methods to detect and control. Stress corrosion cracking (SCC) is a form of electrochemical corrosion that results in clusters or colonies of cracks on the external surface of the affected pipeline.

According to the Federal Pipeline & Hazardous Materials Safety Administration (PHMSA), the majority of pipeline incidents caused by SCC are found on natural gas pipelines rather than hazardous liquid pipelines. However, SCC can manifest itself wherever the right combination of factors exists. External SCC of underground pipelines has been the most common issue; however, it has become apparent that internal SCC, as a result of exposure to alcohols, also can pose a threat to pipelines. Both ethanol and methanol are potent SCC agents.

This paper examines the probability that liquid contamination of the internal surface of a natural gas transmission pipeline can penetrate the steel matrix and promote corrosion on the outside surface of the steel pipeline. The external surface will corrode where the protective coating has been disbonded allowing electrochemical communication through the steel matrix and provide the necessary ions for transfer of the chemical processes that cause corrosion.

Corrosion of steel takes place readily when there is a plentiful supply of oxygen and hydrogen ions to facilitate the electrochemical corrosion processes. Water and hydrocarbon penetration of the steel/iron matrix is aided by dissociation of water and other compounds that are in contact with the steel surface and by internal operating pressure. The penetration is similar to a reverse osmosis process where the membrane is a steel pipeline. The pathway will be along grain boundaries and dislocations in the crystal 2 formations in the steel. The saturation and development of electrical communication is slow process so it will take several years in service for the external corrosion issues to manifest themselves.

Basic Corrosion Chemistry for Iron Corroding into Rust

Iron Fe → Fen+ + n electrons the iron atom can lose some electrons and become a positively charged ion. This allows it to bond to other groups of atoms that are negatively charged.

Wet steel rusts to give a variant of iron oxide so the other half of the reaction must involve water ($H_2O$) and oxygen ($O_2$) to produce negatively charged material

$O_2 + 2H_2O + 4e- \ 4OH$

This material will combine with the iron Fe and electrons to produce

$Fe + 3O_2 + 2H_2O = 2Fe2O3H_2O$
(Iron) + (Oxygen) + (Water) = Hydrated ferric oxide (Rust)

This series of steps tells us a lot about the corrosion process.

1. Ions are involved and need a medium to move in (usually water).
2. Oxygen is involved and needs to be supplied.
3. The metal has to be willing to give up electrons to start the process.
4. A new material is formed and this may react again or could be protective of the original metal.
5. A series of simple steps are involved and a driving force is needed to achieve them. Interfering with the steps involved allows the corrosion reaction to be stopped or slowed to a manageable rate.

The reaction is slow in pure water because there are actually two reactions taking place at separate sites. At one site, the reaction is the oxidation of the iron to produce ferric oxide and electrons that enter the metal. At the other site, the reaction is the reaction of these electrons to reduce water to hydrogen gas. The electrons move rapidly through the metal, but if the reaction is to proceed rapidly, electrolytic charge must also move rapidly through the water and in pure water it doesn't.

However, when a salt is dissolved in water it forms an electrolytic solution that will conduct electricity. (The salt is an electrolyte. Many acids and bases form conductive solutions in water and are also electrolytes.) The electrolyte carries electric current through the solution from one site where the iron is oxidized to ferric oxide to another site where hydrogen gas (H2) is produced.

Contributing factors to drive the formation of an electrolyte into the steel matrix of pipeline include the internal operating pressure of pipeline and the process of osmosis. The high operating pressure increases the internal molecular movement and subsequent collision rates to enable the process to advance. Similarly, water from the outside of the pipeline does not enter the steel matrix completely due to the pressure being lower; however, the outside environment will provide dissolved oxygen in the to the corroded area to complete the formation of corrosion products. The drive for supplying fresh oxygen from the outside environment to the corrosive site is aided by the phenomena that water will travel to a higher salt (or any solute) concentration solution. When the steel matrix is saturated, the solute concentration will attract fresh water. This natural process is called osmosis and can be demonstrated when fresh water will tend to migrate through a membrane to the salt solution on the other side.

