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Petition of PECO Energy Company-Gas  
for a Finding of Necessity Pursuant  
to 53 P.S Section 10619 That the  
Situation of Two Buildings  
Associated with a Gas Reliability  
Station in Marple Township, Delaware  
County Is Reasonably Necessary for  
the Convenience and Welfare of the  
Public - On Remand

Docket No.:  
P-2021-3024328

Call-In Telephonic Further Hearings  
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Judge's Chambers  
State Office Building  
801 Market Street  
Philadelphia, PA

Wednesday, November 15, 2023

Commencing at 10:00 a.m.

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Docket No. P-2021-3024328

Hearing Date: November 15, 2023

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US EPA 2023 Model Year Certificate of Conformity with  
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US EPA 2023 Model Year Certificate of Conformity with  
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**PECO ENERGY COMPANY  
STATEMENT NO. 3-RD**

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PETITION OF PECO ENERGY COMPANY FOR A FINDING OF  
NECESSITY

PURSUANT TO 53 P.S. § 10619

Docket No. P-2021-3024328

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REMAND DIRECT TESTIMONY

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WITNESS: MIKE ISRANI

SUBJECT: SAFETY OF THE NATURAL GAS  
RELIABILITY STATION

DATED: SEPTEMBER 22, 2023

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1                                   **REMAND DIRECT TESTIMONY OF MIKE ISRANI**

2                                   **I.       INTRODUCTION**

3    **1.     Q.     Please state your name and business address.**

4           A.     My name is Mike Israni. My business address is 9757 Sara Ann Court, Dublin, CA  
5                   94568. I am an independent pipeline safety consultant and was previously an  
6                   official with the U.S. Department of Transportation, Pipeline and Hazardous  
7                   Materials Safety Administration (“PHMSA”).

8    **2.     Q.     Have you previously submitted testimony in this proceeding?**

9           A.     Yes. I submitted expert surrebuttal testimony that is marked as PECO Statement  
10                  No. 6-SR. My educational background and work experience are set forth in my  
11                  surrebuttal testimony.

12   **3.     Q.     Mr. Israni, what is the purpose of your Remand Direct Testimony?**

13          A.     I am providing expert testimony to respond to the Pennsylvania Commonwealth  
14                  Court’s Opinion and Order in this matter, where the Court discussed the concept of  
15                  an “impact radius of a potential explosion” as it related to the siting of PECO’s  
16                  proposed Natural Gas Reliability Station at 2090 Sproul Road (the “Station”).<sup>1</sup> My  
17                  expert testimony will respond to the Court’s Opinion to provide background on the  
18                  purpose of the PHMSA regulatory provisions for the “Potential Impact Radius” (or  
19                  “PIR”). Additionally, my expert testimony will provide clarity for the Commission  
20                  that the PHMSA PIR regulations are unrelated to the siting of the Station because  
21                  the Station is within PECO’s natural gas distribution system and the PIR is related  
22                  to risk mitigation provisions for natural gas transmission systems. Furthermore,

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<sup>1</sup> See *Twp. of Marple v. Pennsylvania Pub. Util. Comm’n*, 294 A.3d 965, 973-75 (Pa. Commw. Ct. 2023), reconsideration and reargument denied (Apr. 25, 2023).

1 my expert testimony here reiterates my testimony provided in the initial proceeding  
2 for this matter that there are no PHMSA regulations prohibiting PECO's proposed  
3 Station to be sited at 2090 Sproul Road. PECO's proposed Station, which I  
4 previously classified as a natural gas district regulating station, is a very safe type  
5 of natural gas distribution system asset. And importantly for this remand  
6 proceeding, there are no PHMSA "agency determinations", the term used by the  
7 Commonwealth Court, to be made by PHMSA because PHMSA does not regulate  
8 the siting of facilities like the Station. Finally, my expert testimony will update for  
9 the Commission my review of available PHMSA Pipeline Safety-Flagged  
10 Incidents, a defined term at 49 C.F.R. 191.3 ("Incidents"), and enforcement data  
11 sets since my previous expert testimony in this proceeding in July 2021.

12 **4. Q. Mr. Israni, based upon your education, training, and experience, do you**  
13 **believe that you are capable of expressing an opinion to a reasonable degree of**  
14 **professional certainty as to the operations and safety of natural gas facilities,**  
15 **including PECO's proposed Natural Gas Reliability Station that is the subject**  
16 **of this proceeding?**

17 A. Yes, I do.

18 **5. Q. Mr. Israni, are you sponsoring any exhibits?**

19 A. Yes. I am sponsoring the following exhibits:

- 20 • Exhibit MI-3 - Gas Technology Institute (GTI) Natural Gas Industry  
21 Overview Diagram.



1     **II.     RESPONSE TO THE COMMONWEALTH COURT’S OPINION AND ORDER**  
2                   **REGARDING “EXPLOSION IMPACT RADIUS.”**

3     **6.     Q.     Mr. Israni, did you review the Commonwealth Court’s Opinion and Order,**  
4                   **dated March 9, 2023, where the Court raised the issue of “explosion impact**  
5                   **radius” and “impact radius of a potential explosion”?**

6             A.     Yes.

7     **7.     Q.     Based on your expert experience, what is your opinion on the Commonwealth**  
8                   **Court’s usage of these terms as they relate to PECO’s siting proposal for the**  
9                   **Station at 2090 Sproul Road?**

10            A.     Based on my regulatory and industry experience, the Commonwealth Court’s  
11                   Opinion and Order intended to apply the term “Potential Impact Radius,” yet this  
12                   term is unrelated to the siting of the Station at 2090 Sproul Road.

13     **8.     Q.     What information allows you to form this opinion?**

14            A.     I am relying on the PHMSA regulations at Title 49 C.F.R. Parts 191 and 192.

15     **9.     Q.     Could you please explain your opinion further?**

16            A.     First, there is no term that I am familiar with called “impact radius for a potential  
17                   explosion” or “explosion impact radius” in PHMSA’s natural gas infrastructure  
18                   regulations. I am familiar with the term “Potential Impact Radius”, which I testified  
19                   to previously in this proceeding (*see* PECO Energy Company Statement No. 6-SR  
20                   at 23:1-24:4), which is related to natural gas pipeline transmission facilities, and is  
21                   not related to natural gas distribution facilities. Second, because the Station is part  
22                   of PECO’s distribution system under PHMSA regulations, the “Potential Impact  
23                   Radius” concept is simply inapplicable to the Station. Third, even for natural gas  
24                   transmission facilities, the “Potential Impact Radius” is unrelated to any type of

siting approval or PHMSA determination for siting natural gas transmission facility infrastructure and is related to integrity management programs for natural gas transmission facilities.

**10. Q. What is the difference between transmission facilities and distribution facilities?**

A. As an initial concept, PHMSA regulations are applicable to different types of “pipelines”, including both the interstate gas lines delivering natural gas to PECO’s natural gas system and the equipment through which natural gas moves through a utility’s distribution system, such as the Station itself. The natural gas pipeline industry considers “Gas Facilities” to include pipes, mains, regulators, and other facilities owned or operated by a natural gas operator for the purpose of providing gas service. As such, the PHMSA regulations define “Pipeline or Pipeline system” to include all parts of those physical facilities through which gas moves in transportation, including, but not limited to, pipe, valves, and other appurtenance attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies. *See* 49 C.F.R. § 191.3.

“Transmission lines” and “Distribution lines” have different functions within the natural gas infrastructure network. “Transmission lines” typically are interstate natural gas lines connecting larger volumes of natural gas, which increases the pressure, to large storage facilities or into public utility systems, such as PECO’s distribution systems. Distribution lines are pipes and related infrastructure, including PECO’s proposed Station, that connect natural gas supplies to customers.

1 PECO's utility infrastructure connecting natural gas supplies to residential and  
2 commercial customers is a natural gas distribution system.

3 "Transmission line" and "Distribution line" are defined terms in the PHMSA  
4 federal regulations (49 C.F.R. § 192.3). The PHMSA regulations define  
5 "Transmission line" as those natural gas facilities that have a maximum allowable  
6 operating pressure ("MAOP") of 20 percent or more of the specified minimum  
7 yield strength ("SMYS") listed for a manufactured steel pipe. If the pipe has a  
8 MAOP below 20% of SMYS and is downstream from a gate station where custody  
9 transfer from transmission facilities to distribution facilities takes place, then the  
10 facility would be classified as a "Distribution line". *See* 49 C.F.R. § 192.3.

11 A depiction of the difference between "Transmission lines" and "Distribution lines"  
12 is shown on Exhibit MI-3, where the light-blue depicts the transmission network,  
13 and pink depicts the distribution network. As an example of the interface between  
14 Transmission lines and Distribution lines, PECO witness Tim Flanagan previously  
15 testified to PECO's city gate stations, which are transmission facilities that connect  
16 an interstate Transmission line to PECO's distribution system and supply the  
17 distribution system with natural gas.

18 **11. Q. How would you classify PECO's Station and gas main connecting to the**  
19 **Station?**

20 A. PECO's Station and the gas main connecting to the Station are all within PECO's  
21 distribution network and are connecting to the existing distribution network, and  
22 accordingly, would be classified as a part of PECO's distribution network.

23 **12. Q. What is the "Potential Impact Radius"?**

1           A.     The “Potential Impact Radius” or “PIR” is defined at 49 C.F.R. § 192.903 and is a  
2                   calculation for operators of natural gas transmission facilities to determine risk,  
3                   specifically, whether the natural gas transmission facility is within a “High  
4                   Consequence Area”, i.e., an area with a higher concentration of commercial and  
5                   residential buildings in proximity to the natural gas transmission facility. If a  
6                   natural gas transmission facility is within a “High Consequence Area” then the  
7                   natural gas transmission facility is classified as a “Covered Segment” and the  
8                   natural gas transmission facility operator is required to develop and follow a written  
9                   “Transmission Integrity Management Program” or “TIMP” and include the  
10                  Covered Segment in the TIMP. *See* 49 C.F.R. §§ 192.903 and 907.

11               To explain further, the “Potential Impact Radius” is defined as:

12                               “Potential impact radius (PIR) means the radius of a  
13                               circle within which the potential failure of a pipeline  
14                               could have significant impact on people or property.  
15                               PIR is determined by the formula  $r = 0.69 * (\text{square root of } (p * d^2))$ , where ‘r’ is the radius of a circular  
16                               area in feet surrounding the point of failure, ‘p’ is the  
17                               maximum allowable operating pressure (MAOP) in  
18                               the pipeline segment in pounds per square inch and  
19                               ‘d’ is the nominal diameter of the pipeline in inches.”  
20

21               As stated within the above definition, the variables for the PIR include the MAOP  
22               of a pipeline segment and the diameter of the pipeline segment. The PIR is then  
23               used to calculate the “Potential Impact Circle”, which is then used to determine  
24               what class location the natural gas transmission pipeline segment is within. There  
25               are four class locations: Class 1, Class 2, Class 3 and Class 4. *See* 49 C.F.R. §  
26               192.5. Class 3 and Class 4 locations, which are typical of suburban and urban areas,  
27               are automatically within a “High Consequence Area” and a natural gas transmission

1 line operator is required to develop and follow a written integrity management plan  
2 for segments within these areas. *See* 49 C.F.R. §§ 192.903 and 907. Class 1 and  
3 Class 2 locations, which are typical of more rural areas, can meet the definition of  
4 High Consequence Area depending on the number of occupied buildings within the  
5 Potential Impact Circle. Therefore, the PIR is used to determine whether areas  
6 within a Class 1 or Class 2 location that are in proximity to a natural gas  
7 transmission pipeline meet the definition of “High Consequence Area”, and  
8 therefore would be a “Covered Segment” and require a natural gas transmission  
9 line operator to include those segments of the transmission line in the operator’s  
10 TIMP.

11 **13. Q. How is the “Potential Impact Radius” related to natural gas distribution**  
12 **facilities?**

13 A. The PIR is **not** related to **distribution facilities**. As I explained above, the **PIR is**  
14 **only related** to determining whether a natural gas **transmission** facility meets the  
15 definition of “Covered Segment”. If a natural gas transmission facility meets the  
16 definition of “Covered Segment”, then the natural gas transmission operator is  
17 required to develop, follow, and include the Covered Segment within the operator’s  
18 written TIMP under 49 C.F.R. Subpart O, Gas Transmission Pipeline Integrity  
19 Management. There is no PIR calculation for distribution facilities under the  
20 PHMSA regulations because operators of distribution facilities are required in  
21 accordance with 49 C.F.R. Part 192, Subpart P, Gas Distribution Pipeline Integrity  
22 Management (IM), to include all of their distribution facility assets in a written

Distribution Integrity Management Program (“DIMP”) regardless of the proximity of a distribution asset to occupied buildings.

**14. Q. Is the “Potential Impact Radius” related to any siting restrictions of natural gas distribution facility infrastructure?**

A. No. The PIR is unrelated to any natural gas distribution facility and does not apply to any siting determinations by an operator. As I explained in my prior testimony in this proceeding at Tr. 1577:5-10 and 1650:8-1651:20, natural gas distribution systems are located where natural gas is distributed to customers, which need to be in residential and commercial areas to serve those customers, and the PHMSA regulations do not restrict where natural gas distribution facilities may be located. The PHMSA regulations protect public safety via the DIMP, engineering requirements (such as the 20% of SMYS standard), monitoring, annual inspections and testing, leakage surveys, valve maintenance, and damage prevention requirements per 49 C.F.R. Part 192.

**15. Q. How is the “Potential Impact Radius” related to PECO’s proposed Station or the gas main that connects to the Station?**

A. The PIR is not applicable to PECO’s proposed Station or the gas main that connects to the Station because, as stated above, the Station and the gas main connecting to the Station are not transmission facilities, but are distribution facilities, and the PIR is only related to transmission facilities.

**16. Q. Why did you previously testify about the Potential Impact Radius?**

A. As explained in my prior testimony in this proceeding, (*see* PECO Energy

1 Company Statement No. 6-SR at 23:1-24:4), I raised the issue of the Potential  
2 Impact Radius to respond to the testimony of Delaware County witness Mr. Tim  
3 Boyce. Mr. Boyce stated that the 2020 Department of Transportation Emergency  
4 Response Guidebook (the “Guidebook”) suggested an “impact zone” from a natural  
5 gas pipeline failure of at least 800 meters/half a mile could result in the event of a  
6 delayed ignition. I responded by first stating that the Guidebook does not provide  
7 for a potential impact radius. Second, I referenced the “Potential Impact Radius”  
8 that I am familiar with, which as I previously discussed is a term defined by  
9 PHMSA regulations, that provides for a calculated impact radius based on the  
10 MAOP of a pipeline and the diameter of the pipeline. Although the PIR does not  
11 apply to the Station because it is a distribution facility, I calculated a Potential  
12 Impact Radius for the Station to be 117 feet and not 800 meters (i.e., 2,624.67 feet)  
13 as stated by Mr. Boyce.

14 **17. Q. The Commonwealth Court stated that the Commission “failed to identify any**  
15 **such outside agency determinations that pertained to explosion impact**  
16 **radius...” for the Station. What is your response to this statement by the**  
17 **Commonwealth Court?**

18 A. There are no PHMSA agency determinations required to site the Station’s Buildings  
19 or the Station. As I previously stated, the PHMSA regulations do not use the term  
20 “explosion impact radius” but use the term “Potential Impact Radius”, which as  
21 discussed, is unrelated to PECO’s proposed Station because the PIR is only related  
22 to transmission facilities and PECO’s proposed Station is an asset of PECO’s

1 distribution system. Further, and importantly, I am not aware of any agency  
2 determinations that relate to the PIR.

3 Additionally, there are no PHMSA requirements restricting where an operator may  
4 place a natural gas distribution facility, nor are there any approvals or other  
5 determinations that an operator must obtain from PHMSA to place a natural gas  
6 facility at a specific location. In other words, there are no PHMSA agency  
7 determinations to be considered by the Commission because PHMSA does not  
8 regulate the siting of this type of facility.

9 **18. Q. Why does PHMSA not regulate the siting of district regulating stations?**

10 A. PHMSA does not regulate the siting of district regulating stations, such as PECO's  
11 proposed Station, because the PHMSA regulations require distribution system  
12 operators to comply with the PHMSA integrity management requirements at 49  
13 C.F.R. Part 192, Subpart P regardless of where the facilities are placed and  
14 operators must follow extensive engineering and inspection requirements to ensure  
15 safety of a distribution system asset regardless of its location.

16 All natural gas operators must follow the PHMSA regulations and these regulations  
17 were developed with safety as a priority. PHMSA regulations, at 49 C.F.R. Part  
18 192, include extensive requirements for natural gas distribution operators to follow,  
19 including requirements for the materials used in natural gas facilities (Subpart B);  
20 pipe and pipeline component design requirements (Subparts C and D); construction  
21 requirements, including welding and joining requirements (Subparts D through G);  
22 requirements for customer meters, service regulators, and service lines (Subpart H),  
23 corrosion control requirements (Subpart I); operation and maintenance



requirements (Subparts L and M); personnel qualifications and recordkeeping requirements (Subpart N); and DIMP, which establishes a written program that an operator must follow to continuously evaluate, prioritize and mitigate risks, such as corrosion, excavation damage, other outside force damage, or equipment failure to an operator's distribution system (Subpart P).

### **III. OPINION ON NATURAL GAS INFRASTRUCTURE SAFETY**

**19. Q. Mr. Israni, what was your prior testimony on the safety of natural gas district regulating stations?**

A. As I explained in my prior testimony in this proceeding at PECO Energy Company Statement No. 6-SR at 10:20-14:8, my opinion, based on my years of industry experience and review of PHMSA's publicly available data, is that natural gas pressure reducing district regulating facilities, like PECO's proposed Station, are very safe.

**20. Q. What from your industry experience allows you to form this opinion?**

A. My experience with the PHMSA regulations, including the purpose of the regulations and the process to develop the regulations, allows me to form this opinion. As I explained previously, all natural gas operators must follow PHMSA regulations and these regulations were developed with safety as a priority and apply and incorporate industry best practices.

The PHMSA regulations were developed in consultation with, and incorporate by reference, industry consensus standards involving multiple organizations, including the American Society of Mechanical Engineers (ASME), American Society for Testing and Materials (ASTM), American Petroleum Institute (API), American Gas

1 Association (AGA), Manufacturers Standardization Society of the Valve and  
2 Fittings Industry, Inc. (MSS), National Fire Protection Association (NFPA),  
3 National Association of Corrosion Engineers (NACE), Plastic Pipe Institute (PPI),  
4 and Gas Research Institute (GTI). These organizations regularly review and  
5 modify the industry standards based on updated technology and industry best  
6 practices. These robust, multifaceted, and continuously evolving standards allow  
7 operators to construct and operate their distribution facilities very safely.

8 **21. Q. Your opinion in the original proceeding was also based on the PHMSA**  
9 **publicly available records. What do the PHMSA publicly available records**  
10 **show for district regulating stations since your prior testimony in this**  
11 **proceeding in July 2021?**

12 A. In my prior testimony at PECO Statement No. 6-SR at 7:8-14:18, I included a  
13 review of PHMSA publicly available data through 2020 for reportable Incidents, a  
14 defined term at 49 C.F.R. § 191.3, at natural gas regulating stations across the entire  
15 United States that are comparable to PECO's proposed Station. PHMSA datasets  
16 are now available through 2022. From the 2020 to 2022 PHMSA datasets, I  
17 identified no reportable Incidents at any of PECO's regulating stations and only  
18 identified eight reportable Incidents at comparable regulating stations (not on  
19 PECO's distribution system).<sup>2</sup> To put this into context, as I previously testified at  
20 PECO Statement No. 6-SR at 9:19-10:5, there are thousands of natural gas  
21 distribution operators in the United States, each individually operating potentially

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<sup>2</sup> All data taken from PHMSA DOT website at: <https://www.phmsa.dot.gov/about-phmsa/offices/office-pipeline-safety> (last visited June 8, 2023)

1 several regulating stations, and out of these thousands of regulating stations  
2 operating across the United States over a two-year period, there were only eight  
3 reportable Incidents.

4 **22. Q. Could you please describe the eight reportable Incidents referenced above?**

5 A. The Incidents can be categorized as operator caused, or outside factor caused. Of  
6 the eight Incidents, two of the Incidents can be categorized as operator caused  
7 because of incorrect operation of equipment, one of which resulted in an injury to  
8 an equipment operator during the replacement of equipment at the regulating  
9 station. As previously stated, neither of these Incidents involved a PECO facility.  
10 The remaining six Incidents involved some outside factor, and again, none of these  
11 Incidents involved a PECO facility. Three of the Incidents involved a vehicle  
12 impacting the regulating station, where the only injuries were the drivers of the  
13 vehicles, and unfortunately in one of the Incidents, a driver passed away after the  
14 driver's vehicle hit the station. PECO's proposed Station includes a perimeter wall  
15 that will protect the Station from vehicle impacts. Of the remaining Incidents, one  
16 involved a weather-related equipment malfunction due to icing, one involved a  
17 flash flood, and one involved vandalism of equipment, and again, the Station's  
18 proposed perimeter wall will protect the Station from unauthorized access.

19 **23. Q. Based on this updated review of PHMSA's database, has your opinion on the**  
20 **safety of Natural Gas regulating stations changed?**

21 A. No. The PHMSA records continue to show that the number of reportable Incidents  
22 at regulating stations that are comparable to PECO's proposed Station is very low  
23 out of the thousands of regulating stations across the country, and there were no

reportable Incidents at any of PECO's regulating stations. This current review of the PHMSA datasets does not change my prior opinion in this proceeding. As restated above, regulating stations, such as PECO's proposed Station, are very safe.

**IV. OPINION ON PECO'S OPERATIONAL RECORD.**

**24. Q. Mr. Israni, what was your prior testimony on the operational record of PECO?**

A. In my prior testimony in this proceeding at PECO Energy Company Statement No. 6-SR at 15:9-17:12, my opinion was that PECO's operations meet or exceed federal and state standards for a natural gas system and that PECO will be able to safely operate the proposed Station. This was based on industry experience and review of PHMSA's publicly available records related to PECO.

**25. Q. What do the PHMSA publicly available records show for PECO's operations since your prior testimony in this proceeding in July 2021?**

A. In my prior testimony at PECO Statement No. 6-SR at 15:8-17:12, I included a review of PHMSA publicly available data for PHMSA enforcement cases against PECO. Since my prior testimony, the PHMSA public records that are available through 2022 do not show any enforcement cases against PECO.<sup>3</sup>

**26. Q. Based on this updated review of PHMSA's database, has your opinion on PECO's operational record or ability to safely operate the proposed Station changed?**

A. No. The records show no PHMSA enforcement cases against PECO since my prior

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<sup>3</sup> All data taken from PHMSA DOT website at: <https://www.phmsa.dot.gov/pipeline/enforcement/enforcement-overview> (last visited June 8, 2023)

1 testimony, and this supports my prior opinion in this proceeding and restated above  
2 that PECO's operations meet and exceed federal and state standards and that PECO  
3 will be able to safely operate the proposed Station.

4 **V. CONCLUSION**

5 **27. Q. Does this conclude your Remand Direct Testimony?**

6 A. Yes, it does. However, I reserve the right to file such additional testimony as may  
7 be necessary or appropriate.

**PECO ENERGY COMPANY  
STATEMENT NO. 3-RR**

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PETITION OF PECO ENERGY COMPANY FOR A FINDING OF  
NECESSITY

PURSUANT TO 53 P.S. § 10619

Docket No. P-2021-3024328

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REMAND REBUTTAL TESTIMONY

---

WITNESS: MIKE ISRANI

SUBJECT: SAFETY OF THE NATURAL GAS  
RELIABILITY STATION

DATED: OCTOBER 30, 2023

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1                                   **REMAND REBUTTAL TESTIMONY OF MIKE ISRANI**

2   **I.     INTRODUCTION**

3    **1.     Q.     Please state your name and business address.**

4           A.     My name is Mike Israni. My business address is 9757 Sara Ann Court, Dublin, CA  
5                   94568. I am an independent pipeline safety consultant and was previously an  
6                   official with the U.S. Department of Transportation, Pipeline and Hazardous  
7                   Materials Safety Administration (“PHMSA”).

8    **2.     Q.     Have you previously submitted testimony in this proceeding?**

9           A.     Yes. I submitted expert surrebuttal testimony that is marked as PECO Energy  
10                  Company (“PECO”) Statement No. 6-SR and expert remand direct testimony that  
11                  is marked as PECO Remand Direct Testimony No. 3-RD. My educational  
12                  background and work experience are set forth in my surrebuttal testimony PECO  
13                  Statement No. 6-SR.

14   **3.     Q.     Mr. Israni, what is the purpose of your Remand Rebuttal Testimony?**

15          A.     The purpose of my Remand Rebuttal Testimony is to respond to: (1) the Remand  
16                  Direct Testimony of Marple Township witnesses Jeffrey D. Marx, Marple  
17                  Township Remand Statement No. 2; (2) the Remand Direct Testimony of Marple  
18                  Township witness James Capuzzi, Marple Township Remand Statement No. 4; and  
19                  (3) the Remand Direct Testimony of Marple Township, Ted Uhlman, and Julie  
20                  Baker witness Roberta Winters, Marple Township, Ted Uhlman and Julie Baker  
21                  Remand Statement No. 4. My testimony is based on my decades of cumulative  
22                  training and experiences as a consultant in the natural gas pipeline industry and in  
23                  past positions with PHMSA.



1     **4.     Q.     Mr. Israni, based upon your education, training, and experience, do you**  
2                   **believe that you are capable of expressing an opinion to a reasonable degree of**  
3                   **professional certainty as to the operations and safety of natural gas facilities,**  
4                   **including PECO’s proposed Natural Gas Reliability Station (the “Station”)**  
5                   **that is the subject of this proceeding?**

6             A.     Yes, I do.

7     **5.     Q.     Mr. Israni, are you sponsoring an exhibit?**

8             A.     I am sponsoring the following exhibit:

- 9                         •     MI-4, Google Street View Visual of 2090 Sproul Road

10     **II.     RESPONSE TO REMAND DIRECT TESTIMONY OF JEFFREY D. MARX,**  
11                   **MARPLE TOWNSHIP REMAND STATEMENT NO. 2.**

12     **6.     Q.     Mr. Israni, did you review the Remand Direct Testimony of Jeffrey Marx?**

13             A.     Yes, I have.

14     **7.     Q.     On page 2 of his testimony, Mr. Marx references API RP 752 and 753 in**  
15                   **reference to “Building Siting Studies”. Are you familiar with API RP 752 and**  
16                   **753?**

17             A.     Yes, API RP 752 and 753 are American Petroleum Institute (API) recommended  
18                   practices (RP) numbers 752 and 753.

19     **8.     Q.     Are API RP 752 and 753 related to the siting of natural gas distribution**  
20                   **facilities?**

21             A.     No. API RP 752 and 753 are not related to the siting of natural gas distribution  
22                   facilities and are not referenced in the PHMSA regulations for natural gas  
23                   distribution systems. API RP 752 provides recommended practices for occupied  
24                   permanent buildings and API RP 753 provides recommended practices for portable

1 buildings, with both RPs specific to buildings located at refineries, petrochemical  
2 and chemical operations, natural gas liquids extraction plants, and natural gas  
3 liquefaction plants. These are all extensive heavy industrial facilities. None of  
4 these facilities are remotely equivalent to PECO's proposed Station. PECO's  
5 proposed Station is a district regulating station that reduces the natural gas pressure  
6 through a series of pipes and valves and also includes a natural gas line heater to  
7 regulate the temperature of the natural gas and a generator to supply back-up power  
8 in an emergency. Thousands of these types of stations exist in residential and urban  
9 areas across the country.

10 **9. Q. On page 4, lines 1-9 of Mr. Marx's testimony, he states that the "the hazards**  
11 **associated with the Marple Reliability Station (MRS) are common to most**  
12 **natural gas transmission and distribution systems." Do you agree with this**  
13 **statement?**

14 A. No, I do not agree with this statement. The proposed Station is a distribution asset  
15 and not a transmission asset, as I previously testified to in my Remand Direct  
16 Testimony at 5:20-22. Distribution systems are required to operate below 20% of  
17 the specified minimum yield strength (SMYS), providing a much larger safety  
18 margin than the 50% SMYS limit for natural gas transmission facilities located in  
19 equivalent suburban locations. Additionally, natural gas distribution systems are  
20 required to be odorized, which provides for enhanced detections of leaks, where  
21 transmission facilities are not required to odorize the transported natural gas.

22 **10. Q. Mr. Marx uses the term "vapor cloud" throughout his testimony, such as on**

1           **pages 4, 5, and 6, to describe the potential hazard associated with the Station.**

2           **What is your response to this statement?**

3           From my experience, there is not a potential for a vapor cloud formation in a natural  
4           gas facility like PECO's proposed Station. Vapor clouds are typically associated  
5           with natural gas liquids ("NGLs"), such as propane and butane, both of which are  
6           denser than air. In contrast, the primary component of natural gas, methane, is  
7           much lighter than air when in gaseous form and will tend to disperse into the  
8           atmosphere rather than form a dense vapor cloud near the ground. Liquified natural  
9           gas ("LNG"), which is natural gas supercooled to minus 260 degrees Fahrenheit to  
10          remain in a liquid form, also can form a vapor cloud if it is released and the  
11          supercooled liquid quickly warms and is vaporized. Here, as I understand from this  
12          proceeding, the natural gas that will travel to the Station will already be in gaseous  
13          form as it enters the gas main 11.5 miles away from the Station and any hypothetical  
14          leak or release from the Station will dissipate into the air because, as discussed,  
15          gaseous natural gas is more buoyant than air.

16   **11.   Q.   Did you review Mr. Marx's testimony on pages 4 and 5 where he describes an**  
17           **analysis modeling potential accidental releases at the Station?**

18           A.   Yes.

19   **12.   Q.   Could you please summarize your understanding of his analysis?**

20           A.   Yes, Mr. Marx's testimony states that he conducted a modeling analysis using  
21           Quest's CANARY by Quest® program. Mr. Marx calculated potential accidents  
22           involving fire or explosions at the "inlet" of the proposed Station, the "outlet" of  
23           the proposed Station, and within the proposed Station building. He describes two

1 scenarios that were simulated. The first scenario involved two-inch diameter  
2 “significant holes” in the Station’s equipment, which event was characterized by  
3 Mr. Marx as “rare, or what is often called the maximum ‘credible’ event size.” The  
4 second scenario involved a “full pipe rupture” in the Station’s equipment, which  
5 was characterized by Mr. Marx as “extremely rare.”

6 **13. Q. Could you please provide your commentary on Mr. Marx’s analysis regarding**  
7 **the “significant holes” event?**

8 A. I believe that this “significant holes” event would be a very hypothetical situation.  
9 First, as I previously mentioned, there is no “vapor cloud” to be formed from a  
10 release from the Station because the natural gas is already in gaseous form at  
11 ambient temperatures, much lighter than air, and will quickly rise and dissipate in  
12 the air. Also, in my experience at PHMSA and in the industry, I have never heard  
13 of a distribution pipeline asset such as the equipment at PECO’s proposed Station  
14 to develop two-inch holes in the equipment when this equipment is: (1) new  
15 equipment in compliance with PHMSA regulations and industry standards, (2)  
16 safely enclosed in an operator’s building; (3) monitored 24/7; and (4) is required to  
17 have routine inspections. Additionally, the situation is highly unlikely given my  
18 review of PHMSA’s Incident (as defined by 49 C.F.R. § 191.3) database involving  
19 district regulating stations equivalent to PECO’s proposed Station, where I did not  
20 identify an Incident as described by Mr. Marx.

21 **14. Q. Could you please provide your opinion on Mr. Marx’s analysis regarding the**  
22 **“full rupture” event?**

23 A. Yes. First, I agree with Mr. Marx that a “full rupture” event is an extremely

1 rare event. A review of the PHMSA dataset for district regulating stations did not  
2 identify a single event equivalent to what Mr. Marx is analyzing. Ruptures are rare  
3 events that can occur during excavation around pipelines. Here, however, the  
4 Station would be fully enclosed within a security fence, which would prevent any  
5 potential rupture events from construction equipment. Also, as previously  
6 mentioned, the Station will be continuously monitored by PECO and subject to  
7 inspections and leak surveys. In addition, the natural gas will be odorized, which  
8 would alert any persons in proximity to the Station of a leak occurring at the Station.

9 With regards to the results from Mr. Marx's analysis, I do not agree with the  
10 calculation presented by Mr. Marx that a potential impact distance of 220 feet  
11 would occur at the inlet of the Station. Although this calculation is used only for  
12 transmission lines as I previously testified to in PECO Statement No. 3-RD, a  
13 PHMSA potential impact radius ("PIR") calculation of 220 feet would require an  
14 inlet pressure for the Station to be 705 psi. However, the pressure at the Station is  
15 not proposed to ever be 705 psi, as PECO witness Ryan Lewis testified at PECO  
16 Statement No. 3SR. Mr. Lewis, formerly PECO's Gas Engineering & Asset  
17 Performance Manager for PECO's Gas Asset Management and Performance  
18 Department, testified that the pressure of the natural gas exiting PECO's West  
19 Conshohocken LNG facility will be approximately 475 psi. It will then travel 11.5  
20 miles through PECO's new gas main and lose pressure as it travels, and ultimately  
21 will arrive at 2090 Sproul Road with a pressure of approximately 150 psi to 200  
22 psi. Once at the Station, the pressure of the natural gas will be reduced to 99 psi  
23 before being injected into the existing distribution system within Sproul Road.

1 Accordingly, the 220 feet impact radius calculated by Mr. Marx is inconceivable  
2 because the 705 psi pressures necessary for this calculation will not be present at  
3 the Station.

4 **15. Q. Mr. Israni, on pages 6 through 9 of Mr. Marx's testimony, he describes his**  
5 **review of the PHMSA data for Incidents involving natural gas facilities. How**  
6 **do you respond to Mr. Marx's testimony?**

7 A. Mr. Marx is providing statistics on all natural gas distribution lines, for both buried  
8 and aboveground systems. Mr. Marx's review does not focus on PHMSA Incidents  
9 for district regulating stations that are equivalent to PECO's proposed Station. As  
10 I have testified, these stations are very safe based on the PHMSA database, are  
11 highly regulated, and PECO does not have any reported Incidents at its equivalent  
12 stations or any enforcement actions in the past 20 years, demonstrating exemplary  
13 operation of its system. Mr. Marx's review describes below ground Incidents,  
14 where a significant portion are related to excavation activities, such as road repairs,  
15 laying underground water pipes, storm drains, sewer lines, electric or  
16 telecommunication cables, or planting or removing trees near residential properties.

17 Also, Mr. Marx's review describes aboveground Incidents, where a significant  
18 portion are related to vehicular or third party damage to residential meter regulator  
19 equipment and risers coming out of the ground. Notwithstanding Mr. Marx's  
20 inclusion of all Incidents involving natural gas distribution systems, out of the  
21 millions of miles of natural gas distribution systems across the country and over 70  
22 million customers, in my opinion these numbers establish a very limited number of

Incidents and overall demonstrate the inherent safety of natural gas distribution systems.

**III. RESPONSE TO REMAND DIRECT TESTIMONY OF JAMES CAPUZZI,**  
**MARPLE TOWNSHIP REMAND STATEMENT NO. 4.**

**16. Q. Mr. Israni, did you review the Remand Direct Testimony of James Capuzzi?**

A. Yes.

**17. Q. What is your reaction to Mr. Capuzzi's testimony?**

A. Mr. Capuzzi's Remand Direct Testimony offers essentially the same testimony as his initial Direct Testimony, Marple Township Statement No. 2, dated July 6, 2021, which testimony was offered by Marple Township in the initial proceeding for this matter. My Surrebuttal Testimony, PECO Statement No. 6-SR at 24:5-25:2 responded to the testimony of Mr. Capuzzi in the initial proceeding, which testimony I reaffirm herein.

**18. Q. Do you share the same opinion as Mr. Capuzzi as stated on page 4, lines 17-21 of his Remand Direct Testimony that "[s]hould there be a leak emanating from a pipe flange ahead of the main valve of the incoming gas line inside the Reliability Station it will be necessary to manually shut the valve in the street...[and] [e]ach second the leak goes unmitigated increases the potential for an explosion with widespread destruction of property and potentially the loss of life (both civilian and emergency responders)"?**

A. No. I do not share Mr. Capuzzi's opinion here. In my view, risks posed by this Station are minimal. First, natural gas regulating stations are extremely safe, which is supported by PHMSA's publicly available Incident records regarding these types of facilities, as I have previously testified. See PECO Remand Statement No. 3-

1 RD at 11:9-13. I was unable to identify a single natural gas explosion Incident at  
2 an equivalent natural gas regulating station in my review of PHMSA's Incident  
3 database, with records going back over 25 years. This opinion is also shared by  
4 Marple Township's own witness, Mr. Jeffrey Marx, who characterized these types  
5 of events as "rare" and "extremely rare". *See* Marple Township Remand Statement  
6 No. 2 at 4-6.

7 In addition, the numerous operational procedures and design specifications for  
8 PECO's proposed Station will ensure the safe operation of PECO's proposed  
9 Station. The Station will be housed within a secured building equipped with gas  
10 sensors and alarms. Also, the Station is continuously monitored by PECO staff 24-  
11 hours a day, seven days a week. PECO will be required by PHMSA regulations at  
12 49 C.F.R. §§ 192.721 and 192.723 to conduct frequent inspections and leak  
13 surveys to check equipment at the Station.

14 If there were a hypothetical leak to occur at the Station within the Station building,  
15 then the natural gas sensors within the building will trigger an alarm, and PECO's  
16 controller will be able to remotely shut down the gas supply through a remote-  
17 control valve. Thus, gas accumulation will be minimized. Also, as I understand  
18 from the designs of the Station, the Station Building will be vented, which would  
19 reduce any natural gas accumulation within the building and negate the risk of an  
20 explosion. In addition, as I understand from PECO's operations, and which are  
21 required by regulations and industry practice, a PECO crew will be dispatched to



1 investigate the leak and upon the arrival of the emergency crew, they will be able  
2 to mitigate the situation.

3 Also, if a hypothetical leak were to occur on the incoming line of the Station outside  
4 the building, natural gas will escape into the atmosphere and dissipate any risk of  
5 an explosion. PECO's controller will be able to detect the leak and will be able to  
6 determine the need to stop the flow of natural gas and will send a PECO emergency  
7 crew to investigate the leak.

8 **19. Q. Mr. Israni, in his testimony, Mr. Capuzzi states on page 5 that the Station**  
9 **being unmanned causes great concern and increases the likelihood of greater**  
10 **area of damage before mitigation can be accomplished. Do you share this**  
11 **concern?**

12 A. No. As I have previously testified, regulating stations, such as PECO's proposed  
13 Station, are extremely safe based on the extensive safety parameters in place for  
14 these types of stations and a review of the PHMSA database. Also, the Station will  
15 be continuously monitored by PECO and PECO will conduct periodic inspections  
16 and leak surveys as required by PHMSA regulations. Finally, as I previously  
17 testified in the initial proceeding (*see* PECO Statement No. 6-SR at 24), studies  
18 conducted by PHMSA have found that pipeline operators in the industry report to  
19 incidents within an hour 88% of the time.<sup>1</sup> As I understand from PECO Energy  
20 Company Statement No. 4-SR, PECO responds to 99.9% of odor calls within an

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<sup>1</sup> See December 10, 2012 PHMSA Leak Detection Study Final Report, conducted by Kiefner & Associates, Inc. available at <https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/technical-resources/pipeline/16691/leak-detection-study.pdf>, last visited 07/08/2021.

1 hour, and PECO ranks in the first decile for Percent First Responder Calls Under  
2 One-Hour for the last 13 years among similar gas utilities per industry  
3 benchmarking, which means that PECO will be able to quickly respond to a  
4 potential leak at the Station.

5 **20. Q. What is your response to Mr. Capuzzi's opinion that PECO's proposed Station**  
6 **should not be sited at 2090 Sproul Road because the site is in close proximity**  
7 **to persons and property?**

8 A. I do not agree with Mr. Capuzzi's opinion. I previously testified in this proceeding  
9 that natural gas facilities, and especially regulating stations such as PECO's  
10 proposed Station, are typically located near residential and commercial areas for  
11 engineering reasons and to serve the nearby community. The purpose of these  
12 regulating stations is to enable a supply of natural gas to be placed into the  
13 distribution network for customers to use at their homes and businesses. In my  
14 experience at PHMSA, many gate stations and regulating stations that are larger  
15 and more complex than PECO's proposed Station are located in both urban and  
16 more residential locations. These natural gas regulating stations, such as PECO's  
17 proposed Station, are very safe.

