

1
2 **BEFORE THE**
3 **PENNSYLVANIA PUBLIC UTILITY COMMISSION**
4

5 MEGHAN FLYNN :
6 ROSEMARY FULLER :
7 MICHAEL WALSH :
8 NANCY HARKINS :
9 GERALD MCMULLEN : DOCKET NOS. C-2018-3006116
10 CAROLINE HUGHES and : P-2018-3006117
11 MELISSA HAINES :
12 Complainants :
13 v. :
14 :
15 SUNOCO PIPELINE L.P., :
16 Respondent :
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20 **DIRECT TESTIMONY OF**
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22 **TIMOTHY BOYCE**
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24 **ON BEHALF OF**
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26 **FLYNN COMPLAINANTS**
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1 **Tim Boyce Testimony**

2 **I. Voir Dire**

3 **Q: What do you do for a living?**

4 A: I'm the Director of the Delaware County Department of Emergency Services. I was
5 appointed to that position by Delaware County Council in the Fall of 2016.

6 **Q: What is your educational background?**

7 A: I hold a Degree in Finance from Temple University. I have a Master of Science degree in
8 Public Safety from Saint Joseph's University.

9 **Q: How long have you held positions in emergency services work?**

10 A: I started out as a fire fighter in the in the Upper Darby Fire Department and served in that
11 department for 27 years. I rose to the rank of Deputy Chief. Concurrently, I served as the
12 District Attorney's Homeland Security Coordinator for 10 years.

13 **Q: Is Exhibit Boyce-1 a current copy of your Curriculum Vitae?**

14 A: Yes, it is.

15 **FLYNN COMPLAINANTS OFFER EXHIBIT BOYCE-1 INTO EVIDENCE**

16 **Q: As Director of the Department of Emergency Services, what are your general**
17 **responsibilities?**

18 A: My job is to oversee a department that has the responsibility to support public safety
19 agencies, programs and initiatives that protect the people, institutions and culture of Delaware
20 County. I lead 130 employees and oversee operations of the County 911 Center. As director, I
21 represent Delaware County on the Southeast Pennsylvania Regional Terrorism Task Force. I'm
22 also responsible to coordinate specialized emergency services like urban search & rescue, mass

1 care, the emergency operations center and the County's certified hazardous materials response
2 teams.

3 **Q: Tell us something about your department's involvement in emergency**
4 **communications?**

5 A: My department is a 24-hour emergency communications center and emergency management
6 agency that is responsible for the 911 calls of 49 municipalities spread across 184 square miles in
7 Delaware County. These calls can be related to the necessity of police, fire or emergency
8 medical services.

9 **Q: Can you give us an overview of the Delaware County 911 call system?**

10 A: Nearly 2,500 911 calls are answered each day for over 40 law enforcement agencies, 65 fire
11 departments and 31 emergency medical services agencies. There are 12 emergency services that
12 are managed, including the Delaware County Citizen's Corps.

13 **Q: Have you also had other involvement in serving your community?**

14 A: Yes. I'm a founding and sustaining member of the Heroin Task Force, the Law Enforcement
15 Chaplains Association and the Safe Schools Committee. I also serve on several volunteer boards
16 that focus on public safety, education and community health.

17 **Q: When we refer to "first responders," who are we talking about?**

18 A: First responders are police, firefighters and paramedics that are called to respond to an
19 emergency event. First responders are also individuals in positions of responsibility at schools,
20 care facilities such as senior living facilities and hospitals, and businesses. In about the first 30
21 minutes of an emergency involving hazardous, highly volatile liquids, "first responders" also
22 includes members of the public in harm's way, as they are unlikely to receive outside assistance
23 or instructions during this time.

1 **Q: When you were a firefighter and later a captain and deputy chief, were you called to**
2 **scenes of fire and other emergencies?**

3 A: Yes, from time-to-time. The primary duty of the Department was to respond to emergency
4 events to which we were called within the constraints of our response capabilities.

5 **Q: When you started out in the late 1980s did you receive special training related to spills**
6 **of hazardous liquids?**

7 A: Yes, but in those days it was mostly non-highly volatile hazardous liquids like gasoline or
8 oil. There were few or no highly volatile liquids pipelines in Delaware County.

9 **Q: Do you understand the differences between the properties of natural gas (consisting**
10 **primarily of methane) and hazardous, highly volatile liquids such as propane?**

11 A: Yes, there are a number of important differences. Methane is lighter than air, so natural gas
12 tends to dissipate upon release to the atmosphere. It also usually has an odorant added to it.