The internal operating pressure of the pipeline will also drive any water present on the inside surface through the steel matrix as it acts like a semipermeable membrane. The water produced by reverse osmosis has a comparatively low pH and has little or no alkalinity. This means that the water lacks its hardness to function like a buffer and will be highly corrosive when reacting on the outside surface of the pipeline.

**A summary of the corrosion issues is presented below. Actual corrosion issues that cause failures usually involve several types of corrosion that are discussed.**

## 1-UNIFORM CORROSION 30% of failures

Uniform corrosion occurs over the majority of the surface of a metal at a steady and often predictable rate. Uniform corrosion can be slowed or stopped by using the five basic facts:

1. Slow down or stop the movement of electrons
    a. Coat the surface with a non-conducting medium such as paint, lacquer or oil
    b. Reduce the conductivity of the solution in contact with the metal
    c. Apply a current to the material (see cathodic protection).
2. Slow down or stop oxygen from reaching the surface. Difficult to do completely but coatings can help.
3. Prevent the metal from giving up electrons by using a more corrosion resistant metal higher in the electrochemical series. Use a sacrificial coating which gives up its electrons more easily than the metal being protected. Apply cathodic protection. Use inhibitors.
4. Select a metal that forms an oxide that is protective and stops the reaction.

## 2- LOCALISED CORROSION 70% of failures

### 2.1 GALVANIC CORROSION

This can occur when two different metals are placed in contact with each other and is caused by the greater willingness of one to give up electrons than the other. Three special features of this mechanism need to operate for corrosion to occur:

- The metals need to be in contact electrically
- One metal needs to be significantly better at giving up electrons than the other
- An additional path for ion and electron movement is necessary.

Prevention of this problem is based on ensuring that one or more of the three features do not exist.

- Break the electrical contact using plastic insulators or coatings between the metals.
- Select metals close together in the galvanic series.
- Prevent ion movement by coating the junction with an impermeable material, or ensure environment is dry and liquids cannot be trapped.

### 2.2 PITTING CORROSION

Pitting corrosion occurs in materials that have a protective film such as a corrosion product or when a coating breaks down. The exposed metal gives up electrons easily, and the reaction initiates tiny pits with localized chemistry supporting rapid attack. Control can be ensured by:

- Selecting a resistant material
- Ensuring a high enough flow velocity of fluids in contact with the material or frequent washing
- Control of the chemistry of fluids and use of inhibitors
- Use of a protective coating
- Maintaining the material's own protective film.

**Note:** Pits can be crack initiators in stressed components or those with residual stresses resulting from forming operations. This can lead to stress corrosion cracking.

### 2.3 SELECTIVE ATTACK

This occurs in alloys such as brass when one component or phase is more susceptible to attack than another and corrodes preferentially leaving a porous material that crumbles. It is best avoided by selection of a resistant material but other means can be effective such as:

- Coating the material
- Reducing the aggressiveness of the environment
- Use of cathodic protection

### 2.4 STRAY CURRENT CORROSION

When a direct current flows through an unintended path and the flow of electrons supports corrosion. This can occur in soils and flowing or stationary fluids. The most effective remedies involve controlling the current by:

- Insulating the structure to be protected or the source of current
- Earthing sources and/or the structure to be protected
- Applying cathodic protection
- Using sacrificial targets

## 2.5 MICROBIAL CORROSION

This general class covers the degradation of materials by bacteria, moulds and fungi or their byproducts. It can occur by a range of actions such as:

- Attack of the metal or protective coating by acid by-products, Sulphur, hydrogen Sulphide or Ammonia
- Direct interaction between the microbes and metal which sustains attack.

Prevention can be achieved by:

- Selection of resistant materials
- Frequent cleaning
- Control of chemistry of surrounding media and removal of nutrients
- Use of biocides
- Cathodic protection.