18 In addition, I have testified previously that there are no PHMSA regulations  
19 governing where natural gas distribution facilities, such as this proposed Station,  
20 should be located because PHMSA regulations require operators to adhere to  
21 numerous safety standards, including facility design parameters, materials  
22 standards, and operator practices, such as extensive monitoring, surveys, and threat  
23 assessments.

1     **21.     Q.     Mr. Capuzzi references the United States Department of Transportation 2020**  
2                   **Emergency Response Guide (“ERG”) on pages 3 and 4 in his testimony to**  
3                   **support his opinion that the Station should not be sited at 2090 Sproul Road.**  
4                   **What is the ERG?**

5           A.     The ERG is a guidebook created by PHMSA to provide first responders with a  
6                   manual to help with hazardous materials transportation accidents, whether via  
7                   truck, pipeline, rail, or marine. The ERG is not related to any siting requirement or  
8                   recommendation for natural gas facilities. I previously provided testimony  
9                   regarding the ERG in response to Mr. Timothy Boyce’s testimony during the initial  
10                  proceeding (*see* PECO Statement No. 6-SR at 23:5-11). The ERG provides  
11                  recommended emergency response procedures for situations involving hundreds of  
12                  different types of materials, anything from natural gas, gasoline, coal, oxygen to  
13                  even charcoal.

14    **22.     Q.     Does the ERG affect your opinion as to the overall safety of the Station?**

15           A.     No, the ERG does not affect my opinion that PECO’s proposed Station will be a  
16                   safe natural gas distribution facility asset. I based my opinion on my industry  
17                   experience, knowledge of the extensive PHMSA regulatory safety requirements for  
18                   these facilities, and my review of PHMSA’s database. The ERG provides guidance  
19                   for emergency situations, which I, and Marple Township’s witness Mr. Marx, have  
20                   already testified that an emergency event at this proposed Station would be a very  
21                   rare event.

22                   Notwithstanding the rarity of such an event, my review of the ERG provides that  
23                   the Station, which will be transporting natural gas, will provide evacuation ranges

1 in emergency situations comparable to other property uses in the area of PECO's  
2 proposed Station at 2090 Sproul Road. For example, as Mr. Capuzzi's testimony  
3 states, the ERG provides a recommended immediate isolation distance of 100  
4 meters (330 feet) for releases of flammable gas. For emergencies involving  
5 gasoline, which can occur at gasoline stations, the ERG provides evacuation ranges  
6 for gasoline spills and fires.<sup>2</sup> I understand that the site at 2090 Sproul Road was  
7 formerly a gasoline station, and that there is currently a gasoline station across  
8 Sproul Road from the site, which is identified on the photograph from Google Street  
9 View, Exhibit MI-4. According to the ERG, for gasoline spills of more than 55  
10 gallons, the evacuation range is recommended at 300 meters (1,000 feet) in all  
11 directions. For fires involving gasoline tank trucks, which frequently arrive and  
12 depart from gasoline stations (an example of which is depicted on Exhibit MI-4),  
13 the ERG provides an evacuation range of 800 meters (1/2 mile). Accordingly, the  
14 evacuation range for an incident at the Station is less than that which would apply  
15 to a large gasoline spill or a fire involving a truck delivering gasoline to one of the  
16 service stations in Marple Township.

17 **IV. RESPONSE TO REMAND DIRECT TESTIMONY OF DR. ROBERTA**  
18 **WINTERS, MARPLE TOWNSHIP, TED UHLMAN & JULIE BAKER**  
19 **REMAND STATEMENT NO. 4**

20 **23. Q. Mr. Israni, did you review the Remand Direct Testimony of Dr. Roberta**  
21 **Winters?**

22 **A. Yes.**

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<sup>2</sup> See U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Emergency Response Guidebook, 2020, pg. 190, Guide 127, available at <https://www.phmsa.dot.gov/hazmat/erg/erg2020-english>

1    **24.    Q.    What was your reaction to her Remand Direct Testimony?**

2           A.    Dr. Winters' testimony and report are very similar to her report that was  
3                offered by Ms. Julie Baker during the initial proceeding in this matter. I previously  
4                reviewed Dr. Winters' report in the initial proceeding and provided testimony as to  
5                that report in my Surrebuttal. However, Administrative Law Judge DeVoe  
6                sustained PECO's objection to Dr. Winters' testimony and Dr. Winters did not  
7                testify during the initial proceeding. *See* Tr. 893:5-14. Because Dr. Winters did  
8                not testify in the initial proceeding, my Surrebuttal testimony in response to Dr.  
9                Winters' report was omitted from the record by agreement of the parties. *See* Tr.  
10              1522-1530.

11   **25.    Q.    Dr. Winters' testimony on pages 7 through 9 asks multiple questions**  
12                **regarding the safety and operations of natural gas infrastructure. How do you**  
13                **respond to Dr. Winters' questions?**

14           A.    In my Surrebuttal Testimony (PECO Statement No. 6-SR at 7-15) and Remand  
15                Direct Testimony (PECO Statement No. 3-RD at 11-14), I provide an extensive  
16                analysis on the safety of natural gas infrastructure and the review of PHMSA's  
17                datasets for district regulating stations, which shows a limited number of Incidents  
18                over several decades, out of thousands of similar stations, which signifies that any  
19                risks from these stations are very low. In addition, in my Remand Direct  
20                Testimony, I identify the extensive number of PHMSA regulatory requirements at  
21                49 C.F.R. Part 192 for natural gas distribution systems material selection,  
22                construction requirements, personnel training, and operator asset inspections and

1 surveys to ensure safety of the natural gas distribution system. See PECO  
2 Statement No. 3-RD at 10:10-11:5.

3 **26. Q. On page 7, lines 16 through 18 of Dr. Winters' testimony, Dr. Winters cites to**  
4 **PHMSA reports for incidents over the past three years. What is your response**  
5 **to Dr. Winters' reference to these PHMSA reports?**

6 Dr. Winters is referring to PHMSA data for all pipelines, including hazardous  
7 liquids lines, natural gas transmission lines, gas gathering lines, gas storage  
8 facilities, liquified natural gas facilities, and natural gas distribution lines, and  
9 across all types of assets connected to these various types of pipeline systems. Dr.  
10 Winters' review was not refined to a review of incidents at assets comparable to  
11 PECO's proposed Station. I classify PECO's proposed Station as a natural gas  
12 distribution system district regulating station. This type of asset is different than  
13 natural gas transmission lines, liquified natural gas facilities, and hazardous gas  
14 liquids lines, which are included within the data referred to by Dr. Winters. These  
15 types of pipeline assets, as opposed to the Station, operate differently, such as  
16 operating at different pressures, pose different risks, and have different regulatory  
17 schemes, and therefore, I do not consider this to be a relevant comparison.

18 As I have previously testified, I reviewed the PHMSA data for Incidents occurring  
19 at natural gas distribution system regulating stations comparable to PECO's  
20 proposed Station and I have identified a very few number of Incidents at these  
21 stations. Based on my review of the PHMSA data and my understanding of these  
22 facilities from my experience in the industry, I am able to opine that facilities such  
23 as PECO's proposed Station are very safe in operation.

1    **27.    Q.    On page 2 of the “Expert Report of Roberta Winters” attached as**  
2                   **an exhibit to the Remand Direct Testimony of Dr. Winters, Dr. Winters**  
3                   **references a “Hazard Mitigation Planning: Practices for Land Use Planning**  
4                   **and Development near Pipelines” prepared by the Pipelines and Informed**  
5                   **Planning Alliance (“PIPA”) (the “PIPA Guidance”). Mr. Israni, are you**  
6                   **familiar with PIPA and this PIPA Guidance?**

7                   Yes, I am familiar with PIPA and the PIPA Guidance document. PIPA was formed  
8                   by PHMSA to develop recommended practices on land use, development, and  
9                   emergency management near existing hazardous liquid and gas transmission  
10                  pipelines. The PIPA Guidance is primarily concerned with ensuring that the local  
11                  government is knowledgeable of hazardous liquid and transmission pipeline  
12                  infrastructure to develop adequate emergency planning and to prevent accidental  
13                  disruption to the infrastructure, such as developing in an area without adequate  
14                  knowledge of the infrastructure. The PIPA Guidance also states that siting and  
15                  construction requirements for new transmission lines are beyond the scope of the  
16                  PIPA Guidance and also specifically states that PHMSA is not authorized to  
17                  prescribe the location or routing of any pipeline facilities. The PIPA Guidance is  
18                  also specifically not intended to apply to distribution pipeline systems, such as  
19                  PECO’s gas main and the proposed Station that are the subject of this proceeding,  
20                  and therefore is inapplicable to PECO’s proposed Station.<sup>3</sup>

21    **28.    Q.    Do the PHMSA regulations prohibit the siting of regulating stations, such as**

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<sup>3</sup> See PIPA Guidance, at 6, available at <https://www.fema.gov/node/hazard-mitigation-planning-practices-land-use-planning-and-development-near-pipelines-2015>

1 **PECO's proposed Station, in residential areas?**

2 A. No, there is no such regulation prohibiting the siting of regulating Stations,  
3 whether gate stations or district regulating stations, within residential areas. In fact,  
4 these facilities are commonly sited in residential areas so those areas can be served.

5 **29. Q. On page 4 of Dr. Winters' Remand Direct Testimony and her report, Dr.**  
6 **Winters states that PECO's proposed Station "will release or vent natural gas**  
7 **into the air as a means to regulate and reduce pipeline pressure." Mr. Israni,**  
8 **can you please comment on this statement?**

9 A. Regulating stations, such as PECO's proposed Station, do not release natural  
10 gas into the air to regulate the pressure as part of their normal operations. The  
11 designs for these stations include regulators that ensure that natural gas is not  
12 released to the environment. The fundamental principle of natural gas regulation is  
13 controlling the flow or pressure without releasing the natural gas.

14 **V. SUMMARY OF OPINION**

15 **30. Q. Mr. Israni, could you please summarize your opinion on PECO's proposed**  
16 **Station in light of your review of the witnesses' testimony offered by Marple**  
17 **Township, Ted Uhlman, and Julie Baker?**

18 A. Yes. I continue to have the same opinion that natural gas distribution facilities  
19 generally, and PECO's proposed Station specifically, are very safe assets. The  
20 testimony from the other parties has not changed my opinion. I do not have safety  
21 concerns with the proposed Station being sited at 2090 Sproul Road. This proposed  
22 Station is equivalent to a district regulating station, of which there are an estimated  
23 thousands of these types of equivalent regulating stations across the natural gas



1 industry. These stations are commonly located in suburban and urban areas to serve  
2 the needs of nearby customers. My opinion as to the safety of these facilities is to  
3 a reasonable degree of scientific certainty based on my review of PHMSA's  
4 database, where there are only minimal identified Incidents across the entire United  
5 States involving equivalent facilities, my industry experience and understanding of  
6 the extensive PHMSA regulations that operators must follow to ensure safety, and  
7 my review of PHMSA enforcement data involving PECO, which demonstrates that  
8 PECO has an exemplary operational record.

9 **VI. CONCLUSION**

10 **31. Q. Does this conclude your Remand Rebuttal Testimony?**

11 A. Yes, it does. However, I reserve the right to file such additional testimony as may  
12 be necessary or appropriate.

# Exhibit

## MI-3

# gti<sup>®</sup> Natural Gas Industry



PIPELINE OPERATIONS & MAINTENANCE



GAS CONTROL



GAS QUALITY



CUSTOMER SERVICE



SAFETY



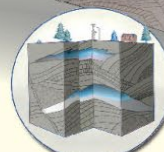
CORROSION CONTROL



REGULATION/OVER-PRESSURE PROTECTION



MEASUREMENT



STORAGE OPERATIONS

# Exhibit

## MI-4





Broomall, Pennsylvania

Google Street View

May 2023

[See more dates](#)

Image capture: May 2023 © 2023 Google



**PECO ENERGY COMPANY  
STATEMENT NO. 6-RD**

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PETITION OF PECO ENERGY COMPANY FOR A FINDING OF  
NECESSITY

PURSUANT TO 53 P.S. § 10619

Docket No. P-2021-3024328

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REMAND DIRECT TESTIMONY

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WITNESS: JEFFREY HARRINGTON

SUBJECT: ENVIRONMENTAL IMPACTS TO AIR  
QUALITY, WATER QUALITY,  
WETLANDS, STORMWATER,  
ENDANGERED AND THREATENED  
SPECIES AND OTHER  
ENVIRONMENTALLY SENSITIVE  
RESOURCES; IMPACTS TO HISTORIC  
RESOURCES

DATED: SEPTEMBER 22, 2023

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1                   **REMAND DIRECT TESTIMONY OF JEFFREY HARRINGTON**

2                                   **I.       INTRODUCTION**

3   **1.     Q.     Please state your name and business address.**

4           A.     My name is Jeffrey Harrington. My business address is 451 Presumpscot St.,  
5                   Portland, Maine 04103.

6   **2.     Q.     What is your educational background?**

7           A.     I received a Bachelor of Science in chemical engineering from Stanford University  
8                   and a Master of Science (MS) in civil engineering from Carnegie Mellon  
9                   University.

10 **3.     Q.     Please identify your professional experience relevant to your Direct**  
11 **Testimony.**

12          A.     I am a senior environmental engineer with 35 years of experience in environmental  
13                   permitting and compliance. Over the last 35 years, I have participated in more than  
14                   200 projects across approximately 35 states, the District of Columbia, Puerto Rico,  
15                   and the Canadian provinces of Nova Scotia, Alberta, Manitoba, and Quebec. I  
16                   have served as technical lead, senior project engineer, or project manager for  
17                   dozens of projects supporting many industry sectors including petroleum and  
18                   natural gas distribution, electric power generation, chemical manufacturing, the  
19                   transportation sector, and the automobile and metallurgical industries. I have  
20                   conducted and managed broad-based environmental reviews identifying and  
21                   evaluating environmental permitting requirements and critical issues assessments  
22                   involving air emissions, industrial wastewater and stormwater discharges to surface  
23                   water and groundwater, subsurface contamination, noise, and natural and cultural



resources. The majority of my work is in the area of air emissions with a specialty in air emissions permitting, air quality dispersion modeling, air emission inventories, and model development. I routinely assist clients in submitting Title V and major source air permit applications and conduct analyses of air quality impacts to support such applications. Prior to working at Tetra Tech, Inc. ("Tetra Tech"), I was a Senior Project Engineer at AMEC Foster Wheeler Environment & Infrastructure in Portland, Maine, from April 2005 to September 2016, where I focused on critical issues assessments for commercial projects, air permitting, dispersion modeling (including air quality impacts analysis and Human Exposure Models), air toxics modeling, and comprehensive emissions inventories. Between 1994 and 2005, I was a Senior Project Engineer with Earth Tech in Portland, Maine, where I had the same job duties as described above. Between 1992 and 1994, I was a Senior Engineer for Systems Applications International (SAI) located in Morrisville, North Carolina. Between 1988 and 1991, I was an Environmental Engineer with ABB Environmental Services in Portland, Maine. Among other things, while at ABB, I assisted in groundwater analysis of contamination at a Superfund site and guided the technical development of the U.S. Environmental Protection Agency's ("EPA") sponsored model called FATE, which predicts the fate and treatability of chemicals at wastewater treatment plants.

**4. Q. Please identify your current job responsibilities.**

A. Since September 2016, I have served as Senior Environmental Engineer at Tetra Tech, a leading global provider of consulting and engineering services, where I also serve as Discipline Lead, Air Quality and Acoustics. In that capacity, I work with

1 clients on a wide array of environmental issues including environmental permitting,  
2 compliance, monitoring, and modeling. While I have years of project management  
3 experience encompassing the areas of noise, surface and groundwater  
4 contamination, sedimentation, habitat destruction, and endangered and threatened  
5 species, my work primarily focuses on air emissions permitting, air quality  
6 monitoring, and performing air quality dispersion modeling.

7 **5. Q. Are you a member of any professional organizations?**

8 A. Yes, I am a member of the Air and Waste Management Association, a non-profit  
9 professional organization with the goal of improving environmental knowledge on  
10 environmental issues including air pollution control and the management of  
11 hazardous wastes.

12 **6. Q. Have you authored any publications?**

13 A. Yes, I authored five articles on topics including air permitting, modeling, and  
14 exposure assessments. I have also presented at more than a dozen conferences on  
15 similar topics.

16 **7. Q. Have you previously provided expert testimony?**

17 A. Yes, I have testified in the following matters:

- 18 • *Sierra Club v. Woodville Pellets, LLC*, Case No. 9:20-cv-00178 (E.D. Tex.),  
19 where I was qualified as an expert in air permitting, air quality monitoring,  
20 emissions inventories, and air dispersion modeling;
- 21 • *NL Industries, Inc. v. ACF Industries LLC, et al.*, Case No. 10-cv-89W (W.D.  
22 N.Y.), where I was qualified as an expert in air dispersion modeling and  
23 emissions inventories;

- *Carrie Jean LaBauve, et al. v. Olin Corporation et al.*, Case No. 03-CV-0567-WS-B (S.D. Ala.), where I was qualified as an expert in mercury air monitoring and air dispersion modeling; and
- *Paulini Loam, LLC v. Town of Framingham Zoning Board of Appeals, et al.*, Case No 09-MS-401214 (Mass. Land Court) where I was qualified as an expert in air dispersion modeling, emissions inventories, and air permitting.

**8. Q. What is the purpose of your Remand Direct Testimony in this proceeding?**

A. The Commonwealth Court's opinion remanded this matter to conduct an environmental impact review with respect to the siting of the Fiber Building and the Station Building at 2090 Sproul Road (the "Property") within the context of the Pennsylvania Environmental Rights Amendment. Tetra Tech conducted such review, which includes the following topics: air quality, water quality, stormwater, wetlands, endangered species, and impacts to historic structures.

**9. Q. Based on your education, training, and experience, do you believe that you are capable of expressing an opinion to a reasonable degree of professional certainty as to the environmental impacts of the Fiber Building and Station Building and the Natural Gas Reliability Station ("Station") at the Property?**

A. Yes, I am.

**10. Q. Are you sponsoring any exhibits?**

A. Yes, I am sponsoring Exhibit JH-1, which is my resume. I am also sponsoring Exhibits JH-2 and JH-3, which are Certificates of Conformance issued by the EPA for the proposed emergency generators at the Station.

## II. SCOPE OF REVIEW

### 11. Q. What was your scope of review?

A. The Commonwealth Court remanded this matter to the Pennsylvania Public Utility Commission (“Commission”) so the Commission can issue an Amended Decision incorporating “the results of a constitutionally sound environmental impact review as to the proposed siting on the Property of the Fiber Building and the Station Building.”<sup>1</sup> I understand that the reference to a “constitutionally sound” environmental impact review is a reference to the Environmental Rights Amendment in Article I, Section 27 of the Pennsylvania Constitution which protects the peoples’ “right to clean air, pure water, and the preservation of the natural, scenic, historic, and esthetic values of the environment.” I address those issues and similar environmental concerns raised by the parties in this matter. Notably, this assessment analyzes the impacts (or lack thereof) of the Station as a whole in addition to the impacts (or lack thereof) of the proposed siting of the Fiber Building and the Station Building. In this sense, my scope of review is broader than what was required by the Commonwealth Court. This comprehensive review performed by me and my Tetra Tech colleagues included a review of environmental permit applications; environmental permits and approvals; correspondence with local, state, and federal agencies; environmental due diligence reports; and design and engineering documents for the Station (collectively, “Project Documents”) to assess the potential impacts of the Station on air quality, water quality, wetlands, stormwater, endangered and threatened species, and historical structures.

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<sup>1</sup> *Twp. of Marple v. Pa. Pub. Util. Comm’n*, 294 A.3d 965, 975 (Pa. Commw. 2023).

12. Q. Based upon your comprehensive assessment, as well as your education, training, and experience, are you able to express an opinion to a reasonable degree of professional certainty as to the environmental impacts of siting the Fiber Building and the Station Building at the Property?

A. Yes. For the reasons noted below, siting the Fiber Building and the Station Building at the Property will not cause any unreasonable environmental impacts.

13. Q. And based upon your comprehensive assessment, as well as your education, training, and experience, are you able to express an opinion to a reasonable degree of professional certainty as to the environmental impacts of the construction or operation of the Station?

A. Yes. For the reasons noted below, neither the construction nor the operation of the Station will cause any unreasonable environmental impacts.

**III. ENVIRONMENTAL PERMITS, APPROVALS, AND COMPLIANCE**

14. Q. Have you reviewed PECO's environmental permits and approvals obtained for the Station?

A. Yes. As part of Tetra Tech's analysis, we reviewed the following environmental permits and approvals:

Permit	Approval Number	Agency	Status/Findings
National Pollutant Discharge Elimination System (NPDES) Individual Permit for Discharges of Stormwater Associated with Construction Activities	PAD460044 A-2	Pennsylvania Department of Environmental Protection ("PaDEP")	Approved by PaDEP (June 8, 2021)
Pennsylvania Natural Diversity Index (PNDI)	PNDI-714855	Pennsylvania Game Commission ("PGC")	No known impact; no further review required (September 30, 2020)

Permit	Approval Number	Agency	Status/Findings
		Pennsylvania Department of Conservation and Natural Resources (“DCNR”)  Pennsylvania Fish and Boat Commission (“Pa. F&BC”)  U.S. Fish and Wildlife Service (“U.S.F&WS”)	
Project Review Form	2020-1388-091B	Pennsylvania Historical and Museum Commission (“PHMC”)	No effect on historic properties (October 19, 2020)

**15. Q. Are there any other environmental permits or approvals required for the construction or operation of the Station?**

A. Based on Tetra Tech’s review of the description of the construction and operation of the Station, no other environmental permits are required for the construction and operation of the Station.

**16. Q. Is PECO in compliance with the NPDES permit identified above?**

A. Yes. Based on Tetra Tech’s review of publicly available databases and information, no violations have been issued and no enforcement actions have been brought against PECO with respect to PECO’s NPDES permit, or with respect to the Station.

#### **IV. AIR QUALITY WILL NOT BE UNREASONABLY IMPACTED BY THE CONSTRUCTION OR OPERATION OF THE STATION**

**17. Q. Did Tetra Tech analyze potential impacts to air quality from the construction and operation of the Station?**

A. Yes. Tetra Tech reviewed PECO's construction plans and equipment specifications which show that there will be two air emission units which are located outside of the Station Building and Fiber Building: (1) the Cold Weather Technologies (CWT) Indirect Line Heater ("Line Heater") and (2) an emergency generator.

**18. Q. Please describe the Line Heater.**

A. The Line Heater will be required to provide a heat input of 4.6 million British thermal units per hour (“MMBtu/hr”) to control the temperature of the natural gas flowing out of the Station. The Line Heater will include six (6) burners fueled with natural gas which are used to heat water and the heated water in turn is used to control the natural gas temperature. Note that the Line Heater is an indirect Line Heater, which requires a slightly higher heat input capacity of 5.75MMBtu/hr in order for the heated water to deliver the 4.6 MMBtu/hr to the process.

**19. Q. Does the Line Heater require an air permit?**

A. No. The regulations at 25 Pa. Code Chapter 127 provide for several exemptions to air permits. In addition, PaDEP maintains a document (Document Number 275-2101-003) that specifies allowable exemptions under 25 Pa. Code § 127.14(a)(8). This document is noticed on the Pennsylvania Bulletin for public review and comment before any changes can be made to allowable exemptions. The following exemptions are relevant to the Station:

- 1 1. Combustion units with a rated capacity of less than 10 MMBtu/hr of heat input  
2 fueled by natural gas supplied by a public utility, 25 Pa. Code § 127.14(a)(3)  
3 (“Exemption 1”);
- 4 2. Internal combustion engines rated at less than 100 brake horsepower (bhp), 25  
5 Pa. Code § 127.14(a)(8) and PaDEP Document Number 275-2101-003  
6 (“Exemption 2”); and
- 7 3. Internal combustion engines, regardless of size, with combined actual nitrogen  
8 oxides (NO<sub>x</sub>) emissions less than 100 pounds per hour (lb/hr), 1000 pounds per  
9 day (lb/day), 2.75 tons per ozone season, and 6.6 tons per year (tpy) on a 12-  
10 moth rolling basis, 25 Pa. Code § 127.14(a)(8) and PaDEP Document Number  
11 275-2101-003 (“Exemption 3”).

12 In this instance, the Line Heater falls comfortably within the Exemption 1 criteria  
13 above because the rate capacity of heat input is well under the 10 MMBtu/hr  
14 threshold and therefore no permit is required.

15 **20. Q. Please describe the emergency generator.**

16 A. The Station will have one (1) emergency generator which will either be a 30-  
17 kilowatt (kW) or 50-kW emergency generator. It is my understanding that the 50-  
18 kW emergency generator may be required in the event that PECO constructs the  
19 “Enhanced Design” including a clock tower pursuant to an agreement between  
20 PECO and the Township, as described in the Remand Direct Testimony of Jim  
21 Moylan (PECO Statement No. 4-RD). The rated mechanical capacity of the 50-  
22 kW emergency generator as stated by the vendor is 104.7 bhp.

23 **21. Q. Does the emergency generator require an air permit?**



1 A. No. Assuming that PECO uses a 50-kW emergency generator, Exemption 2 is  
2 inapplicable because the engine exceeds the 100 bhp threshold. However,  
3 Exemption 3 applies. For instance, vendor-provided information indicates a NO<sub>x</sub>  
4 and hydrocarbon (NO<sub>x</sub>-HC) emissions rate of 4.89 grams per horsepower-hour  
5 (g/hp-hr). Tetra Tech then assumed that 86 percent of the NO<sub>x</sub>-HC is NO<sub>x</sub>, and  
6 further assumed that emergency generator use will be limited to 500 hours per year  
7 of operation. These are standard assumptions used when calculating emissions for  
8 air permitting purposes for emergency or intermittent engines. Based on this, the  
9 calculated NO<sub>x</sub> emissions are:

- 10 • 0.97 lb/hr (less than the 100 lb/hr threshold);
- 11 • 23.3 lb/day (less than the 1,000 lb/day threshold); and
- 12 • 0.24 tpy (less than the 6.6 tpy threshold and the 2.75 tons per ozone  
13 season threshold).

14 Accordingly, any NO<sub>x</sub> emissions from the 50-kW emergency generator are well  
15 below the emissions threshold in Exemption 3, and no air permit is required.

16 **22. Q. Does your answer change if PECO uses the 30-kW emergency generator?**

17 A. No, the 30-kW emergency generator will also be subject to Exemption 3. However,  
18 I would note that Exemption 2 also applies because the rated mechanical capacity  
19 of the 30-kW emergency generator as stated by the vendor is 46.6 bhp, which is  
20 less than the 100 bhp threshold. Thus, regardless of whether a 50-kW or a 30-kW  
21 emergency generator is used, an air permit is not required.

22 **23. Q. Is the 50-kW emergency generator subject to any other emissions standards?**

1 A. Yes. Per 40 CFR 60.4233(e)<sup>2</sup>, the 50-kW emergency generator is subject to the  
2 emissions standards listed in Table 1 of 40 CFR 60, Subpart JJJJ for NO<sub>x</sub>, HC, and  
3 carbon monoxide (CO). Specifically, the NO<sub>x</sub>-HC emissions standards are 10  
4 g/hp-hr and the CO emissions standards are 387 g/hp-hr.

5 **24. Q. Will the emergency generator to be installed at the Station comply with these**  
6 **emissions standards?**

7 A. Yes. PECO provided Certificates of Conformity from the EPA for both the 30-kW  
8 and 50-kW emergency generators. The Certificates of Conformity indicate that the  
9 engines have been found to conform with applicable federal emissions standards.  
10 The Certificates of Conformance are attached hereto as JH-2 (for the 30-kW  
11 emergency generator) and JH-3 (for the 50-kW emergency generator).

12 **25. Q. What is your conclusion with respect to air impacts from the construction and**  
13 **operation of the Station?**

14 A. Based on the above and based on Tetra Tech's experience and review of Project  
15 Documents, there will be no unreasonable environmental impacts to air quality  
16 from the construction or operation of the Station.

17 **V. WATER QUALITY WILL NOT BE ADVERSELY IMPACTED BY THE**  
18 **CONSTRUCTION OR OPERATION OF THE STATION**

19 **26. Q. Did Tetra Tech analyze potential impacts to streams and surface waterbodies**  
20 **from the construction and operation of the Station?**

21 A. Yes. A review of the United States Geological Survey online web view tool for the  
22 project area indicates that no streams are mapped at the Property or in proximity to

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<sup>2</sup> If the 30-kW emergency generator were to be installed, it would be subject to 40 CFR 60.4233(d), which also refers to the emissions standards listed in Table 1 of 40 CFR 60, Subpart JJJJ. It would be subject to the same numerical emissions standards as the 50-kW emergency generator.

1 the area, with the closest streams located approximately 1,250 feet west and  
2 approximately 1,085 feet north of the Property. Tetra Tech also reviewed the  
3 U.S.F&WS's National Wetlands Inventory ("NWI") online map tool which  
4 likewise confirmed that no streams are identified on or in proximity to the Property,  
5 with the closest stream being located 0.55 miles to the west of the Property.

6 **27. Q. What is your conclusion with respect to impacts to stream and surface**  
7 **waterbodies from the construction and operation of the Station?**

8 A. Based on the above and based on Tetra Tech's experience and review of Project  
9 Documents, there will be no environmental impacts to streams or surface  
10 waterbodies from the construction or operation of the Station.

11 **28. Q. Did Tetra Tech analyze potential impacts to wetlands from the construction**  
12 **and operation of the Station?**

13 A. Yes. PECO, through its consultant Stantec Consulting Services, Inc. ("Stantec")  
14 reviewed the U.S. Department of Agriculture's ("USDA's") Web Soil Survey and  
15 the U.S.F&WS's NWI data which did not indicate the presence of wetlands at the  
16 Property. Stantec also conducted multiple site visits and observed that wetlands or  
17 other surface waters are not present at the Property. Tetra Tech also reviewed  
18 U.S.F&WS's NWI online tool and concurs that there are no wetlands located at the  
19 Property.

20 **29. Q. What is your conclusion with respect to impacts to wetlands from the**  
21 **construction and operation of the Station?**

1 A. Based on the above and based on Tetra Tech's experience and review of Project  
2 Documents, there will be no environmental impacts to wetlands from the  
3 construction or operation of the Station.

4 **VI. STORMWATER WILL NOT BE ADVERSELY IMPACTED BY THE**  
5 **CONSTRUCTION OR OPERATION OF THE STATION**

6 **30. Q. Did Tetra Tech analyze potential impacts to stormwater from the construction**  
7 **and operation of the Station?**

8 A. Yes. To assess potential impacts to stormwater, Tetra Tech reviewed PECO's  
9 NPDES permit and the associated Erosion and Sedimentation Control Plan  
10 ("ESCP") and Post-Construction Stormwater Management ("PCSM") Plan. The  
11 PCSM Plan was completed on January 28, 2021 as a modification to the existing  
12 NPDES permit issued by PaDEP on April 13, 2020. According to the PCSM Plan,  
13 the area of impervious cover at the Property will decrease by approximately 0.19  
14 acres, which will result in a net reduction in the rate and volume of stormwater  
15 runoff. The PCSM Plan also includes several Best Management Practices  
16 ("BMPs") which include (1) minimizing the total disturbed areas, (2) maintaining  
17 drainage features by re-grading the post-construction grading to match the pre-  
18 construction topography, and (3) permanently stabilizing the Property with  
19 vegetation of native species to reduce the rate and volume and improve the quality  
20 of any stormwater runoff from the Property. Furthermore, according to data from  
21 the Federal Emergency Management Agency (FEMA FIRM Panel #  
22 42045C01103F), the Property is located outside of any special flood hazard area or  
23 flood zones.

1   **31.   Q.   What is your conclusion with respect to stormwater impacts from the**  
2                   **construction and operation of the Station?**

3           A.   Based on the above and based on Tetra Tech's experience and review of Project  
4               Documents, there will be no unreasonable environmental impacts to stormwater  
5               from the construction and operation of the Station. In fact, stormwater conditions at  
6               the Property will be improved in so far as there will be net reduction in stormwater  
7               from the Property following construction.

8           **VII.   THERE WILL BE NO IMPACTS TO ENDANGERED OR THREATENED**  
9                                   **SPECIES**

10   **32.   Q.   Did Tetra Tech analyze potential impacts to endangered and threatened**  
11                   **species?**

12           A.   Yes. As part of PECO's PCSM Plan, a Pennsylvania Natural Diversity Index  
13               (PNDI) review was conducted. The review included determinations from PaGC,  
14               DCNR, Pa. F&BC, and U.S.F&WS, each concluding that there are no known  
15               impacts to endangered and threatened species and recommending no further action.

16   **33.   Q.   What is your conclusion with respect to impacts to endangered or threatened**  
17                   **species from the construction and operation of the Station?**

18           A.   Based on the above and based on Tetra Tech's experience and review of Project  
19               Documents, there will be no impacts to endangered and threatened species resulting  
20               from the construction and operation of the Station.

21           **VIII.   THERE WILL BE NO IMPACTS TO OTHER ENVIRONMENTALLY**  
22                                   **SENSITIVE RESOURCES**

23   **34.   Q.   Did Tetra Tech analyze potential impacts to other environmentally sensitive**  
24                   **resources?**

1           A.     Yes. In addition to the above, Tetra Tech analyzed whether the construction or  
2                   operation of the Station will cause adverse impacts to agricultural resources or areas  
3                   protected by conservation easements. As part of this review, Tetra Tech analyzed  
4                   whether Prime Farmland, which is land protected under the Farmland Protection  
5                   Policy Act due to its favorable soil and hydrological properties and high crop yields,  
6                   was present on the Property. According to the soil map unit for the Property, no  
7                   soils classified as Prime Farmland or Farmland of Statewide Importance are  
8                   mapped at the Property. Additionally, Tetra Tech reviewed the U.S. Department  
9                   of Agriculture’s Natural Resources Conservation Service’s (“USDA-NRCS”)   
10                  Stewardship Lands Easement Locations Public Viewer to determine if any  
11                  environmental conservation easements are in place that are designed to maintain or  
12                  enhance land for agricultural or environmental purposes. No conservation  
13                  easements are in place for the Property or any adjacent property. I would note that,  
14                  as described in the testimonies of Keith Kowalski (PECO Statement No. 2-RD) and  
15                  Jim Moylan (PECO Statement No. 4-RD), an environmental covenant was  
16                  approved by PaDEP restricting the use of the Property to non-residential uses only.  
17                  The intended use of the Property is compliant with the restrictions in the  
18                  environmental covenant.

19   **35.   Q.    What is your conclusion with respect to impacts to other environmental**  
20                   **sensitive resources from the construction and operation of the Station?**

21           A.     Based on the above and based on Tetra Tech’s experience and review of Project  
22                   Documents, there will be no impacts to other environmentally sensitive resources  
23                   resulting from the construction and operation of the Station.

1     **IX.     THERE WILL BE NO IMPACTS TO SENSITIVE HISTORICAL STRUCTURES**

2     **36.   Q.     Did Tetra Tech analyze potential impacts to historical structures or historical**  
3                   **sites?**

4           A.     Yes.   PECO, through Stantec, conducted a survey to determine whether any  
5                   historical resources are present at the Property.   According to the Pennsylvania  
6                   Historical and Museum Commission (“PHMC”) Cultural Resources Geographic  
7                   Information System web mapping service, no mapped cultural resources are located  
8                   on the Property.   Additionally, PECO completed a consultation with the PHMC-  
9                   State Historic Preservation Office (“SHPO”).   The SHPO concluded that the  
10                  construction of the Station will have “no effect on historic properties.”

11    **37.   Q.     What is your conclusion with respect to impacts to historic structures or**  
12                   **historic resources from the construction and operation of the Station?**

13           A.     Based on the above and based on Tetra Tech’s experience and review of Project  
14                   Documents, there will be no impacts to historic structures or resources resulting  
15                   from the construction and operation of the Station.

16                               **X.     CONCLUSION**

17    **38.   Q.     Mr. Harrington, have you formed a conclusion as to the environmental**  
18                   **impacts regarding siting the Fiber Building and the Station Building at the**  
19                   **Property?**

20           A.     Yes.   Based on my experience and review of Project Documents, neither the siting  
21                   of the Fiber Building or Station Building at the Property, nor the construction and  
22                   operation of the Station as a whole, will cause any unreasonable impacts to air,  
23                   water, historical, or other environmentally sensitive resources.

1    **39.    Q.    Does this conclude your testimony?**

2           A.    Yes.  However, I reserve the right to file such additional testimony as may be  
3                necessary or appropriate.



# EXHIBIT

## JH-1

## EXPERIENCE SUMMARY

Jeffrey Harrington is a senior project engineer with 35 years of experience in air emissions permitting, air quality dispersion modeling, air quality monitoring, air emissions inventories, model development, and applied statistics. He has produced Prevention of Significant Deterioration (PSD) and Title V operating permit applications; managed and performed air quality dispersion modeling for permitting, air toxics evaluations, risk assessment, and feasibility studies; prepared air emission inventories for permit applications and dispersion and photochemical modeling demonstrations; prepared air emissions control analyses (RACT, BACT, LAER); managed and designed ambient monitoring and fugitive emissions monitoring programs; performed advanced statistical analyses of air quality, groundwater, surface water, and sediment monitoring data; and developed custom software packages for clients to meet environmental recordkeeping requirements. He regularly applies deterministic, numerical, and stochastic (probability) models in his work. He is particularly experienced with air quality dispersion models, Monte Carlo simulation models, and data mining techniques, such as Classification and Regression Tree (CART). He has performed work in 35 states in many industry sectors: pulp and paper and other forest products; chemical manufacturing; electric power generation; petroleum and natural gas distribution; semiconductor and electronics; textiles and leather; aerospace; automobile parts; transportation; copper smelters, aluminum foundries and other metallurgical industry; Portland cement and other aggregate and mining industry; sugar; and pharmaceutical and other health care products. In addition to permitting-related projects, he has considerable experience with mercury air emissions and the fate and transport of atmospheric mercury, worked closely with the development of Maine's Volatile Organic Compound (VOC) reduction strategy under the Clean Air Act (CAA) requirements for ozone nonattainment areas, and managed the air quality tasks of a petition that successfully delisted a glycol ether (EGBE) from the CAA's hazardous air pollutant (HAP) list. He has also managed projects requiring multimedia environmental assessment including stormwater, floodplain mitigation, industrial wastewater, hazardous materials, and cultural and natural resources. He has additionally served as a testifying expert witness in courtroom, legislative, regulatory agency, and planning board settings and has prepared technical documentation in support of testifying expert witnesses.

### EDUCATION

MS, Civil Engineering, Carnegie Mellon University, 1988

BS, Chemical Engineering, Stanford University, 1984

### AREA OF EXPERTISE

Air emissions permitting

Air quality monitoring

Air quality dispersion models

### OFFICE

Portland, ME

### YEARS OF EXPERIENCE

35

### YEARS WITHIN FIRM

7

## RELEVANT PROJECT EXPERIENCE

### PERMITTING

#### Coffee County Landfill RNG, Air Permit Application, Coffee County, AL

Prepared and submitted an air permit application to the Alabama Department of Environmental Management (ADEM) for a new County-owned and operated landfill gas capture RNG project. Oversaw the development of a project emissions inventory, identified the applicable regulations, and coordinated communication between the developer and ADEM.

#### Veterans Affairs Medical Centers (VAMC), Air Permit Applications, UT and WY

Managed the preparation of air permit applications for proposed combined heat and power (CHP) facilities at VAMC facilities in Salt Lake City (2.65 MW) and Cheyenne (1.1 MW), both of which utilize natural gas-fired reciprocating engines. The applications required preparation of inventories of potential emissions, regulatory analysis, control technology analysis, and dispersion modeling. The CHP located at the Salt Lake City VAMC was additionally subject to nonattainment area permitting for PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub>, and dispersion modeling for air toxics.

**Primus Green Energy, Construction Permit Application, WV**

Managed the preparation of an air permit application for a proposed commercial 150 metric ton per day methanol production facility in West Virginia. The application required preparation of a comprehensive inventory of potential and actual emissions from the proposed methanol production activities and associated equipment. EPA's TANKS model was used to calculate emissions from storage tanks and the U.S. Environmental Protection Agency's (EPA) AP-42 emission factors were used to calculate emissions from product loadout. Vendor guarantees and the engineering heat and mass balance were used to calculate emissions from the balance of the equipment, which included a steam methane reformer (SMR), methanol synthesis reactors, and methanol distillation. A comprehensive regulatory analysis was performed to identify applicable federal and state regulations. In addition to the air permitting, also directed a critical issues evaluation of environmental permitting requirements.