13 Highly volatile liquids by contrast, if released to the atmosphere, transform rapidly into colorless,
14 odorless gas. This gas is heavier than air, so it tends to concentrate near the ground and can flow
15 along it downwind and downhill into low-lying areas. According to the Emergency Response
16 Guide used by firefighters, these gases are extremely flammable or explosive. Because HVLs are
17 highly volatile, if there is a breach in a pipeline, all of the material in the failed segment will
18 emerge as it expands into gas, even with valves closed.

19 **Q: As a firefighter, what was the process by which you became aware of an emergency**
20 **requiring your response?**

21 A: Generally, we were notified through the 911 system of an emergency.

22

Q: Was there a lag time between the time when an incident occurred and the time you were contacted?

A: Yes, there is always a delay because a person capable of both recognizing the danger and communicating to 911 takes a period of time. Usually it's around 3 minutes for a 911 call to be processed and an alert to be issued.

Q: Was there a lag time between when the call came and when you arrived at a scene?

A: Yes, it always takes time to prepare and travel. The exact amount of time depends on whether firefighters are at the station or not (many volunteer firefighters are not) as well as location of the emergency; traffic, weather conditions and whether we were on another emergency already. The response time from the time of notification can be fifteen minutes or more. In the case of an unignited vapor cloud, the response time may be longer as firefighters attempt to determine the exact location and size of the cloud.

Q: In the last several years have you become aware of the construction and operation of the Mariner East HVL pipelines in Delaware County?

A: Yes, I have

Q: In your capacity as Director of Emergency Services, have you devoted time and resources to the matter of possible emergency response to release of HVLs in Delaware County?

A: Yes, I've given the matter a great deal of thought. I've spoken with Sunoco personnel. I've read a variety of materials. I've read a number of risk/hazard assessments.

Q: During the time you were a firefighter, did you ever have any personal experience responding to a leak or rupture of highly volatile liquids?

1 A: I responded to several propane emergencies. Most were the common 20-pound canisters like
2 those used with barbeque grills. These contain only a few gallons of material but are still
3 considered very dangerous.

4 **Q: Are you familiar with any of the published risk assessments relating to the Mariner East**
5 **pipelines in Delaware County?**

6 A: I'm very familiar with the Delaware County Risk Assessment, which deals with the
7 consequences of HVL releases, in particular, what happens if there's an accident involving
8 Mariner East 1, 2 or 2X.

9 **Q: Am I right you've also had dealings with Sunoco staff relative to the Mariner East**
10 **project since your appointment as Director?**

11 A: Yes, that's right.

12 **Q: During the period 2006 to 2016 were you attached to the Delaware County District**
13 **Attorney's Office?**

14 A: Yes, as Homeland Security Coordinator.

15 **Q: Was that a full-time, paid position?**

16 A: Part time paid.

17 **Q: Were you still Deputy fire chief for Upper Darby?**

18 A: Yes.

19 **Q: How did it happen that you were hired for the Homeland Security Coordinator job at**
20 **the District Attorney's Office?**

21 A: I was recruited based on my job experience and educational background.

22 **Q: What special training did you receive?**

23 A: Training in threat recognition, emergency planning and response coordination.

1 **Q: During the ten years you held that position, what were some of the threats that you dealt**
2 **with?**

3 A: My responsibilities involved planning, training, and exercises. The threats addressed included
4 bio and agro terrorism as well as weapons of mass destruction.

5 **Q: Do you remain concerned about homeland security threats in Delaware County?**

6 A: Yes, in my role as Emergency Services Director I incorporate many of those responsibilities.

7 **Q: Are you familiar with Sunoco's so-called "public awareness program" flyers?**

8 A: Yes. I've read and reviewed them carefully.

9 **Q: Mr. Boyce, based upon your education, training, and experience, do you believe that**
10 **you are capable for expressing an opinion to a reasonable professional certainty as to the**
11 **dangers of the Mariner East pipelines in Delaware County, Sunoco's public awareness**
12 **flyers, and the challenges presented by the present communication system relative to**
13 **Sunoco petroleum product pipeline releases?**

14 A: Yes, I am.

15 **FLYNN COMPLAINANTS OFFER MR. BOYCE AS AN EMERGENCY**
16 **SERVICES PROFESSIONAL FOR THE PURPOSE OF GIVING EVIDENCE**
17 **RELATIVE TO THE DANGERS OF THE MARINER EAST PIPELINES IN**
18 **DELAWARE COUNTY, SUNOCO'S PUBLIC AWARENESS FLYERS, AND THE**
19 **CHALLENGES PRESENTED BY THE PRESENT COMMUNICATION SYSTEM**
20 **RELATIVE TO THE RELEASES OF SUNOCO PETROLEUM PRODUCTS.**

21 **II. Risk Assessments/Hazard Assessments**

22 **Q: Are you familiar with the terms risk assessments or hazard assessments in connection**
23 **with the consequences of releases from HVL pipelines?**

1 A: Yes. At this point I've heard the terms many times.

2 **Q: What is your general understanding of what these terms refer to?**

3 A: We're talking about assessments of the risk to the public of damages to persons and property
4 following leaks or punctures or ruptures. In the case of Delaware County, more specifically,
5 we're talking about what happens if there's an accident involving Mariner East 1, 2 or 2X.