## 2.6 INTERGRANULAR CORROSION

This is preferential attack of the grain boundaries of the crystals that form the metal. It is caused by the physical and chemical differences between the centres and edges of the grain. It can be avoided by:

- Selection of stabilized materials
- Control of heat treatments and processing to avoid susceptible temperature range

## 2.7 CONCENTRATION CELL CORROSION (CREVICE)

If two areas of a component in close proximity differ in the amount of reactive constituent available, the reaction in one of the areas is speeded up. An example of this is crevice corrosion which occurs when oxygen cannot penetrate a crevice and a differential aeration cell is set up. Corrosion occurs rapidly in the area with less oxygen. The potential for crevice corrosion can be reduced by:

- Avoiding sharp corners and designing out stagnant areas
- Use of sealants
- Use welds instead of bolts or rivets
- Selection of resistant materials

## 2.8 THERMOGALVANIC CORROSION

Temperature changes can alter the corrosion rate of a material and a good rule of thumb is that 10 C rise doubles the corrosion rate.

## 2.9 CORROSION CAUSED BY COMBINED ACTION

This is corrosion accelerated by the action of fluid flow sometimes with the added pressure of abrasive particles in the stream. The protective layers and corrosion products of the metal are continually removed exposing fresh metal to corrosion. Prevention can be achieved by:

- Reducing the flow rate and turbulence
- Use of replaceable or robust linings in susceptible areas
- Avoiding sudden changes of direction
- Streamlining or avoiding obstructions to the flow

## 2.10 CORROSION FATIGUE

The combined action of cyclic stresses and a corrosive environment reduce the life of components below that expected by the action of fatigue alone. This can be reduced or prevented by:

- Coating the material
- Good design that reduces stress concentration
- Avoiding sudden changes of section
- Removing or isolating sources of cyclic stress

## 2.11 STRESS CORROSION CRACKING

The combined action of a static tensile stress and corrosion which forms cracks and eventually catastrophic failure of the component. This is specific to a metal material paired with a specific environment. Prevention can be achieved by:

- Reducing the overall stress level and designing out stress concentrations
- Selection of a suitable material not susceptible to the environment
- Design to minimize thermal and residual stresses
- Developing compressive stresses in the surface the material
- Use of a suitable protective coating

### External Stress Corrosion Cracking(SCC).

Three conditions are necessary for external SCC on underground pipelines (like other forms of SCC) to occur:

1. a susceptible metal,
2. a tensile stress of sufficient magnitude, and
3. a potent environment at the metal surface.

The carbon steels used to manufacture line pipe are susceptible to SCC in a number of environments, including two that develop beneath disbonded coatings underground.

Tensile stresses on underground pipelines originate from a number of sources, including residual stresses from pipe manufacturing and construction, internal operating pressure, damage to the pipeline, such as that caused by from dents and mechanical damage, and land movement. These stresses usually can be in the hoop direction (e.g., from the internal pressure), resulting in axial cracks in the axial direction.

The majority of underground pipelines are externally coated and cathodically protected to mitigate corrosion. A potent environment must have access to the metal surface for SCC to occur. Accordingly, an intact, well-bonded coating will mitigate all forms of external corrosion, including SCC. The first step in the development of a potent environment at the pipeline surface is the disbondment of the coating, typically at defects in the coating.

Potent environments are associated with the presence of carbon dioxide in the soil, typically from decay of organic matter. The cathodic protection (CP) causes the pH of the electrolyte beneath the disbonded coating to increase and the carbon dioxide dissolves in the elevated pH electrolyte, resulting in a potent high pH-cracking environment containing carbonate and bicarbonate.

### 2.13 HYDROGEN DAMAGE

A surprising fact is that hydrogen atoms are very small and hydrogen ions even smaller and can penetrate most metals.