**Highlands Ethanol LLC, PSD Permit Application, FL**

Managed the preparation of a major source (PSD) air permit application for a proposed commercial 36 million gallon per year cellulosic ethanol production facility in Florida. The application required preparation of a comprehensive inventory of potential and actual emissions from the proposed ethanol production activities and the associated biomass boilers. EPA's TANKS model was used to calculate emissions from a variety of storage tanks and EPA's WATER9 model was used to calculate emissions from the wastewater treatment operations. A comprehensive regulatory analysis was performed to identify applicable federal and state regulations. A BACT analysis was prepared to identify appropriate control technologies, and dispersion modeling was performed with AERMOD. In addition to the air permitting, also directed the acquisition of the industrial wastewater, environmental resource, water use, and FAA permits as well as the preparation of technical reports that were requested to meet county requirements. Also was responsible for managing the preparation of an Environmental Assessment (EA), which was prepared to meet the NEPA requirements of DOE's loan guarantee program under the 2005 Energy Policy Act. Mr. Harrington presented the facility site plan and the resulting permitting implications in front of a public meeting of the Planning and Zoning Board of Highlands County, Florida.

**Port of New Haven and Gateway Terminal, NEPA Environmental Review, CT**

Managed the preparation of a pre-NEPA Environmental Review, which was prepared to meet the NEPA requirements of the U.S. Department of Transportation Maritime Administration's (MARAD) Port Infrastructure Development Grant (PIDG) program. The report evaluated public health and safety, endangered species, wildlife resources, wetlands, wild and scenic rivers, wildlife and waterfowl refuges, park and recreation lands, historic properties and districts, stormwater, navigable waterways, coastal zones, and more.

**Long Ridge Energy Generation, PSD Permit Application, Monroe County, OH**

Managed the preparation of a major source (PSD) air permit application for a proposed 485 MW gas-fired combined-cycle electric generating facility located at a site along the Ohio River. The application required preparation of a comprehensive inventory of potential emissions from three turbine vendors (GE, Mitsubishi, and Siemens) inclusive of startup and shutdown operations and an alternative fuel blend of natural gas and ethane. Dispersion modeling was performed using AERMOD, with particular challenges associated with the bluff topography rising 700 feet adjacent to the site and a cumulative source inventory that required the input of more than 1,800 emissions sources to AERMOD. A BACT analysis was prepared to identify appropriate control technologies as well as a regulatory analysis documenting federal and state permitting and emissions standards requirements.

**Chicago Department of Public Health (CDPH), Cumulative Impacts Assessment Program, Chicago, IL**

Co-managing a project supporting CDPH with their development of a Cumulative Impact Assessment (CIA) program based on environmental justice principles. Participating in frequent meetings of Project Management, Data & Methods, and Policy Work Groups. Reviewing technical team work evaluating different indexing tools such as CalEnviroScreen, EJScreen, and ATSDR's Environmental Justice Index; indicators that serve as proxy estimates of pollution levels, potential exposure, community health status, and potential susceptibility to pollution; and regulatory programs established by multiple jurisdictions around the United States to identify methods, policies, and lessons learned that can be applied to the CIA.

**Mountain States Asphalt, Air Permit Application, Tooele, UT**

Provided senior oversight for the preparation of an air emissions inventory and BACT analysis in support of an air permit application for a proposed new storage facility for black wax crude oil, atmospheric tower bottoms (ATBs), and liquid asphalt.

**Cricket Valley Energy Center, Multiple Projects, NY**

Managed air quality permitting tasks associated with Cricket Valley Energy Center's 1,000 MW combined-cycle natural gas-fired power plant, including applications for a Title V permit renewal and for modifications of the facility's PSD permit. The Title V renewal required a comprehensive inventory of potential and actual emissions, an assessment of regulatory requirements, an evaluation of operating scenarios, a demonstration of compliance, and a compliance assurance monitoring plan. The PTIO modifications included addressing stack configuration changes and reconciliation of the permits with the actual constructed equipment. In addition to managing these and other permitting projects, performs on-going compliance assistance with the facility's periodic reporting obligations including the continuous emissions monitoring system (CEMS) and ambient air quality monitoring requirements.

**King & Spalding, LLP, Litigation Support, TX.**

Provided expert witness services on behalf of a wood pellet mill during litigation of a civil claim filed in U.S. District Court. Performed analysis of historic air permit applications filed with the Texas CEQ, facility emissions records, ambient air quality assessments, visible emissions, odors, and meteorology. Identified other sources of air emissions in the vicinity of the facility for comparison. Prepared an expert report summarizing the analysis performed. Deposed but the case was settled before trial.

**Freeport McMoran Miami Inc., Multiple Projects, AZ**

Technical lead for the development of a 1-hour SO<sub>2</sub> SIP attainment plan and for the development of a BART assessment for FMMI's primary copper smelter, a PSD major source facility. Prepared a comprehensive emissions inventory for the SIP demonstration, BART assessment, and a separate permitting effort. Compiled future potential and baseline actual emissions inventories of the smelting operations and related activities such as material transport and rock crushing and screening. Employed innovative dispersion modeling strategies for the SO<sub>2</sub> attainment plan, including evaluations of CALPUFF and EMVAP. Developed a thorough cost effectiveness evaluation of SO<sub>2</sub> and NO<sub>x</sub> control strategies for the BART analysis.

**Morehouse BioEnergy LLC, Title V Air Permit Application, LA**

Managed the preparation of a Title V major source air permit application for a proposed 500,000 metric ton per year wood pellet production facility in Louisiana. The application required preparation of a comprehensive inventory of potential and actual emissions from the proposed pellet manufacturing activities including a drum dryer, biomass furnace, hammermills, pelletizers, emergency engines and fire pump. A comprehensive regulatory analysis was performed to identify applicable federal and state regulations, and a Compliance Assurance Monitoring (CAM) plan was prepared. Also assisted with the negotiation of vendor guarantees for emissions from air pollution control equipment.

**Braintree Electric Light Department, Permit Renewal, MA**

Managed and prepared the Title V renewal application for this 96.5-MW combined-cycle gas turbine electric generation unit. The application required a comprehensive inventory of potential and actual emissions, an assessment of regulatory requirements, an evaluation of operating scenarios, a demonstration of compliance, and a compliance assurance monitoring plan. Also managed the submittal of applications for small emission sources located at the facility.

**Amite BioEnergy LLC, Air Permit Application, MI**

Managed the preparation of a minor source air permit application for a proposed 500,000 metric ton per year wood pellet production facility in Mississippi. The application required preparation of a comprehensive inventory of potential and actual emissions from the proposed pellet manufacturing activities including a drum dryer, biomass furnace, hammermills, pelletizers, emergency engines and fire pump. A comprehensive regulatory analysis was performed to identify applicable federal and state regulations. Also assisted with the negotiation of vendor guarantees for emissions from air pollution control equipment.

**Phillips 66 Company, Air Permit Application, OR**

Prepared air permit applications for a marine vessel gasoline loading facility at an existing bulk terminal. The applications were for the upgrade of three fixed roof storage tanks to internal floating roof storage tanks and the addition of a marine vessel loading rack and vapor recovery unit. Potential and actual VOC and HAP emissions from the storage tanks were calculated using TANKS and speciation profiles provided by Phillips 66. A detailed regulatory analysis was performed to identify the requirements for the storage tank upgrades and vapor recovery unit.

**IN Madison LLC, Dispersion Modeling and Control Technology Assessment, ME**

Managed the preparation of an air quality impact analysis and BACT analysis in support of a major source air permit application for a new 135 MMBtu/hr wood-fired boiler to be located at Madison Paper Industries. Also performed the AERMOD dispersion modelling which required assessment of the NO<sub>2</sub> and SO<sub>2</sub> NAAQS that were promulgated in 2010, as well as the Class I impact analysis and additional impacts analysis required for PSD applications.

**Koch Membrane Systems, Permit Application, MA**

Managed the preparation of a minor source air permit application for a proposed coating line at this existing manufacturing facility in Massachusetts. The facility manufactures membrane filtration systems for water treatment and food and beverage industries. The application required preparation of a comprehensive inventory of potential and actual emissions from the proposed production activities and the existing facility. The emissions inventory required applying the WATER9 model to several process lines to estimate VOC and acid emissions from a series of aqueous baths. A comprehensive regulatory analysis was performed to identify applicable federal and state regulations, and a BACT analysis was prepared to identify appropriate control technologies.

**GreatPoint Energy, Permit Assistance, MA**

Performed air dispersion modeling for a permit application for a new coal gasification demonstration plant to be located at the Brayton Point coal-fired power plant. The SCREEN3 dispersion model was used to assess impacts from a flare to be located at the site. Also performed a detailed review of emissions calculated for the flare and provided senior review of the permit application and draft permit.

**AES Sparrows Point LNG Project, EIS Support, MD**

Part of the AMEC technical team that provided AES Sparrows Point LNG, LLC and Mid-Atlantic Express LLC with third-party services regarding the Sparrows Point Project. As an objective third-party reviewer, AMEC's services were performed under the direction of FERC, with AES as the project proponent funding the analysis. AMEC prepared National Environmental Policy Act (NEPA) compliant documents (the Draft Environmental Impact Statement [DEIS] and the Final EIS) for LNG facilities and related pipelines and a non-jurisdictional power plant. Specific responsibilities included the review and assessment of the Resource Reports related to Air and Noise Resources and preparation of those particular sections of the EIS in accordance with the 2002 FERC Guidance Manual for Environmental Report Preparation.

**First Quality Tissue, PSD Permit Application, PA**

Managed the preparation of a major source (PSD) air permit application for a proposed 120 MW coal and wood-fired circulating fluidized bed (CFB) cogeneration facility to be located at a paper mill. The application required preparation of a comprehensive inventory of potential and actual emissions from the proposed CFB, associated fuel handling operations, and existing papermaking operations. A comprehensive regulatory analysis was performed to identify applicable federal and state regulations. A BACT analysis was prepared to identify appropriate control technologies, and dispersion modeling was performed with AERMOD. The modeling protocol included an analysis supporting the use of nearby meteorological data as on-site data for modeling purposes.

**Confidential Client, Critical Issues Assessment, Multiple US Locations**

Managed the preparation of multimedia critical issues assessments and permit plans for commercial-scale biodiesel facilities in multiple locations. The project was performed in support of applications for Federal DOE loan guarantees.

**Celunol Corp., Critical Issues Assessment, Multiple US Locations**

Managed the preparation of multimedia critical issues assessments and permit plans for commercial-scale cellulosic ethanol facilities in multiple locations. The project was performed in support of applications for Federal DOE loan guarantees.

**Verenium Corp., Permit Application, LA**

Managed the preparation of a minor source air permit application for a proposed bagasse (waste sugar cane) ethanol facility. The application required preparation of a comprehensive inventory of potential and actual emissions from fermentation and distillation equipment and feedstock handling systems. EPA's TANKS model was used to calculate emissions from a variety of storage tanks and EPA's WATER9 model was used to calculate emissions from the wastewater treatment operations. A comprehensive regulatory analysis was also performed and applicable federal and state regulations were identified. A BACT analysis was prepared to identify appropriate control technologies for the various process units.

**Celunol Corp., PSD Permit Application, LA**

Provided management oversight for the preparation of a PSD permit application for a proposed grain and cellulosic ethanol facility. Performed detailed reviews of the emission inventory and the regulatory, BACT, and air quality impact analyses performed by another consultant. Prepared the Compliance Assurance Monitoring (CAM) plan for the facility. The proposed facility included a biomass boiler using bagasse (waste sugar cane), wood waste, and rice hull fuels.

**Formed Fiber Technologies, Permit Application and Permit Renewal, ME**

Prepared an air emission license renewal application for this non-woven textile manufacturer. An application for a new thermobonding line was included in the application package. The application included a BPT analysis for visible emissions, and condensable PM/VOC emissions.

**Wheelabrator-Sherman Energy Company, Permit Assistance, ME**

Assisted with the acquisition of a Beneficial Reuse License which would allow the facility to receive and store construction and demolition debris on-site. Also assisted with assessing the environmental compliance impacts of receiving wood wastes from a fiberboard mill as a fuel source. Assisted the facility with preparing a successful application to add the fuel to its air emission license.

**Wheelabrator-Sherman Energy Company, Permit Assistance, ME**

Prepared a Title V renewal application for an 18-MW wood-fired independent power producer in Sherman Station, Maine. Prepared the Compliance Assurance Monitoring (CAM) Plan required by the application as well as the BPT analysis.

**Polyclad Laminates, Permit Renewals, NH**

Prepared the minor source air permit renewal applications for two prepreg (printed circuit board) manufacturing plants, both located in Franklin. The application required an inventory of potential and actual emissions.

**Osmose, Inc., Permit Application, IL**

Prepared a minor source air permit application for a solidification/stabilization treatment system for source area remediation at the former Casswood Treated Products Site. The application required an inventory of potential emissions, an assessment of regulatory requirements, and a demonstration of compliance.

**Braintree Electric Light Department, Permit Renewal, MA**

Managed and prepared the Title V renewal application for this 96.5-MW combined-cycle gas turbine electric generation unit. The application required a comprehensive inventory of potential and actual emissions, an assessment of regulatory requirements, an evaluation of operating scenarios, a demonstration of compliance, and a compliance assurance monitoring plan. Also managed the submittal of applications for small emission sources located at the facility.

**Regional Waste Systems, Regulatory Assistance, ME**

Participated in negotiating the terms of a draft Title V air emissions license for this 250-tons per day (tpd) municipal waste combustor.



**Gates Formed-Fibre Products, Permit Assistance, ME**

Prepared an air emission license application for the move of synthetic fiber production equipment from Fiber Extrusion in Eastport to Gates Formed-Fibre in Auburn. The application included a BACT analysis for visible emissions, and condensable PM/VOC emissions.

**Textron Automotive Corporation, Permit Review, NH**

Reviewed draft Title V permits prepared by New Hampshire Department of Environmental Services (DES). Provided numerous comments that were generally accepted by the DES.

**St. Paul's School, Permit Assistance, NH**

Prepared an air permit application and performed dispersion modeling required for the replacement of three boilers at this prep school. The ISCST3 and COMPLEX-I modeling included seven interactive sources.

**TyCom Integrated Cable Systems Inc., Permit Assistance and Dispersion Modeling, NH**

Prepared an air permit application and performed dispersion modeling required for a boiler replacement at this fiber optic cable manufacturing facility. Proposed that the existing air permits be consolidated and clarified in a single permit because TyCom had several permits for fuel burning devices and because some of these permits contained inaccurate information. The ISCST3, ISC3-PRIME, and COMPLEX-I modeling included 37 interactive sources and was complicated by predicted exceedances of air quality standards in both New Hampshire and Maine. The project required negotiations with the New Hampshire DES to resolve the client's predicted contributions to the predicted exceedances. The negotiations were highly successful for the client as a consolidated permit was granted with no additional requirements imposed.

**HoltraChem Manufacturing Co., Permit Assistance, ME**

Prepared an air emission license application for a proposed burner replacement in two boilers located at this former mercury-cell chlor-alkali facility. The application included a BACT analysis.

**Fiber Extrusion, Inc., Permit Assistance, ME**

Prepared an air emission license application for a polyester fiber manufacturer. Developed emission factors from published articles and an air quality impact analysis was conducted with SCREEN3 and ISCST3. Demonstrated conformance with Maine and National Ambient Air Quality Standards (MAAQS and NAAQS), and ambient increments. A Class I Area analysis was performed because of the facility's proximity to several Class I areas where visibility has been a contentious issue.

**Wyman-Gordon Investment Castings, Permit Assistance, NH**

Assisted with the preparation of state operating permit applications for an investment casting facility. Conducted an inventory of metals emissions from casting and finishing operations as well as ISCST3 modeling to demonstrate compliance with New Hampshire's air toxics rules at Env-A 1300. Also assisted with the preparation of a beryllium NESHAPs application.

**Wheelabrator-Sherman Energy Company, Permit Assistance, ME**

Prepared a PSD air emission license application for an 18-MW wood-fired independent power producer in Sherman Station, Maine. The proposed modifications included a request to burn alternative wood fuels such as railroad ties, utility poles, and construction/demolition wood. Emission factors were developed for the alternative wood fuels and an air quality impact analysis was conducted with SCREEN3 and ISCST3. The modeling analysis demonstrated conformance with MAAQS and NAAQS, ambient increments, and MIAAG.

**Hannaford Bros. Co., Permit Assistance, ME**

Managed air emission licensing of natural gas-fired generators to be installed at grocery stores in Maine, New Hampshire, and New York. The project included development of the licensing strategy and negotiations with the environmental regulatory agencies in all three states. The negotiations resolved issues related to licensing exemptions, emissions testing, and air quality dispersion modeling. The project was conducted through Hannaford's counsel, Preti, Flaherty, Beliveau & Pachios.

**National Semiconductor Corporation, Permit Assistance, ME**

Managed a project that provided a variety of services relative to the renewal of the air emission license. Managed outlining of a method for documenting VOC emissions and compliance with the annual emission limitation, proposing monitoring activities associated with a VOC control unit, proposing new fuel usage limits based on expanded facility operations and new fuels, and compiling all existing facility emission points.

**Wheelabrator Environmental Services, Inc., Permit Assistance, MI**

Developed emission factors for a proposed waste wood to energy facility, where proposed fuels included forest residuals/land clearing material, industrial/manufacturing wood wastes, construction wood, wood from yard waste, demolition wood and horticultural/agricultural wood and vegetative wastes. The developed emission factors were compiled into a support document for an air emission license application.

**Maine Energy Recovery Company, Permit Assistance, ME**

Assisted the preparation of an air emission license application for a municipal waste combustor. The proposed modifications included a request to burn additional fuels. Conducted an air quality impact analysis with SCREEN2 to demonstrate compliance with NAAQS and PSD increments. Reviewed dispersion modeling conducted by another consultant in support of risk assessments and provided suggestions for improvement. Conducted a statistical evaluation of the ash-sampling program to support renewal of the facility's solid waste license.

**Ohio Edison Station, Environmental Information Volume, OH**

Prepared the air quality sections of an Environmental Information Volume (EIV) under the 1987 Innovative Clean Coal Technology (ICCT) program. The approach selected for the project was a wet-gas sulfuric acid/sulfur dioxide and nitrogen oxides (WSA-SNOX) flue gas clean-up technology. The WSA-SNOX technology was proposed to be implemented as a demonstration project at Ohio Edison's Niles facility, a 216 MW coal-fired power plant. The EIV required an evaluation of existing air quality, an emissions inventory for the proposed project, an ISCST dispersion modeling analysis, and a regulatory compliance analysis.

**City Water Light & Power, Environmental Information Volume, IL**

Prepared the air quality sections of an Environmental Information Volume (EIV) under the 1987 Innovative Clean Coal Technology (ICCT) program. The approach selected for the project was integrated gasification combined cycle (IGCC) technology. The IGCC technology was proposed to be implemented as a demonstration project at CWL&P's Lakeside facility and involved the proposed repowering of a 120 MW coal-fired unit. The EIV required an evaluation of existing air quality, an emissions inventory for the proposed project, an ISCST dispersion modeling analysis, and a regulatory compliance analysis.

**TRANSACTIONAL DUE DILIGENCE****Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of multiple properties consisting of warehouses and dry goods storage yards being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on stormwater management as this had the greatest potential for compliance risk. The project team also performed Phase I Environmental Site Assessments in accordance with ASTM standards for subsurface contamination. The properties were located on and adjacent to sites listed on the federal Superfund National Priorities List (NPL) and state hazardous waste site lists. The property condition assessment team performed civil engineering review of warehouses and other non-marine infrastructure.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a dry goods marine terminal being considered for lease by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on stormwater management as this had the greatest potential for compliance risk. The project team also performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination. The property condition assessment team performed a commercial diving assessment of the marine infrastructure.



**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of multiple properties consisting of dry goods marine terminals, warehouses, and cold storage operations being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on storage tanks and stormwater management as these had the greatest potential for compliance risk. The project team also performed Phase I Environmental Site Assessments in accordance with ASTM standards for subsurface contamination. The property condition assessment team performed a commercial diving assessment of marine infrastructure at one of the properties as well as a civil engineering review of warehouses and other non-marine infrastructure at all of the properties.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a dry goods marine terminal and warehouses being considered for lease by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on storage tanks and stormwater management as these had the greatest potential for compliance risk. The project team also performed Phase I Environmental Site Assessments in accordance with ASTM standards for subsurface contamination. The property condition assessment team performed a commercial diving assessment of the marine infrastructure as well as a civil engineering review of warehouses and other non-marine infrastructure.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a facility consisting of a dry goods barge terminal, truck fleet, and construction/demolition debris landfills being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on air emissions, storage tanks, and stormwater management as these had the greatest potential for compliance risk. The project team also performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental and structural review of a facility consisting of a dry goods and petroleum marine terminal and truck fleet being considered for acquisition by a confidential client. The environmental project team reviewed compliance with particular focus on air emissions, storage tanks, stormwater management, and dredging operations as these had the greatest potential for compliance risk. The environmental project team also performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination. The property condition assessment team performed a commercial diving assessment of marine infrastructure as well as a civil engineering review of warehouses, cranes, and other non-marine infrastructure.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a dry goods barge terminal being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on air emissions, storage tanks, and stormwater management as these had the greatest potential for compliance risk. The project team also performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a wood pellet mill being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on air emissions and PSD permitting compliance as these had the greatest potential for compliance risk.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a kraft pulp mill being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on air emissions and wastewater discharges as these had the greatest potential for compliance risk. The project team also performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a paper mill being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on air emissions as this had the greatest potential for compliance risk. The project team also performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination. Performed the work alongside an engineering due diligence team that evaluated the paper machines, buildings, and other assets on the property.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a paper mill being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on air emissions as this had the greatest potential for compliance risk.

**Confidential Client, Transactional Due Diligence.**

Led a multi-media environmental review of a greenfield property being considered for acquisition by a confidential client for development of a forest products production facility. The project team evaluated natural resources considerations and performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination.

**Confidential Client, Transactional Due Diligence**

Led a multi-media environmental review of a kraft pulp mill being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on air emissions and wastewater discharges as these had the greatest potential for compliance risk. The project team also performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination.

**Confidential Client, Transactional Due Diligence**

Led a multi-media environmental review of a paper mill being considered for acquisition by a confidential client. The project team reviewed compliance with environmental requirements, with particular focus on air emissions as this had the greatest potential for compliance risk. The project team also performed a Phase I Environmental Site Assessment in accordance with ASTM standards for subsurface contamination.

**Confidential Client, Transactional Due Diligence**

Performed an air quality permitting and compliance review of a combined-cycle power generation facility being considered for acquisition by a confidential client.

**DISPERSION MODELING****Salton Sea Management Program, Technical Support for the Dept. of Water Resources, Salton Sea, CA**

Led two air quality modeling assessments, the first an AERMOD analysis of fugitive dust emissions in the immediate vicinity of Bombay Beach and the second a CALPUFF analysis of basin-wide fugitive dust emissions from exposed lakebed. The AERMOD analysis was conducted to estimate the contribution of local fugitive dust emissions sources to measured ambient PM<sub>10</sub> concentrations and to assess the effectiveness of emissions mitigation techniques. The CALPUFF analysis was conducted in support of a Dust Suppression Action Plan to estimate the exposed lakebed fugitive dust air quality impacts associated with long-range restoration concepts for the Salton Sea. The expected air quality impacts due to fugitive emissions from exposed lakebed surfaces for a future baseline condition and multiple future restoration concepts were evaluated within a modeling domain surrounding the Salton Sea. Both analyses required preparation of meteorological, geographical surface characteristics, and topographical elevation inputs to the model. Fugitive dust emissions inputs were calculated based on rulesets developed from PI-SWERL studies of exposed lakebed surfaces. These studies have helped explain overwhelming transport of fugitive dust from distant desert sources as well as localized meteorological conditions that can lead to elevated ambient PM<sub>10</sub> concentrations from exposed lakebed surfaces alone. Predicted impacts on nearby communities were also evaluated for the CALPUFF analysis to assess the potential benefits of the various restoration concepts considered in the long-range plan.

**USEPA, Jackpile-Paguate Uranium Mine, Paguate, NM.**

Technical lead for the review of dispersion modeling performed by the party responsible for CERCLA cleanup activities associated with a former uranium mine. The responsible party is performing both CALPUFF and AERMOD analyses to assess historic mine operations for proposing collection of soil background samples, siting of ambient air quality and meteorological monitoring locations, and impacts associated with site remediation activities for input to human health and ecological risk assessments. The models are being used to predict both ambient air quality and soil deposition flux. Advising USEPA on the adequacy of model inputs and strategies.

**Haile Gold Mine, SEIS Dispersion Modeling Analysis, Kershaw, SC**

Task Lead. Performed an AERMOD analysis of a gold mining, ore processing, and production facility for a Supplemental EIS. The facility consists of conventional open pit mines with a capacity of 7,000 tons per day of sulfide ore through ore processing operations including crushing and conveying, milling, flotation, flotation thickening, regrind, carbon-in-leach (CIL) leaching, carbon stripping, carbon regeneration/acid washing, electrowinning and refining, and tailing thickening and storage. The SEIS required a full AERMOD air quality analysis including air emissions inventory of the gold production operations, fugitive dust emissions from mining operations, and mobile equipment exhaust emissions. An air dispersion modeling analysis was required to demonstrate conformance with ambient air quality standards.

**Mitsubishi Cement Corporation, CEQA Dispersion Modeling Analysis and Air Toxics Analysis, CA**

Performed dispersion modeling of this Portland cement manufacturing facility's proposed South Quarry for CEQA review. The CEQA modeling included an assessment of ambient air quality beyond the ambient air boundary and of the nearby San Geronio Wilderness Class I Area using AERMOD as well as a visibility impairment analysis using VISCSCREEN. Additionally performed air toxics modeling of the Portland cement manufacturing facility and its associated quarries per CARB's AB 2588 requirements. The AB 2588 modeling included a detailed AERMOD dispersion modeling analysis of approximately 300 emission sources, including point, area, volume, and line sources. The analyses were performed under a subcontract with Yorke Engineering.

**Taunton Municipal Light & Power, Dispersion Modeling, MA**

Managed the preparation of an air quality impact analysis in support of an air permit application for modifications at TMLP's Cleary Flood Generating Station. Performed AERMOD dispersion modeling which required assessment of the NO<sub>2</sub> and SO<sub>2</sub> NAAQS that were promulgated in 2010. Included in the evaluation were the station's oil-fired boilers and diesel startup engine.

**Evergreen Development, Hot Mix Asphalt Plant, MA**

Managed the preparation of an air quality impact analysis in support of an air permit application for a new greenfield hot mix asphalt plant. Performed AERMOD dispersion modeling which required assessment of the NO<sub>2</sub> and SO<sub>2</sub> NAAQS that were promulgated in 2010. Process and fugitive dust sources evaluated included material handling operations, truck travel on paved and unpaved roads, and point source emissions.

**UPM Madison Paper, MACT Residual Risk Modeling Assessment, ME**

Performed a Human Exposure Model (HEM) and AERMOD assessment of HAP emissions from the mill's groundwood pulp mill, paper machine, and boiler operations. Used NCASI data to allocate HAP emissions to various groundwood pulping operations as part of the development of the dispersion model inputs. Prepared a modeling report that was submitted to USEPA's docket on their initial residual risk modeling.

**Berwick Iron & Metal Recycling, Planning Board Support, ME**

Performed air quality dispersion modeling for a metal recycling facility and presented the results at a public hearing conducted by the town Planning Board. Modeling was performed for a 3600 hp diesel engine and additional consideration of fugitive dust sources such as metal shredding, material handling operations, and truck travel on paved and unpaved surfaces was evaluated.

**H-POWER, Cooling Tower Modeling, HI**

Performed air quality dispersion modeling of the cooling tower expansion associated with the addition of a third combustion unit at this Municipal Waste Combustor. The modelling was an update of the modelling previously performed for a PSD permit application and FEIS for the addition of the third unit.

**Ready Mix Concrete Plant, MA**

Provided air quality assistance for a Zoning Board of Appeals (ZBA) application and hearing for a proposed ready mix concrete facility. Performed dispersion modeling using AERMOD to support professional testimony before the Zoning Board of Appeals. Process and fugitive dust sources evaluated included material handling operations, truck travel on paved and unpaved roads, and point source emissions from the enclosed ready mix operation. The results of this analysis were presented in testimony to the ZBA.

**Confidential Client, Permit Assistance**

Performed air dispersion modeling for an existing pulp and paper mill. The mill was seeking to identify alternative emission limits for its recovery boiler and power boiler. The AERMOD dispersion model was used to assist with the establishment of the alternative emission limits. The mill is located within 10 kilometers of a Class I area, which required strategies to be developed to maintain minor modification status with respect to that Class I area. Sources modeled include the recovery boiler, smelt tank vent, power boiler, lime kiln, and a VOC incinerator located at the mill, as well as emission sources at a nearby forest products manufacturer.

**Confidential Client, Permit Assistance**

Performed air dispersion modeling for a PSD permit application for a new 212 MMBtu/hr wood-fired bubbling fluidized bed (BFB) boiler to be located at a pulp and paper mill. The AERMOD dispersion model was used. The modeling required preparation of a meteorological data set from on-site data.

**H-POWER, PSD Permit and FEIS Risk Assessment Modeling, HI**

Performed senior review of air quality dispersion modeling performed for the addition of a third combustion unit at this Municipal Waste Combustor. The PSD Permit modelling included a demonstration of compliance with NAAQS and PSD increments; an additional impacts analysis of visibility impacts, soil and vegetation impacts and secondary growth; a preconstruction monitoring analysis; and a Class I area analysis. The FEIS modelling supported a risk assessment performed in accordance with USEPA guidance. USEPA Region 9 was the regulatory agency that reviewed the modelling.

**Huber Engineered Woods, Permit Assistance, ME**

Performed air dispersion modeling for a PSD permit application for an expansion and MACT compliance project at this oriented strandboard (OSB) manufacturing facility which included a new 152 MMBtu/hr wood-fired furnace. The AERMOD dispersion model was used and included 31 interactive sources. The effort was complicated by predicted exceedances of air quality standards from other sources in the area. The project required evaluations of numerous possible facility configurations to identify which ones would produce insignificant impacts. The evaluations explored revisions to the emissions inventory as well as locations of proposed buildings and stacks. Also prepared the additional impacts analysis required for the PSD application, prepared a BACT analysis for an interim permit amendment, and participated in negotiations with the DEP.

**Golden Pass Pipeline, Permit Assistance, TX**

Performed dispersion modeling to assess the impacts of liquefied natural gas (LNG) pipeline blowdowns near a proposed LNG terminal. Used DEGADIS to ensure that potential dense gas conditions were properly accounted for. The release was simulated using the vertical jet source algorithms built into DEGADIS.

**Confidential Client, Permit Assistance**

Performed dispersion modeling to assess the impacts of cold air resulting from liquefied natural gas (LNG) vaporizer arrays. Used DEGADIS to predict impacts for each hour of a local five year sequential hourly meteorological data set to assess the frequency and distances to freezing temperatures and water vapor saturation temperatures. The analysis assessed the probability of reduced growing seasons and reduced visibility in the immediate vicinity of the project. Also prepared a detailed review of climate data for the area.

**Velcro USA Inc., Stack Height Analysis, NH**

Evaluated the impact of a proposed tenter frame ventilation upgrade on the building's air intakes, and assessed changes in fence-line odor impacts. Used American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and USEPA methods to perform the evaluation.

**National Semiconductor Corporation, Impact Analysis, ME**

Evaluated the impact of a neighboring facility's proposed process on the client's air intakes. Used American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and U.S. EPA methods to perform the evaluation.

**Duro Industries, Dispersion Modeling, MA**

Performed dispersion modeling to demonstrate that the move of a boiler from one facility location to another did not result in an increase in ambient air quality impacts. Performed ISCST3 and COMPLEX-I modeling.

**Calpine Ontelaunee Energy Center, Dispersion Modeling, PA**

Performed dispersion modeling for a proposed 511 MW gas-fired combined cycle baseload power plant. Conducted the air quality impact analysis with ISCST3. Demonstrated conformance with National Ambient Air Quality Standards (NAAQS), and Class II ambient increments.

**PG&E Corporation Covert Generating Company, Dispersion Modeling, MI**

Prepared the dispersion modeling sections of a PSD air emission license application for a proposed 1200-MW gas-fired combined-cycle baseload power plant. The air quality impact analysis was conducted with ISCST3. The modeling analysis demonstrated conformance with NAAQS, and Class II ambient increments.

**Duke Energy Washington Generating Facility, Dispersion Modeling, OH**

Prepared the dispersion modeling sections of a PSD air emission license application for a proposed 620-MW gas-fired combined-cycle peaking power plant. The air quality impact analysis was conducted with ISCST3. The modeling analysis demonstrated conformance with NAAQS, and Class II ambient increments.

**Pharmacia & Upjohn Caribe Inc., Dispersion Modeling, Barceloneta, Puerto Rico**

Performed a dispersion modeling analysis of proposed thermal oxidizer units to be installed for control of VOC emissions from a pharmaceutical manufacturing facility. Modeled interactive sources and demonstrated that the project did not contribute toward predicted exceedances of air quality standards.

**Calpine Berrien Energy Center, Dispersion Modeling, MI**

Prepared the dispersion modeling sections of a PSD air emission license application for a proposed 1100-MW gas-fired combined-cycle baseload power plant. The air quality impact analysis was conducted with ISCST3. The modeling analysis demonstrated conformance with NAAQS, and Class II ambient increments.

**Regional Waste Systems, Dispersion Modeling, ME**

Conducted an updated dispersion modeling analysis of RWS' MSW incinerator in support of the facility's Title V license application using the ISCST3 and COMPLEX-I model. Modeled interactive sources and demonstrated that the project did not contribute toward predicted exceedances of air quality standards.

**Duke Energy Lee LLC, Dispersion Modeling, IL**

Prepared the dispersion modeling sections of a PSD air emission license application for a proposed 640-MW gas-fired peaking power plant. The air quality impact analysis was conducted with ISCST3. The modeling analysis demonstrated conformance with NAAQS, and Class II ambient increments.

**Gorham Energy Limited Partnership, Dispersion Modeling, ME**

Prepared the dispersion modeling sections of a PSD air emission license application for a proposed 900-MW gas-fired power plant, using CALPUFF, ISCST3, COMPLEX-I, SCREEN3 and VISCREEN. Demonstrated conformance with MAAQS and NAAQS, and Class I and Class II ambient increments.

**Maritimes & Northeast Pipeline, Dispersion Modeling, ME**

Prepared the dispersion modeling sections of air emission license applications for proposed gas-fired compressor stations in Baileyville, Richmond, and Chelsea, Maine. The air quality impact analysis was conducted with ISCST3, SCREEN3 and VISCREEN. The modeling analysis demonstrated conformance with MAAQS and NAAQS, and ambient increments. A Class I Area analysis was performed for the Baileyville application because of its proximity to Class I areas.



**Rumford Power Associates, Dispersion Modeling, ME**

Prepared the dispersion modeling sections of a PSD air emission license application for a proposed 265-MW gas-fired power plant, using ISCST3, SCREEN3 and VISCREEN. The modeling analysis demonstrated conformance with MAAQS and NAAQS, Class I and Class II ambient increments, and Maine Interim Ambient Air Guidelines (MIAAG).

**Saco Defense, Inc., Dispersion Modeling, ME**

Conducted dispersion modeling in support of an air emission license application for an ordnance manufacturer in Saco, Maine. Ambient criteria pollutant impacts resulting from boiler emissions were evaluated using SCREEN3 and ISCST3. Demonstrated conformance with MAAQS and ambient increments.

**Fairchild Semiconductor Corporation and National Semiconductor Corporation, Dispersion Modeling, ME**

Conducted dispersion modeling in support of air emission license applications for these neighboring semiconductor manufacturers in South Portland, Maine. Ambient criteria pollutant impacts resulting from boiler emissions were evaluated using SCREEN3 and ISCST3. The modeling analysis demonstrated conformance with MAAQS and ambient increments.

**Pennsylvania Electric Association, Emissions Inventory, PA**

Conducted quality assurance of Pennsylvania's Urban Airshed Model (UAM) emissions inventory. Compared the inventory with other available databases for Pennsylvania power plants. Assisted with the preparation of EPS inventories for PEA's independent UAM analysis.

**United States Sugar Corporation, Dispersion Modeling, FL**

Conducted an ISCST2 modeling analysis in support of a PSD application. The proposed modification was for the addition of a bagasse/oil-fired boiler to the Clewiston, Florida, sugar mill. The modeling analysis included over 100 nearby sources and demonstrated compliance with NAAQS and PSD increments.

**Confidential Client, Air Modeling, NJ**

Conducted an FDM modeling analysis of a hazardous waste site in support of a Monte Carlo risk assessment. The analysis accounted for emissions of particulate matter resulting from wind erosion and site cleanup activities. A GIS system was employed to develop the FDM source inputs from soil concentration data. Monte Carlo techniques were employed to account for uncertainties in the emissions estimation procedures.

**AIR TOXICS****Mitsubishi Cement Corporation, AB 2588 Air Toxics Analysis, CA**

Performed air toxics modeling of this Portland cement manufacturing facility's associated quarries per CARB's AB 2588 requirements. The modeling included a detailed AERMOD dispersion modeling analysis of quarry emission sources. The analysis was performed under a subcontract with Yorke Engineering, which input the AERMOD results to CARB's Hot Spots Analysis and Reporting Program Version 2 (HARP 2).

**NYSDEC, Air Toxics Analysis, American Thermostat Site Remediation, NY**

Performed a dispersion modeling analysis using NYSDEC's DAR-1 guidance and software. The principal air toxics were chlorinated organics including PCE, TCE, DCE, and vinyl chloride emitted from an air stripper used for groundwater remediation. The analysis demonstrated the air stripper could be operated without granular activated carbon.

**Stanley Fastening Systems, Air Toxics Analysis, RI**

Performed a dispersion modeling analysis using AERMOD for a wire processing facility to demonstrate compliance with Rhode Island's Air Pollution Control Regulation No. 22. The principal air toxics were methylene chloride emitted from vapor degreasing operations and VOC species from surface coating operations.

**Velcro USA Inc., Air Toxics Analysis, NH**

Prepared a comprehensive emissions inventory of air toxics emission sources and performed AERMOD, ISCST3, SCREEN3, and COMPLEX-I dispersion modeling analyses for a textile manufacturing facility to demonstrate compliance with New Hampshire's air toxics rules at Env-A 1400. The analysis has been performed multiple

times for various expansions and reconfigurations of the facility, both before and after USEPA's implementation of the AERMOD dispersion model. The principal air toxics are VOC species emitted from various surface coating operations.

#### **Sydney Tar Ponds Agency, Sydney, Nova Scotia**

Technical lead on the ambient air quality analysis of proposed remediation projects at a former coke ovens and steel mill site. The analysis supported a human health risk assessment, evaluated predicted concentrations against ambient air quality standards and occupational exposure limits, and provided an inventory of greenhouse gases and ozone precursors. Emissions evaluated were fugitive VOC and PM from excavation, stabilization, landfarming, and capping activities, as well as diesel exhaust emissions from the equipment used to support the activities. The ISCST3 and AERMOD dispersion models were used to predict ambient air concentrations of 25 constituents emitted from the activities. Over 350 scenarios were considered, based on two different prospective project schedules, 10 project years, and multiple combinations of activities within each project year. The project included a field experiment that measured ambient air concentrations around a trial excavation of sediments that contained naphthalene and BTEX. The field experiment was used in the ambient air quality analysis to estimate emissions from excavation and stabilization of pond sediments. Also reviewed emissions calculations and AERMOD dispersion modeling performed for a proposed incinerator that is being considered for the thermal destruction of PCBs contained in some of the pond sediment areas. The results of this analysis were presented in testimony at a public hearing held by the regulatory authority responsible for approving the remediation projects.

#### **Bridgestone Firestone Inc., Air Toxics Analysis, SC**

Performed three-tiered air toxics modeling per SCDHEC's Standard No. 8. In anticipation of significant future growth, Bridgestone Firestone requested preapproval of new emission sources from South Carolina Department of Health & Environmental Control (SCDHEC) through the South Carolina Environmental Innovations Program. To obtain the preapproval, Bridgestone Firestone was required to evaluate the potential impacts of increased air toxics and criteria pollutant emissions from the proposed tire manufacturing plant expansion. The tiered modeling included a detailed ISCST3 dispersion modeling analysis of the emissions from the proposed expansion of the tire manufacturing facility to demonstrate compliance with ambient air quality standards, PSD increments, and South Carolina's air toxics rules. The modeling analysis included 272 stack emission sources and considered a total of 49 toxic air pollutants. The analysis demonstrated that the proposed plant expansion would comply with the SCDHEC's Air Toxics Standard No.8.