6 **Q: Does Delaware County have a risk or hazard assessment relating to possible HVL**
7 **accidents on the Mariner East pipelines?**

8 A: We have a Federal Emergency Management Agency (FEMA) publication providing broad
9 guidelines on Threat and Hazard Identification and Risk Assessment. It is publicly available at
10 www.fema.gov/threat-and-hazard-identification-and-risk-assessment.

11 **Q: Did you become aware Sunoco had a risk assessment or hazard assessment?**

12 A: At some point I did.

13 **Q: Did you make any efforts to get Sunoco's risk assessment or hazard assessment?**

14 No. I was not aware that it would tell me something of value given the multiple publicly
15 available risk assessments of Mariner East.

16 **Q: Did Sunoco ever inform you that if you signed a nondisclosure agreement it would let**
17 **you view its risk or hazard assessment?**

18 A: I don't recall that happening.

19 **Q: Have you seen Sunoco's HVL risk assessments or hazard assessments?**

20 A: No, I have not. I understand that Sunoco has one but considers it confidential.

21 **Q: Do you think if it were released it would aid a terrorist attack?**

22 A: No, I think that risk comes from the hazard itself, and everything is already in the public
23 domain. Facilities like highly visible HVL valve sites are obvious targets.

Q: What would you like to know from Sunoco's risk assessment or hazard assessment that you believe would be helpful?

A: I'm not sure at this point there is any more to be learned beyond what is now in the public domain: ~~an HVL release from Mariner East, especially a delayed ignition accident, is likely to affect a very large area containing many people and a great deal of valuable property.~~

Q: Are you familiar with the Delaware County risk assessment and the Quest Consultants risk assessment of Mariner East?

A: Yes. My Department was assigned to procure the Delaware County risk assessment and served as the primary point of contact with the vendor.

Q: What can you tell us about what led to those assessments being obtained?

A: Delaware County Council assigned me to lead an independent risk assessment and hazard vulnerability analysis of the HVL pipeline. This was in response to public concerns about the risks associated with Mariner East.

Q: As a result of your becoming involved in the present PUC proceeding, have you become familiar with documents from PUC, PHMSA and Sunoco relating to the risks and hazards associated with both immediate ignition and delayed ignition events?

A: Yes, I've now had a chance to review a portion of Sunoco's emergency response manual for an 8-inch pipeline in Canada (Ex. Friedman 13); PUC's letter in February, 2018 to Sunoco requesting that Sunoco furnish risk assessments for the Mariner East pipelines (Ex. Friedman 09); and PHMSA's May, 2019 notice to Sunoco of Probable Violation for failure to comply with 49 CFR 190.440 (Ex. Boyce – 2).

Q: State briefly your understanding of these three documents, insofar as they relate to the Mariner East pipelines.

1 A: In the February 2018 letter from PUC, the Commission is telling Sunoco that as of that date—
2 four years after ME1 started transporting HVLs—PUC still does not have Sunoco’s model of
3 consequences of immediate ignition or delayed ignition on the Mariner East pipelines.

4 The May 2019 PHMSA letter has PHMSA telling Sunoco that as of August 2018, Sunoco was
5 still only using the old 660 foot radius as a “buffer” zone, even though that was based on pre-
6 HVL service. Sunoco agreed to expanded communications to 1,000 feet. This was based in part
7 on Stantec’s risk assessments for Sunoco. PHMSA tells Sunoco that the Public Awareness
8 Program should state the buffers and how they were determined or rationale for selection
9 referencing 49 CFR section 195.440 and the API RP 1162 guidance. Inally, the excerpt from
10 Sunoco’s Canadian Emergency Manual says that for an ethane rupture on an 8-inch pipeline,
11 expect a 700-meter hazard zone.

12 ~~Q: Have you had an opportunity to review Quest Consultants’ recent Consequence~~
13 ~~Analysis for the Mariner East pipelines?~~

14 ~~A: Yes, I have.~~

15 ~~Q: Is it fair to say then that, even though you have not seen Sunoco’s risk/hazard~~
16 ~~assessments, you are now familiar with consequence projections from the company’s~~
17 ~~Canadian emergency response manual, the Delaware County Risk Assessment, Quest~~
18 ~~Consultants’ recent report, and the PHMSA notice of violation of May, 2019?~~

19 ~~A: Yes, that’s correct.~~

20 ~~Q: As a result of your review of those materials, do you have a belief as to the extent of the~~
21 ~~impact zone of a possible rupture of HVLs on the Mariner East pipelines where there is~~
22 ~~immediate ignition?~~

1 A: In the event of immediate ignition, the reports suggest a range of anywhere from
2 approximately 1,000 feet to as much as half a mile. Obviously, in any given event it would
3 depend on the size of the pipe, the weather conditions, the specific HVL, and other factors.