Hydrogen, by various mechanisms, embrittles a metal especially in areas of high hardness causing blistering or cracking especially in the presence of tensile stresses. This problem can be prevented by:

- Using a resistant or hydrogen free material
- Avoiding sources of hydrogen such as cathodic protection, pickling processes and certain welding processes
- Removal of hydrogen in the metal by baking.

## Hydrogen Embrittlement

Hydrogen diffuses along the grain boundaries and combines with the carbon, which is alloyed with the iron, to form methane gas. The methane gas is not mobile and collects in small voids along the grain boundaries where it builds up enormous pressures that initiate cracks. Hydrogen embrittlement is a primary reason that the reactor coolant is maintained at a neutral or basic pH in plants without aluminum components.

If the metal is under a high tensile stress, brittle failure can occur. At normal room temperatures, the hydrogen atoms are absorbed into the metal lattice and diffused through the grains, tending to gather at inclusions or other lattice defects. If stress induces cracking under these conditions, the path is trans-granular. At high temperatures, the absorbed hydrogen tends to gather in the grain boundaries and stress-induced cracking is then intergranular.

Hydrogen embrittlement does not affect all metallic materials equally. The most vulnerable are high strength steels, titanium alloys and aluminum alloys.

Sources of hydrogen causing embrittlement have been encountered in the making of steel, in processing parts, in welding, in storage or containment of hydrogen gas, and related to hydrogen as a contaminant in the environment that is often a by-product of general corrosion. If the presence of hydrogen sulfide causes entry of hydrogen into the component, the cracking phenomenon is often termed “Sulphide stress cracking (SSC)”

Transco is proposing to transport additional volume of natural gas via Compressor Station 206 and new pipeline for additional capacity in Mainlines A and C. There have been no details provided regarding existing pipeline conditions or reports identifying vulnerable segments associated with corrosion and erosion, no details regarding increase in mass flow and velocity, and no details of the segments that were installed prior to 1970 that traverse through highly populated central New Jersey. As detailed above, there are significant risks associated with this project due to adding capacity throughout New Jersey, which risks shearing the patinated layer on the inside of the pipe (a naturally deposited coating that grows on the pipe).

**https://corrosion-doctors.org/Forms-Erosion/erosion.htm**
**Erosion-corrosion:** Erosion corrosion is an acceleration in the rate of corrosion attack in metal due to the relative motion of a corrosive fluid and a metal surface. The increased turbulence caused by pitting on the internal surfaces of a tube can result in rapidly increasing erosion rates and eventually a leak. Erosion-corrosion is associated with a flow-induced mechanical removal

of the protective surface film that results in a subsequent corrosion rate increase via either electrochemical or chemical processes. It is often accepted that a **critical fluid velocity** must be exceeded for a given material for shearing to occur. It is likely that with the added gas capacity, critical velocity will be exceeded and shearing will be triggered throughout the distribution, its extent unknown. The mechanical damage by the impacting fluid imposes disruptive shear stresses or pressure variations on the material surface and/or the protective surface film. Erosion-corrosion may be enhanced by particles (solids or gas bubbles) and impacted by multi-phase flows. The morphology of surfaces affected by erosion-corrosion may be in the form of shallow pits or horseshoes or other local phenomena related to the flow direction.

The existing pipeline that would be connected to Compressor Station 206 are currently Class 1 according to Williams/Transco's question and answer segment of their June 2018 Freshwater Wetlands application. Initially, Mainline A in this area was installed in 1950, and Mainline C was installed in 1969. A segment of pipeline closest to Trap Rock Quarry was relocated and replaced in 1987 with a Class 3 pipeline segment according to this section of the application. However, the specific locations of older and newer pipeline are not known.

NJDEP may only issue a Freshwater Wetlands Individual Permit if the agency determines that the regulated activity is **in the public interest** after considering the "functions and values provided by the freshwater wetlands and probable individual and cumulative impacts of the regulated activity on **public health** and fish and wildlife." [N.J.A.C. 7:7A–10.2(b)12vii]. As part of its public interest analysis, the term "public health" requires the NJDEP to consider the potential safety impacts of the proposed Compressor Station 206 as well as construction of new pipeline sections in Old Bridge and Sayreville that are near residences, through and by toxic and Superfund sites, and through high pH acid producing soils that could, potentially, hasten pipeline corrosion.