#### **Shook Hardy & Bacon, Risk Assessment, OK**

Performed a third-party review of the air quality impact assessment prepared for a human health risk assessment. The analysis had been performed for fugitive emissions of lead, cadmium, and zinc compounds from chat piles located at the Tar Creek Superfund site. Fugitive emissions from wind erosion, unpaved road surfaces, and material handling were assessed as was the dispersion modeling analysis which had used the ISCST3 dispersion model.

#### **Velcro USA Inc., Air Toxics Analysis, SC**

Performed ISCST3, SCREEN3, and COMPLEX-I dispersion modeling analyses for flame lamination processes at a textile manufacturing facility to demonstrate compliance with South Carolina's air toxics rules. Assisted with the preparation of a minor source air permit application and a conditional major air permit application and with the preparation of a compliance recordkeeping system.

#### **Robins AFB, Air Compliance Assistance, GA**

Prepared two phases of an air toxics compliance demonstration for the largest manufacturing complex in Georgia. Assisted with the preparation of a comprehensive emission inventory of air toxics and performed ISCST3 dispersion modeling analyses for aircraft and support vehicle surface coating and repainting operations as well as chromium anodizing and pickling operations. The analysis addressed more than 50 significant emission points and more than 100 buildings (downwash). A de minimus emissions approach developed for the first phase of the effort was used to address more than 2000 additional emission sources at the base. The second phase of the analysis specifically addressed air toxics that are not listed as Federal Hazardous Air Pollutants (HAPs). The first phase of the analysis specifically addressed 35 HAPs emitted from the various operations. Also assessed the

impact of revised chromium PELs on the analyses previously performed for the chromium anodizing and pickling operations.

#### **Chemical Manufacturers Association, Air Impact Analysis, VA**

Created innovative air quality impact assessments in support of the delisting of the HAP EGBE, a glycol ether, from Section 112(b) of the CAA. The petition was granted final approval on November 18, 2004 and became effective on November 29, 2004 (69 FR 69320). The effort included revising the SCREEN3 model to incorporate Monte Carlo simulated inputs. The revision allowed for the prediction of impacts from thousands of simulated facilities in a single model run. Decision trees were then developed from the generated data with the CART statistical procedure. The decision trees were used as a screening tool to decide if actual facilities had the potential to produce high ambient impacts. Used innovative techniques with the EPA's tiered approach to modeling risks from sources of HAPs. The technique involved using an inverted form of the EPA's Tier 1 table to assess the number of TRI sources that had the potential to produce high ambient impacts. The technique effectively limited a potentially excessive scope of work. A South Carolina facility was one of the largest EGBE users, and a regulatory analysis of that facility was performed for the preparation of the delisting petition. This work was performed under a subcontract with ChemRisk®, a Division of McLaren/Hart.

#### **Husch & Eppenberger, Litigation Support, AL**

Provided expert witness services on behalf of a confidential client during litigation of a class action property damage claim. Performed ambient air screening monitoring for mercury using Lumex RA-915+ and Jerome® 431-X instruments. Evaluated mercury emission sources, ambient mercury air quality, and mercury deposition in the region. Prepared an expert report responding to plaintiffs' expert reports and summarizing screening monitoring programs. Testified at a class action hearing in U.S. District Court.

#### **Polyclad Laminates, Air Toxics Analysis, NH**

Prepared a comprehensive air toxics emissions inventory and conducted ISCST3, ISC3-PRIME, and COMPLEX-I dispersion modeling analyses for a prepreg (printed circuit board) manufacturing facility to demonstrate compliance with New Hampshire's air toxics rules at Env-A 1400. The principal air toxics were VOC species emitted from surface coating operations.

#### **HiRel Systems, LLC, Air Toxics Analysis, NH**

Prepared an inventory of lead and VOC emissions and conducted ISCST3, SCREEN3, and COMPLEX-I dispersion modeling analyses for a magnetic devices manufacturing facility to demonstrate compliance with New Hampshire's air toxics rules at Env-A 1400. The principal air toxic was lead emitted from soldering operations.

#### **Wyman-Gordon Investment Castings, Air Toxics Analysis and Emissions Inventory, NH**

Prepared a comprehensive criteria pollutant and Hazardous Air Pollutant (HAP) emissions inventory for this investment casting facility to demonstrate compliance with New Hampshire's air permitting rules at Env-A 600. Also prepared a comprehensive air toxics emissions inventory and conducted ISCST3, ISC3-PRIME, and COMPLEX-I dispersion modeling analyses to demonstrate compliance with New Hampshire's air toxics rules at Env-A 1400. The analysis was performed multiple times for various reconfigurations of the facility. The principal air toxics were metallic species from casting and finishing operations, acids from metal finishing and cleaning operations, and VOC species emitted from waxing and molding operations. Also conducted an applicability analysis against MACT standards published for the secondary aluminum industry.

#### **Prime Tanning Company, Inc., Air Toxics Analysis, NH**

Prepared a comprehensive air toxics emissions inventory and conducted ISCST3, ISC3-PRIME, and COMPLEX-I dispersion modeling analyses for a leather finishing facility to demonstrate compliance with New Hampshire's air toxics rules at Env-A 1400. The principal air toxics were VOC species emitted from surface coating operations.

#### **TyCom Integrated Cable Systems Inc., Air Toxics Analysis, NH**

Prepared a comprehensive air toxics emissions inventory and conducted ISCST3, ISC3-PRIME, and COMPLEX-I dispersion modeling analyses for a fiber optic cable manufacturer to demonstrate compliance with New Hampshire's air toxics rules at Env-A 1400. The principal air toxics were metallic compounds from welding operations, acids from cleaning operations, and PAHs emitted from armoring operations.



**Textron Automotive Corporation, Air Toxics Analysis, NH**

Prepared a comprehensive air toxics emissions inventory and conducted ISCST3, SCREEN3, and COMPLEX-I dispersion modeling analyses for an automotive parts manufacturing facility to demonstrate compliance with New Hampshire's air toxics rules at Env-A 1400. The principal air toxics were VOC species emitted from surface coating operations.

**Rotor Coaters International (RCI), Air Toxics Analysis, MI**

Performed a dispersion modeling analysis of proposed coatings changes to demonstrate compliance with Michigan's air toxics rules, as part of an application to amend RCI's Permit to Install.

**Maine Electronics, Inc., Dispersion Modeling, ME**

Conducted dispersion modeling in support of a groundwater remediation program. The selected technology was an air stripper that removed perchloroethylene (PCE), among other constituents, from groundwater. Air quality impacts of PCE resulting from air stripper operations were evaluated using SCREEN3 and ISCST3. Demonstrated conformance with statutory air quality standards for PCE.

**Irving Oil Corporation, Dispersion Modeling, ME**

Conducted dispersion modeling in support of an air emission license application for a proposed gasoline bulk terminal. Ambient impacts resulting from VOC emissions from storage tanks, a vapor recovery unit, and tank trucks were evaluated using ISCST2. The modeling analysis demonstrated conformance with MIAAG for air toxics and that odors would be maintained at levels below published odor thresholds. Conducted TANKS2 emission calculations that compared VOC emissions from white painted tanks and green painted tanks.

**Union Carbide Corporation, Dispersion Modeling, CT**

Managed a dispersion modeling effort in support of a delisting of a hazardous air pollutant from Section 112(b) of the CAA. The modeling was conducted for two hypothetical automotive coating facilities to assess the feasibility of the delisting petition. The project convinced the Chemical Manufacturers Association that the petition was potentially feasible and worth pursuing further.

**Maxus Energy Corporation, Regulatory Review, NJ**

Managed and conducted a review of methods established by the New Jersey DEP for determining soil cleanup levels for chromite ore processing residue sites. NJDEP's method was based on an air inhalation exposure pathway. More appropriate alternative methods were identified and proposed.

**Chemical Manufacturers Association, Air Modeling, Washington, D.C.**

Conducted a COMPDEP modeling analysis of Tetrachlorodibenzodioxin (TCDD) emissions from a hypothetical hazardous waste incinerator along the Texas Gulf Coast. The modeling results were used to evaluate EPA's Methodology for Assessing Health Risks Associated with Indirect Exposure to Combustor Emissions.

**CONFORMITY, SIPS, AND MOBILE SOURCES****Godby Road Improvement Project, Air Quality Impact Assessment, Georgia Dept. of Transportation**

Performed an assessment of air quality impacts resulting from the improvement of Godby Road in Clayton County, Georgia. Performed MOVES and CAL3QHC modeling for intersections at each end of the project where traffic impacts were predicted to be greatest upon project build out. The hot-spot modeling demonstrated that air quality at the intersections would be in compliance with ambient air quality standards.

**I-71/I-75 Auxiliary Lanes Project, NEPA Analysis, Kentucky Transportation Cabinet Dist. 6**

AMEC prepared a Categorical Exclusion (CE) Level 3 analysis of the construction of auxiliary lanes, one in each direction, along I-71/I-75 between the KY 536 (Mt. Zion Road) and US42 interchanges in Boone County, KY. Specific responsibilities include preparing the air quality analysis which provided an evaluation of transportation conformity due to the county's nonattainment and maintenance area status of ozone and PM<sub>2.5</sub>, respectively. MOBILE6.2 was used to generate emission factors unique to the local parameters and the resulting emission estimates were used in the transportation conformity analysis. The project was identified as regionally significant and subject to transportation conformity requirements (non-exempt). The MPO subsequently determined that the project was consistent with the air quality goals of the SIP and the conformity requirements under the 8-hour

ozone standard and the annual PM<sub>2.5</sub> standard. MOBILE6.2 was also used to quantify the project's impact on MSAT emissions in accordance with FHWA guidelines.

#### **Air National Guard Facilities, MA and NH**

Performed emissions modeling using EPA's MOVES and MOBILE6.2 models for the preparation of an emissions inventory of vehicle maintenance facilities. The inventories were used to assess facility compliance with air permitting requirements.

#### **Cumberland River Regional Waterway Intermodal Facility, Environmental Assessment, TN**

Performed emissions modeling for and senior review of an air quality analysis prepared for a NEPA Environmental Assessment (EA) for the proposed modification of a single purpose port into a multimodal general purpose river terminal with interconnectivity to major rail and interstate highway systems. Evaluations included the assessment of current air quality status for the project location, determination of transportation conformity applicability, and estimation of potential air emissions during construction and operation of the proposed facility using EPA's NONROAD and MOBILE6.2 models as well as emissions associated with the transport of bulk commodity shipments. Also assisted with the preparation of an application for CMAQ funding for the project.

#### **Newport Pacific, Incorporated, Environmental Impact Report, CA**

Performed the air quality modeling for and conducted senior review of an air quality analysis prepared for a CEQA environmental impact report (EIR) for a proposed shopping complex in San Diego County. Intersection hot spot modeling was performed using the EMFAC2007 emissions model and the CALINE4 dispersion model in accordance with CALTRANS guidance.

#### **Ramona Air Center, LLC, Environmental Assessment, CA**

Performed senior review of an air quality analysis prepared for a CEQA/NEPA Environmental Assessment (EA) to analyze the impacts of a planned airport expansion at the Ramona airport in San Diego County, California. The analysis required estimating construction emissions and operational emissions, including aircraft and ground support equipment (GSE) emissions. Emissions modeling utilized EDMS for aircraft and GSE emissions and NONROAD for construction equipment emissions. Intersection hot spot dispersion modeling using the CALINE4 or CAL3QHC models is anticipated, for which the EMFAC2007 model will be used to calculate vehicle emissions.

#### **Fishermen's Energy Off-Shore Wind Farm, General Conformity Determination, NJ**

Performed emissions modeling using EPA's MOBILE6.2 and NONROAD models in support of a General Conformity applicability analysis to assess vessel and construction equipment emissions during both construction and operation of the wind farm to be constructed off the coast of Atlantic City, New Jersey. The General Conformity analysis was conducted as part of the USACOE permitting for the Fishermen's offshore wind farm. Because the wind farm is to be located in state waters, permitting requirements under 40 CFR 55 (outer continental shelf regulations) did not apply to the project. Emissions were calculated for the following construction elements: (6) wind turbines, an underwater transmission cable system, transmission vaults, and AC interconnections to the Huron Substation located in Atlantic City, NJ. The Fishermen's Project is located in the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Interstate Air Quality Control Region (AQCR) which is designated as moderate nonattainment for ozone and nonattainment for PM<sub>2.5</sub>. In addition, the Project is also located in the Northeast Ozone Transport Region (OTR). Therefore, the Project evaluated air emissions of ozone precursors (VOC and NO<sub>x</sub>) as well as PM<sub>2.5</sub> from construction and operation of the Project. The analysis showed that emissions would be below conformity applicability thresholds for all pollutants.

#### **Norfolk Southern Railway, Memphis Regional Intermodal Facility, TN**

Part of the AMEC technical team that followed the Tennessee Environmental Streamlining Agreement (TESA) process to complete an Environmental Assessment (EA) of the Norfolk Southern Railway Company's (NSR) proposal to construct, own, and operate the Memphis Regional Intermodal Facility (Memphis Regional IMF). TDOT, as the state lead, uses the TESA process to complete the NEPA requirements. Specific responsibilities include determining the air quality status of the project location, evaluating the applicability of conformity requirements, and calculating potential air emissions of criteria pollutants and mobile source air toxics (MSATs) using EPA's NONROAD and MOBILE6.2 models. Emissions from both long-term operation and short-term construction of the facility were evaluated.

**Bayonne Energy Center, General Conformity Analysis, NJ**

Performed emissions modeling using EPA's MOBILE6.2 and NONROAD models in support of a General Conformity applicability analysis for the installation of an underwater transmission cable for a proposed new natural gas-fired power plant located in an area designated as nonattainment for ozone and fine particulate matter (PM<sub>2.5</sub>). Efforts conducted included quantifying emissions for off-road construction equipment, mobile on-road sources and marine vessels and comparing emissions to conformity applicability thresholds. The results of this analysis indicated that emissions from the construction of the underwater cable would not trigger conformity for direct and precursor emissions.

**Industrial Energy Consumer Group, Expert Witness Services, ME**

Prepared expert witness testimony for a public hearing of the Calais LNG project. Testimony was prepared on behalf of the Industrial Energy Consumer Group (IECG), a consortium of heavy industrial facilities in Maine, with a specific focus on the project's air quality benefits. The public hearing was scheduled by the Board of Environmental Protection, but the meeting was cancelled when the project was announced to be put on hold.

**Plum Creek Timber Company, Traffic Analysis, ME**

Provided testifying expert witness services at a public hearing of the project conducted by Maine's Land Use Regulation Commission (LURC), the regulatory authority responsible for approving the project. Managed an analysis of air quality impacts resulting from traffic predicted to be induced by Plum Creek's Concept Plan for the Moosehead Lake Region. Performed MOBILE6.2 and CAL3QHC modeling for an intersection in Newport where traffic impacts were predicted to be greatest upon project build out. Also performed an analysis of air quality regulations and their potential applicability to the project.

**King County Division of Roads, Environmental Impact Statement, WA**

Performed a third party review of an environmental impact statement prepared for the NE Novelty Hill Road Improvement Project. The EIS included an emissions inventory, MOBILE6.2 and CAL3QHC modeling analyses, and transportation conformity assessment. Prepared a detailed list of comments to address deficiencies.

**Alberta Infrastructure and Transportation, Freeway and Intersection Modeling, Calgary, Alberta**

Performed MOBILE6.2C and CAL3QHC modeling in support of an environmental impact statement for the proposed Southwest Calgary Ring Road. Used projected traffic flow data to select heavily travelled freeway links and associated intersections for analysis of future air quality impacts. Analyses were conducted for a freeway link expected to have nearly 17,000 vehicles per hour during peak afternoon traffic conditions. Three intersections associated with the project, each with more than 5,000 vehicles per hour, were also evaluated.

**Preti Flaherty, Intersection Evaluation, ME**

Evaluated traffic impacts on air quality for two separate shopping mall developments. Performed MOBILE6.2 modeling for the environmental assessments. Intersection modifications were proposed to accommodate the expected traffic increase. Traffic emissions were calculated for the existing intersection (No-Build) and for the proposed modifications to the intersection (Build).

**U.S. Army Corps of Engineers, New York District, Conformity Analysis, NY**

Managed a General Conformity analysis of the Sea Gate Reach portion of the Coney Island Area Shore Protection Project. Emissions of VOC, NO<sub>x</sub>, and CO were calculated using EPA's MOBILE6 and NONROAD models and data supplied by the USACE. The emission inventory demonstrated that project emissions were less than General Conformity applicability thresholds. A Record of Non-Applicability (RONA) was prepared.

**Maine Department of Transportation, Intersection Modeling, ME**

Performed MOBILE5b and CAL3QHC modeling for an environmental assessment of a proposed bridge replacement. Focused on an intersection where traffic congestion was a problem during peak traffic. Analyses were conducted for the existing intersection (No-Build) and for proposed modifications to the intersection (Build) for the proposed construction year of 2002 and a future year of 2022.

**Maine Petroleum Association, Regulatory Impact Analysis, ME**

Evaluated Maine's proposed elimination of the reformulated gasoline program. MOBILE5a and MOBILE5b were used to evaluate replacement fuel alternatives to achieve the 15 percent VOC reductions mandated by the 1990 Clean Air Act Amendments (CAAA).

**Maine Turnpike Authority, Conformity Analysis, ME**

Managed a preliminary transportation conformity analysis of a highway-widening alternative for the Maine Turnpike. Emissions of VOC and NO<sub>x</sub> were estimated using MOBILE5a. Emission reduction benefits from programs not accounted for by MOBILE5a were also estimated. Results were presented to the authority's Board of Directors. The project helped the MTA assess the feasibility of the widening alternative.

**Maine Oil Dealer's Association, Regulatory Review, ME**

Evaluated Maine's proposed rate-of-progress plan to achieve the 15 percent VOC reductions mandated by the 1990 CAAA. Proposed modifications to DEP's base year emission inventory of the moderate ozone nonattainment areas and encouraged DEP to take full credit for VOC reductions achieved by existing regulation. Applied the EPA models MOBILE5a and TANKS2 as part of this effort. Prepared and provided expert testimony at a public hearing conducted by Maine's Board of Environmental Protection.

**CONTROL TECHNOLOGY EVALUATIONS****Velcro USA Inc., Dust Evaluation, NH**

Evaluated the explosibility of polyethylene particles generated by a process located at the facility. The particles were sent to a third party laboratory for testing. Recommendations were provided for alternative ventilation configurations.

**Huber Engineered Woods, Permit Assistance, ME**

Prepared the BACT analysis for a permit application for this oriented strandboard (OSB) manufacturing facility. The application included a request to bubble PM and VOC emissions from various operations located at the facility. The permit application was prepared in response to potential permit compliance issues.

**Ludlow Technical Products, Air Quality Plan, MA**

Prepared the Best Available Control Technology (BACT) analysis section of a comprehensive plan approval for a healthcare products and adhesive products manufacturer. The BACT analysis focused on VOC emissions from a variety of processes at the facility. The permit application was prepared in response to identified permit compliance issues.

**Gates Formed-Fibre Products, Permit Assistance, ME**

Assisted with preparation of a successful application for tax-exempt status for air pollution control equipment located at the facility.

**Maritimes & Northeast Pipeline, Emissions Inventory, NH**

Performed emission inventories and BACT cost evaluations in support of air emission license applications for proposed gas-fired compressor stations in Eliot, Gorham, Searsmont, and Brewer, Maine.

**Hillman Power Company, Permit Assistance, MI**

Prepared the BACT analysis and additional impacts analysis section of a PSD permit application for a 18-MW wood-fired independent power producer. The proposed modification included a request to burn additional TDF. The permit application was prepared in response to a denial of an initial permit application. The revised application successfully resulted in receipt of a permit, which survived appeals by environmental groups and local citizens to the U.S. EPA's Environmental Appeals Board.

**Prime Tanning Company, Inc., Permit Assistance, NH**

Prepared an application for the proposed expansion of a leather finishing facility. The application included development of an alternative VOC RACT demonstration and a compliance plan in accordance with the leather finishing MACT rule.

**Cadillac Renewable Energy, Regulatory Assistance, MI**

Prepared a response to U.S. EPA comments regarding a PSD air emission license application for a 38-MW wood-fired independent power producer. The proposed modification included a request to burn TDF. In preparation of the response, the BACT analysis and the additional impacts analysis were revised.

**Carrabassett Valley Sanitary District, BACT Analysis, ME**

Managed a BACT analysis in support of an air emission license application for a wastewater treatment facility located in Carrabassett Valley, Maine. The analysis was for a proposed diesel generator to be used in a snowmaking operation.

**Irving Tanning, RACT Demonstration, ME**

Assisted the preparation of an alternate VOC RACT demonstration for a leather tannery, which required a comprehensive VOC emissions inventory of the facility and the evaluation of VOC control technologies and pollution prevention options for the facility.

**Great Northern Paper Company, RACT Demonstration, ME**

Developed alternate VOC RACT demonstrations for two pulp and paper mills, plus a sawmill in Ashland, Maine. The demonstrations required comprehensive VOC emissions inventories of all facilities and the evaluation of VOC control technologies for numerous process sources. The demonstrations were submitted to MEDEP and approved.

**EMISSIONS INVENTORIES****Braintree Electric Light Department, Compliance Assistance, ME**

Managed and prepared the quarterly Emissions Collection and Monitoring Plan System (ECMPS) and Electronic Data Reporting (EDR) submittals of continuous emissions monitoring system (CEMS) data for this facility since July 2002, which is subject to reporting under Subpart H of 40 CFR Part 75.

**Harvard University, Permitting Assistance, MA**

Prepared a complete inventory of potential emissions from several steam and power configurations being considered for the Allston Campus. The emissions inventory was used to develop NSR permitting strategies.

**Environment Canada, Benchmarking Study, Gatineau, Quebec**

Assisted with data collection efforts for a benchmarking study to compare emissions from Canadian biofuels (ethanol and biodiesel) facilities to similar facilities located in the United States. Worked with team members to identify facilities to be selected for further review, and assisted with the completion of questionnaires. Obtained and reviewed dozens of air permits from multiple states.

**Braintree Electric Light Department, Compliance Assistance, MA**

Managed and prepared the annual source registrations for this 96.5-megawatt (MW) combined-cycle gas turbine electric generation unit since 2002. Prepared a complete inventory of actual emissions for the facility, which includes a variety of other fuel combustion sources.

**Wheelabrator-Sherman Energy Company, Compliance Assistance, ME**

Managed and prepared the annual i-Steps emission statement for this 18-megawatt (MW) wood-fired independent power producer. Prepared a complete inventory of actual emissions for the facility, which included other fuel combustion sources.

**Tyco Adhesives, Emissions Inventory, NJ**

Performed an inventory of 2002 and 2001 emissions and prepared the annual emission statement using New Jersey Department of Environmental Protection's (NJDEP's) RADIUS software.

**Velcro USA Inc., Emissions Inventory, NH**

Assisted with the preparation of a comprehensive air emissions inventory for Velcro's New Hampshire facilities. The inventory was used to submit Velcro's 2002 annual emissions statement. Identified potential compliance issues with respect to minor source permitting and VOC RACT. Participated in the development of strategies to address the issues with New Hampshire Department of Environmental Services (NHDES).



**Wyman-Gordon Investment Castings, Emissions Inventory, NH**

Prepared an updated comprehensive criteria pollutant and HAP emissions inventory to demonstrate compliance with New Hampshire's air permitting rules at Env-A 600. The inventory update was needed to address changes to process equipment and fuel burning equipment at both facilities.

**Textron Automotive Corporation, Emissions Credit Analysis, NH**

Prepared an application for VOC emission reduction credits (ERCs) for Textron's proposed shutdown of the Dover facility. Some operations were moved from Dover to the Farmington facility, which was factored into the calculation of available ERCs.

**Irving Oil Corporation, Emissions Inventory, ME**

Prepared a VOC and HAP emissions inventory of an existing bulk terminal. Performed a thorough audit of the storage tanks' stored products, roof characteristics, and fittings. Potential and actual emissions from the storage tanks were calculated using TANKS2. Emissions from the loading racks were based on the regulations applicable, which depended on the construction date of each rack. Emissions were also computed from the boiler and equipment leaks. The inventory was used to respond to an EPA reporting requirement under Section 114(a)(1) of the CAA. The inventory was also intended to prepare the facility for approaching Title V operating permit requirements.

**REGULATORY ANALYSIS****Celunol Corp., Regulatory Applicability, MA**

Assessed the applicability of the Pulp & Paper Cluster Rule to the cellulosic ethanol process.

**Celunol Corp., EHS Assessment, LA**

Managed a project that assessed the applicability of Environmental, Health, and Safety requirements to Celunol's pilot-scale and demonstration-scale cellulosic ethanol facilities located in Jennings. Provided a recommended strategy for achieving compliance.

**Little Bay Lobster Company, Regulatory Evaluation, NH**

Performed an emissions inventory and regulatory evaluation of equipment located at this lobster processing facility. Identified potential compliance issues with respect to air permitting and emission standards. Participated in the development of strategies to address the issues.

**United States Postal Service, Environmental Compliance Guidebooks**

Reviewed and updated environmental compliance guidebooks used by Postmasters in Maine and New Hampshire. Specifically reviewed to ensure guidebooks reflected current air quality regulations in both states. Coordinated with others to review and update other areas of environmental compliance such as pollution prevention, stormwater, storage tanks and solid waste.

**OSRAM SYLVANIA Products Inc., NH**

Assisted with the evaluation of an accidental release of hydrofluoric acid from a sand washing process. The evaluation concluded that the release was effectively captured by a wet scrubber and that the total quantity released to the environment did not exceed EPCRA reporting quantities. Participated in a meeting with USEPA to present our findings.

**Velcro USA Inc., Regulatory Evaluation, SC**

Performed a regulatory evaluation for the proposed move of flame laminators from Velcro's Casa Grande, Arizona facility to the Lancaster plant. Also performed an inventory of emissions from the flame laminators as part of the evaluation. Identified potential compliance issues with respect to opacity, air permitting, and Maximum Achievable Control Technology (MACT). Participated in the development of strategies to address the issues with SCDHEC.

**Sylvania Yarn Systems, Regulatory Analysis, GA**

Evaluated the applicability of ozone depleting substances (ODS) rules at 40 CFR Part 82 to the facility, which was particularly interested in the need for a refrigerant management plan. Concluded that a plan was not required but may be helpful within an ISO 14000 framework.

**Confidential Refinery, Permit Evaluation**

Prepared an air permitting evaluation for a refinery gas boiler. Reviewed U.S. EPA policy regarding averaging periods, which was of particular concern because of highly variable sulfur content and highly variable fuel availability.

**Confidential Power Client, Permit Assistance**

Prepared an air permitting evaluation for a 20-MW wood-fired independent power producer that was considering adding tire-derived fuel (TDF) to its fuel mix.

**HoltraChem Manufacturing Co., Legislation Support, ME**

Provided technical support to HoltraChem and expert testimony during the Maine Legislature's consideration of An Act to Reduce Mercury Use and Emissions. HoltraChem operated a mercury-cell chlor-alkali plant in Maine at the time. The support culminated in testimony provided to the Natural Resources Committee. Provided testimony including a review of scientific research regarding the transport and deposition of mercury in Maine, much of which rebutted information provided by the MEDEP in their report on mercury in Maine.

**Portland Water District, Regulatory Assistance, ME**

Performed a regulatory applicability evaluation for the possible installation of electricity self-generation equipment at various Portland Water District locations. Various sizes of generation equipment were considered as were various fuels, depending on the needs of the District's respective locations.

**DATA MANAGEMENT SYSTEMS****Fairchild Semiconductor Corporation, Compliance Data Management, ME**

Developed a computerized air emissions recordkeeping system that records purchasing and waste shipment transactions and calculates estimated emissions for rolling 12-month periods. Products purchased are matched with waste collection systems and air pollution control equipment. The system was developed with Microsoft Access and has been in place since 1998. Continues to develop enhancements to the system ISO 14000 reporting and Toxics Release Inventory (TRI) reporting. The accuracy of calculated releases are continually refined as more information about the various processes are gathered.

**Velcro USA Inc., Compliance Data Management, NH**

Managed the development of a computerized air emissions recordkeeping system that records purchasing transactions and calculates estimated both process and combustion emissions for rolling 12-month periods. The system was developed with Microsoft Excel. The system also enables Velcro to check compliance of new coating formulations against VOC RACT and NSPS requirements.

**Tyco Engineered Products and Services, Matter Management System, NH**

Developed a computerized Matter Management System (MMS) for tracking TEPS' legal matters throughout the United States. The MMS helps TEPS' General Counsel prepare cost tracking and forecasting reports required by Tyco's Corporate Legal Department. The MMS also facilitates the tracking of court schedules and daily activities. The MMS is installed at TEPS' headquarters in Exeter and satellite legal departments in Long Beach, California and Harvey, Illinois. The headquarters MMS is set up to upload data from the satellite MMS' on a regular basis. Continues to develop enhancements to the Microsoft Access based system including the tracking of intellectual property costs.

**Tyco Engineered Products and Services, Compliance Data Management, NH**

Developed a computerized recordkeeping system for tracking environmental compliance at more than 200 manufacturing facilities throughout the world. The system interfaces with quarterly environmental certifications supplied by environmental managers located at the manufacturing facilities.

**Phillips Petroleum, Compliance Data Management, CT**

Developed a recordkeeping system for demonstrating compliance with air permit requirements for this air sparge system used to remediate gasoline-contaminated soils.

**Cresticon, Inc., Former Decotone Site, MA**

Developed an emissions calculator for demonstrating compliance with air permit requirements for this air sparge system used to remediate soils contamination.

**ITT Night Vision, Reporting System, VA**

Developed a computerized air emissions reporting system, using Microsoft Access, to record purchasing and waste shipment transactions and calculate estimated emissions for periods specified by the user. Depending on the product involved, emissions are calculated either by an emission factor method or by a mass balance method.

**AMBIENT MONITORING AND DATA ANALYSIS****Confidential Client, Benchmarking Review of Opacity Standards, Brazil.**

Managed a benchmarking review of international regulations, guidance, and air emissions permits to propose key performance indicators (KPI) for minimizing visible fugitive particulate matter (PM) emissions from steelmaking operations. The benchmarks reviewed included visible emissions standards, PM emissions standards, and work practice standards. The proposed KPIs focused on establishing visible emissions standards as the performance criteria and also proposed the monitoring methods to use in evaluating compliance. The international review considered programs in the United States, Canada, European Union, Australia, Japan, and South Korea.

**Great River Energy, Regulatory Assistance, MN**

Evaluated historical ambient sulfur dioxide (SO<sub>2</sub>) measurements collected in North Dakota Class I areas to support the client's testimony at hearings conducted by the North Dakota Department of Health. U.S. EPA alleges that allowable increments in North Dakota's Class I areas have been exceeded. Prepared a report concluding that air quality measurements collected in North Dakota's Class I areas demonstrate that air quality has not degraded since the Prevention of Significant Deterioration (PSD) baseline was established in 1978. The results of the analysis were presented at a public hearing conducted by the Department of Health.

**Pharmacia & Upjohn Company, Data Management, MI**

Developed software that enabled the client to convert the format of meteorological data collected at the site to the Atmospheric Information Retrieval System (AIRS) reporting format required by the Michigan Department of Environmental Quality (MIDEQ).

**FPL Energy, Wyman Station, Legislation Support, ME**

Provided technical support during the Maine Board of Environmental Protection's consideration of a rulemaking that would impose restrictions on NO<sub>x</sub> emissions. Prepared a report detailing the ozone problem in Maine, the regional transport of ozone and its precursors, and the chemistry and dynamics of ozone formation. Conclusions on Wyman Station's effect on ozone nonattainment were drawn from an analysis of New England ambient ozone, NO<sub>x</sub>, and hydrocarbons data, maps showing the formation and transport of ozone in the Northeast, and analysis of air mass trajectories. Demonstrated that Wyman Station's contribution to the ozone problem was negligible at most and that exceedances of the ozone standards will continue in Maine as long as the air mass coming into Maine exceeds the ozone standards.

**HoltraChem Manufacturing Co., Ambient Mercury Air Monitoring, ME**

Developed and managed an ambient air mercury monitoring program for this mercury-cell chlor-alkali facility. The network consisted of three mercury (Tekran 2537A) and one meteorological monitoring sites, all employing continuous monitoring equipment. Dispersion modeling was used as a tool to assist with the siting of the mercury monitors. Coordinated quality assurance activities for both mercury and meteorological monitoring equipment. Prepared quarterly reports that provided advanced statistical analysis of the relationship of measured ambient mercury concentrations to measured meteorological parameters and measured cell room parameters (Jerome® 431-X). The Classification and Regression Tree (CART) data mining technique was used to establish relationships between the reported mercury and meteorological measurements.



**U.S. EPA, Data Analysis, Research Triangle Park, NC**

Conducted statistical analyses of historical ambient air quality data and predicted benefits of the CAA and its amendments. The studies evaluated particulate matter, sulfur dioxide, nitrogen oxides, and ozone trends with the CAA in place and predicted trends under the assumption that the CAA had not been promulgated.

**U.S. EPA, Ambient Air Monitoring Guidance, Research Triangle Park, NC**

Assisted the development of guidance for the siting of ambient lead monitoring stations near point sources. Developed case studies to show how the guidance should be applied. Conducted ISCST and SCREEN applications for a hypothetical lead acid battery plant, a hypothetical secondary lead smelter, and a hypothetical primary lead smelter.

**Madison Paper Industries, Meteorological Monitoring, ME**

Assisted with the setup and maintenance of a meteorological monitoring site.

**Confidential Client, Ambient Air Monitoring, ME**

Maintained a PM<sub>10</sub> monitoring site for a year. The site included three co-located monitors. Two monitors alternated collecting samples every third day, and the third collected duplicate samples. Performed site visits with sufficient frequency to change filters and deliver filters to a lab for analysis.

**EMISSIONS MONITORING AND DATA ANALYSIS****Formed Fiber Technologies, Compliance Assistance, ME**

Performed a detailed review of stack testing data collected at this non-woven textile manufacturing facility. Emission factors were developed by product for filterable particulate matter, condensable particulate matter and vapor-phase volatile organic compounds. Reference methods 5, 202, and 25A had historically been used. Assessed the impact on emissions of a scrubber fire caused by a power outage. Based on the products being run at the time, demonstrated that the facility was in compliance with PM emission limits despite the scrubber outage.

**Braintree Electric Light Department, Alternative Monitoring System Petition, MA**

Managed and prepared an alternative monitoring system (AMS) petition for a Predictive Emissions Monitoring System (PEMS), in accordance with Subpart E of 40 CFR Part 75, for this 96.5-MW combined-cycle gas turbine electric generating unit. The petition required data analysis of more than 700 concurrent measurements of nitrogen oxides (NO<sub>x</sub>) emissions using the PEMS and a temporary CEMS to demonstrate the equivalency of the PEMS to a CEMS. Equivalency was determined by linear regression, t-test, and F-test techniques.

**Regional Waste Systems, Mercury Continuous Monitoring Review, ME**

Managed the evaluation of methods and protocols for the use of mercury continuous emissions monitoring systems (CEMS) at a municipal solid waste (MSW) incinerator. Reviewed the status of the Clean Air Mercury Rule (CAMR) and technical documentation to identify the current state-of-the-art for mercury CEMS. The review concluded that mercury CEMS accuracy and reliability had not advanced sufficiently to justify installation of such units to demonstrate compliance with permitted emission limits.

**Braintree Electric Light Department, Compliance Assistance, MA**

Managed and prepared the quarterly Electronic Data Reporting (EDR) 2.1 submittals of continuous emissions monitoring system (CEMS) data for this facility since July 2002, which is subject to reporting under Subpart H of 40 CFR Part 75.

**Braintree Electric Light Department, Monitoring Protocol, MA**

Managed and prepared an alternative monitoring system test protocol for a Predictive Emissions Monitoring System (PEMS), in accordance with Subpart E of 40 CFR Part 75, for this 96.5-MW combined-cycle gas turbine electric generating unit. The Subpart E requirements include concurrent measurements of nitrogen oxides (NO<sub>x</sub>) emissions using the PEMS and a temporary CEMS for at least 720 hours to demonstrate the equivalency of the PEMS to a CEMS.

**Regional Waste Systems, Regulatory Assistance, ME**

Assisted with the preparation of a response to a notice of violation issued by United States Environmental Protection Agency (U.S. EPA) Region I with respect to carbon monoxide (CO) emissions.

**Regional Waste Systems, Regulatory Assistance, ME**

Prepared a response to a notice of violations alleged by the Maine DEP. The response resulted in a considerable reduction of the proposed penalty.

**HoltraChem Manufacturing Co., Mercury Emissions Monitoring, ME**

Designed and began implementation of a continuous fugitive mercury emissions monitoring program for a mercury-cell chlor-alkali facility that provided a review of available options and provided a basis for the final design. The method was conceptually based on U.S. EPA's Method 14. The design included a mercury analyzer based on cold vapor atomic absorption spectroscopy (Seefeldler HG-2000) and ultrasonic wind sensors to measure air flow through roof vents.

**Regional Waste Systems, Emissions Monitoring Review, ME**

Managed the evaluation of methods and protocols for the use of continuous emission rate monitoring systems (CERMS) at a municipal solid waste (MSW) incinerator to study the effect of CERMS on facility operations and environmental quality. Reviewed regulations that applied to the facility and the practices employed by other MSW incinerators, analyzed the effects of measurement uncertainties on data quality, reviewed existing uses of CERMS, and provided a protocol for the operation of a CERMS at the facility. Conducted Monte Carlo simulation modeling for the measurement uncertainty analysis. Continues to negotiate with the Maine DEP regarding the appropriate use of CERMS at the facility.

**Ridgewood Power Corporation, Trial Burn, ME**

Reviewed stack test results for a trial burn of alternative wood fuels at a 24.5-MW wood-fired power plant. The results compared favorably to alternative wood fuel emission factors developed for other wood-fired power plants.

**HoltraChem Manufacturing Co., Mercury Emissions Analysis, ME**

Conducted a statistical analysis of mercury concentrations measured in the cell room of this mercury-cell chlor-alkali plant in support of developing mercury emissions estimates for the facility.

**KTI Environmental Group, Regulatory Assistance, ME**

Estimated a dry equivalent to Maine's Chapter 138 NO<sub>x</sub> RACT requirements for MSW incinerators using refuse-derived fuel. The dry equivalent was needed because KTI's facilities in Biddeford (Maine Energy) and Orrington (Penobscot Energy) measured NO<sub>x</sub> stack concentrations on a dry basis.

**RISK MANAGEMENT PLANNING****OSRAM SYLVANIA Products Inc., NH**

Performed an analysis to respond to a USEPA audit of OSRAM's RMP. The analysis focused on hydrogen usage at the facility and determined that two separate processes existed with respect to RMP applicability. The Multi-Energy model was used to assess distances to specified blast overpressure. Also suggested and reviewed alternative hydrogen supply arrangements. Participated in a meeting with USEPA to present our findings.

**Fairchild Semiconductor Corporation, ME**

Facilitated an update of Fairchild's demonstration of compliance with the General Duty clause of the RMP rules. Reviewed documentation for completeness and accuracy. Performed SLAB and ALOHA modeling of chemical releases in support of the project. A wide variety of chemicals were addressed including acid storage and bulk compressed gas storage.

**FiberMark, Inc., Gap Analysis, VT**

Prepared a gap analysis of the Risk Management Program (RMP) requirements for a paperboard mill. Relevant material safety data sheets (MSDS) data were input to a Microsoft Access database that identified the products that contained RMP-regulated substances. These products were then inventoried to determine if threshold quantities were exceeded. For products that exceeded the threshold quantities, the gap analysis provided options

for opting out of the RMP requirements and identified work that remained to be completed if opting out was not feasible.

#### **Fairchild Semiconductor Corporation, ME**

Facilitated the preparation of Fairchild's demonstration of compliance with the General Duty clause of the RMP rules. Reviewed documentation for completeness and accuracy. Performed SLAB and ALOHA modeling of chemical releases in support of the project. A wide variety of chemicals were addressed including acid storage and bulk compressed gas storage.

#### **Fairchild Semiconductor Corporation and National Semiconductor Corporation, Gap Analysis, ME**

Prepared a gap analysis of the RMP requirements for these neighboring semiconductor plants. Relevant MSDS data were input to a Microsoft Access database that identified the products that contained RMP-regulated substances. These products were then inventoried to determine if threshold quantities were exceeded. For products that exceeded the threshold quantities, the gap analysis provided options for opting out of the RMP requirements and identified work that remained to be completed if opting out was not feasible.

#### **Maine DEP, Regulatory Seminars, ME**

Conducted seminars on behalf of the MEDEP for small businesses of the Risk Management Program requirements. The seminars included seven sessions that covered all aspects of the regulations and four seminars dedicated to businesses using propane. Presented sessions related to estimating release rates and dispersion and using the U.S. EPA software packages RMP\*Comp and RMP\*Submit. Response to the first seminars was very positive, prompting the MEDEP to add another seminar to the schedule.

#### **U.S. Department of Energy, Emissions Analysis, MA and NY**

Evaluated the emissions and dispersion of VOCs and semi-volatile organic compounds (SVOCs) from excavation and land treatment activities at military Superfund sites. The excavation and land treatment activities included soils contaminated with chlorinated organics, polycyclic aromatic hydrocarbons (PAHs), pesticides, and PCBs. The evaluation was conducted to demonstrate compliance with Massachusetts and New York Acceptable Ambient Limits and Occupational Safety & Health Administration (OSHA) standards.

### **MODEL DEVELOPMENT AND ENVIRONMENTAL DATA ANALYSIS**

#### **U.S. EPA, FATE Model Development, Washington, D.C.**

Guided technical development of a U.S. EPA-sponsored computerized model (FATE) predicting the fate and treatability of organic and inorganic chemicals in wastewater treatment plants. The purpose of the model was to estimate the treatability of Comprehensive Environmental Response Compensation and Liability Act (CERCLA) wastes in Public-owned Treatment Works (POTWs). The model assumed removal from the wastewater stream by sorption, biodegradation, and volatilization. Work published in Water Environment and Technology and presented at the National Research and Development Conference on the Control of Hazardous Materials in Anaheim.

#### **International Paper, Technology Analysis, ME**

Evaluated two proposed designs for the oxygenation of Gulf Island Pond on the Androscoggin River. The proposed methods included sidestream oxygenation and bubble diffusion. Assessed the ability of each system to provide sufficient oxygen to the river, as well as the adverse ecological impacts caused by each system. Although bubble diffusion provided less efficient oxygenation, the method was proposed because it provided sufficient oxygen and exhibited minimal ecological impacts.

#### **United Technologies, Groundwater Analysis, ME**

Performed a detailed statistical analysis of the distribution of chemicals leaching into groundwater from the Winthrop Landfill Superfund site. Assessed the statistical distribution of concentrations of chemicals at groundwater and surface water monitoring stations in order to determine the magnitude of attenuative mechanisms occurring in the groundwater. The analysis was then used to establish alternate concentration limits (ACLs) at specified compliance points in the landfill.

**Champion International, Groundwater Analysis, ME**

Designed the statistical evaluation of historical groundwater monitoring data from the paper mill's landfill site to determine whether significant differences in chemical concentrations existed between wells. The results of the statistical evaluation were used to assess whether significant differences were the result of landfill operations or other sources.

**IBM, Groundwater Analysis, VT**

Designed the statistical evaluation of monitoring data from proposed RCRA groundwater monitoring networks. Ten compliance zones were proposed, each with upgradient (background) and downgradient (compliance) wells. Historical monitoring data were evaluated for trend, seasonality, and distributional assumptions which facilitated the development of the proposed statistical program. Control charts were recommended for the detection of significant trends and confidence intervals were proposed for comparison with groundwater protection standards.

**United Technologies, Groundwater Monitoring, ME**

Managed the quarterly monitoring program at the Winthrop Landfill Superfund site. Coordinated sampling efforts for 100 monitoring stations, and laboratory analysis for volatile and semivolatile organic compounds and inorganic compounds. Data were validated, summarized, and interpreted in the form of quarterly reports submitted to EPA Region I.

**IBM, Corrective Measures Study, VT**

Participated in writing a corrective measures study, which screened corrective action alternatives for groundwater and soils contamination and provided treatability study recommendations to assess preferred corrective action alternatives.

**OTHER INFORMATION****PRESENTATIONS**

"Environmental Justice is Coming to Cities near You, too." 116<sup>th</sup> Air & Waste Management Association Annual Conference & Exhibition, Orlando, Florida, June 5-8, 2023.

"Hybrid Modeling Approaches Applied to AERMOD Modeling Analyses" (with others). 112<sup>th</sup> Air & Waste Management Association Annual Conference & Exhibition, Québec City, Québec, June 25-28, 2019.

"Regulatory Analysis of Power Island Options for Cellulosic Biorefineries" (with L. Modica). Electric Utility Environmental Conference, Phoenix, Arizona, January 30, 2012.

"Engineering Considerations for Addressing Climate Change Requirements." Maine Paper Days 2010, Maine Pulp and Paper Foundation, University of Maine, Orono, Maine, April 7, 2010.

"Experiences with Operating a 40 CFR 75 Subpart E Alternative Monitoring System" (with J. Nelson). Electric Utility Environmental Conference, Phoenix, Arizona, February 3, 2009.

"Strategic Siting and Permitting Considerations for Cellulosic Ethanol Production Plants" (with D. Agneta). Electric Utility Environmental Conference, Tucson, Arizona, January 29, 2008.

"Highway Modelling in the City of Calgary" (with R. Rudolph and Y. Wong). Emerging Issues in Air Quality Modelling for Canada, A&WMA Specialty Conference, Calgary, Alberta, October 5, 2006.

"Visualizing NSR Reforms" (with J.L. Hanisch). EnviroExpo 2003, Boston, Massachusetts, May 6, 2003.

"Estimating Fugitive Gaseous Emissions from Naturally Ventilated Structures" (with D.R. Tonini). EnviroExpo 2002, Boston, Massachusetts, May 7, 2002.

"Evaluation of Methods and Protocols for Operation of a CERMS at a Municipal Waste Combustor" (with M. Arienti). In Proceedings of The 10th Annual North American Waste to Energy Conference (NAWTEC10), Philadelphia, Pennsylvania, May 6-8, 2002.

"Ambient and Fugitive Emissions Measurements of Total Gaseous Mercury at a Chlor-Alkali Plant" (with D.R. Tonini, M.J. Mains, S.J. Wallace, and D.W. Dixon). A&WMA New England Section Conference on Mercury, Worcester, Massachusetts, October 23, 2001.

“Ambient and Fugitive Emissions Measurements of Total Gaseous Mercury at a Chlor-Alkali Plant” (with D.R. Tonini, M.J. Mains, S.J. Wallace, and D.W. Dixon). In Proceedings of The A&WMA Specialty Conference on Mercury Emissions: Fate, Effects, and Control, Arlington Heights, Illinois, August 20-23, 2001.

“Retrospective Air Quality Analyses for PM, SO<sub>2</sub>, and NO<sub>x</sub>: Benefits of the Clean Air Act.” (with J.E. Langstaff and K.A. McAuliffe). In Proceedings of the 86th Annual Meeting & Exhibition of the AWMA, Denver, Colorado, Number 93-TP-56.01, June 13-18, 1993.

“A Model for Estimating the Fate and Treatability of Organic and Inorganic Pollutants Discharged to Publicly Owned Treatment Works.” (with T.L. Arnold and N. Walter). In Proceedings of National Research and Development Conference on the Control of Hazardous Materials, Anaheim, California, pp. 230-234, February 20-22, 1991.

“Comparisons of Predicted and Measured Dry Deposition Velocities of Trace Metals onto Natural Surfaces” (with C.I. Davidson). In Proceedings of the Sixth International Conference on Heavy Metals in the Environment, New Orleans, Louisiana, September 15-18, 1987.

## **PUBLICATIONS**

“A Practical Guide to NSR Reform,” with John Hanisch, EM, September 2004

“Uncertainty and Variation in Indirect Exposure Assessments: An Analysis of Exposure to Tetrachlorodibenzo-p-Dioxin from a Beef Consumption Pathway,” with others, Risk Analysis, 16(2):263-277, 1996.

“FATE: A computerized model for estimating the fate and treatability of hazardous pollutants in publicly owned treatment works,” with others, Water Environment & Technology, March 1993.

“Seasonal variations in sulfate, nitrate, and chloride in the Greenland Ice Sheet: Relation to atmospheric concentrations,” with others, Atmos. Environ. 23(11):2483-2493, 1989.

“Radioactive cesium from the Chernobyl accident in the Greenland Ice Sheet,” with others, Science, 237:633-634, August 7, 1987.

## **PROFESSIONAL AFFILIATIONS**

Member, Air & Waste Management Association

Exhibit

JH-2



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
2023 MODEL YEAR  
CERTIFICATE OF CONFORMITY  
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION  
AND AIR QUALITY  
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Rolls-Royce Solutions America Inc**  
(U.S. Manufacturer or Importer)

Certificate Number: **PMDDDB02.5GBX-002**

Effective Date:

**10/20/2022**

Expiration Date:

**12/31/2023**

**Byron J. Bunker, Division Director**  
Compliance Division

Issue Date:

**10/20/2022**

Revision Date:

**N/A**

**Manufacturer:** Rolls-Royce Solutions America Inc

**Engine Family:** PMDDDB02.5GBX

**Mobile/Stationary Certification Type:** Stationary

**Fuel :** Natural Gas (CNG/LNG)  
LPG/Propane

**Emission Standards :**

Part 90 Phase I

CO ( g/kW-hr ) : 519.0

HC + NOx ( g/kW-hr ) : 13.4

NMHC + NOx ( g/kW-hr ) : 13.4

**Emergency Use Only : Y**

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 60, 1065, 1068, and 60 ( stationary only and combined stationary and mobile ) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60, 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60, 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Exhibit

JH-3





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
2023 MODEL YEAR  
CERTIFICATE OF CONFORMITY  
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION  
AND AIR QUALITY  
ANN ARBOR, MICHIGAN 48105

**Certificate Issued To:** Power Solutions International, Inc.  
(U.S. Manufacturer or Importer)

**Certificate Number:** PPSIB5.70EMT-009

**Effective Date:**

05/09/2022

**Expiration Date:**

12/31/2023

Byron J. Bunker, Division Director  
Compliance Division

**Issue Date:**

05/09/2022

**Revision Date:**

N/A

**Manufacturer:** Power Solutions International, Inc.

**Engine Family:** PPSIB5.70EMT

**Mobile/Stationary Certification Type:** Stationary

**Fuel :** Natural Gas (CNG/LNG)  
LPG/Propane

**Emission Standards :**

Part 60 Subpart JJJJ Table 1

VOC ( g/Hp-hr ) : 1.0

NOx ( g/Hp-hr ) : 2.0

CO ( g/Hp-hr ) : 4.0

Stationary Part 1048

HC + NOx ( g/kW-hr ) : 2.7

NMHC + NOx ( g/kW-hr ) : 2.7

CO ( g/kW-hr ) : 4.4

**Emergency Use Only : Y**

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 1065, 1068, and 60 ( stationary only and combined stationary and mobile ) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

**BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**PETITION OF PECO ENERGY COMPANY FOR A FINDING OF NECESSITY**

**PURSUANT TO 53 P.S. § 10619**

**Docket No. P-2021-3024328**

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**REMAND DIRECT TESTIMONY**

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**WITNESS: JEFFREY D. MARX, P.E.**

**SUBJECT: PROVIDE EXPERT TESTIMONY REGARDING THE RISK  
AND POTENTIAL HAZARDS ASSOCIATED WITH PECO'S  
PROPOSED GAS RELIABILITY STATION TO BE  
LOCATED AT 2090 SPROUL ROAD, MARPLE TOWNSHP,  
PA.**

**DATED: September 22, 2023**

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1                   **REMAND DIRECT TESTIMONY OF JEFFREY D. MARX, P.E.**

2                   **I. INTRODUCTION**

3   **Q.     Please state your name and business address.**

4   A.     My name is Jeffrey D. Marx. My business address is 908 26<sup>th</sup> Avenue N.W., Norman,  
5   OK, 73069.

6                   **II. PURPOSE**

7   **Q.     Mr. Marx, what is the purpose of your testimony in this proceeding?**

8   A.     I am providing expert testimony regarding the potential hazards associated with the  
9   proposed Gas Reliability Station to be located at 2090 Sproul Road, Marple Township, PA.  
10   Specifically, my analysis is intended to describe the potential hazards associated with accidental  
11   releases from the station and their potential impacts on the surrounding community.

12   **Q.     What is your educational background?**

13   A.     I received my MS in Mechanical Engineering from Georgia Institute of Technology in  
14   2002, along with a BS in Mechanical Engineering from the University of Oklahoma in 1993. My  
15   certifications include the being registered as a professional engineer in the State of Oklahoma.

16   **Q.     Please describe your work experience relevant to your Direct Testimony.**

17   A.     I have worked for Quest Consultants Inc. since 1993, where I am currently a Principal  
18   Engineer. At Quest Consultants, we direct quantitative risk analysis (QRA) studies involving  
19   refineries or refinery units, toxic and flammable gas/liquid pipeline systems, oil and natural gas  
20   production systems, LPG import/export terminals, LNG import/export terminals, hydrogen  
21   systems, pipelines, gas treatment and processing plants, reinjection systems, and road/rail  
22   transportation systems. Additionally, I manage and conduct building siting studies to assess  
23   occupied building impacts from fires, vapor cloud explosions, and toxic/flammable vapor

infiltration. Tasks include accident selection, hazard calculation, and results presentation in the form of overpressure exceedance curves, vulnerability zones, and location-specific risk contours, with recommendations for building risk reduction/hazard mitigations.

**Q. What other certifications or experiences further qualify you to provide your expert testimony?**

A. I have acted as instructor or co-instructor for several of Quest’s short courses, including *Risk Analysis Methodology*, *Liquefied Gas Safety*, *LNG Safety Technology and Inspection* (conducted for the U.S. DOT to train 49 CFR 193 inspectors), and *Introduction to Consequence Analysis*. I am the co-inventor of a patented community response guideline device. The device allows local emergency response agencies (police, fire department, etc.) to quickly assess the nature and severity of hazards posed by accidental releases of hazardous fluids. I have facilitated team meetings for process hazards analysis (PHA) studies, for several major projects. I am a member of the American Society of Mechanical Engineers, American Institute of Chemical Engineers, a Registered Professional Engineer – Oklahoma, a Member of the Technical Committee for CSA Z276: *Liquefied natural gas (LNG) —Production, storage, and handling*, and Member of the Industrial Advisory Board, *Fire Protection and Safety Engineering Technology Program*, Oklahoma State University.

**Q. Do you have any publications?**

A. Yes. I have published several articles, such as “*A New Look at Release Event Frequencies*” in the *Journal of Loss Prevention in the Process Industries* (2021); “*Radiant Heat Flux Impact Criteria for API RP 752 Building Siting Studies*”, presented at 2018 AIChE Spring Meeting & 14th Global Congress on Process Safety, Orlando, FL (2018); “*A Comprehensive Approach to API RP 752 and 753 Building Siting Studies*” in the *Journal of Loss Prevention in*

1 the Process Industries (2016); “*Facility Siting Studies – A Comprehensive Methodology*”,  
2 presented at 2016 AIChE 7th Latin America Conference on Process Safety, Lima, Peru (2016);  
3 and, “*Review of the Risk Analysis Option in NFPA 59A (2013)*”, presented at Mary Kay  
4 O’Connor Process Safety Center International Symposium, College Station, Texas (2014).

5 **Q. Have you previously provided expert testimony?**

6 A. Yes, I have provided expert testimony in other legal proceedings. The subject matter of  
7 those proceedings dealt with hazardous materials pipelines. My expert testimony was, in  
8 general, focused on risk, such that it helped to explain the probability of accidental releases as  
9 well as the consequences of such releases. Most of the testimony, however, was concerned with  
10 the consequences side of risk - how those accidental scenarios develop and manifest as a hazard  
11 to people, property, or the environment, whether that be by fire, explosion, or toxic impact.

12 **Q. Mr. Marx, based upon your education, training, and experience, do you believe that**  
13 **you are capable for expressing an opinion to a reasonable degree of professional certainty**  
14 **as to the risks and potential hazards as it relates to the proposed gas reliability station that**  
15 **is the subject to this proceeding?**

16 A. Yes, I do.

17 **Q. Mr. Marx, are you sponsoring any exhibits?**

18 A. Yes. I am sponsoring Exhibit JM-1, which is my professional resume of CV. I am also  
19 sponsoring Exhibit JM-2, which is my report dated September 11, 2023.

## 20 II. HAZARDS IDENTIFICATION

21 **Q. Did you find any hazards associated with the PECO gas reliability station?**

1 A. Yes. The hazards associated with the Marple Reliability Station (MRS) are common to  
2 most natural gas transmission and distribution systems. If an accidental release of natural gas  
3 should occur, the following hazards may be present:

- 4 • Exposure to a flash fire following development and ignition of a flammable vapor  
5 cloud;
- 6 • Exposure to thermal radiation due a jet fire (a momentum-dominated release of  
7 pressurized natural gas that is ignited); or
- 8 • Exposure to a blast wave following ignition of a flammable vapor cloud that is a  
9 confined or congested space.

10 **Q. How did you perform your analysis?**

11 A. Quest has developed a modeling package, CANARY by Quest®, which contains a set of  
12 complex models that calculate the potential magnitude of fires, explosions, flammable gas, and  
13 toxic gas effects following a release. The models contain algorithms that account for  
14 thermodynamics, mixture behavior, transient release rates, gas cloud density relative to air, initial  
15 velocity of the released fluid, and heat transfer effects from the atmosphere and the substrate. For  
16 modeling scenarios, the selection of loss-of-containment events for the proposed Marple  
17 Reliability Station was based on the various states of natural gas in the facility, the processing  
18 equipment, and an estimate of the likelihood of accidental events. Potential events were modeled  
19 in CANARY using the available MRS data regarding gas conditions and the equipment proposed  
20 for the site.

21 **Q. What type of scenarios were modeled for the Gas Reliability Station?**

22 A. Accidental release scenarios were developed for equipment in the Inlet system, the Outlet  
23 system, and that within the building of the proposed MRS. For each of the three areas (inlet,

outlet, and within the building), equipment failures that resulted in a loss of natural gas were evaluated. Because the magnitude of any accidental release scenario is directly related to the hole size from which gas escapes, several potential hole sizes were postulated. These were chosen from the range of potential releases that spans small leaks (seldom occurrences), to small holes or failures (unlikely), to significant holes (rare, or what is often called the maximum 'credible' event size), to full pipe ruptures (extremely rare). The corresponding potential impacts from such a range of release scenarios could range from small, which are localized, on-site impacts only to large impacts which would extend offsite. For the analysis presented in Exhibit JM-2, two hole sizes were chosen: a rare event represented by a two inch diameter hole and an extremely rare event modeled as a full rupture of a pipe carrying natural gas. The analysis was also constrained to accidental releases from aboveground equipment, as buried pipeline hazards are already present in the area.

**Q. Can you explain the consequences analysis results?**

A. For the rare events, which can also be classified as the maximum credible event (MCE) size, the potential impacts extend to approximately 100 feet from the release source within the MRS. These impacts are dominated by the potential thermal radiation from a fire that could cause burns to unprotected skin, assuming a 30 second exposure time. More serious fire radiation impacts, such as those that could ignite wood, were found to extend about 60 feet from their release source. Except for some areas to the south of the MRS site, this hazard was mostly contained within the site boundaries. Flammable vapor cloud and vapor cloud explosion hazards were found to be constrained to within the MRS site.

For pipe ruptures, or what are expected to be extremely rare events, the impacts could extend up to about 220 feet from the equipment where the scenario originates. This is again



1 dominated by the potential area where burns could be experienced. Ignition of wood was found  
2 to be possible up to 120 feet from the release point. Both of these fire impacts extend beyond the  
3 MRS site boundaries. As with the MCEs, or rare events, the flammable vapor cloud and vapor  
4 cloud explosion hazards remain within the MRS site boundaries.

5       Regarding vapor cloud explosions, natural gas is not a very reactive material and rarely  
6 produces damaging explosions. The exception to this is when natural gas is released within a  
7 confined space. Many examples of this exist for homes where gas leaks occur, and the gas is  
8 ignited, normally destroying the home. In most of these cases, there is little significant damage  
9 beyond the structure where the event originated. Likewise, a release and ignition within the  
10 MRS building is possible, but the damaging overpressure impacts, often called a blast wave, are  
11 not predicted to extend beyond the site boundaries. While this will be a dramatic event that  
12 rattles windows, modeling for such events, which is reasonably consistent with anecdotal  
13 evidence, indicates that such a scenario would not cause any significant damage beyond the site  
14 walls.

15       To summarize the hazards associated with the MRS, the largest impacts are from  
16 potential fire events. If an equipment failure of significant magnitude were to occur that releases  
17 natural gas, and that gas is ignited, there could be fire impacts in the immediate areas outside the  
18 facility boundaries.

#### 19                                   IV. ACCIDENT TRENDS

20 **Q.     Are accidents such as the ones in your analysis reported within natural gas**  
21 **distribution industry?**

22 **A.     Accidental release scenarios like the ones modeled in my report have happened in the**  
23 **natural gas distribution industry. The regulatory agency responsible for natural gas distribution**

1 systems is the U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials  
2 Safety Administration (PHMSA). Gas pipeline systems, as regulated under 49 CFR § 192, are  
3 required to report “incidents” to PHMSA. Since 2010, the criteria that classifies an accidental  
4 event as an incident, as defined in 49 CFR § 191.31, have been a release of gas from a pipeline  
5 with one or more of the following consequences:

- 6 • A death or injury requiring hospitalization;
- 7 • Estimated property damage of \$50,000 or more, including loss to the operator and  
8 others, or both, but excluding the cost of gas lost;
- 9 • Unintentional estimated gas loss of three million cubic feet or more; or
- 10 • An event that is significant in the judgment of the operator.

11 In recent years, the property damage threshold has been raised but the other criteria are the same.

12 **Q. Mr. Marx, does that mean that some accidents are not reported?**

13 A. Yes, based on the above criteria, not all accidental releases from gas distribution systems  
14 will be reported or recorded. However, most incidents that have the capacity for serious harm to  
15 the public will be captured by these criteria, such that PHMSA’s incident database provides a  
16 reasonable description of the kinds of events that may of concern to an offsite impacts  
17 assessment.

18 **Q. Can you explain the accident trends in the natural gas distribution industry in the**  
19 **last 5 years?**

20 A. The following information was extracted from the past 5 years of reported PHMSA data,  
21 and is described in more detail in my report .

- 22 • In the USA, there are more than 2 million miles of natural gas distribution pipelines  
23 serving more than 70 million customers, delivered by 1,462 operating entities.

1 • In the calendar years 2018 through 2022, there were about 100 reported incidents per  
2 year, or 506 total incidents. In 30 of those there were a total of 37 fatalities, and in 96 of  
3 the events 168 injuries were recorded.

4 • About half (263 of 506) the accidental releases of gas were reported to be ignited,  
5 resulting in a fire.

6 • Due to vague recording and reporting parameters, no details about explosions are  
7 available in the PHMSA database.

8 **Q. Can you provide any other specifics of the accidents referenced above?**

9 A. Yes, it is useful to evaluate the incident data for events that originated in aboveground  
10 equipment like what is proposed to be installed at the MRS. According to the PHMSA database,  
11 again for the past 5 calendar years:

12 • In 156 of the 506 reported incidents, the accidental release originated from aboveground  
13 or transition area piping or equipment; thus, about 70% of the reported incidents  
14 originated in buried piping.

15 • Of the 156 aboveground equipment incidents, 12 incidents resulted in 15 fatalities and  
16 28 incidents resulted in 46 fatalities (4 incidents had both fatalities and injuries).

17 • Of the 156 incidents, only 6 were reported to be a “rupture,” 65 were reported as a  
18 “leak,” 6 as a “mechanical puncture.” The remaining incidents were classified as  
19 “other.” Because about half of the incidents were not given a hole size classification, it is  
20 not possible to come to a good conclusion about the fraction of all incidents that would  
21 fall into the “rare” or “extremely rare” categories. However, it does seem that those  
22 classes of event would be approximately ten percent of PHMSA-reportable incidents.

1 • Of the 156 aboveground incidents, 109 had some type of cause listed. 76 of these were  
2 caused by some type of vehicular impact, and others by a mix of causes such as lightning,  
3 external fires, damage from gunshots, connection failures, or customer damage.

#### 4 **V. CONCLUSION**

5 **Q. Does this conclude your Direct Testimony?**

6 A. Yes. However, I reserve the right to file such additional testimony as may be necessary or  
7 appropriate.



**Jeffrey D. Marx, P.E.**  
**Principal Engineer**

**EDUCATION**

- 2002 M.S., Mechanical Engineering  
Georgia Institute of Technology, Atlanta, Georgia
- 1993 B.S., Mechanical Engineering  
University of Oklahoma, Norman, Oklahoma

**EXPERIENCE**

- 1993 - Present Quest Consultants Inc., Norman, Oklahoma  
Staff Engineer, Project Engineer, Senior Engineer, Principal Engineer

Directs quantitative risk analysis (QRA) studies involving refineries or refinery units, toxic and flammable gas/liquid pipeline systems, oil and natural gas production systems, LPG import/export terminals, LNG import/export terminals, hydrogen systems, pipelines, gas treatment and processing plants, reinjection systems, and road/rail transportation systems. Work on these projects included data gathering, accident selection, analysis structuring, consequence calculations, frequency analysis, risk mapping, and risk assessment. Organized and input all data required by the risk quantification software, CANARY+, and presented the results in the form of risk contours and F-N curves. Explained the results and findings of QRA studies in reports for client's internal use, presentation to the public, and for submission to regulatory authorities.

Manages and conducts building siting studies to assess occupied building impacts from fires, vapor cloud explosions, and toxic/flammable vapor infiltration. Tasks include accident selection, hazard calculation, and results presentation in the form of overpressure exceedance curves, vulnerability zones, and location-specific risk contours, with recommendations for building risk reduction/hazard mitigations.

Responsible for software package and model development for the consequence modeling package CANARY by Quest® and the CANARY+ risk quantification software with its supporting analysis and assessment tools. Author of computer codes that model thermal radiation from pool fires, torch fires, flares, and BLEVE fireballs. Instructor for CANARY by Quest® software training.

## Jeffrey D. Marx, P.E.

Conducts and coordinates facility siting studies including plant spacing and layout for regulatory compliance, pipeline integrity management program calculations, and specific hazards analyses. Applicable codes and standards include NFPA 2 (hydrogen), 49 CFR 193 (LNG), NFPA 59A (LNG), and various fire protection standards as applicable.

Instructor or co-instructor for several of Quest's short courses, including *Risk Analysis Methodology*, *Liquefied Gas Safety*, *LNG Safety Technology and Inspection* (conducted for the U.S. DOT to train 49 CFR 193 inspectors), and *Introduction to Consequence Analysis*.

Facilitated team meetings for process hazards analysis (PHA) studies, including the following projects.

RMS Engineering/US PolyCo: RDS Asphalt process HAZOP  
Bechtel: Driftwood LNG HAZID  
Tonmoor International: HAZOP for LPG storage and distribution terminal  
Bechtel: SPLNG Vendor Packages HAZOP and SIL assessment  
Williams Pipeline: Distribution Lines and Valve/Meter Station HAZOPs  
SDG&E: Hydrogen generation, storage, fueling, and blending HAZOP  
Basic Engineering: Natural Gas Storage Fill/Withdrawal Systems; HAZOP  
Bechtel: Denali Alaska Gas Pipeline Project; HAZID  
CB&I: Southern LNG Expansion Projects; HAZOP  
BE&K Engineers: LPG Storage, Pipeline, and Delivery Facilities; HAZOP  
Keyspan: LNG Peakshaver; HAZOP  
Willbros Engineers, Inc.: Unocal Bibyana Gas Plant; HAZOP  
Engelhard Corporation: Fuel Cell; HAZOP  
Bechtel: Brass Offshore LNG; "What if?"

Co-inventor of a patented community response guideline device. The device allows local emergency response agencies (police, fire department, etc.) to quickly assess the nature and severity of hazards posed by accidental releases of hazardous fluids; provides a visual indication of the area in which the public might be told to evacuate or shelter-in-place, based on the specific properties of the material being released, the relative size of the release, and the wind direction.

1990 - 1993 Quest Consultants Inc., Norman, Oklahoma  
Engineer Trainee (part-time)

Assisted in scenario definition, case input and results presentation for various consequence analysis studies. Used CAD to prepare technical drawings and illustrations for inclusion in reports, course texts, and presentations.

## Jeffrey D. Marx, P.E.

1990 - 1991 Hilti, Inc., Tulsa, Oklahoma

Co-op Student Intern in Mechanical Engineering

CADD operator for product design, development, and testing. Assisted with implementation and editing of CAD database. Assisted with development and testing of existing construction fastening system products, and the design, testing, and fabrication of new products.

### PROFESSIONAL MEMBERSHIPS

American Society of Mechanical Engineers

American Institute of Chemical Engineers

Registered Professional Engineer – Oklahoma

Member of the Technical Committee for CSA Z276: *Liquefied natural gas (LNG) – Production, storage, and handling*

Member of the Industrial Advisory Board, *Fire Protection and Safety Engineering Technology Program*, Oklahoma State University

### PUBLICATIONS

Marx, J.D. and B.R. Ishii (2021), “*A New Look at Release Event Frequencies.*” *Journal of Loss Prevention in the Process Industries*, Vol. 69, 2021, 104368.

Marx, J.D., Ishii, B.R., Wesevich, J.W., and S. Dara (2018), “*Radiant Heat Flux Impact Criteria for API RP 752 Building Siting Studies.*”. Presented at 2018 AIChE Spring Meeting & 14<sup>th</sup> Global Congress on Process Safety, Orlando, FL, April 22-25, 2018.

Marx, J.D. and B.R. Ishii, “*Revisions to the QMEFS Vapor Cloud Explosion Model.*”. 2017 AIChE Spring Meeting & 13<sup>th</sup> Global Congress on Process Safety, San Antonio, TX, March 2017.

Marx, J. D. and Ishii, B. R., “*A Comprehensive Approach to API RP 752 and 753 Building Siting Studies.*” *Journal of Loss Prevention in the Process Industries*, Volume 44, November 2016.

Marx, J.D. and C.R. Jimenez (2016), “*Facility Siting Studies – A Comprehensive Methodology.*” Presented at 2016 AIChE 7<sup>th</sup> Latin America Conference on Process Safety, Lima, Peru, August 22-23, 2016.

Marx, J.D. and A. Nicotra (2016), “*Is a Two-Inch Hole Adequate for a Siting Study?*”. Presented at 2016 AIChE Spring Meeting & 12<sup>th</sup> Global Congress on Process Safety, Houston, TX, April 11-13, 2016.

Marx, J. D. and Ishii, B. R., “*Infiltration hazards for building siting studies.*” *Process Safety Progress*,

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Vol. 35, No. 1, 61–67, March 2016.

Marx, J.D. and B.R. Ishii (2014), “*Review of the Risk Analysis Option in NFPA 59A (2013).*” Presented at Mary Kay O’Connor Process Safety Center International Symposium, College Station, Texas, October 28-30, 2014.

Marx, J.D., Werts, K.M., “*Application of F–N curves in API RP 752 building siting studies*”. Journal of Loss Prevention in the Process Industries, Vol. 30, 301-306, July 2014.

Marx, J.D., Werts, K.M., “*The Application of Pressure-Impulse Curves in a Blast Exceedance Analysis*”. Journal of Loss Prevention in Process Industries, Vol 26, Issue 3, 478-482, May 2013.

Marx, J.D., Werts, K.M., “*The Use of Overpressure Exceedance Curves in Building Siting*”. 2011 AIChE Spring Meeting & 7<sup>th</sup> Global Congress on Process Safety, Chicago, IL, March 2011.

Marx, J.D., Cornwell, J.B., “*The Importance of Weather Variations in a Quantitative Risk Analysis*”. Journal of Loss Prevention in the Process Industries, Vol. 22, Issue 6, 803-808, November 2009.

Marx, J.D., Cornwell, J.B., “*Selection and Evaluation of Release Scenarios for an LNG Import Terminal*”. American Institute of Chemical Engineers 2005 Spring National Meeting Process Plant Safety Symposium, Atlanta, GA, April, 2005.

Martinsen, W. E., and J. D. Marx (1999), “*An Improved Model for the Prediction of Radiant Heat from Fireballs*.” Presented at the 1999 International Conference/Workshop on Modeling Consequences of Accidental Releases of Hazardous Materials, San Francisco, California, September, 1999.

Cornwell, J.B., Marx, J.D., and Lee, W.W. (1998), “*Application of Qualitative and Quantitative Risk Analysis Techniques to Building Siting Studies*”. Process Plant Safety Symposium, Houston, TX, October 26-27, 1998.

### SELECTED PROJECT EXPERIENCE

**Siting, Safety, and Fire Protection for an LNG Peakshaving Plant:** *Project Manager* for facility siting studies (API RP 752; PHMSA/49 CFR 193), fire protection systems support and design (including fire/gas detection, fire water systems), and general site safety/layout services for an LNG liquefaction, storage, and vaporization facility. *Client: Matrix PDM Engineering*

**LNG Facility Siting Review:** *Project Manager* for a reviews of various submittals to the U.S. Department of Transportation’s Pipeline and Hazardous Materials Safety Administration (PHMSA) regarding proposed liquefied natural gas (LNG) projects and compliance with the requirements of 49 CFR Part 193; assistance to PHMSA in reviews; subject matter expert



## Jeffrey D. Marx, P.E.

consulting to PHMSA regarding general LNG issues and development of the frequently-asked-questions (FAQs) guidance to assist with compliance with the siting provisions of 49 CFR 193; coordination with the Federal Energy Regulatory Commission (FERC) regarding facility siting issues. *Client: PHMSA*

**PHA and Consequence Analysis for a Hydrogen and Natural Gas Fueling Station:** *Facilitator and Lead Analyst*; Facilitator for a “What If?” study for a proposed hydrogen and natural gas fueling facility in California. Evaluated potential accidental releases from the hydrogen and natural gas system to determine potential fire loading as determination of the fire water needs. *Client: Wayne Perry, Inc.*

**LNG Facility Siting Safety Study:** *Project Manager* for a study to demonstrate compliance with the siting provisions of 49 CFR 193 and other PHMSA requirements, as well as requirements of the FERC. The study included design spill selection, vapor dispersion and fire radiation modeling, coordination of a contractor for computational fluid dynamics (CFD) studies, as well as verification of adequate facility layout and assistance with development of regulatory filings. *Client: Bechtel Oil, Gas, and Chemicals*

**Buildings Siting Evaluation for Coal Gasification Plant:** *Project Manager* for a study to evaluate the potential impacts at occupied permanent plant buildings and temporary buildings. Hazard types included toxic vapor exposure (CO, H<sub>2</sub>S, SO<sub>2</sub>), fires, and vapor cloud explosions. Recommended building mitigation measures. *Client: Duke Energy*

**Facility Siting Evaluations for Hydrogen Fueling Stations:** *Project Manager* for a set of studies to evaluate NFPA 2 siting and setback distances for hydrogen fueling stations. Facilitator for HAZID studies at each site to evaluate potential hazards and recommended mitigation or control measure additions. *Client: Iwatani*

**Quantitative Risk Analysis, Siting Study, Fire and Explosion Analysis, and Emergency Systems Survivability Analysis for a Large LNG Export Terminal:** *Project Manager* for multiple risk studies for a competitive FEED LNG liquefaction and export terminal on the coast of Mozambique. Risk was calculated for workers, public, as well as equipment damage and risk of escalation. Risk studies were submitted as part of the FEED. *Client: Anadarko Petroleum Corporation through Bechtel International*

**Quantitative Risk Analysis for a Natural Gas Transmission Line:** *Project Manager* for a QRA of a large diameter gas transmission line in the New Jersey and southern New York areas. The QRA was done to evaluate the risk to the public in sensitive locations along the pipeline route. *Client: Kiefner and Associates/ Spectra*

**LNG Facility Siting Safety Study:** *Project Manager* for a study to demonstrate compliance with the siting provisions of CSA Z276, Canada’s LNG safety code. The study included vapor

## Jeffrey D. Marx, P.E.

dispersion and fire radiation, as well as verification of adequate facility layout and generally good engineering design. *Client: Fortis BC and Black & Veatch*

**Quantitative Risk Analysis for a Proposed Gas-to-Liquids Facility:** *Lead Process Risk Analyst* for a full QRA of a new gas-to-liquids facility along the Nigerian coast. QRA was submitted to local and Federal Nigerian authorities. *Client: Chevron Energy and Technology*

**Pipeline Hazard Calculations:** *Lead Analyst* for a study to evaluate the potential hazards associated with accidental NGL pipeline release events to evaluate high consequence area (HCA) impacts. The evaluation included flammable vapor cloud travel, product loss estimation, and blowdown time estimation. *Client: Williams Field Services*

**Quantitative Risk Analysis for a Refinery:** *Lead Process Risk Analyst* for a full QRA of a large refinery in the USA. QRA was conducted to understand the potential risk to the public, as well as to occupied buildings on the site. Analysis included evaluation of flammable and toxic fluids, vapor cloud explosions, and fires from crude units, hydrocrackers, separation and distillation units, sulfur recovery, and product storage and transportation facilities. *Client: Chevron Energy and Technology*

**Process Hazards Analysis for Refinery and Petrochemical Facility:** *Lead Process Safety Engineer* for coarse HAZOP of proposed design of a refinery and petrochemical facility in Malaysia. Facilitated coarse Hazard and Operability Studies (HAZOP) for multiple units of the refinery and integrated petrochemical facility. *Client: Technip, for Petronas (Malaysia)*

# **PECO Marple Reliability Station Hazard Analysis Study**

## **Introduction**

Quest Consultants Inc. (Quest) was retained by McNichol, Byrne, & Matlawski, PC to evaluate the potential hazards associated with a proposed natural gas pressure reduction station in Marple Township, PA. The proposed Marple Reliability Station, planned to be installed to the southwest of the intersection of Sproul and Cedar Grove Road, is intended to provide a supplemental supply of natural gas to the local distribution network. This study is intended to describe the potential hazards associated with accidental releases from the station and their potential impacts on the surrounding public areas.

## **Hazards Analysis**

To describe the hazards associated with the station in a detailed manner, the following steps are required:

- Hazard Identification
- Data Collection and Analysis
- Consequence Analysis Calculations
- Results Presentation and Assessment

## **Hazards Identification**

The hazards associated with the Marple Reliability Station are common to most natural gas transmission and distribution systems. If an accidental release of natural gas should occur, the following hazards may be present:

- Exposure to a flash fire following development and ignition of a flammable vapor cloud;
- Exposure to thermal radiation due a jet fire (a momentum-dominated release of pressurized natural gas that is ignited); or
- Exposure to a blast wave following ignition of a flammable vapor cloud that is a confined or congested space.

## **Data Collection and Analysis**

Data regarding the Marple Reliability Station and its operating conditions was provided for this study in order to quantify the potential hazards. Data was provided by McNichol, Byrne, & Matlawski, PC, as well as by PECO through a secure data portal. Information concerning the piping configurations, pipe sizes, gas conditions (pressure, temperature, flow rate), and station layout were obtained for this analysis.

## Consequence Analysis

The ability to accurately model the release of hazardous fluids is important if an accurate assessment of potential exposure of people and equipment is to be attained in consequence and risk analysis studies. For this reason, Quest has developed a modeling package, CANARY by Quest®, which contains a set of complex models that calculate the potential magnitude of fires, explosions, flammable gas, and toxic gas effects following a release. The models contain algorithms that account for thermodynamics, mixture behavior, transient release rates, gas cloud density relative to air, initial velocity of the released fluid, and heat transfer effects from the atmosphere and the substrate.

The release and dispersion models contained in CANARY were reviewed in multiple studies. Conclusions of these studies included: a recommendation for the use of the CANARY software for in toxic and flammable gas dispersion studies; a finding that it produced conservative (i.e., overpredicted) results; and awarded the highest possible ranking in science and credibility categories.

In addition to the dispersion modeling capability of CANARY, the software package contains models for simulating pool fire, jet fire, and fireball radiation. These models account for impoundment configuration (for pool fires), fuel composition, target height relative to the flame, target distance from the flame, atmospheric attenuation (includes humidity), wind speed, and atmospheric temperature. The models are based on published information in the public domain and have been validated with experimental data. More information on CANARY consequence models is available upon request.