Since we do not know the historical and current condition of the pipelines to which NESE components would connect, there is no way that the NJDEP could adequately and independently assess the risk of constructing and operating this Project.

New Jersey has acknowledged the risk of installing interstate pipeline with lower class standards (Classes 1 to 3) than those required for New Jersey's intrastate pipelines (Class 4) by passing ACR164 and SCR118 which urges the President and Congress of the United States to require that all interstate natural gas pipelines constructed in New Jersey conform to New Jersey regulations concerning the construction, operation, and maintenance of natural gas pipelines.

Furthermore, there is not a **compelling public need** for the NESE Project, as detailed in the reports listed below, and as detailed in the definition for "compelling public need" in the **Freshwater Wetlands Protection Act Rules 7:7A-1.3** "Compelling public need" means that based on specific facts, the proposed regulated activity will serve an essential health or safety need of the municipality in which the proposed regulated activity is located, that the public health and safety benefit from the proposed use and that the proposed use is required to serve existing needs of the residents of the State, and that there is no other means available to meet the established public need.

*See:*

Aucott, Michael. (10 May 2018). Report by M. Aucott of Environmental Science and Energy Consulting to EELC that was submitted to FERC on 5/14/18 as Exhibit B. FERC Accession No. 20180514-6168(32885359) – *see pages 3-6 of the report.*

Mattei, Suzanne. (19 March 2019). False Demand: The case against the Williams fracked gas pipeline. 350.org. *Available at:* http://350.org/wp-content/uploads/2019/03/Stop_Williams_False_Demand.pdf.

**Points of concern:**

- No knowledge by local resident task force, local township, State or Federal officials on the current operation worthiness conditions of the existing pipe network including pipe wall thicknesses, pipe corrosion, pipe erosion, cracks, joint deterioration, leaks, pipe supports, pressure sensor calibration, etc.
- No knowledge by local resident task force, local township, State or Federal officials on the dates when the pipe sections were last examined and cleared for continued production and at what specific flow and pressure not to be exceeded [to prevent or accelerate system corrosion/erosion].
- No knowledge by local resident task force, local township, State or Federal officials on required scheduled maintenance procedure logs for previous years.
- No knowledge by local resident task force, local township, State or Federal officials on the exact operating parameters on which the pipe distribution and the new compressor station will operate safely, i.e. pressure, volume flow (cfh), velocity.
- No knowledge by local resident task force, local township, State or Federal officials on contingency safety plans or redundancy mechanisms.
- No knowledge by local resident task force, local township, State or Federal officials on the quality of the natural gas currently flowing through the pipe distribution, i.e. hydrocarbon composition, water content, $CO_2$, $H_2S$, $O_2$.
- Ongoing lack of transparency regarding the future operation of the system by Williams/Transco invites the possibility of legitimizing the predetermined inclusion of a statistically foreseeable catastrophic event in the company's risk management outlook.
- No knowledge by local resident task force, local township, State or Federal officials on the risks introduced by the installation (currently underway) of bidirectional flow to existing compressor station locations and the shearing potential impact on mainlines A and C.

It is the opinion hereby set forth that NJ land is simply being forcibly thrusted to serve as a routing and transport venue, albeit in public non-compliance, to bring a valued commodity extracted in a neighboring state to be delivered at the ports of entry in either Elizabeth or Newark where the material is likely liquefied and loaded onto cargo ships for global distribution delivery [given that natural gas is a global commodity and neither NJ nor NY will be making use of this excess production]. Recently, it was discussed by the USDOE that Puerto Rico will require to transition to natural gas [from diesel] to meet its energy generating requirements prior to reaching full 100% renewable energy production goal by 2050. I wonder if this new source of energy, requiring American shipping for its delivery, will be dangerously making its way through New Jersey [from its origin in the Marcellus formation] before being loaded and ultimately landing on the shore of the capital city, San Juan? I would not be the least surprised that this accord [and many others like it] have already been reached.