## Hazard Endpoints

When modeling the potential effects of hazardous fluid releases, the modeling must be given specific values where the calculations end. These are called endpoints, and each is attached a meaning associated with the potential harm done by that hazard. For example, when modeling a flammable gas cloud, the concept of flammable range becomes important. At the point of release, the gas has not mixed with air, so is not flammable (it's too rich to be ignited). As it mixes with air, the gas-air mixture enters the range of flammability, and with more dilution will become non-ignitable again due to being too lean. Consequently, the most common endpoint is the lower flammable limit (LFL), which defines the extent of flammability in terms of dilution with air and in terms of its physical reach from the release point. Within the LFL, the hazard is exposure to a flash fire – the relatively quick combustion of flammable gases.

In the event of an ignited gas cloud, the continuing release of a flammable gas will create a jet fire. This momentum-dominated fire introduces the hazard of thermal (fire) radiation. Thermal radiation is capable of causing damage to vegetation, homes, cars, physical assets, and of course to humans. Human impacts can range from minor (sunburn or its equivalent), to moderate (burns to unprotected skin), to death. In all cases, the detrimental effects are a function of the

strength of the thermal radiation and the duration of exposure. As an example, consider a natural gas jet fire that radiates energy in the form of thermal radiation. In areas very close to the flame, persons could be killed, but further away the only affect may be burns, while yet further away an individual may only feel the warmth or nothing at all. In hazard and consequence analysis, a common endpoint is burns to unprotected skin after 30 seconds of exposure. This impact is associated with the thermal radiation flux level (strength) of 1,600 Btu/hr-ft<sup>2</sup>. The potential also exists for a fire to impose sufficient thermal radiation that wooden structures (such as houses) would be ignited. A threshold thermal radiation flux level of 8,000 Btu/hr-ft<sup>2</sup> is normally associated with this effect. The exposure time associated with this level of fire radiation is greater than 20 minutes.

The final hazard of concern in this study is vapor cloud explosion overpressure. In the event of a release of flammable gas that collects in a confined or congested space, and is ignited, there is a possibility that a damaging blast wave will be generated in the explosion. Impacts can range from a loud noise to a blast wave that will destroy buildings. The most common endpoint for vapor cloud explosions is 1.0 psi of overpressure. This value is correlated to minor to moderate damage to buildings of ordinary construction and can be seen as the threshold for injury or death for building occupants. While 1.0 psi will certainly break most windows and can result in minor structural damage to a building, it is generally not capable of causing serious injuries to people outdoors.

The modeling endpoints adopted for this study are:

- |                                |   |
|--------------------------------|---|
| • Flammable vapor cloud        | LFL (lower flammable limit of dispersed gases in air)                   |
| • Thermal radiation (jet fire) | 1,600 Btu/hr-ft <sup>2</sup> for 30 seconds (burns to unprotected skin) |
| • Thermal radiation (jet fire) | 8,000 Btu/hr-ft <sup>2</sup> for 20+ minutes (ignition of wood)         |
| • Explosion blast wave         | 1.0 psi (building damage threatening occupants)                         |

## Modeling Scenarios

The selection of loss-of-containment events for the proposed Marple Reliability Station was based on the various states of natural gas in the facility, the processing equipment, and an estimate of the likelihood of accidental events.

Scenarios were developed within the following sections of the proposed Marple Reliability Station:

- Inlet system, including gas heating (begins at 475 psig, 11 miles away; 12-inch piping flowing a maximum of 3,624,000 standard cubic feet per hour)
- Outlet system (99 psig, 24-inch piping; maximum 3,624,000 standard cubic feet per hour)
- Within the building (both inlet and outlet conditions exist)

In all cases, the accidental release scenario was assumed to be a mechanical failure resulting in a loss of containment from aboveground equipment, at the maximum pressure and flowrates possible. The released gas was modeled as a mixture of materials, primarily methane, to simulate a typical distribution quality natural gas.

The weather conditions applied to all calculations were derived from ten years of data at the Philadelphia International Airport. Annual averages, listed below, were used in all calculations. Seasonal conditions can change the consequence modeling results, but not significantly; thus the annual average values were considered properly representative.

- Air temperature        57.9°F
- Relative humidity    70%
- Wind speed            8.1 mph

For release height and orientation, the equipment layout and site conditions were evaluated. The following findings were deemed relevant to the consequence analysis.

- All equipment (primarily piping and valves) is within about 5 feet of grade level. The exception to this is that parts of the gas heater are taller. However, most of the natural gas systems are within about 3 feet of grade. Thus, a release height of 3 feet was applied.
- Releases with a horizontal orientation tend to produce the largest hazard zones. At this site, the natural gas equipment will be surrounded by an 8-foot wall. Accidental releases in the horizontal direction will impact the wall.
  - For unignited natural gas, the dispersing vapor cloud will be deflected inward and upward, resulting in no hazard beyond the walls.
  - If a gas release is ignited, the collected gases within the walls could participate in a vapor cloud explosion and create a blast wave within and around the facility.
  - An ignited release that forms a jet fire would be deflected inward and upward and could compromise the walls.
- A significant amount of the equipment at the site is contained within the station building. This building would act like the outer walls, constraining both vapor clouds and fires to the immediate area within and perhaps above the building.

Due to the above issues, jet fires were modeled with a 45° orientation from horizontal from outdoor equipment. This allows the fire to extend above, and in many cases beyond, the facility walls without any interaction, and so was applied as the worst-case orientation for releases.

## Calculations

For each of the three areas (inlet, outlet, and within the building), equipment failures were evaluated. The magnitude of any accidental release scenario is directly related to the hole size from which gas escapes. The range of potential releases spans small leaks (seldom), to small holes or failures (unlikely), to significant holes (maximum 'credible' size, or rare), to full pipe ruptures

(extremely rare). The corresponding potential impacts from such a range of release magnitudes is small (localized) to large (offsite impacts). While these designations are subjective and open to interpretation (especially 'credible'), they do serve to frame the problem of the event likelihood compared to potential adverse impacts.

The first accident type evaluated was the category of maximum credible event (MCE), which can be considered rare events. A release hole size of 2 inches in diameter was selected for the MCE scenarios. This corresponds to a failed connection line or instrumentation line on the main gas piping. Such scenarios would be rare events, whose resultant risk can be considered low. In addition, hydrocarbon failure rate databases would indicate that this selected MCE hole size is larger than 95% of all loss of containment events. This means that a significant majority of accidental releases would be smaller than the MCE event. Table 1 provides the results of the MCE scenario consequence analysis evaluation.

**Table 1**  
**Consequence Analysis Results for MCE (Rare) Release Scenarios**

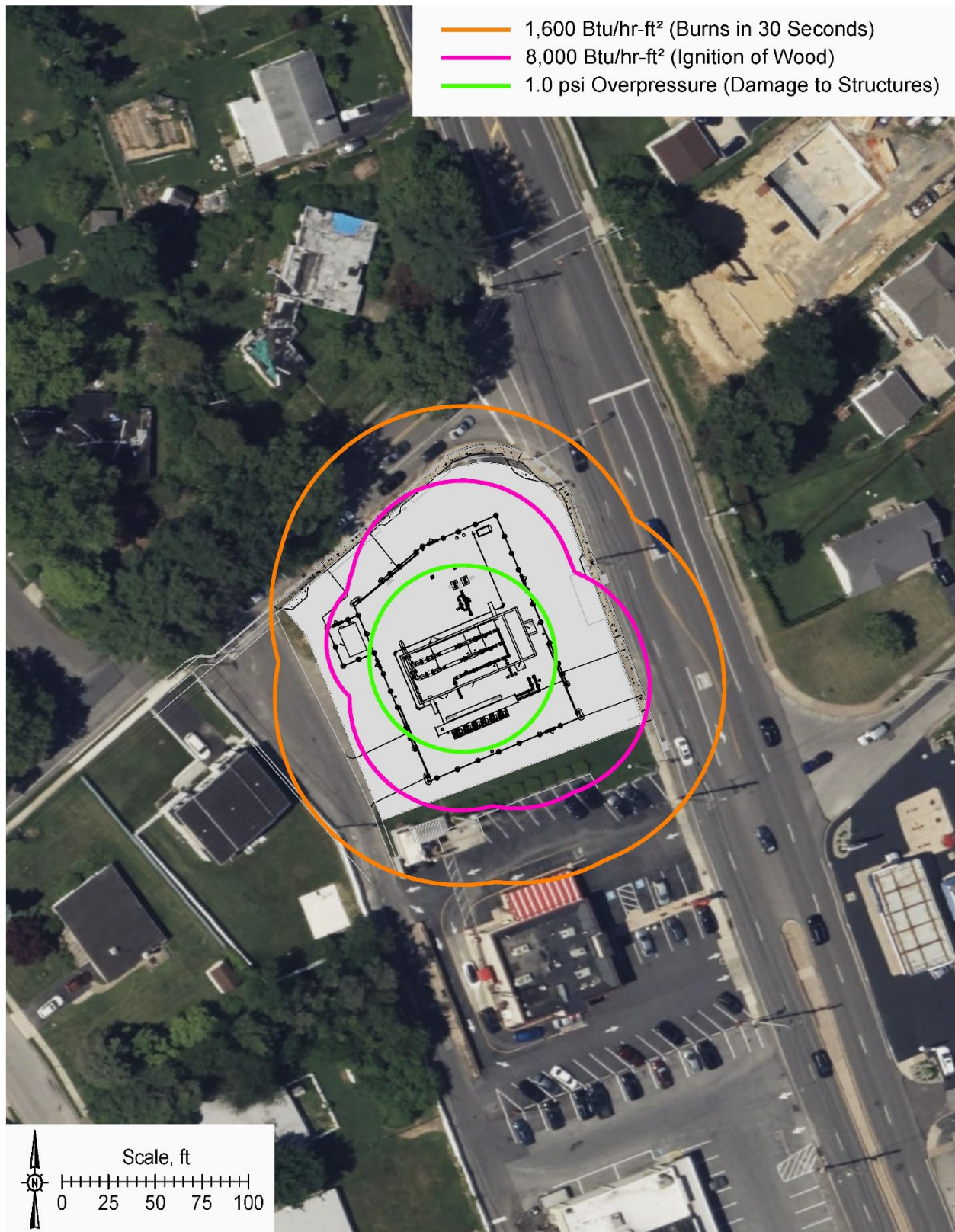
Hazard	Modeling Endpoint	Potential Impact Distance [feet]		
		Inlet	Building	Outlet
Flash fire	LFL	Contained within site walls	Contained within the building	Contained within site walls
Jet fire – burns to persons	1,600 Btu/hr-ft <sup>2</sup>	100	Contained within the building	65
Jet fire – ignition of wood	8,000 Btu/hr-ft <sup>2</sup>	60	Contained within the building	40
Vapor cloud explosion	1 psi	†	50	†

† - Insufficient explosion strength to reach this overpressure level

As seen in Table 1, the potential adverse impacts are limited to about 100 feet from the natural gas equipment in the Marple Reliability Station. The MCE events are shown graphically in Figure 1 as composite vulnerability zones. Composite vulnerability zones show the combined extents of the various hazards could be experienced, based on the various equipment locations and the endpoints chosen for this analysis. Not all areas within a given vulnerability zone can be affected by any one accident; the vulnerability zone represents the total area that could be affected by many possible release locations, considering all possible wind directions.

The second release magnitude that was considered was worst-case, or extremely rare, scenarios. These are represented by full pipe ruptures. Historical data would show that such events are not expected to occur, especially within a controlled access facility such as this, but are within the realm of possibility. Thus, the risk for such events is extremely low. The consequence modeling results for these scenarios are presented in Table 2 and depicted graphically in Figure 2.





**Figure 1**  
**Composite Vulnerability Zones for MCE (Rare) Scenarios**



**Table 2**  
**Consequence Analysis Results for Worst-Case (Extremely Rare) Scenarios**

Hazard	Modeling Endpoint	Potential Impact Distance [feet]		
		Inlet	Building	Outlet
Flash fire	LFL	Contained within site walls	Contained within the building	Contained within site walls
Jet fire – burns to persons	1,600 Btu/hr-ft <sup>2</sup>	220	Contained within the building	200
Jet fire – ignition of wood	8,000 Btu/hr-ft <sup>2</sup>	120	Contained within the building	105
Vapor cloud explosion	1 psi	†	50	†

† - Insufficient explosion strength to reach this overpressure level

## Accident Trends

Accidental release scenarios like the ones modeled in this analysis have happened in the natural gas distribution industry. The regulatory agency responsible for natural gas distribution systems is the U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA). Gas pipeline systems, as regulated under 49 CFR § 192, are required to report incidents to PHMSA. Since 2010, the criteria for an incident, as defined in 49 CFR § 191.3<sup>1</sup>, have been a release of gas from a pipeline with one or more of the following consequences:

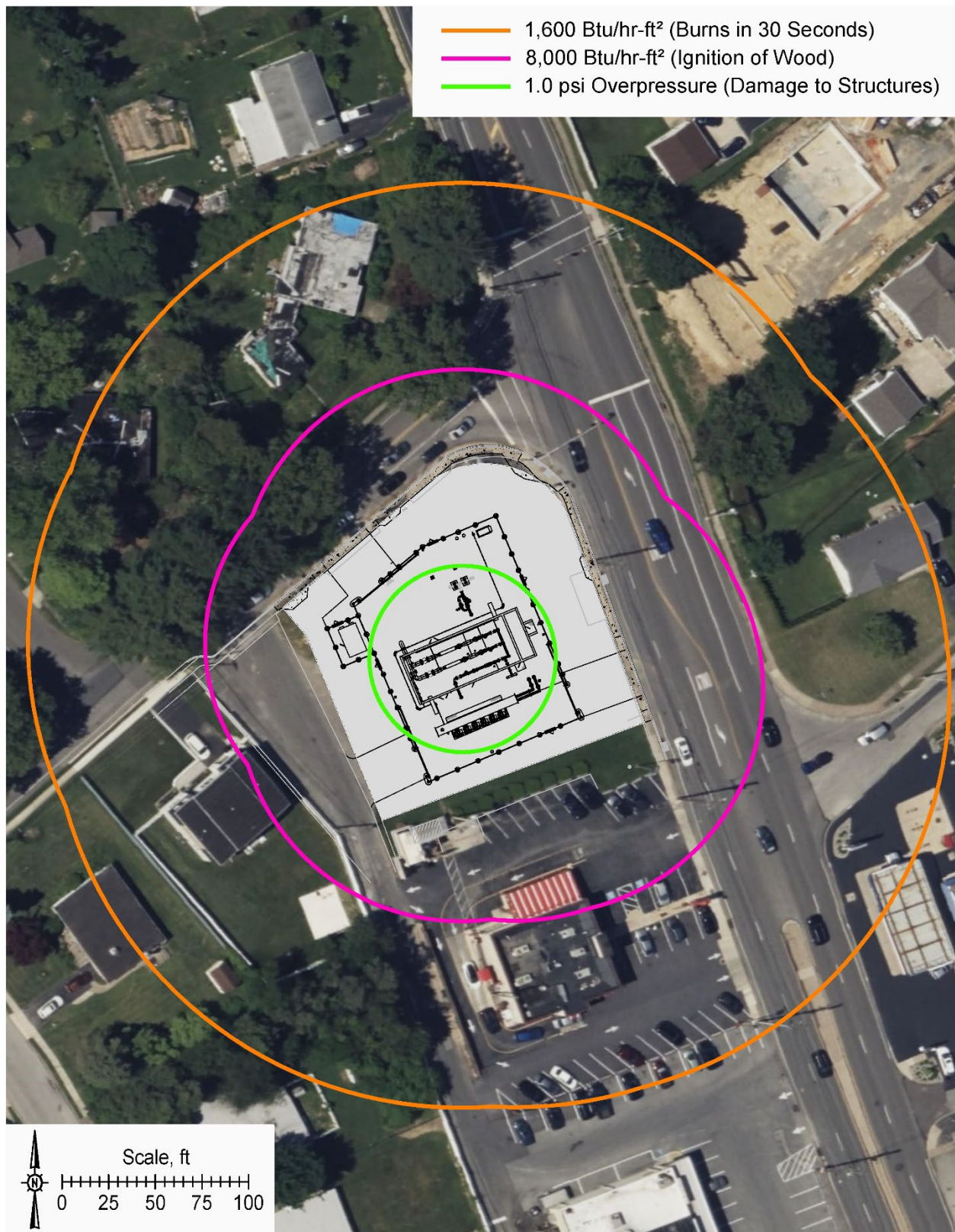
- A death or injury requiring hospitalization;
- Estimated property damage of \$50,000 or more, including loss to the operator and others, or both, but excluding the cost of gas lost;
- Unintentional estimated gas loss of three million cubic feet or more; or
- An event that is significant in the judgment of the operator.

In 2021, the property damage value was raised from \$50,000 to \$121,000 and is adjusted upwards for inflation annually, in subsequent years. Based on the above criteria, not all accidental release from gas distribution systems will be reported or recorded. However, most incidents that have the capacity for serious harm will be captured by these criteria, such that the incident database provides a reasonable description of the kinds of events that may be possible.

Data from PHMSA was downloaded and evaluated to provide the information presented below. The incident reporting forms have been largely consistent since 2010 until the present, so all data in that range can be evaluated with some assurance that it is consistent. For the purposes of this analysis, incident data from the last five full years (calendar years 2018-2022) was used<sup>2</sup>.

<sup>1</sup> <https://www.phmsa.dot.gov/incident-reporting>

<sup>2</sup> <https://www.phmsa.dot.gov/data-and-statistics/pipeline/distribution-transmission-gathering-lng-and-liquid-accident-and-incident-data>



**Figure 2**  
**Composite Vulnerability Zones for Worst-Case (Extremely Rare) Scenarios**

The following information was extracted from the past 5 years of reported PHMSA data.

- There was an average of 1,462 regulated gas distribution pipeline operating entities in the U.S. that reported to PHMSA.
- An average of 2,282,180 miles of distribution main and estimated service mileage were reported each year.
- These 2+ million miles of distribution piping served about 70.4 million customers each year.
- Within these systems, 506 incidents were reported in the years 2018-2022, resulting in an average of about 101 reportable incidents each year.
- There were 30 incidents that resulted in a total of 37 reported fatalities.
- There were 96 incidents that resulted in a total of 168 injuries requiring hospitalization.
- About half (263 of 506) the accidental releases of gas were reported to be ignited (resulting in a fire).
- Due to vague recording parameters, no details about explosions are available in the PHMSA database.
- In 156 of the 506 reported incidents, the accidental release originated from aboveground or transition area piping or equipment; thus, about 70% of the incidents originated in buried piping.
- Of the 156 incidents originating in aboveground equipment, 12 incidents resulted in 15 fatalities and 28 incidents resulted in 46 fatalities (4 incidents had both fatalities and injuries).
- Of the 156 aboveground incidents, 105 originated in meter/regulator equipment (the remainder were from piping or other equipment).
- Of the 156 aboveground incidents, only 6 were reported to be a “rupture,” 65 were reported as a “leak,” 6 as a “mechanical puncture,” and the remainder classified as “other.” With half of the incidents not classified by size, it is not possible to draw further conclusions about the magnitude of events.
- Of the 156 aboveground incidents, 109 had some type of cause listed. 76 of these were caused by some type of vehicular impact, and others by varied reasons such as lightning strike, external fire, damage from gunshot, connection failures, or customer damage.

To qualitatively summarize these findings, consider the following points:

- There were only about 100 incidents per year from over 2 million miles of gas distribution pipelines.
- Only about 30% of the incidents involved aboveground equipment, and 4% of those were reported as a rupture.
- About one-fourth of the incidents originating in aboveground equipment result in an injury or fatality.
- The most frequent cause of a release was vehicular impact.

**MARPLE TOWNSHIP, TED UHLMAN & JULIE BAKER  
REMAND STATEMENT NO. 1**

**BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**PETITION OF PECO ENERGY COMPANY FOR A FINDING OF NECESSITY**

**PURSUANT TO 53 P.S. § 10619**

**Docket No. P-2021-3024328**

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**REMAND DIRECT TESTIMONY**

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**WITNESS: JAMES A. SCHMID, M.A., PhD.**

**SUBJECT: PROVIDE EXPERT TESTIMONY REGARDING THE  
POTENTIAL ENVIRONMENTAL CONSEQUENCES  
ASSOCIATED WITH PECO'S PROPOSED GAS  
RELIABILITY STATION TO BE LOCATED AT 2090  
SPROUL ROAD, MARPLE TOWNSHP, PA.**

**DATED: September 22, 2023**

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1                   **REMAND DIRECT TESTIMONY OF JAMES A. SCHMID, M.A., PhD.**

2                   **I. INTRODUCTION**

3   **Q.     Please state your name and business address.**

4   A.     My name is James Schmid. My business address is 1201 Cedar Grove Road Media PA  
5   19063. My business and residence are located in Marple Township, Delaware County PA.

6                   **II. PURPOSE**

7   **Q.     Dr. Schmid, what is the purpose of your testimony in this proceeding?**

8   A.     I am providing expert testimony regarding the potential environmental consequences  
9   associated with a proposed Gas Reliability Station to be located at 2090 Sproul Road, Marple  
10   Township, PA. My testimony is based on my education and experience and my knowledge of the  
11   vicinity of the proposed project site.

12   **Q.     What is your educational background?**

13   A.     I received my B.A. degree cum laude, ΦBK, from Columbia College in 1966. I received  
14   my M.A. and Ph.D. degrees from the University of Chicago.

15   **Q.     Please describe your work experience relevant to your Direct Testimony.**

16   A.     I am a biogeographer and consulting ecologist employed full-time in the professional  
17   assessment of environmental impacts since 1973. From 1970 until 1973 I taught graduate and  
18   undergraduate courses in environmental science, plant ecology, and biogeography as a member  
19   of the Biological Sciences Department at Columbia University and Barnard College in New  
20   York City. After work as a consulting ecologist for several firms, I founded Schmid & Company  
21   in 1980 and serve as its president. My clients include industrial organizations seeking permits to  
22   construct many kinds of facilities; conservation-oriented groups that question proposed



1 developments; and federal, state, and municipal regulatory agencies seeking environmental  
2 reviews, regulatory assistance, and policy guidance.

3 **Q. What other certifications or experiences further qualify you to provide your expert**  
4 **testimony?**

5 A. I have written and supervised preparation of many dozens of environmental impact  
6 statements, as well as permit applications for numerous proposed development projects. I have  
7 acted as senior scientist on many contracts involving multidisciplinary teams preparing guidance  
8 for agencies such as the National Oceanic and Atmospheric Administration and the Council on  
9 Environmental Quality. My personal research specialties are wetlands, water resources, and urban  
10 vegetation. I hold certification as a Senior Ecologist from the Ecological Society of America and  
11 as a Professional Wetland Scientist from the Society of Wetland Scientists, and I have served on  
12 the professional accreditation committees of both those organizations. My publications include  
13 ten books on urban vegetation and on the plants of the mid-Atlantic states, as well as numerous  
14 book chapters and professional reviews. I routinely perform fieldwork, as well as write reports  
15 and offer expert testimony before federal and state courts, the Pennsylvania Environmental  
16 Hearing Board, and various other public boards and commissions. Over the years I have made  
17 numerous presentations at academic and professional conferences, and I have delivered guest  
18 lectures at several colleges and universities. My report titles, listed in my curriculum vitae, cover  
19 many pages of fine print.

20 I also have participated in public service. For some 30 years I served on the Marple Township  
21 Environmental Advisory Board, many terms as chair or vice-chair. Since 2017 I have served on  
22 the Citizens Advisory Council to the Pennsylvania Department of Environmental Protection  
23 pursuant to gubernatorial appointment. I currently am a voting member of the Environmental

1 Quality Board (elected by the Council), and also of the Mining and Reclamation Advisory  
2 Board. I thus am bound by oath to support the Constitution of the Commonwealth of  
3 Pennsylvania, including Article 1, §27.

4 **Q. Dr. Schmid, based upon your education, training, and experience, do you believe**  
5 **that you are capable for expressing an opinion to a reasonable degree of professional**  
6 **certainty as to the environmental impact as it relates to the proposed gas reliability station**  
7 **that is the subject to this proceeding?**

8 A. Yes, I do.

9 **Q. Dr. Schmid, are you sponsoring any exhibits?**

10 A. Yes. I am sponsoring Exhibit JS-1, which is professional resume of CV. I am also  
11 sponsoring Exhibit JS-2, which is my expert report. The report contains graphics and many  
12 citations to the relevant literature that I have consulted in preparing this testimony.

## 13 II. ENVIRONMENTAL IMPACT

14 **Q. Are there environmental concerns with the proposed Gas Reliability Station?**

15 A. Yes, there are.

16 **Q. Can you explain what those environmental concerns are?**

17 A. There will be impacts on human safety, on human health and that of other organisms, on  
18 air quality, on noise levels, and on aesthetics experienced by current and future generations.

19 **Q. What are the human safety and health impacts of the Gas Reliability Station?**

20 A. The very close proximity of the proposed heavy industrial facility to adjacent homes, to well-  
21 traveled sidewalks, and to Freddy's restaurant is concerning and would create an unnecessary and  
22 unwise risk to human safety, along with increased air pollution and noise from facility operations for  
23 numerous pedestrians and residents. The very small site can allow only minimal buffering.



Homes are present on the adjacent lots to the east, north, and west of the facility site, there is an adjacent restaurant on the south side, and sidewalks run along two of its sides (See, Exh. B, **Figure 1**). There is no space for functional or aesthetic landscaping between the industrial facility and pedestrians, vehicles, or half-dozen homes within 200 feet. It will not be possible either to reduce operational noise or to buffer damages in the event that a natural gas explosion were to occur. None of the surrounding structures was constructed with fire- and explosion-proof protection measures on walls that would face the new facility. There are many homes and an elementary school in Marple within the potential evacuation corridor along the 12-inch, high pressure gas pipeline that surrounds the pipeline. Despite the relatively low probability of a major explosion, the potential for lethal damage to resident and transient people unavoidably will be increased if the transfer facility is constructed in this densely populated area (See, Exh. B, **Figure 3**). The elderly and persons with impaired mobility will be most at risk of a gas explosion. Heavy industrial facilities belong in districts zoned for industrial use (such exist in Marple Township).

Installing the new servicing pipeline up to the reliability station site already has put numerous residents newly at risk of high-pressure natural gas pipeline explosion along 11.5 miles of roadway rights of way between Conshohocken and the proposed station site in Marple. This landscape is densely settled, and the pipeline is only 3 feet below the land surface. Additional distribution pipelines will be needed to reach new customers beyond the present pipeline terminus within additional lands, also densely settled, thereby further extending some explosion hazard. No structures in the vicinity of the pipeline have been built to withstand the blast or fire from an explosion.

**Q. Can you describe the impact on air pollution?**

A. The operation of the proposed gas heating and transfer facility will generate outdoor air pollution from two sources. One is the combustion of gas burnt onsite to heat products moved through the 12-

1 inch pipeline. Natural gas combustion is just as damaging to climate as the other fossil fuels---coal or  
2 oil. The other is the valves which control the flow of products through the pipelines, and which  
3 typically leak. These discharges will increase the amounts of methane, carbon dioxide, nitrogen dioxide,  
4 and other air pollutants released into Marple Township for residents to breathe. Some of the land  
5 adjacent to the proposed site has been designated by the Pennsylvania Department of Environmental  
6 Protection as an Environmental Justice (EJ) Area (See, Exh. B, **Figure 4**). The residents of EJ areas are  
7 particularly burdened by negative environmental factors such as polluted air (nitrogen dioxide, ozone,  
8 and fine particulate matter already exceed national air quality standards in Delaware County) and should  
9 not be burdened further with additional sources of air pollution and hazardous facilities. We Marple  
10 residents will get more volatiles and organic carbon to breathe, affecting my asthma and that of far too  
11 many neighbors.

12 **Q. Can you describe what effects from the facility will be on users of the natural gas?**

13 A. This facility is being built to serve new customers for natural gas that PECO hopes and  
14 expects to appear in Marple Township and Delaware County. As a result of indoor gas leaks,  
15 persons occasionally die of asphyxiation by carbon monoxide, and fires are caused by flammable  
16 methane. But the ordinary use of natural gas appliances indoors also causes health problems via  
17 release of air pollutants generated during the combustion of methane, such as nitrogen dioxide,  
18 super-fine particulate matter, carbon monoxide, and others. Some, but not all, gas appliances to  
19 be used indoors are required to be equipped with ventilation flues to reduce the harmful  
20 byproducts of gas combustion. In particular, gas ranges, space heaters, and fireplace logs are not  
21 required to be vented. After installation, ventilation requires maintenance to function effectively,  
22 and noisy ventilation fans may discourage actual use by consumers. Gas appliances often leak  
23 methane even when turned off. Thus indoor air quality where gas-fired appliances are used often

exceeds the concentrations of pollutants allowed by regulation outdoors. Americans slowly are coming to realize that there are many health hazards from using natural gas indoors.

**Q. What kind of health impacts result from using gas appliances in residences?**

A. The impacts of breathing gas combustion products are greatest on children, and may cause various short-term physical symptoms---most often contributing to asthma---as well as long-term damage to mental health. The proportion of childhood asthma in Pennsylvania that could be theoretically prevented if gas stove use was not present is estimated as 13.5%. Again, the most likely persons to be affected are residents of Environmental Justice areas who may rent and may not be able to afford upgrading appliances or ventilation equipment.

**Q. Can you describe what emissions from the facility will have an effect on the environment?**

A. Any discharges of carbon dioxide or methane at the facility or by users of its gas downstream will contribute directly to the atmospheric warming that has now risen to crisis levels globally. The proposed facility would facilitate the burning of methane gas at new residences and businesses to be built within the expanded service area to be served by the reliability station. There is no proposed offset of atmospheric warming by greenhouse gases to be discharged from the service area. Under business as usual including measures such as the proposed facility, annual average temperatures in PA by 2050 are projected to be about 6° F. above the baseline average for the 1971-2000 period (Pennsylvania DEP's May 2021 "Climate Impacts Assessment"). The same report tells us that Environmental Justice communities in PA will suffer twice as much increase in 90° F. or hotter days as will the state as a whole. We shall experience crisis summer heat waves, more rainfall delivered as frequent and intense thunderstorms separated by drought periods, and increased flooding in the Darby Creek basin. Downstream communities in our basin will receive runoff from the impervious construction, and Marple

(unlike Philadelphia), does not collect any fee for stormwater management. The state’s 2021 climate assessment labels the clearly predictable added heat mortality, Lyme disease increase, and rises in violent crime as critical impacts. It describes impacts as catastrophic on Pennsylvania forests, wildlife, and ecosystems. These include reduced dissolved oxygen in the waters of our freshwater streams as well as the Delaware River estuary as consequences of global warming to which this proposed PECO facility will contribute. When more gas is burnt, air temperatures rise, and more air conditioning is needed for human comfort. Environmental Justice communities are least likely to be able to afford air conditioning.

### III. ALTERNATIVES

**Q. Did PECO thoroughly evaluate alternatives for this station?**

A. No. Several alternative sites were discussed and rejected by PECO. One vacant site 0.9 mile south of the proposed site meets all stated engineering requirements (See, Exh. B, **Figure 5**). It is farther from residents and restaurants, and its use would pose significantly less environmental risk and impacts on Marple residents. The industrially zoned district in Marple were considered too far away from the ideal “null point” for use of the current high-pressure pipeline or transfer facility design and would require redesign or pipeline reconstruction. No consideration was given to the no-action alternative, although it is socially desirable to reduce gas usage rather than increase it, as by substituting electric appliances.

**Q. In your opinion, given potential impact of reduced air quality and emissions resulting from the proposed PECO facility, should this facility be located where proposed?**

A. No. This proposed PECO facility is NOT reasonably necessary for the convenience and welfare of the public, but in fact it would comprise a public nuisance. It could be sited elsewhere in Marple Township with fewer local adverse consequences. But there is no site which could

1 reduce the broader adverse consequences of a station enabling increased gas use on Delaware  
2 County and the earth as a whole. Instead, this project should not be built. PECO should be  
3 encouraging adoption of all practicable alternative measures for reducing future consumption of  
4 natural gas.

5 **Q. Is there anything you wish to add to your testimony?**

6 A. Denying approval for this PECO project will not solve the climate crisis, but it will avoid  
7 the genuine, adverse, cumulative effects of one more proposed environmental damage. Each bit  
8 helps and is vitally important. Pennsylvania appears to like rhetoric on paper in environmental  
9 laws and regulations that might promote sustainable life in our commonwealth, but loopholes  
10 and non-enforcement usually assure that those soothing recommendations are not actually  
11 applied in specific cases. State regulators and the judicial system should stand behind such local  
12 efforts to protect residents of Marple, of Pennsylvania, and of our beleaguered earth.

#### 14 **IV. CONCLUSION**

15 **Q. How do you conclude your Direct Testimony?**

16 A. This proposed PECO gas heating and transfer station is NOT reasonably necessary for the  
17 convenience and welfare of the public. Its negative, short- and long-term impacts on public  
18 welfare are both local and global. Its basic purpose is to facilitate additional future use of natural  
19 gas, which should be reduced instead to benefit public health and safety.

20 This reliability station is badly sited in a high consequence area that is contrary to township  
21 zoning and much too close to residences, businesses, and pedestrians. Its appearance would  
22 detract from the aesthetic values of the community. It would be a dangerous nuisance that  
23 threatens public safety close to an elementary school. As an industrial facility it would  
24 contribute to documented air quality issues that are particularly relevant to an adjacent  
25 Environmental Justice zone. The impact of its air pollution on public health, its on-going noise

1 and light, would contribute stress degrading to both mental and physical health of station  
2 neighbors.

3 Because these cumulative impacts create unnecessary adverse consequences both locally and  
4 worldwide, the PECO “reliability” station should not be built at all. It conflicts directly with  
5 Article 1, §27, of the Pennsylvania Constitution. As a trustee responsible for protecting the  
6 citizens of the Commonwealth and their environment from unnecessary and harmful activities, it  
7 is the duty of the Public Utility Commission to deny the requested Finding of Necessity.

8 **Q. Is this your professional opinion expressed to a reasonable degree of scientific**  
9 **certainty?**

10 A. Yes. However, I reserve the right to file such additional testimony as may be necessary or  
11 appropriate.

**MARPLE TOWNSHIP, TED UHLMAN & JULIE BAKER  
REMAND REBUTTAL STATEMENT NO. 1-R**

**BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**PETITION OF PECO ENERGY COMPANY FOR A FINDING OF NECESSITY**

**PURSUANT TO 53 P.S. § 10619**

**Docket No. P-2021-3024328**

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**REMAND REBUTTAL TESTIMONY**

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**WITNESS: JAMES A. SCHMID, M.A., PhD.**

**SUBJECT: PROVIDE EXPERT TESTIMONY REGARDING THE  
COMPONENTS OF A CONSTITUTIONALLY SUFFICIENT  
ENVIRONMENTAL ASSESSMENT OF THE PROPOSED  
GAS RELIABILITY STATION IN MARPLE TOWNSHIP,  
DELAWARE COUNTY, PENNSYLVANIA**

**DATED: October 30, 2023**

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1           **REMAND REBUTTAL TESTIMONY OF JAMES A. SCHMID, M.A., PhD.**

2                           **I. INTRODUCTION**

3   **Q.     Please state your name, business address and title.**

4   A.     My name is James A. Schmid. My business address is 1201 Cedar Grove Road Media PA  
5   19063. I am a biogeographer and consulting ecologist employed full-time in the professional  
6   assessment of environmental impacts since 1973.

7   **Q.     Have you previously submitted testimony in this proceeding?**

8   A.     Yes. I submitted direct testimony that is marked as Marple Township, Ted Uhlman and  
9   Julie Baker Remand Rebuttal Statement No. 1-R. My educational background and work  
10   experience are set forth in my direct testimony and exhibits thereto as well as my report rebuttal  
11   report.

12   **Q.     Dr. Schmid, what is the purpose of your rebuttal testimony in this proceeding?**

13   A.     The purpose of my testimony is to respond to PECO's "environmental" assessment and  
14   to express my concern and expert opinions regarding what information should be included in a  
15   Constitutionally sufficient environmental analysis of the consequences of a proposed gas  
16   reliability station for the site in Marple Township, Delaware County, as required by the  
17   Commonwealth Court.

18   **Q.     Are you sponsoring any exhibits?**

19   A.     Yes. I am sponsoring Exhibit JS-3, which is my expert rebuttal report, dated October 27,  
20   2023.

21                           **II.     RESPONSE TO PECO'S ENVIRONMENTAL ASSESSMENT**

22   **Q.     Did you review PECO's preserved remand testimony in this matter?**

23   Q.     Yes, I did.

1 **Q. Can you describe the environmental assessment performed by PECO?**

2 A. PECO has not performed an environmental assessment. I believe that PECO has failed to  
3 disclose and analyze how the proposed facility, if approved, will endanger the environment and  
4 residents of the Township, will reduce the quality of air and biological resources in the  
5 Township, will contribute to global warming and thereby endanger all current and future  
6 residents of Pennsylvania, will contribute to indoor air pollution reducing the health of Township  
7 and County residents, and will conflict directly with the trustee obligations of all Commonwealth  
8 entities that is imposed by Article 1, §27, of the Pennsylvania Constitution to protect the  
9 environmental resources of current and future generations of Pennsylvanians.

10 **Q. In your experience, did Tetra Tech perform an environmental assessment?**

11 A. No. PECO presented the testimony of Mr. Keith Kowalski of Tetra Tech, a PA-registered  
12 professional geologist. Mr. Kowalski assesses environmental impacts using a 70-question PECO  
13 Environmental Checklist to ascertain environmental requirements for permits that would be  
14 needed by proposed facilities. As Senior Manager of Environmental Management, he also obtains  
15 permits and manages remediation and mitigation activities. He mentions no experience preparing  
16 environmental assessments or impact statements dealing with public interest reviews during his  
17 work for other private sector firms prior to joining PECO. Nowhere does Mr. Kowalski suggest  
18 that he followed any guidelines or outline of contents for a thorough environmental assessment or  
19 impact statement such as prepared by any public agency. The information provided is insufficient  
20 to enable preparation of a Constitutionally sufficient analysis by the Pennsylvania Public Utility  
21 Commission.

22 **III. GUIDELINES FOR ENVIRONMENTAL IMPACT ASSESSMENTS**

23 **Q. Does Pennsylvania have specific rules for Environmental Impact Assessments?**

24 A. No, however, there are places to look for guidance, such as Federal law and other states.

25 **Q. Can you explain those guidelines?**

26 A. Yes. This is the *National Environmental Policy* of the United States of America, as set  
27 forth in the National Environmental Policy Act ("NEPA", PL 91-190), effective 1 January 1970:  
28

1 The Congress ... declares that it is the continuing policy of the Federal  
2 Government, in cooperation with State and local governments, and other  
3 concerned public and private organizations, to use all practicable means and  
4 measures, including financial and technical assistance, in a manner calculated to  
5 foster and promote the general welfare, to create and maintain conditions under  
6 which man and nature can exist in productive harmony, and fulfill the social,  
7 economic, and other requirements of present and future generations of Americans.  
8 [Excerpted from Title I, Section 101 (a) of the National Environmental Policy Act  
9 of 1969.]

10  
11 NEPA established the obligation of every American to protect and enhance environmental  
12 quality.

13 Congress succinctly outlined a basic environmental ethic for society as a whole and for individual  
14 citizens:

- 15 • Each generation is the trustee of the environment on behalf of succeeding generations  
16 [Section 101(b)]
- 17 • Each person needs to be able to enjoy a healthful environment, but each person also is  
18 expected to preserve and enhance the environment [Section 101 (c)].

19  
20 NEPA was further defined by Executive Order 11514, and the Council on Environmental Quality  
21 issued general guidelines for use by all Federal agencies when preparing detailed environmental  
22 statements that comprehensively disclose the consequences of pending approvals [40 CFR,  
23 Chapter V, Part 1500]. Agency environmental analyses of private sector projects are to be  
24 produced independently, based on information provided by project sponsors. Specific project  
25 impacts are to be discussed in proportion to their significance. Agencies may collect additional  
26 data or perform additional analyses beyond those offered by a project sponsor. Documentation  
27 of project planning and the formal recording of reasons for rejecting alternatives deemed not  
28 viable are basic to the environmental review process.

1 **Q. Does the compliance with a specific permit requirement take the place of an**  
2 **environmental assessment?**

3 A. No. Environmental Impact Statements (EISs) are prepared and circulated in draft form, then  
4 revised to incorporate comments received. Environmental Assessments (EAs) are less formal  
5 documents covering the contents specified by CEQ. But EISs and EAs are expected to fully disclose all  
6 aspects of pending approvals, not just compliance with specific permit requirements. Rather, they  
7 specifically solicit review by agencies other than the issuer of specific approvals and by the public of  
8 aspects that might otherwise be overlooked by permit reviewers. Both Environmental Impact  
9 Statements and Environmental Assessments can be prepared for agencies not only by agency staff but  
10 also by independent contractors. Third-party assessments paid for by applicants can be successful, if  
11 independently controlled by responsible agencies.

12 **Q. Is the Pennsylvania ERA similar to NEPA?**

13 A. Yes. In 1971, §27 was added to Article 1 of the Pennsylvania Constitution:

14  
15 The people have a right to clean air, pure water, and to the preservation of the  
16 natural, scenic, historic and esthetic values of the environment. Pennsylvania's  
17 public natural resources are the common property of all the people, including  
18 generations yet to come. As trustee of these resources, the Commonwealth shall  
19 conserve and maintain them for the benefit of all the people. [May 18, 1971,  
20 P.L.769, J.R.3]  
21

22 By intent, this Pennsylvania Environmental Rights Amendment (ERA) language is similar to that  
23 of NEPA, cited above. It was approved unanimously by two successive General Assemblies and  
24 received a 75% favorable vote from the electorate statewide. However, no statewide general  
25 guidance was issued for environmental reviews implementing Article 1, §27. But recent decisions  
26 of the Pennsylvania Supreme Court, and of Commonwealth Court in this very case, direct that  
27 environmental analysis should not be limited solely to permit compliance. Given standard  
28 practice in environmental assessment for the past 50 years, it is hardly necessary to reinvent the  
29 wheel when considering what should be appropriate environmental analysis, and the analysis is  
30 not limited to information provided by the project sponsor or permit applicant. Most agencies  
31 requiring environmental assessments across the nation follow the general format of the CEQ.  
32  
33

1   **Q.     What are the CEQ guidelines?**

2   A.     Over the years, individual Federal agencies have adjusted their environmental review  
3   guidelines to reflect the specific technical concerns within the overarching CEQ guidelines  
4   promulgated at 40 Code of Federal Regulations, Chapter V, Part 1500. The original CEQ  
5   guidelines themselves have been updated by supplements to reflect newer environmental concerns,  
6   such as global warming. But the seven basic substantive elements to be explained by any  
7   environmental analysis have remained the same:

- 8         ●Description of the Proposed Action
- 9         ●Description of the Environment to be Affected
- 10        ●Relation to Plans, Policies, and Controls for Land Use
- 11        ●Alternatives
- 12        ●Adverse Effects which Cannot be Avoided
- 13        ●Relationship between Local Short-term Uses of the Environment and the Maintenance  
14           and Enhancement of Long-term Productivity
- 15        ●Irreversible and Irretrievable Commitments of Resources

16  
17   CEQ in recent years has been issuing subject-specific supplemental guidance. In January 2023  
18   the CEQ issued new “National Environmental Policy Act Guidance on Consideration of  
19   Greenhouse Gas Emissions and Climate Change” [88 *Federal Register* 5:1196 ff.]. According  
20   to those guidelines, Americans are now in a “climate crisis, and there is little time left to avoid a  
21   dangerous—potentially catastrophic—climate trajectory. Climate change is a fundamental  
22   environmental issue, and its effects on the human environment fall squarely within NEPA’s  
23   purview. ... Climate change is a defining national and global environmental challenge of this  
24   time, threatening broad and potentially catastrophic impacts to the human environment. It is well  
25   established that rising global atmospheric GHG concentrations are substantially affecting the  
26   Earth’s climate, and that the dramatic observed increases in GHG concentrations since  
27   1750 are unequivocally caused by human activities including fossil fuel combustion.”

28   Thus the CEQ insists that reasonably foreseeable, direct and indirect greenhouse gas (GHG)  
29   emissions be quantified for proposed projects and their alternatives including no-action. “Given  
30   the urgency of the climate crisis and NEPA’s important role in providing critical information to

1 decision makers and the public, NEPA reviews should quantify proposed actions' GHG  
2 emissions, place GHG emissions in appropriate context and disclose relevant GHG emissions  
3 and relevant climate impacts, and identify alternatives and mitigation measures to avoid or  
4 reduce GHG emissions. CEQ encourages agencies to mitigate GHG emissions associated with  
5 their proposed actions to the greatest extent possible, consistent with national, science-based  
6 GHG reduction policies established to avoid the worst impacts of climate change.” This is  
7 supplemental guidance, which does not replace the need for considering other impacts.

8 **Q. Should environmental justice be considered in Environmental Assessments?**

9 A. Yes. The 2023 CEQ guidelines go on to observe that climate change “is a particularly  
10 complex challenge given its global nature and the inherent interrelationships among its sources  
11 and effects. Further, climate change raises environmental justice concerns because it will  
12 disproportionately and adversely affect human health and the environment in some communities,  
13 including communities of color, low-income communities, and Tribal Nations and Indigenous  
14 communities.” The 2023 CEQ supplemental greenhouse gas/climate guidelines contain full  
15 citations to Executive Orders addressing environmental justice, and direct that environmental  
16 justice issues be discussed early in project planning as well as recorded fully in environmental  
17 documentation.

18 **Q. Did PECO conduct any comprehensive environmental review?**

19 A. No. PECO has merely looked to see what permits it needs to secure prior to construction  
20 of its proposed Phase III reliability station. Furthermore, I believe that PECO has failed to  
21 provide the minimum information necessary for PUC to complete an independent review of any  
22 proposed regulatory action it may take. Following the sequence of information normally used in  
23 environmental impact statements, PECO’s information is deficient at the local, regional, and  
24 global levels of analysis.

25 **Q. To expand on that, can you comment on the information provided by PECO for the**  
26 **Proposed Action (the Phase III Gas Reliability Station)?**

27 A. PECO has not provided clear quantitative information on all the air pollutants that will be  
28 released from the reliability station, from associated methane leaks, and from the downstream  
29 releases into residential and outside air of combustion products from new users facilitated by the

1 proposed station. It has not identified the amount of gas by which future usage is expected to  
2 increase as a result of its new pipeline and proposed reliability station construction. It has not  
3 identified the noise levels that will be produced by station equipment operations or the noise  
4 levels that will result at the edge of the 2090 Sproul Road project site. It has not addressed the  
5 remaining 16.28 acres in Phase I of the project mentioned in permit applications, which appear to  
6 consist of pipeline construction within public roadways. It does not address the location or  
7 probability of hazards of combustion and explosion to the public posed by the station and  
8 pipeline in any of the project's three phases.

9 **Q. Did PECO prepare a thorough analysis of the local environment to be affected by**  
10 **the gas Reliability Station?**

11 A. No. PECO has provided no information on the population density or socioeconomic  
12 characteristics of the project site and its surroundings. It has not identified the distances to  
13 existing homes and businesses on adjacent properties. It has not mentioned the existence of an  
14 Environmental Justice Area identified by the Pennsylvania Department of Environmental  
15 Protection (PADEP) immediately across Sproul Road from the property. It has not mentioned the  
16 existing air quality at the site of its proposed new combustion source. It essentially has ignored  
17 the local surroundings of its proposed station and new pipeline.

18 This proposed heavy industrial facility is adjacent to homes and to Freddy's restaurant, where it will  
19 create an unnecessary and unwise risk to human safety, physical health, and mental health along with  
20 increased noise and air pollution from facility operations for numerous pedestrians and residents.  
21 Homes are present on the adjacent lots to the east, north, and west of the facility site, and sidewalks run  
22 along two of its sides (**Figure 1**). There are half a dozen homes and one restaurant within 200 feet. The  
23 food and convenience store services along this stretch of Sproul Road draw much pedestrian traffic from  
24 children and adults, as well as from patrons arriving by automobile. None of the surrounding structures  
25 was constructed with fire- and explosion-proof protection measures on walls that face the transfer  
26 facility or the high-pressure gas pipeline that is to feed it. Despite the relatively low probability of a  
27 major explosion, the potential for lethal damage to resident and transient people unavoidably will be  
28 increased if the facility is constructed in this densely populated area. Heavy industrial facilities belong  
29 in districts zoned for industrial use (such districts exist in Marple Township).

1 **Q. Did PECO consider the project’s relation to plans, policies, and controls for land use?**

2 A. PECO has indicated that the proposed reliability station does not conform with local zoning until  
3 a special exception is approved; however, it now seeks a current PUC approval to circumvent this  
4 zoning requirement. No further information on zoning approval was provided.

5  
6 Some of the land adjacent to the proposed reliability station site has been designated by the  
7 Pennsylvania Department of Environmental Protection as an Environmental Justice Area (**Figure 3**).  
8 The residents of such areas are most likely to be damaged by additional sources of air pollution and  
9 hazardous facilities. Marple residents will get more volatiles and organic carbons to breathe, affecting  
10 the asthma of far too many neighbors surrounding the proposed reliability station.

11 **Q. Did PECO consider alternatives?**

12 A. PECO did not consider the socially and environmentally appropriate, no-action  
13 alternative for the reliability station. Many measures are available to discourage natural gas use,  
14 which must be curtailed as rapidly as practicable, such as offering incentives for the preferable  
15 alternative appliances for healthier electric heating and cooking. Without new gas customers that  
16 PECO hopes to appear in the future in Delaware County, there is no need for the proposed  
17 station. PECO did not address “global” alternatives in the context of new greenhouse gases at  
18 all, nor did it propose any offsetting mitigation measures.

19 An alternative site, however, could reduce local impacts if a reliability station were constructed  
20 despite global impacts. PECO states that the completed engineering for the proposed reliability  
21 station allows its location to be practicably sited within 0.5 mile of the existing “null point” of  
22 the 16-inch pipeline, that is, 0.5 mile from the intersection of Lawrence Road with Sproul Road.  
23 The proposed station site is 0.46 mile north, at Cedar Grove Road on the west side of Sproul  
24 Road at 2090 Sproul Road. An alternative site initially was considered by PECO. It would  
25 appear to provide a significant reduction in exposure to station operations and danger from  
26 explosive potential to residents of Marple Township. This location is 0.47 mile south of the null  
27 point along the east side of Sproul Road south of Reed Road at 1900 Sproul Road (**Figure 4**).  
28 This location is on vacant land across a wide segment of Sproul Road from one existing home  
29 and from a cemetery. It is across Reed Road at a significantly greater distance from the Wendy’s  
30 restaurant than the proposed station is from Freddy’s restaurant. PECO offered no engineering



1 reasons why this would not be an acceptable location for its reliability station. A location here  
2 would be dramatically farther from existing homes and other facilities than the proposed site,  
3 enabling reduced impacts on residents of Marple Township and screening from adjacent uses.  
4 But it would entail another mile of 12-inch pipeline construction in Sproul Road. PECO did not  
5 justify its rejection of this local site alternative. Design modifications, of course, could allow a  
6 larger choice of siting alternatives, such as the existing industrial district in Marple Township.

7 **Q. Did PECO present any information or summary of adverse effects that cannot be**  
8 **avoided?**

9 A. PECO prepared no summary of adverse impacts which cannot be avoided. Like most  
10 applicants, it opted to highlight positive benefits rather than adverse impacts of its proposed project.  
11 The operation of the proposed reliability station facility itself will generate outdoor air pollution from  
12 two sources at a location where ambient outdoor standards at present are not being met. One is the  
13 onsite combustion of the natural gas (primarily methane) in order to heat liquified natural gas moved  
14 through the 12-inch pipeline. Natural gas combustion is just as damaging to climate as byproducts of  
15 the other fossil fuels---coal and oil. The other source is the valves which control the flow of products  
16 through the pipelines, and which typically leak methane. These discharges will increase the amounts of  
17 carbon dioxide, methane, nitrogen dioxide, and other air pollutants discharged into Marple Township  
18 and Delaware County for residents to breathe. Outdoor air in Delaware County currently is classified as  
19 not attaining national air quality standards (NAAQS) for nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), and fine  
20 particulate matter (PM 2.5). There is no proposed offset of these discharges or of the global warming by  
21 greenhouse gases to be discharged from the service area.

22 Approval of the proposed gas reliability station will promote adverse impacts on the health of Marple  
23 Township and Delaware County residents and employees by facilitating the proliferation of gas  
24 appliances used indoors in buildings increasingly insulated against air leaks. As a result of indoor gas  
25 leaks, people occasionally die of asphyxiation by carbon monoxide, and fires are caused by flammable  
26 methane. Gas appliances often leak methane even when turned off, with damage to human health.

1 **Q. Did PECO submit any analysis or information on short-term versus long term uses**  
2 **on the environment?**

3 A. No, PECO did not. However, the impacts of greenhouse gases are very long-term,  
4 according to the 2023 CEQ guidelines and the scientific literature they cite. PECO also did not  
5 discuss the likelihood of stranding shareholder assets by constructing additional gas distribution  
6 facilities as public policies shift away from gas use because of catastrophic global warming.

7  
8 Under business as usual, annual average temperatures in Pennsylvania by 2050 are projected to be about  
9 6° F. above the baseline average for the 1971-2000 period (Pennsylvania Department of Environmental  
10 Protection. 2021. Climate impacts assessment. ICF. Fairfax VA. 143 p.). This State climate report  
11 labels the clearly predictable added heat mortality, Lyme disease increase, and rises in violent crime as  
12 critical impacts that will result from global warming in the Commonwealth under business as usual. The  
13 report describes the resulting impacts as catastrophic on Pennsylvania forests, wildlife, and ecosystems.  
14 These adverse impacts include reduced dissolved oxygen in the waters of our freshwater streams as well  
15 as in the Delaware River estuary as consequences of global warming to which this proposed PECO  
16 facility will contribute. During 2023 our region experienced unhealthy concentrations of smoke from  
17 distant wildfires induced by global warming, exacerbating the consequences of local emissions.

18 **Q. Finally, did PECO seek to summarize irreversible and irretrievable commitments of**  
19 **resources?**

20 A. No, it did not. This proposed PECO gas heating and transfer station, and pipeline are not  
21 reasonably necessary for the convenience and welfare of the public. Their negative, short- and long-  
22 term impacts on public welfare are both local and global. Their basic purpose is to facilitate additional  
23 future use of natural gas, which should be reduced instead to benefit public health and safety as well as  
24 the potential new customers who stand to be poisoned by indoor gas leakage and combustion. The  
25 proposed reliability station is badly sited in a high consequence area, contrary to township zoning, and  
26 much too close to existing residences, businesses, and pedestrians. Its appearance would detract from  
27 the aesthetic values of the community. It would be a dangerous nuisance that threatens public safety  
28 close to an elementary school. As an industrial facility it would exacerbate documented air quality  
29 issues that are particularly relevant to residents of an adjacent Environmental Justice zone. The impact  
30 of its air pollution on public health and its on-going noise would contribute stress degrading to both

1 mental and physical health of station neighbors. At least one other local site offers the potential for  
2 reduced impacts on the surrounding community.

3 Instead of expanding gas use, PECO instead should be removing gas infrastructure and increasing electric  
4 energy supplies, primarily from renewable sources, to replace existing gas uses. Fossil fuel use is not  
5 sustainable, if the earth is to remain habitable.

#### 6 **IV. CONCLUSION**

7 **Q. Does this conclude your Rebuttal Testimony?**

8 A. Yes. However, I reserve the right to file such additional testimony as may be necessary or  
9 appropriate.

# **JAMES A. SCHMID**

## **EDUCATION**

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Ph.D., Geography, University of Chicago, 1972

M.A., Geography, University of Chicago, 1969

A.B., Geography, Columbia College, Columbia University, 1966

## **CERTIFICATIONS**

Ecological Society of America: Senior Ecologist (1983; recertified 1988, 1993, 1999, 2008, 2014)

Society of Wetland Scientists: Professional Wetland Scientist #284 (1995; recertified 2007, 2012)

US Army Corps of Engineers, Baltimore District: Wetland Delineator Program  
(Provisional Certification #93MD0310008A)

US Fish & Wildlife Service: Habitat Evaluation Procedures (HEP 1981)

## **CONTACT INFORMATION**

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## **SUMMARY OF EXPERIENCE**

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**1985- President, Schmid & Company, Inc.,** Consulting Ecologists. Dr. Schmid's current responsibilities include fieldwork, administration of contracts, writing and editing reports, regulatory analysis, client representation before agencies, expert testimony in court and at hearings, and overall management of the firm.

**1981-1985 Principal, Schmid & Company,** Consulting Ecologists. Dr. Schmid was responsible for fieldwork, project management, consultation with clients and regulatory agency personnel, the preparation and delivery of testimony in court and at public meetings, and the technical and editorial supervision of multidisciplinary reports.

**1981-1982 Principal Environmental Scientist, TERA Corporation.** Dr. Schmid provided technical supervision for a major environmental impact statement on alternative railroads in Niagara County, New York, and managed analyses of wetland fill and mitigation proposed in the New York and Philadelphia metropolitan areas and in the New Jersey Pine Barrens. He also worked on lignite mining projects in the Red River basin of western Louisiana.

**1979-1981 Principal Scientist, WAPORA, Inc.** Dr. Schmid supervised a statewide impact assessment of coal mining in Appalachia for the Environmental Protection Agency and provided technical direction for seven areawide environmental assessments of future coal mining in West Virginia. He managed impact statements for oil and coal terminals and prepared an extensive report on coastal zone management for the New Jersey Department

of Environmental Protection. He also served as senior technical advisor on projects in the Mississippi River basin, the eastern Kentucky coal fields, and the Texas Gulf Coast.

**1973-1979 Chairman of the New York office (1973-1974) and Vice President, Jack McCormick & Associates, Inc., Pennsylvania office (1974-1979).** Dr. Schmid managed environmental assessments and reports on proposed residential, industrial, and commercial developments at Brigantine, Secaucus, East Rutherford, North Bergen, Hoboken, and Camden, New Jersey; Philadelphia, Pennsylvania; and Beachville, Maryland. He directed inventories and analyses of the Fire Island National Seashore for the National Park Service and of the New York Bight for the National Oceanic and Atmospheric Administration. He designed and implemented a major analysis of environmental regulations and their effects on private industry for the US Department of Commerce and the President's Council on Environmental Quality.

**1970-1973 Assistant Professor and Instructor in the Department of Biological Sciences, Barnard College and Columbia University.** Dr. Schmid taught graduate and undergraduate courses in ecology, biogeography, environmental science, and cultural geography. His prime research interests were in the environmental effects of urbanization, the role of vegetation in cities, and the conceptualization and quality control of environmental assessments.

**1968-1970 He served as technical editor for research papers in the Department of Geography at the University of Chicago.**

Dr. Schmid has been a **guest lecturer on environmental analysis and wetlands at the University of Pennsylvania, Columbia University, Cabrini College, Clark University, West Chester State University, Rutgers University,** and the **Delaware County Community College.** He has often addressed wetland issues at the Polley Associates School of Real Estate. He has served on the Standing Committee on Environmental Education for the Association of American Geographers and has contributed reviews to the *Geographical Review* and to *Ecology*. He has served on the Board of Professional Certification of the Ecological Society of America and on the Certification Standards Committee of the Society of Wetland Scientists Professional Certification Program, Inc. For many years he served on the Environmental Advisory Board of Marple Township, Delaware County, Pennsylvania. He has peer reviewed journal articles for *Wetlands* and grant proposals submitted to the National Science Foundation, the US Department of State, and the National Geographic Society. Dr. Schmid has served as the elected president of the Chester County Beekeepers Association.

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## HONORS AND AWARDS

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Columbia College Scholarship  
Columbia College Phi Beta Kappa  
A.B. cum *laude*, Columbia College, Columbia University  
NDEA Title VI fellowship awards (U. Chicago, U. Wisconsin at Madison, U. Washington at Seattle, Johns Hopkins U.)  
Gubernatorial appointment to Pennsylvania Department of Environmental Protection's Citizens Advisory Council (2017-)

## **PROFESSIONAL AFFILIATIONS**

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Association of American Geographers  
Ecological Society of America  
New Jersey Academy of Science  
New York State Wetlands Forum, Inc.  
Society of Wetland Scientists

## **PROJECT EXPERIENCE**

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Dr. Schmid's career in environmental analysis began in the late 1960s. He has worked for all types of clients, including federal agencies, state agencies, municipalities, private developers, utilities, conservation groups, attorneys, architects, and engineering firms on many kinds of assignments.

While on the faculty of Biological Sciences at Columbia University, Dr. Schmid introduced students to the ecology of the New York-New Jersey metropolitan area and the New Jersey Pine Barrens. His scholarly research focuses on urban vegetation and historic changes in vegetation affected by human activity. His first environmental impact assessment and recommendations for minimizing impacts were prepared for a developer while he was still a graduate student and dealt with a proposed residential subdivision in the Thorn Creek Woods of suburban Will County, Illinois.

During his graduate studies in plant ecology at the University of Chicago, Dr. Schmid became familiar with the bogs and floodplain vegetation of northern Illinois, northern Indiana, and southern Michigan. While a visiting graduate student at the University of California at Los Angeles, he worked on the flora of the Mojave Desert and Santa Monica Mountains of southern California with Mildred Mathias, and he accompanied Jonathan Sauer on a flora collecting expedition to San Clemente Island. He helped Monte Lloyd collect periodic cicadas in Illinois, Ohio, and West Virginia. His master's thesis dealt with historic vegetation change in the subhumid to semi-arid limestone Edwards Plateau of southcentral Texas.

During his six years as Project Manager and Vice President at Jack McCormick & Associates, Dr. Schmid was closely associated with the late Dr. McCormick (a nationally recognized authority on wetlands and environmental assessment), both in field analyses and in project planning aimed at preserving, enhancing, restoring, or creating wetland ecosystems.

Dr. Schmid has participated in more than 100 environmental impact statements prepared using Federal, State, or local guidelines. He wrote a major analysis of the effects of the National Environmental Policy Act and Federal EISs on private industry for the US Department of Commerce, and conducted a follow-on seminar sponsored by the Council on Environmental Quality and the American Management Association. He prepared a shortened version of the report for distribution by the Commerce Department and the Business Roundtable. As senior scientist he worked on diverse projects in Maine, West Virginia, Kentucky, Illinois, Iowa, Texas,

Louisiana, Washington State, and Pacific coastal Nicaragua, not to mention the mid-Atlantic States. He participated in several wastewater treatment system EISs in suburban Philadelphia, suburban Baltimore, and at Oakwood Beach, Staten Island.

In the Hackensack Meadowlands of New Jersey, Dr. Schmid was responsible for the analyses and negotiations that led to issuance of major Federal and State permits (Clean Water Act Section 404) to fill wetlands and the Hackensack River at the Harmon Cove residential development (96 acres) and for compliance monitoring at the New Jersey Sports Complex (federal permit, 35 acres; State permit, 250 acres of tidal and non-tidal wetlands). He also was involved with assessments of a proposed new freeway (US 1 & 9), the initial Hartz Mountain Harmon Meadows Tract shopping and residential development proposal, the redevelopment of a city park (Lincoln Park West) in Jersey City, and a plan for wetlands enhancement in connection with a proposed sand and gravel operation in North Bergen. He was responsible for environmental studies, mitigation plans, and technical negotiations that led to issuance of a major Corps permit to fill 127 acres of marsh with compensation by enhancing 151 acres. He recently analyzed historic land use activities at a cemetery at the edge of the Meadowlands to ascertain the extent of wetland violations and aid the landowner in attaining compliance with NJDEP requirements.

Dr. Schmid directed a comprehensive inventory of Fire Island National Seashore in Suffolk County, New York, for the National Park Service. In New Jersey, he assisted Dr. McCormick in designing satisfactory restoration leading to permits for filling 11 acres for development in the southernmost section of Brigantine Island facing Atlantic City. In New Jersey he has worked on several analyses of beach protection and the effects of altering sand dunes, a major concern also at Fire Island National Seashore. He has participated in numerous wetland permit applications and resolution of enforcement cases in Staten Island and Brooklyn.

Dr. Schmid wrote a Federal EIS on a proposed fuel oil transfer and storage terminal in the Hudson River under contract to the New York District of the Army Corps of Engineers. Dr. Schmid also was responsible for coastal wetland projects along the Shark River, at Ocean City, and along Barnegat Bay. He supervised an analysis of the freshwater tidal marsh at Fish House Cove on the Delaware River for the Camden County Environmental Agency and a comprehensive review of proposed development in salt marshes along a barrier beach in Sussex County, Delaware, for the Delaware Department of Natural Resources and Environmental Control. Dr. Schmid supervised evaluations of several marshes along Delaware Bay in New Jersey and Delaware for National Natural Landmark status on behalf of the National Park Service.

His extensive analysis of coastal zone management in New Jersey, with a detailed account of the administration of the (Tidal) Wetlands Act and other wetland regulations, formed a major part of a four-volume Estuarine Study submitted to the New Jersey Department of Environmental Protection in 1979. Dr. Schmid managed a residential development analysis near the mouth of the Potomac River at

Beachville, Maryland, and he wrote the foreword to Dr. McCormick's monumental report on the coastal wetlands of Maryland at the request of the Maryland Department of Natural Resources.

Dr. Schmid has represented developers in regulatory negotiations concerning wetlands at Bethany Beach, Delaware; near the mouth of the Raritan River for a major new town associated with New Jersey's largest industrial park; in Gloucester City, New Jersey, where a freshwater tidal marsh was restored; at the DuPont Chambers Works, a major chemical plant adjacent to the Delaware River in Salem County, New Jersey; and in Bucks County, Pennsylvania, where a waterfront slag plant was proposed. He successfully designed mitigation for a major marine container terminal expansion, which entailed the filling of 16 acres in the Delaware River and 8 acres of freshwater tidal marsh and oversaw the restoration of a tidal marsh on the Neshaminy Creek. He has achieved full success in all of his wetland restoration and creation projects.

For the National Oceanic and Atmospheric Administration Dr. Schmid assembled a multidisciplinary panel to establish priority chemical contaminants of the New York Bight. This report formed the basis for funding by NOAA of research on chemicals in the 15,000 square miles of ocean waters off New York and New Jersey.

Dr. Schmid has worked on behalf of developers, environmental groups, and regulatory agencies in the Pinelands of southern New Jersey. Dr. Schmid's analyses enabled the New Jersey Pinelands Commission to approve development on a site with 355 acres of wetlands in Burlington County for more than 2,500 housing units under a hardship application. He assembled a review of vegetation and critical areas mapping in the Pinelands on behalf of a developer near Mays Landing. He wrote a critique of the Pinelands Commission's inventory mapping for the Sierra Club, and he defended a developer and the Pinelands Commission in a challenge to a regulatory decision approving a residential project. He represented the New Jersey Conservation Foundation, Environmental Defense Fund, and other conservation groups challenging a Pinelands Commission hardship waiver on a major residential development. He also supervised a critique of the proposed USEPA designation of a sole-source aquifer in southern New Jersey on behalf of the South Jersey Homebuilders Association. He analyzed the significance of potential impacts on wetlands and other resources by railroad construction in upstate New York under a third-party agreement to produce the major Federal EIS which preceded project approval.

Dr. Schmid assisted in an evaluation of development adjacent to the Tannersville Bog in Monroe County, Pennsylvania, on behalf of The Nature Conservancy. He demonstrated that a proposed nearby housing development posed no threat to the National Landmark bog. He has worked on other wetlands at several locations in the Poconos where delineations and permit approvals were necessary. He oversaw a National Natural Landmarks evaluation of the Great Piece Meadows in northern New Jersey for the National Park Service and an assessment of impacts from regional



sewer construction on the Great Swamp of the upper Passaic River for the US Environmental Protection Agency.

He supervised analyses of proposed development around Lake Valhalla in Morris County, and his testimony helped Montville Township zoning withstand challenge and appeal through the New Jersey court system. He managed the successful technical defense of a highway contractor, accused of polluting Lake Saginaw in Sussex County, New Jersey, with sediment, on behalf of Liberty Mutual Insurance Company. In Morris County he oversaw wetland boundary mapping on a 200+ acre tract and successfully defended the mapping through agency review and intervenor challenge. His project work has taken him to most of the major wetlands in the Passaic River Basin of northern New Jersey: Great Piece Meadows, Troy Meadows, Bog and Vly Meadows, Black Meadow, and Hatfield Swamp.

In Pennsylvania Dr. Schmid has supervised permitting for numerous residential, industrial, and commercial developments including landfills and shopping malls. He analyzed impacts and prepared reports and expert testimony on the impacts of coal mines, surface mines, fiber-optic cables, water wells, and residential subdivisions for various clients including the Izaak Walton League of New Jersey, the Raymond Proffitt Foundation, the Delaware Riverkeeper, the Center for Coalfield Justice, the Mountain Watershed Association, and the Green Valleys Association. He prepared the wetland-related sections of the Crum Creek Rivers Conservation Plan for the Department of Conservation and Natural Resources. He has examined a number of sites for rare species such as bog turtle and beach plum.

Dr. Schmid's principal expertise and professional interest lie in the analysis of urban vegetation and in the design and establishment of functioning ecosystems in the form of new wetlands, reclaimed landfills, mined areas, and other vegetated spaces in the increasingly human-dominated environment. Under his supervision, Schmid & Company has participated in many hundreds of wetland projects throughout New Jersey, Pennsylvania, and New York State, as well as projects in other States.

When the US Fish & Wildlife Service Pleasantville Office evaluated actual compliance with approval conditions by all the Clean Water Act Section 404 fill permits issued by the Corps of Engineers in the State of New Jersey during the period 1985-1992, every Schmid & Company mitigation project was judged in the field to exhibit full compliance with all requirements and mitigation goals. Schmid & Company mitigation projects represented 21% of all the mitigation projects judged fully successful in New Jersey by USFWS in its written report to USEPA.

## **PUBLICATIONS**

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### **ACADEMIC RESEARCH**

Doctoral Dissertation: Urban vegetation, a review and Chicago case study. University of Chicago, Department of Geography (published in full; see below).

Masters Thesis: The wild landscape of the Edwards Plateau of southcentral Texas: a study of developing livelihood patterns and ecological change. University of Chicago, Department of Geography. 1969. 144 p.

### **BOOKS**

- Schmid, James A. 2003. Checklist and synonymy of Maryland higher plants, with special reference to their rarity, protected, and wetland indicator status. First edition. Schmid & Company, Inc. Media PA. 406 p.
- Schmid, James A. 2003. Checklist and synonymy of Delaware higher plants, with special reference to their rarity and wetland indicator status. First edition. Schmid & Company, Inc. Media PA. 302 p.
- Schmid, James A. 2003. Checklist and synonymy of New York higher plants, with special reference to their protective, rarity, and wetland indicator status. First edition. Schmid & Company, Inc. Media PA. 460 p.
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- Schmid, James A. 2001. Checklist and synonymy of Pennsylvania higher plants, with special reference to their rarity and wetland indicator status. Second edition. Schmid & Company, Inc. Media PA. 365 p.
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- Schmid, James A. 2005-2006. Introduced, non-native, and invasive plants in mid Atlantic woods and wetlands: is there a problem in the human habitat? *The Forum* 11(2) and 12(1). New York State Wetlands Forum, Inc.
- Schmid, James A. 2003. Evaluating created wetlands in New Jersey: how credible is NJDEP? (Abstract). *New Jersey Academy of Science Bulletin* 48 (1): 28.
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- Schmid, James A. 2015. Powerlines, pipelines, wetlands, and streams: data are critical for decisionmaking. Schuylkill Watershed Congress. Pottstown PA.
- Schmid, James A. 2015. How not to design and regulate onlot residential sewage systems---someone might be paying attention. American Water Resources Association, Philadelphia Metropolitan Area Section. Philadelphia PA.
- Schmid, James A. 2014. Water quality protection: a “wicked” problem in Pennsylvania. Cabrini College. Radnor PA.
- Schmid, James A. 2014. To keep New York green, learn from Pennsylvania’s mistakes. New York State Wetlands Forum, Inc. Annual Meeting, Rochester NY.
- Schmid, James A. 2014. Shale gas, pipelines, and rural water supplies. Pennsylvania Rural Watershed Association Annual Meeting. Harrisburg PA.
- Schmid, James A. 2014. How precarious is environmental protection in Pennsylvania? Precarious Alliance Energy in Transition Symposium. Doylestown PA.
- Schmid, James A. 2013. How not to protect streams and wetlands, Pennsylvania-style. Ecological Society of America Mid-Atlantic Chapter Annual Meeting. Dover DE.
- Schmid, James A. 2013. Natural gas extraction and its impacts in the landscape. Fourth Annual Choose Clean Water Conference. Baltimore MD.
- Schmid, James A. 2012. Wetland science versus wetland regulation: observations of a practicing ecologist. Society of Wetland Scientists Mid-Atlantic Chapter Annual Conference. New Brunswick NJ.
- Schmid, James A. 2012. Let mother nature clean up our mess: an attempted misuse of science to avoid protecting streams and wetlands. Society of Wetland Scientists Mid-Atlantic Chapter Annual Conference. New Brunswick NJ.
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- Schmid, James A. 2009. Regulatory gaps in Pennsylvania headwaters stream protection. Association of American Geographers Annual Meeting. Las Vegas NV.
- Schmid, James A. 2009. Searching for bog turtles in southeastern Pennsylvania. Greater Philadelphia Herpetological Society and Marple Township Environmental Advisory Board. Broomall PA.
- Schmid, James A. 2009. Protecting significant headwaters in Pennsylvania: Lessons from real projects in five counties, southeast and southwest. Schuylkill Watershed Congress. Pottstown PA.

- Schmid, James A. 2009. Clean coal? Impacts of longwall mining in Pennsylvania. PennEnvironment and Sierra Club of Southeastern Pennsylvania. Free Library of Philadelphia. Philadelphia PA.
- Schmid, James A. 2008. Ecological and soil regions along the Atlantic coastal plain---rules for Clean Water Act wetland delineation. Association of American Geographers Annual Meeting. Boston MA.
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- Schmid, James A. 2006. A consulting ecologist's observations on environmental regulation in the real world---focus on the National Environmental Policy Act and wetlands protection. Columbia University, Department of Ecology, Evolution, and Environmental Biology. New York NY.
- Schmid, James A. 2003. Multiple wetland boundaries on a single tract of land: when different levels of government undermine credible regulation. New York State Wetland Forum, Inc., Annual Meeting. Saratoga Springs NY.
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- JMA. 1977. Supplemental socioeconomic environmental impact assessment on the construction and operation of an Island Residential development on Specially Planned Area I, Town of Secaucus, Hudson County, New Jersey. Submitted to the State of New Jersey, Hackensack Meadowlands Development Commission, Lyndhurst NJ, by Hartz Mountain Industries, Inc. Berwyn PA. 201 p.
- JMA. 1977. Effects of the National Environment Policy Act on corporate decisionmaking: A draft report for review. Prepared for the United States Department of Commerce, Washington DC. Berwyn PA. 268 p.
- JMA. 1978. Draft environmental impact statement for the proposed Ravenscliff Subdivision, Radnor and Newtown Townships, Delaware County, Pennsylvania. Prepared on behalf of Ravenscliff Land Co., Devon PA, for submission to Radnor Township. Berwyn PA. 85 p.
- JMA. 1979. New source NPDES permits and environmental impacts of the coal mining industry in the Monongahela and Gauley River Basins, West Virginia. Prepared for US Environmental Protection Agency Region III, Philadelphia, PA. Berwyn PA.
- WAPORA. 1979. The estuarine study, Volume I, Part 3, management report and recommendations. Prepared for the New Jersey Department of Environmental Protection, Trenton NJ. Chevy Chase MD. 220 p.
- WAPORA. 1979. Potential environmental impacts of energy facilities and other development on Fish House Cove, Delaware River. Prepared for Camden County Environmental Agency, Camden NJ. 78 p. plus folio map.
- WAPORA. 1979. Analysis of sole source designation pursuant to Section 1424(e) of the Safe Drinking Water Act and the proposed coastal New Jersey designation. Prepared for Homebuilders League of South Jersey, Cherry Hill NJ. Berwyn PA. 39 p.
- WAPORA. 1979-1980. New Jersey Sports Complex monitoring reports 59 through 66. Prepared for submission to regulatory agencies by the New Jersey Sports and Exposition Authority. Berwyn PA. (combined) 353 p.
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- Munro, John W., and James A. Schmid. 1980. A technical review of vegetation, land use, and critical areas mapping in the Pinelands of New Jersey, with recommendations for enhanced resource protection and public benefit. Prepared on behalf of the New Jersey Sierra Club for submission to the New Jersey Pinelands Commission. Media PA. 45 p.
- Schmid & Co. 1981. Summary review of environmental aspects of the proposed expansion of the general marine cargo terminal, Gloucester, New Jersey. Prepared for Holt Hauling & Warehousing Systems, Inc., Gloucester NJ. Media PA. 35 p.
- TERA. 1981. Report on environmental conditions at Leisure Towne, Southampton Township, Burlington County, New Jersey. Prepared for Leisure Technology Inc., Lakewood NJ. King of Prussia PA. 16 p.
- TERA. 1981. Environmental mitigation plan to offset the proposed loss of tidal wetlands on lands in North Bergen and Secaucus, Hackensack Meadowland District, New Jersey. Prepared for Hartz Mountain Industries, Inc., Secaucus, New Jersey. King of Prussia PA. 12 p.
- TERA. 1981. Specifications for site work and revegetation, terminal expansion, and park site mitigation, Camden County, New Jersey. Prepared for Holt Hauling & Warehousing System, Inc., Gloucester NJ. King of Prussia PA. 16 p.
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- Schmid & Co. 1983. Statement of Dr. James A. Schmid regarding site conditions and potential impacts of development on the Oxly tract, Stafford Township, Ocean County, New Jersey. Prepared in defense of a hardship waiver granted by the New Jersey Pinelands Commission. Media PA. 16 p.
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- Schmid & Co. 1984. Probable extent of lands not subject to Department of the Army jurisdiction under section 404 of the Clean Water Act on a site in the Borough of Florham Park, Morris County, New Jersey. Prepared on behalf of the Linpro Company for submission to Army Engineer District, New York City. Media PA. 36 p.
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- Schmid & Co. 1984. Preliminary feasibility analysis of hybrid poplar silviculture using municipal sludge on dredged spoil disposal areas, Logan Township, Gloucester County, New Jersey. Prepared for S. T. Hudson Engineers, Inc. Media PA. 10 p.
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- JMA. 1973. Environmental impact statement on the construction and operation of Ocean Harbor, a residential and commercial development in the City of Brigantine, Atlantic County, New Jersey. Prepared for Brigantine Harbour, Inc., for submission to the New Jersey Department of Environmental Protection. Devon PA. 206 p.
- JMA. 1975. The existing water quality of Lake Valhalla, Morris County, New Jersey, and an assessment of potential impacts on water quality of development in the watershed. Prepared for the Committee for the Preservation of Northern Montville. Devon PA. 22 p.
- JMA. 1975. Natural resource inventory of the Middle Run study area, New Castle County, Delaware. Prepared for the New Castle County Department of Parks and Recreation. Devon PA. 129 plus 32 p.
- JMA. 1975. Environmental assessment for the feasibility study for the land reclamation project, complementary urban development, City of Corinto, Nicaragua. Prepared for submission to the Autoridad Portuaria de Corinto and US-AID by Boswell-Amman & Whitney-Lamsa, Ingenieros Consultores. Devon PA. 116 p. plus folio maps.
- JMA. 1975. Waterfowl in the Meadowlands Freeway (US Routes 1 & 9) study area, Hackensack Meadowlands District, Hudson and Bergen Counties, New Jersey. Submitted to the New Jersey Department of Transportation by Louis Berger & Associates, Inc. Berwyn PA. 25 p.
- JMA. 1975. Inventory reports for Legislative Route 202 project area, Chester County, Pennsylvania. Prepared on behalf of Pennsylvania Department of Transportation, District 6-O. Berwyn PA. Variously paged, 377 p.
- JMA. 1975. Request for the determination of eligibility for listing on the National Register of Historic Places of six historic sites in the corridor for the proposed improvements to Legislative Route 202, Charlestown Township and Schuylkill Township, Pennsylvania. Submitted to the Pennsylvania Historic and Museum Commission by the Pennsylvania Department of Transportation, District 6-O. Berwyn PA. 63 p.
- JMA. 1976. Draft environmental impact statement, L.R. 202 (Phoenixville Pike), Pennsylvania Turnpike to City Line Avenue, Borough of Phoenixville, Chester County, Pennsylvania. Prepared for the Pennsylvania Department of Transportation, District 6-O, and the Federal Highway Administration. Berwyn PA. 170 p.
- JMA. 1976. Application for the construction and operation of a residential development in Ocean County, Cape May County, New Jersey. Prepared on behalf of EVED Enterprises, Inc. for submission to the New Jersey Department of Environmental Protection. Berwyn PA. 26 p.
- JMA. 1976. An assessment of beach erosion, with recommendations for the Borough of Ocean City, Cape May County, New Jersey. Berwyn PA. 102 p.
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- JMA. 1976. Quick response environmental impact assessment of dredging and filling at Harmon Cove, Specially Planned Area I, Secaucus, New Jersey. Submitted to the State of New Jersey, Hackensack Meadowlands Development Commission, by Hartz Mountain Industries, Inc. Berwyn PA. 10 p.
- JMA. 1976. A report on the water quality and aquatic macroinvertebrates of Lake Saginaw, Sparta Township, Sussex County, New Jersey. Prepared for the Liberty Mutual Insurance Co., East Orange NJ. Berwyn PA. 25 p.
- JMA. 1977. Evaluation of the potential effects of the Penn Estates development on the Tannersville Bog, Monroe County, Pennsylvania. Prepared for The Nature Conservancy, Boston MA. Berwyn PA. 65 p.
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- TERA. 1982. Stream encroachment permit application for Collings Avenue cargo yards, Newton Creek, Gloucester NJ, for submission to Bureau of Floodplain Management, NJ Department of Environmental Protection. King of Prussia PA, 25 p.
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- Schmid & Co., Inc. 1988. Wetlands on the Shadow Oaks project site, West Windsor Township, Mercer County, New Jersey. Prepared for Garden State Land Group, Cranbury NJ. Media PA. 25 p.
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- Schmid & Co., Inc. 1988. Wetland evaluation of the Cushetunk Lake site, Readington Township, Hunterdon County, New Jersey. Prepared for Trammell Crow Company, Princeton NJ. Media PA. 35 p.
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- Schmid & Co., Inc. 1989. Wetland creation plan for mitigation of fill at wastewater treatment plant expansion, DuPont Chambers Works, Carneys Point Township, Salem County NJ. Prepared for submission to Philadelphia District, Army Corps of Engineers, by E. I. DuPont de Nemours & Co., Inc. Deepwater NJ. Media PA. 25 p.
- Schmid & Co., Inc. 1990. Environmental impact statement, Weatherstone proposed residential development, Lots 14 and 145, Section 21, West Windsor Township, Mercer County, New Jersey. Prepared for Garden State Land Group, Cranbury NJ. Media PA. 17 p. plus appendix.
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- Schmid & Co., Inc. 1990. Wetland identification at the Floodgate Road site, Logan Township, Gloucester County, New Jersey. Prepared for American Dredging Co., Camden NJ. Media PA. 34 p.
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- Schmid & Co., Inc. 1990. Wetland investigation for the Bender Road easement at the Lakeview Estates subdivision, Lehigh Township, Wayne County, Pennsylvania. Prepared for Lakeview Estates International Corporation, Valley Forge PA. Media PA. 61 p.
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- Schmid & Co., Inc. 1991. Wetland identification, Wings Field tract, Whitpain Township, Montgomery County, Pennsylvania. Prepared for LHC Realty/Wings Field Associates. Plymouth Meeting PA. Media PA 40 p.
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- Schmid & Co., Inc. 1995. Wetland conditions on Lots 6, 12, and 233-A, Block 544, Hamilton Township, Mercer County, New Jersey. Media PA. 48 p.
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- Schmid & Co., Inc. 1995. Application to NJDEP for a regulatory line verification, Lot 10.03, Block 9, Kingwood Township, Hunterdon County, New Jersey. Prepared for Cenlar Federal Savings Bank. Media PA.
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- Schmid & Co., Inc. 1995. Wetland conditions at a site along Morton Avenue and MacDade Boulevard, Ridley Township, Delaware County, Pennsylvania. Prepared for Harper Associates, Ridley Park PA. Media PA. 44 p.