We, the residents of Franklin Township and adjacent municipalities, might very well be forced to play Russian roulette every day for the next 30+ years, for a service that will render no local benefits yet possibly peril many of our neighbors given the proximity of the pipe to residential neighborhoods (approximately 50 feet and less in some areas). I urge all parties involved in the NJDEP approval [or disapproval] of this project's permits to consider the opportunity for a catastrophic event as an absolute reality given the complexities brought to light and detailed in this memo regarding the safe management of aged [**and likely already-compromised**] natural gas piping to which the proposed new compressor station would connect and the continued and deliberate lack of transparency demonstrated by the vendor on matters of public safety.

It is a known fact that infrastructure systems such as natural gas pipelines have, for many decades now, been deferred its required maintenance and/or upgrades in this country. Industry associations have raised the red flag by grading the systems with failing grades rendering them dangerous as they continue to operate to provide the public. To ask of these systems to perform beyond their normal operating conditions given their impaired physical status is irresponsible and inherently dangerous. The explosive nature of the product this pipe distributes makes it particularly so. To those receptive to this message, this might be considered a warning not to be disregarded.

Very truly yours,

Rafael Melendez
Somerset, NJ (Franklin Township)

**This was my testimony at the NJDEP Hearing on Freshwater Wetlands Permit Applications (November 5, 2018) at Franklin High School (from transcript – pages 168 – 171)**

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Speaker number 63, Rafael?
MR. MELENDEZ: Rafael Melendez, R-A-F-A-E-L M-E-L-E-N-D-E-Z. So my concern is the quality of the pipe through which we are connecting. I understand that it's not 50 years old; it's about 30 years old. But I'm a mechanical

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engineer. I design piping systems for buildings. The first thing that you learn when you design piping systems is that they all leak. Eventually they all leak. This pipe is 30 years old. It connects to other piping systems down the distribution line that are about 50 to 60 years old. I can guarantee you those are leaking. Okay? Let me tell you a little anecdote. In 2013 two MIT professors migrated to Washington, D.C. and they walked 1,500 miles inside Washington, D.C. and they checked every single natural gas street manhole and they found that six thousand of them were leaking. Now, that's just Washington, D.C.

They didn't check anywhere else. Six thousand of them. Of the six thousand, 19 were explosive. Five hundred thousand parts per million was detected in 19 of them. They told the utility company. And three months later, when they were supposed to come back and check, and they did, 9 of the 19 were still explosive.

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So it's a question of do these things leak? Yes, they leak. What about the quality control? It's lacking.

You're going to add more capacity to this pipe. That means there's going to be more mass flow inside this pipe. More mass flow means more vibration of the pipe. That means more leakage.

I think what these people are doing is playing Russian roulette here in New Jersey. We got a big problem. You know, I think we are considered the place where people come to dump their garbage and that's what they're doing.

In New York they don't need this.

New York is -- New York has -- the mayor has a policy of 80 by 50, which means that by 2050, 80 percent of the energy in New York is going to be provided by green sources, not fossil fuels, which means that you're only going to have 20 percent requirement by 2050.

I'll read you from the United States Energy Information Administration. They have a weekly natural gas storage

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report. And for this, for October 26th, for natural gas there is a decrease of 623 billion cubic feet, which is less than last year's at this time, and 638 billion cubic feet below the five-year average of 3,781 billion cubic feet. At 3,143 billion cubic feet, total working gas is below the five-year historical range.

We're not using natural gas. And oil consumption this month is 3 percent less than last year, and it was 3 percent less the year before. So we're using less oil and less gas. So what is this for? What is this for? I don't know. I really don't, you know. But we -- I think they're playing Russian roulette here and that's a big problem.

Thank you very much.