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Schmid & Co., Inc. 1997. Wetland conditions at Culligan Water Conditioning site, Sunfield Avenue, Raritan Center, Edison Township, Middlesex County, New Jersey. Prepared for Culligan Water Conditioning, Inc. Media PA. 30 p.

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Schmid & Co., Inc. 1998. Wetland redelineation for the Ganes Chemicals property, Pennsville Township, Salem County, New Jersey. Prepared for Ganes Chemicals, Inc. Media PA. 59 p.

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Schmid & Co., Inc. 2000. Site conditions at a property along Domorah Drive, Montgomeryville Industrial Park, Montgomery Township, Montgomery County, Pennsylvania. Prepared for Nappen & Associates, Montgomeryville PA. Media PA. 35 p.

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Schmid & Co., Inc. 2000. Environmental impact statement for The Woods at Cranbury, Block 23, Lots 1, 102.02, 104, and 108, Cranbury Township, Middlesex County, New Jersey. Prepared for MGD Development Group, L.L.C., Hopewell NJ. Media PA. 37 p.

Schmid & Co., Inc. 2000. Existing conditions and potential impacts of proposed development at the Pitcher Property along French Creek Road, West Vincent Township, Chester County, Pennsylvania. Prepared for French and Pickering Creeks Conservation Trust, Pottstown PA. Media PA. 20 p.

Schmid & Co., Inc. 2000. Site conditions at a property along Sherwood Avenue, Block 6784, Lots 73, 75, 79, and 81, Borough of Staten Island, Richmond County, New York. Prepared for Robert Kelly, Staten Island NY. Media PA. 31 p.

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Schmid & Co., Inc. 2001. Site conditions at a property along PA Route 291, Tinicum Township, Delaware County, Pennsylvania. Prepared for SmartPark Inc., Essington PA. Media PA. 30 p.

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Schmid & Co., Inc. 2001. Wetland conditions at a site known as Block 4801, Lot 5.01, Pennsville Township, Salem County, New Jersey. Prepared for Ganes Chemicals Inc., Pennsville NJ. Media PA. 37 p.

Schmid & Co., Inc. 2001. Site conditions at a property along Father Capodanno, Lot 42, Block 3500, Borough of Staten Island, Richmond County, New York. Prepared for R. Crenshaw, Potomac Falls, Virginia. Media PA. 29 p.

Schmid & Co., Inc. 2001. Site conditions at a property along Quincy and Naughton Avenues, Lot 51, Block 3834, Borough of Staten Island, Richmond County, New York. Prepared for L. S. Huie, Brooklyn, New York. Media PA. 26 p.

Schmid & Co., Inc. 2002. Site conditions at a property along Father Capodanno, Lot 34, Block 3500, Borough of Staten Island, Richmond County, New York. Prepared for S. Krebushevski, Staten Island, New York. Media PA. 27 p.

Schmid & Co., Inc. 2002. Site conditions at a property along Jefferson Avenue, Lots 114 and 116, Block 3864, Staten Island, Richmond County, New York. Prepared for V. Grinberg, Staten Island, New York. Media PA. 43 p.

Schmid & Co., Inc. 2002. Site conditions at a property along Father Capodanno Boulevard, Lot 7, Block 3864, Staten Island, Richmond County, New York. Prepared for L. Huie, Staten Island, New York. Media PA. 35 p.

Schmid & Co., Inc. 2002. Wetland conditions, Reed Sod Farm, Lots 22 and 22.02, Block 43, Upper Freehold Township, Monmouth County, New Jersey. Prepared for MGD Development Group, LLC, Hopewell, New Jersey. Media PA. 43 p.

Schmid & Co., Inc. 2002. Site conditions at Tax Parcels 101 and 102, Tinicum Township, Delaware County, Pennsylvania. Prepared for Tinicum LandVest, LLC, Chester Heights, Pennsylvania. Media PA. 40 p.

Schmid & Co., Inc. 2002. Wetland conditions at a site along Fellowship Road and Church Road, Mount Laurel Township, Burlington County, New Jersey. Prepared for M. Rourke, Fairfax Station, Virginia. Media PA. 39 p.

Schmid & Co., Inc. 2002. Site conditions at a property along Slater Boulevard, Lots 4, 7, 11, and 33, Block 3830, Staten Island, Richmond County, New York. Prepared for S. Krebushevski, Staten Island, New York. Media PA. 37 p.

Schmid & Co., Inc. 2002. Site conditions at a property along Father Capodanno, Lot 30, Block 3500, Borough of Staten Island, Richmond County, New York. Prepared for S. Krebushevski, Staten Island, New York. Media PA. 29 p.

Schmid & Co., Inc. Site conditions at Hamanasset, Chester Heights Borough, Delaware County, Pennsylvania. Prepared for Hamanasset at Darlington LLC, Media, Pennsylvania. Media PA. 37 p.

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## **1. Purpose of this Report**

This report is to express my concern and expert opinions regarding probable environmental consequences of the proposed gas reliability station proposed by PECO for a site in Marple Township, Delaware County, Pennsylvania. The station is proposed to facilitate the expansion of additional gas supply to expected new PECO customers in Marple Township and elsewhere in Delaware County. Based on my education and experience, I believe construction of the proposed facility, if approved, will endanger me and other occupants of the Township, will reduce the quality of air and biological resources in the Township, will contribute to global warming and thereby endanger all current and future residents of Pennsylvania, will contribute to indoor air pollution reducing the health of Township and County residents, and will conflict directly with the trustee obligations of all Commonwealth entities imposed by Article 1, §27, of the Pennsylvania Constitution to protect the environmental resources of current and future generations of Pennsylvanians.

## **2. Qualifications**

I am a biogeographer and consulting ecologist employed full-time in the professional assessment of environmental impacts since 1973. I received my B.A. degree cum laude, ΦBK, from Columbia College in 1966. I received my M.A. and Ph.D. degrees from the University of Chicago. From 1970 until 1973 I taught graduate and undergraduate courses in environmental science, plant ecology, and biogeography as a member of the Biological Sciences Department at Columbia University and Barnard College in New York City. After work as a consulting ecologist for several firms, I founded Schmid & Company in 1980 and serve as its president.

My clients include industrial organizations and individuals seeking permits to construct many kinds of facilities, conservation-oriented groups that question proposed developments, and federal, state, and municipal regulatory agencies seeking environmental reviews, regulatory assistance, and policy guidance. I have written and

supervised preparation of many dozens of environmental impact statements, as well as permit applications for proposed development projects. I have acted as senior scientist on many contracts involving multidisciplinary teams preparing guidance for agencies such as the New Jersey and Pennsylvania Departments of Environmental Protection, the National Oceanic and Atmospheric Administration and the Council on Environmental Quality. My personal research specialties are wetlands, water resources, and urban vegetation. I hold certification as a Senior Ecologist from the Ecological Society of America and as a Professional Wetland Scientist from the Society of Wetland Scientists, and I have served on the professional accreditation committees of both those organizations. My publications include ten books on urban vegetation and on the plants of the mid-Atlantic states, as well as numerous book chapters and professional reviews. I routinely perform fieldwork, as well as write reports and offer expert testimony before federal and state courts, including the Pennsylvania Environmental Hearing Board and the New Jersey Office of Administrative Law, and various other public boards and commissions. I have worked on potential impacts from several major pipelines in Pennsylvania, and I prepared a general technical review of pipelines in the context of Lycoming County, Pennsylvania, for the Pennsylvania League of Women Voters under contract to the Pipeline and Hazardous Materials Safety Administration of the US Department of Transportation. Over the years I have made numerous presentations at academic and professional conferences, and I have delivered guest lectures at several colleges and universities. My report titles, listed in my attached curriculum vitae, cover many pages of fine print.

I also have participated in public service. For some 30 years I served on the Marple Township Environmental Advisory Board, many terms as chair or vice-chair. Since 2017 I have served on the Citizens Advisory Council to the Pennsylvania Department of Environmental Protection pursuant to gubernatorial appointment. I currently am a voting member of the Environmental Quality Board (elected by the Council), and also of the Mining and Reclamation Advisory Board. I thus am bound by oath to support the Constitution of the Commonwealth of Pennsylvania, including Article 1, §27.

I have resided on Cedar Grove Road for more than 48 years, so its intersection with Sproul Road, where the reliability station is proposed, is a place I must visit daily. I also am familiar with the surrounding neighborhood. On weekends I take my grandchildren through that intersection to play at Russell Elementary School one block away, a school which their fathers attended. I patronize Freddy's restaurant next to the reliability station site and other commercial establishments along Sproul Road regularly.

### **3. The Proposed Project**

As I understand it, PECO (the local gas utility) proposes to construct a gas reliability station on the west side of Sproul Road (PA 320) on the south side of its intersection with Cedar Grove Road at the lowest possible cost to its investors. This is proposed to be a "city gate" facility with the purpose of reducing the pressure and raising the temperature of natural gas (primarily methane, CH<sub>4</sub>) dispatched from Conshohocken via a new 12-inch (nominal diameter), relatively high-pressure pipeline before transfer of the gas into an old main trunk gas distribution line 16 inches in diameter.

PECO states that gas supplies to Marple Township and nearby sections of Delaware County at present are adequate in volume and pressure to supply natural gas to existing customers. However, the utility hopes and expects demand to increase on the part of new users in the future, based on its actual experience of increased demand from 2011 to 2020. The proposed station is intended to make additional gas available in the future for consumption by new commercial and residential users in Marple Township and Delaware County at the least possible cost.

PECO states that the optimal location for adding gas to its old 16-inch pipeline is at the intersection of Sproul Road with Reed Road, 0.46 mile south of the proposed location. At that point the 16-inch line, which receives input at its north end in Conshohocken Borough, Montgomery County, and at its south end in Brookhaven Borough, Delaware County, has the lowest pressure experienced along its length, with gas reaching its "null" point there from either direction at various times.



The new 12-inch pipeline is to receive gas from liquid storage in Conshohocken. This pipeline has a maximum authorized operating pressure (MAOP) of 525 psig (pounds per square inch above atmospheric pressure). Insertion pressure at Conshohocken is expected to be operated typically at 475 psig and to drop within the 12-inch pipeline over the 11.5 miles down to about 150 psig at the proposed facility. At the station the gas will be heated, and its pressure will be reduced to 99 psig before discharge into the 16-inch line. Currently the 16-inch line is operated at a typical target pressure of 99 psig, and its actual pressure ranges down to 65 psig at non-peak usage hours. The proposed reliability station will provide the additional gas needed by new customers served by the 16-inch line at forecast times of peak demand.

PECO has not stated the quantities or schedule for air pollutants to be released from the proposed station's heaters and valves, the levels or schedule of noise that will be produced, or the outdoor light levels that will be maintained at night.

#### **4. Environmental Concerns**

**First** is the matter of human safety. I am concerned about the very close proximity of the proposed heavy industrial facility to adjacent homes and to Freddy's restaurant, inasmuch as this would create an unnecessary and unwise risk to human safety, physical health, and mental health along with increased noise, air pollution, and possibly nighttime light from facility operations for numerous pedestrians and residents.

Homes are present on the adjacent lots to the east, north, and west of the facility site, and sidewalks run along two of its sides (**Figure 1**). The rectangular PECO lot is about 0.4 acre in size, approximately 130 by 140 feet. There are half a dozen homes and one restaurant within 200 feet. The food services along this stretch of Sproul Road draw much pedestrian traffic from children and adults, as well as patrons arriving by automobile.

None of the surrounding structures was constructed with fire- and explosion-proof protection measures on walls that face the transfer facility or the high-pressure gas pipeline that is to



**Figure 1.** Residences in Marple Township surrounding the intersection of Cedar Grove Road with Sprout Road (PA Route 320). Proposed reliability station site is the lot west of Sprout Road, south of Cedar Grove Road, and north of Freddy's, in the center of this image. North is up in this June 2022 aerial photo from Google Earth.

feed it. Despite the relatively low probability of a major explosion, the potential for lethal damage to resident and transient people unavoidably will be increased if the facility is constructed in this densely populated area. Heavy industrial facilities belong in districts zoned for industrial use (such exist in Marple Township). Damage risk increases with pipeline diameter and operating pressure and decreases with distance.

Modeling for pipelines such as those constructed here by PECO shows that damage would be expected in a broad zone adjacent to them, according to recommendations from the

Pipeline Association for Public Awareness (**Figure 2**). The new 12-inch PECO pipeline has a risk corridor 1,200 feet wide, centered on the pipeline, that includes numerous residences and the Russell Elementary School (**Figure 3**). For a 16-inch diameter pipeline south of the proposed station operated at about 100 psig, the risk corridor narrows by 40% to 730 feet (only 365 feet wide on each side). Additional distribution pipelines will be needed somewhere to reach new customers beyond the present pipeline terminus within additional lands that also are densely settled, thereby further extending currently existing hazards. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) uses a simple, industry-sponsored formula for modeling potential impact radii (PIRs) for use in high consequence areas such as schools and densely populated settlements (C-FER Technologies. 2001. A model for sizing high consequence areas associated with natural gas pipelines. Gas Research Institute Report GRI-00/0189).

Persons in the 60- to 80-year age bracket (and others with impaired mobility) resident within these distances would be expected to experience a mortality rate greater than 50% in the event of a pipeline explosion, according to another report to the Gas Research Institute by DEATECH Consulting Company (2008. Analysis of Report No. GRI – 00/0189 on ‘A model for sizing high consequence areas associated with natural gas pipelines.’ DEATECH Consulting Company. Montgomery TX. 44 p.).

The current PHMSA PIR formula yields the following distances from the PECO Sproul Road pipelines in Marple Township: for new 12-inch diameter, 180 feet at 475 psig [its MAOP is 525 psig], 101 feet at 150 psig; for old 16-inch diameter, 110 feet at 99 psig. This formula ignores several applicable conservative assumptions and does not consider wind effects (National Transportation Safety Board. 2022. Enbridge Inc. natural gas transmission pipeline rupture and fire [Danville KY, 2019]. Pipeline Investigation Report NTSB/PIR-22/02. Washington DC. 56 p.). When the current PHMSA PIR formula is applied, fatalities and damage at distances well beyond its predictions have been observed across the nation. Thus the National Transportation Safety Board has recommended that PHMSA revise its PIR formula to generate larger, more realistic distances for the limits of adjacent areas at risk from pipeline impacts.



# Recommended Minimum Evacuation Distances For Natural Gas Pipeline Leaks and Ruptures

(Not applicable for Butane, Propane, or other Hazardous Liquids)

	Pipeline Size (inches)											
	4	6	8	10	12	16	20	22	24	30	36	42
Pressure (psig)	91	137	182	228	274	365	456	502	547	684	821	958
200	129	193	258	322	387	516	645	709	774	967	1161	1354
300	158	237	316	395	474	632	790	869	948	1185	1422	1659
400	182	274	365	456	547	730	912	1003	1094	1368	1642	1915
500	204	306	408	510	612	816	1020	1122	1224	1529	1835	2141
600	223	335	447	558	670	894	1117	1229	1340	1675	2011	2346
700	241	362	483	603	724	965	1206	1327	1448	1810	2172	2534
800	258	387	516	645	774	1032	1290	1419	1548	1935	2322	2709
900	274	410	547	684	821	1094	1368	1505	1642	2052	2462	2873
1000	288	433	577	721	865	1154	1442	1586	1730	2163	2596	3028
1100	302	454	605	756	907	1210	1512	1664	1815	2269	2722	3176
1200	316	474	632	790	948	1264	1580	1738	1896	2369	2843	3317
1300	329	493	658	822	986	1315	1644	1809	1973	2466	2959	3453
1400	341	512	682	853	1024	1365	1706	1877	2047	2559	3071	3583
1500	353	530	706	883	1060	1413	1766	1943	2119	2649	3179	3709
1600	365	547	730	912	1094	1459	1824	2006	2189	2736	3283	3830
1700	376	564	752	940	1128	1504	1880	2068	2256	2820	3384	3948
1800	387	580	774	967	1161	1548	1935	2128	2322	2902	3482	4063
1900	398	596	795	994	1193	1590	1988	2186	2385	2981	3578	4174
2000	408	612	816	1020	1224	1631	2039	2243	2447	3059	3671	4283
2100	418	627	836	1045	1254	1672	2090	2299	2508	3134	3761	4388
2200	428	642	856	1069	1283	1711	2139	2353	2567	3208	3850	4492

**Table 1 - Evacuation Distance in Feet**

The applicable leak or rupture condition is that of a sustained trench fire fueled by non-toxic natural gas escaping from two full bore pipe ends. Blast overpressure is not addressed. The distances shown in Table 1 are intended to provide protection from burn injury and correspond to a thermal heat flux exposure level of 450 Btu/hr ft<sup>2</sup>. This is the accepted limit of heat exposure for unprotected outdoor areas where people congregate; as established by the US Department of Housing & Urban Development Code 24CFR51, Subpart C, Siting of HUD Assisted Projects Near Hazardous Operations Handling Conventional Fuels or Chemicals of an Explosive or Flammable Nature. The formula used to calculate distance was taken from the Gas Research Institute Report GRI-00/0189, *A Model for Sizing High Consequence Areas Associated with Natural Gas Pipelines*, 2001, prepared by C-FER Technologies. That model does not take into account wind or other factors which may greatly influence specific conditions. Users are advised that the distances shown in Table 1 are considered to be "general information" only and are not intended to replace a site specific risk analysis. The Pipeline Association for Public Awareness makes no warranty with respect to the usefulness of this information and assumes no liability for any and all damages resulting from its use. Anyone using this information does so at their own risk.

**Figure 2.** Recommended minimum distances from natural gas pipelines to guard against damage to people and property (Pipeline Association for Public Awareness. 2007. Pipeline emergency response guidelines. Golden CO. 20 p.).

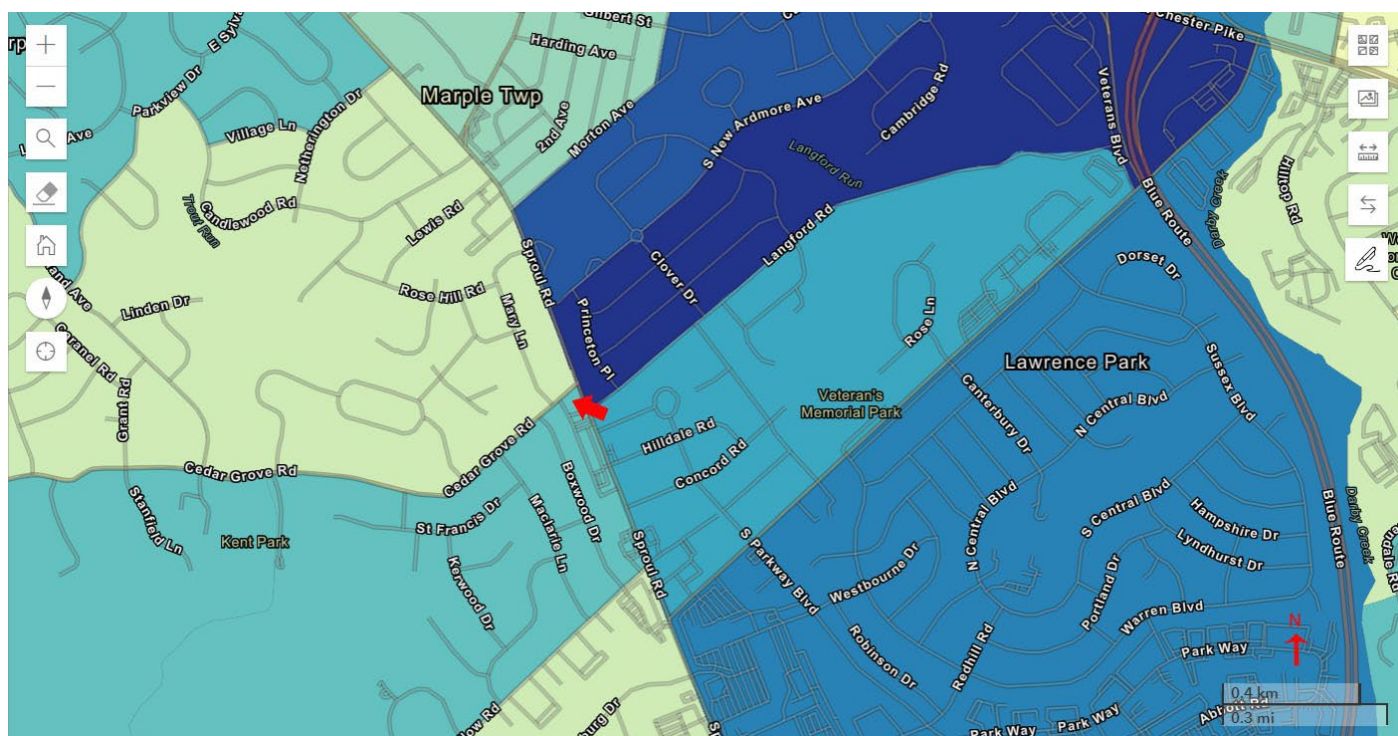




**Figure 3.** Location of the new 12-inch pipeline in Sproul Road (orange line) in Marple Township south from Russell Elementary School to the site of the proposed transfer station. Yellow lines show the 600-foot limits of “minimum evacuation distance” modeled to meet US Department of Housing and Urban Development recommendations for burn protection (Figure 2) if this line were operated at 475 psig. At 150 psig the limit narrows to 320 feet, on each side of the pipe, still encompassing many homes. This October 2020 airphoto is from GoogleEarth.

**Second,** operation of the proposed reliability station facility itself will generate outdoor air pollution from two sources. One is the onsite combustion of the natural gas (primarily methane) to heat products moved through the pipelines. Natural gas combustion is just as

damaging to climate as byproducts of the other fossil fuels---coal and oil. The other source is the valves which control the flow of products through the pipeline, and which typically leak methane. These discharges will increase the amounts of carbon dioxide, methane, nitrogen dioxide, and other air pollutants discharged into Marple Township for residents to breathe. Outdoor air in Delaware County currently is classified as not attaining national air quality standards (NAAQS) for nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), and fine particulate matter (PM 2.5). Some of the land adjacent to the proposed reliability station site has been designated by the Pennsylvania Department of Environmental Protection as an Environmental Justice Area (**Figure 4**). Such areas are most likely to be damaged by additional sources of air pollution and hazardous facilities. We Marple residents will get more volatiles and organic carbons to



**Figure 4.** Red arrow in the center of the map shows the proposed new reliability station site at the intersection of Cedar Grove Road with Sprout Road, surrounded by small, residential streets and the alleyway of the commercial strip. The adjacent dark blue census tract immediately to the east is an Environmental Justice Area (score 81 out of maximum impairment value of 100). There are numerous other Environmental Justice areas in Delaware County. Graphic from <https://gis.dep.pa.gov/PennEnviroScreen/>, accessed September 2023.

breathe, affecting my asthma and that of far too many neighbors. Environmental Justice Areas also warrant expanded public participation when projects are planned (Environmental Justice Office. 2023. Environmental justice policy. Document 015-0501-002. PA Department of Environmental Protection. Harrisburg PA. 27 p.).

**Third**, approval of the proposed gas reliability station will promote adverse impacts on the health of Marple Township and Delaware County residents and employees by facilitating the proliferation of gas appliances used indoors in buildings increasingly insulated against air leaks. As a result of indoor gas leaks, persons occasionally die of asphyxiation by carbon monoxide, and fires are caused by flammable methane. Gas appliances often leak methane even when turned off. The ordinary use of natural gas appliances indoors causes many health problems via release of air pollutants generated during the combustion of methane, such as nitrogen dioxide, super-fine particulate matter, carbon monoxide, and others. Some, but not all, gas appliances to be used indoors are required to be equipped with ventilation flues to reduce the harmful byproducts of gas combustion. Gas ranges, space heaters, and fireplace logs, however, are seldom required to be vented. After installation, ventilation requires maintenance to function effectively, and noisy ventilation fans may discourage actual use by consumers. Thus indoor air quality where gas-fired appliances are used often exceeds the concentrations of pollutants allowed by regulation outdoors (Figuroa, Laura A., and J. Lienke. 2022. The emissions in the kitchen: how the Consumer Products Safety Commission can address the risks of indoor air pollution from gas stoves. Center for Policy Integrity, New York University Law School. New York NY. 19 p.).

The resulting impacts are greatest on children. They may cause various short-term physical symptoms---most often contributing to asthma---as well as damage long-term mental health. The proportion of childhood asthma in Pennsylvania that could be theoretically prevented if gas stove use was not present is estimated as 13.5% (Gruenwald, Talor, B.A. Seals, L.D. Knibbs, and H.D. Hosgood III. 2023. Population attributable fraction of gas stoves and childhood asthma in the United States. International Journal of Environmental Research and Public Health 20[1]: 75). Hence New York City and Ithaca, New York; Berkeley, California; and the state of Victoria (Australia) have banned the use of gas appliances in new construction



(Bambrick, Hilary, K. Charlesworth, S. Bradshaw, and T. Baxter. 2021. Kicking the gas habit: how gas is harming our health. Climate Council of Australia, Limited. Potts Point, Australia. 48 p.). The Consumer Products Safety Commission has been requested to evaluate the need for nationwide restrictions on gas-fired appliances in the United States (Krishnamoorthi, Raja. 1 August 2022. Letter to CPSC. U.S. House of Representatives, Committee on Oversight and Reform, Subcommittee on Economic and Consumer Policy. Washington DC. 5 p.). Again, the most likely persons to be affected are residents of Environmental Justice areas who may rent and may not be able to afford upgrading appliances or ventilation equipment (WE ACT for Environmental Justice. 2023. Out of gas, in with justice: studying the impacts of induction stoves on indoor air quality in affordable housing. New York NY. 68 p.).

**Fourth**, there is no space for functional or aesthetic landscaping between the proposed industrial facility and pedestrians, vehicles, or homes. PECO proposes to reduce operational noise by enclosing its equipment within structures and providing an eight-foot-tall fence with some kind of noise buffering properties. It has not reported the noise levels to be generated at the facility or indicated the expected noise levels at its property lines. Thus the significance of the noise increase cannot be estimated. Noise levels decrease logarithmically with distance from a noise source at the rate of 6 decibels (dBA) per doubling of distance. Relatively small distances sometimes enable significant drops in noise levels. Whether the industrial facility will increase neighborhood light levels at night is not clear.

**Fifth**, any discharges of carbon dioxide or methane at the transfer facility or initiated by downstream users of the increased natural gas supply provided will contribute directly to the atmospheric warming that has now risen to crisis levels globally, as discussed by Professor Najjar in other testimony for this case. The proposed facility would facilitate the burning of methane gas at new residences and businesses to be built within the expanded service area served by the reliability station. There is no proposed offset of warming by greenhouse gases to be discharged from the service area.

Under business as usual, annual average temperatures in Pennsylvania by 2050 are projected to be about 6° F. above the baseline average for the 1971-2000 period (Pennsylvania



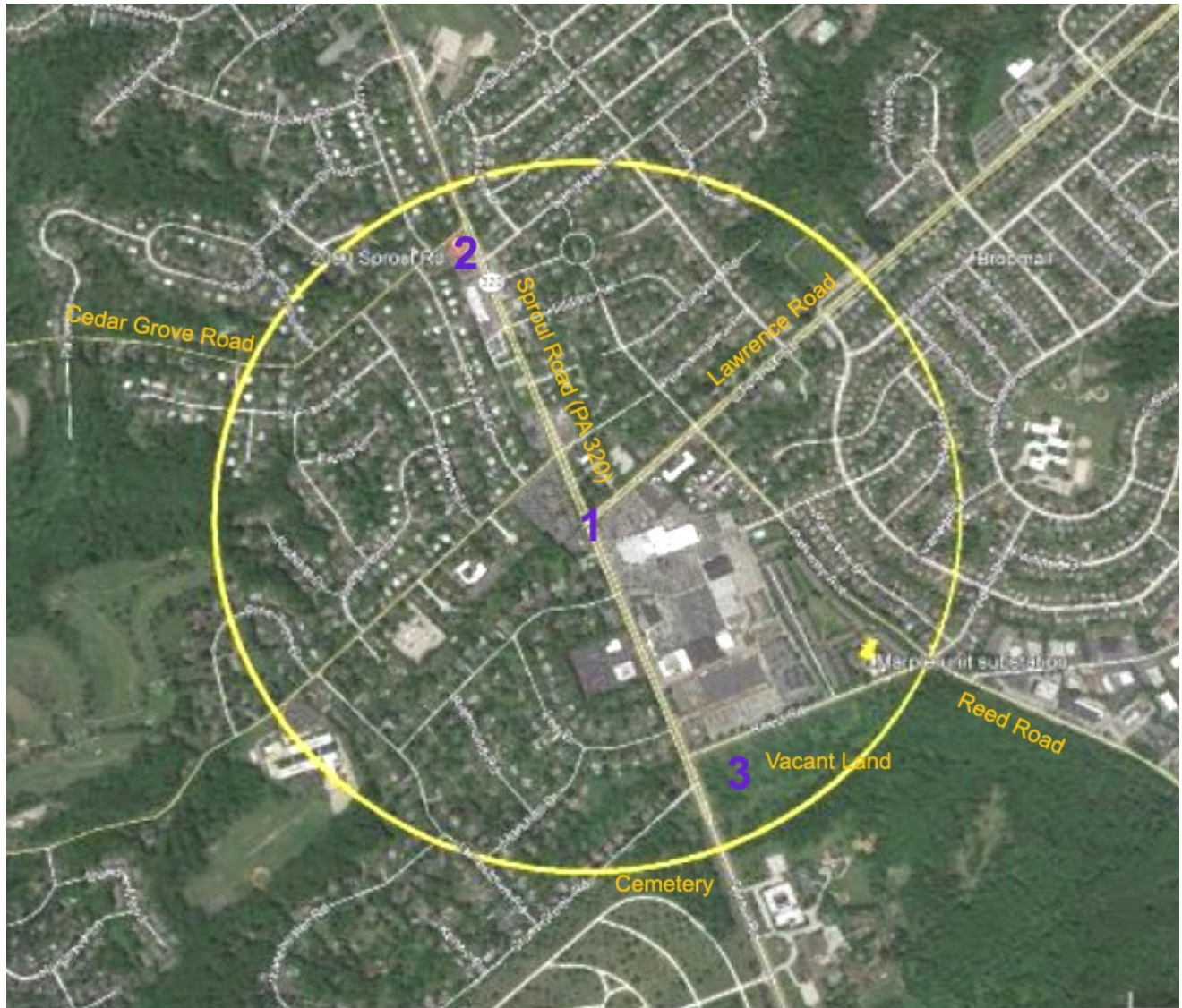
Department of Environmental Protection. 2021. Climate impacts assessment. ICF. Fairfax VA. 143 p.). The same report tells us that Environmental Justice communities in PA will suffer twice as much increase in 90° F. or hotter days as will the state as a whole. We shall experience crisis summer heat waves, more rainfall delivered as frequent and intense thunderstorms separated by drought periods, and increased flooding in the Darby Creek basin. Downstream communities in our basin also will get runoff from the proposed impervious construction, and Marple (unlike Philadelphia), does not collect any fee for stormwater management. The state's climate report labels the clearly predictable added heat mortality, Lyme disease increase, and rises in violent crime as critical impacts that result from global warming. They describe the resulting impacts as catastrophic on Pennsylvania forests, wildlife, and ecosystems. These include reduced dissolved oxygen in the waters of our freshwater streams as well as the Delaware River estuary as consequences of global warming to which this proposed PECO facility will contribute. During 2023 our region experienced unhealthy concentrations of smoke from distant wildfires induced by global warming.

Additional electric energy to power the additional air conditioning would be needed by everyone in Marple and Delaware County to offset the temperature increased by PECO's new gas customers via its proposed reliability station. Most affected, of course, will be residents of Environmental Justice areas in Marple Township and elsewhere in Delaware County. This is precisely the kind of facility that should NOT be constructed: it is to provide gas to new users. PECO claims that it has sufficient capacity to serve this vicinity without any new pipeline or reliability station. Instead of expanding gas consumption, PECO should be removing gas infrastructure and instead increasing electric energy supplies, primarily from renewable sources, to replace existing gas uses.

## **5. Alternatives**

PECO states that the completed engineering for the proposed reliability station allows its location to be practicable within 0.5 mile of the "null point" of the 16-inch pipeline, that is, 0.5 mile from the intersection of Reed Road with Sproul Road. The proposed site is 0.46 mile north, at Cedar Grove Road on the west side of Sproul Road. At least one additional site

would appear to provide significant reduction in danger from station operations and from explosive potential to residents of Marple Township. This location is 0.47 mile south of the null point along the east side of Sproul Road south of Reed Road (**Figure 5**). This location is on



**Figure 5.** Alternative sites for a gas reliability station in Marple Township, Delaware County, Pennsylvania. The yellow circle represents a 0.5-mile radius on a GoogleEarth aerial photograph prepared as PECO Exhibit RL-4. I have added labels in orange. My purple numbers are (1) PECO's ideal null point for injection of gas into the 16-inch trunk pipeline; (2) PECO's proposed location at Cedar Grove Road; and (3) an alternative location south of Reed Road. PECO considered and rejected alternative sites between numbers (1) and (2).

vacant land across a wide segment of Sproul Road from one existing home and from a cemetery. It is across Reed Road at a significantly greater distance from the Wendy's restaurant than the proposed station is from Freddy's restaurant. PECO offered no engineering reasons why this would not be an acceptable location for its reliability station. A location here would be dramatically farther from existing homes and other facilities than the proposed site enabling reduced impacts on residents of Marple Township and screening from adjacent uses.

PECO rejected---as too costly---undertaking alternative transfer station designs and installation of larger diameter pipelines that could enable expansion of the radius of search for an alternative transfer station site such as within the industrially zoned district of Marple Township. It acknowledged the "significant disruption of traffic patterns" and delays over the months of pipeline construction which resulted when it installed the 12-inch pipeline prior to securing the necessary approvals for its proposed reliability station.

No alternative siting of a reliability station, of course, could reduce the long-term impacts of the station on global warming.

## **6. Sustainability**

This proposed gas reliability station is precisely the kind of facility that should NOT be constructed anywhere in Marple Township or Delaware County. Its stated purpose is providing additional gas supply to new users, as cheaply as possible to encourage consumption. Instead of expanding gas use, PECO instead should be removing gas infrastructure and increasing electric energy supplies, primarily from renewable sources, to replace existing gas uses. Fossil fuel use is not sustainable, if the earth is to remain habitable.

A peer-reviewed report from the International Energy Agency (2021. Net zero by 2050, a roadmap for the global energy sector. International Energy Agency. Paris, France. 224 p.) details how governments, business, investors, and citizens all must be investing in new ways to cut fossil fuel use, if there is to be any hope of avoiding increasingly

disastrous impacts on climate. Our municipalities should be prohibiting the issuance of all building permits for new buildings to be served by natural gas and requiring solar panels and electric appliances instead. We do not permit new urban or suburban outhouses, after all. Pennsylvania municipalities should ban gas appliances and heating in new construction. Municipalities should refuse to accept dedication of new roadways serving new developments that burn gas. Our utilities should not be risking their shareholders' dollars to expand natural gas supplies whose use and price are going to decline. Our governments should be raising taxes on gas, not subsidizing PECO's efforts to strand capital assets in new gas distribution facilities while it chases short-term profits and engineering convenience while imposing public nuisances on established communities. Instead, PECO should be subsidizing sustainable items like heat pumps and solar panels.

Denying approvals for this PECO project will not solve the global climate crisis, but it will avoid the genuine, adverse, cumulative effects of one more proposed source of environmental damage in Marple Township and Delaware County. Each bit of natural gas use reduction helps and is vitally important to current and future generations of residents. From my experience participating for decades in environmental regulation, Pennsylvania appears to like rhetoric on paper in environmental laws and regulations that might promote sustainable life in our commonwealth, but loopholes and non-enforcement usually assure that the soothing recommendations on paper are not actually applied in specific cases.

Marple Township's zoning hearing board and commissioners should be commended for denying municipal approval for PECO's proposed gas transfer station. State regulators and the judicial system should stand behind such local efforts to protect residents of Marple, of Pennsylvania, and of our beleaguered earth.

## 7. Conclusions

This proposed PECO gas heating and transfer station is NOT reasonably necessary for the convenience and welfare of the public. Its negative, short- and long-term impacts on public welfare are both local and global. Its basic purpose is to facilitate additional future use of natural gas, which should be reduced instead to benefit public health and safety. This reliability station is badly sited in a high consequence area that is contrary to township zoning and much too close to residences, businesses, and pedestrians. Its appearance would detract from the aesthetic values of the community. It would be a dangerous nuisance that threatens public safety close to an elementary school. As an industrial facility it would contribute to documented air quality issues that are particularly relevant to an adjacent Environmental Justice zone. The impact of its air pollution on public health, its on-going noise and light, would contribute stress degrading to both mental and physical health of station neighbors. Because these cumulative impacts create unnecessary adverse consequences both locally and worldwide, the PECO “reliability” station should not be built at all. It conflicts directly with Article 1, §27, of the Pennsylvania Constitution. As a trustee responsible for protecting the citizens of the Commonwealth and their environment from unnecessary and harmful activities, it is the duty of the Public Utility Commission to deny the requested Finding of Necessity.

A handwritten signature in black ink that reads "James A. Schmid". The signature is fluid and cursive, with the first name "James" and last name "Schmid" clearly legible.

James A. Schmid, Ph. D.

22 September 2023