4 **Q: As a result of your review of those materials, do you have a belief as to the extent of the**
5 **impact zone of a possible rupture of HVLs on the Mariner East pipelines where a cloud of**
6 **HVL gas forms and there is delayed ignition?**

7 A: In the event of immediate ignition, the reports suggest a range of anywhere from
8 approximately 1,000 feet to more than a mile. Obviously, in any given event it would depend on
9 the size of the pipe, the weather conditions, the specific HVL, and other factors.

10 **Q: As a result of your review of those materials, do you have a belief as to the nature of the**
11 **injuries and property damage that might result from a possible rupture of HVLs on the**
12 **Mariner East pipelines where there is immediate ignition?**

13 A: Within the impact zone people may be burned and people may die. There may be property
14 damage. Obviously, in any given event it would depend on the size of the pipe, the weather
15 conditions, the specific HVL, and other factors.

16 **Q: As a result of your review of those materials, do you have a belief as to the nature of the**
17 **injuries and property damage that might result from a possible rupture of HVLs on the**
18 **Mariner East pipelines where a cloud of HVL gas forms and there is delayed ignition?**

19 A: Within the impact zone people may be burned and people may die. There may be property
20 damage. Obviously, in any given event it would depend on the size of the pipeline, the size of the
21 leak, weather conditions, and other factors such as terrain.

22 III. Explanation of Hierarchy for Emergency Response in HVL accident event

23 **Q: Who has the responsibility to manage HVL accidents?**

1 A: Pennsylvania code provides that municipalities have the responsibility to manage HVL
2 incidents. Within Delaware County, I am not aware of any municipality that has a specific,
3 response plan for an HVL release. Building on that, I am not aware of any municipality that has
4 planned for a catastrophic release or would be able to manage that event without outside
5 assistance.

6 **Q: Who has responsibility to develop an emergency response plan for HVL accident?**

7 A: I do not know that any agency is responsible to develop an HVL-specific plan. Most likely
8 the HVL would be covered as a generic hazardous materials release event. I am aware that
9 Sunoco is required under federal regulations to provide information to the public about how to
10 recognize and respond to accidents on its pipelines.

11 **IV. Consequences of Leaks/Punctures/Ruptures**

12 ~~**Q: Are you familiar with the details of the risk/hazard assessments, specifically with**~~
13 ~~**reference to the consequences in the event there is a leak, a puncture or a rupture on one of**~~
14 ~~**the Mariner East HVL pipelines?**~~

15 A: Yes.

16 ~~**Q: Have you heard the terms impact zone, hazard zone, blast radius; what are they?**~~

17 A: Yes, they are guidelines for determining the size of the zones in which public safety would be
18 endangered in the event of a release of HVLs.

19 ~~**Q: Is the idea that beyond a certain distance a person is no longer at risk of injury or**~~
20 ~~**death?**~~

21 A: Not always, besides those in the “zones” a person who moved away during an emergency
22 may have had their safety compromised and need care. In addition, these zones are not
23 necessarily upper limits to the distances to which people may be injured or killed.

1 **Q: Is an HVL cloud always visible?**

2 A: No.

3 **Q: How would a self-evacuating member of the public know how far to walk in order to get**
4 **out of the zone in which injury or death could occur upon ignition?**

5 A: They would not unless they had a combustible vapor detector. The same is true of public
6 safety officials. If they were unable to detect a vapor cloud, and unwittingly entered one, they
7 could risk igniting it themselves.

8 **Q: From your review of the two public assessments, do you have any understanding of how**
9 **to determine a safe distance from an HVL leak that results in a cloud but has not yet**
10 **ignited?**

11 A: I would go with stand off distances like those used for explosives. See

12 <https://publicintelligence.net/dhs-bomb-threat-stand-off-chart>.

13 **Q: Has anyone from Sunoco given you guidance on what a safe distance is in connection**
14 **with an HVL leak that results in a cloud that has not yet ignited?**

15 A: No.

16 **Q: Did you attend any “MERO trainings” for Delaware or any other counties?**

17 A: No, although staff members attended.

18 **Q: From your review of the two public assessments, do you have any understanding of the**
19 **distance to which the public would have to self-evacuate in order to reach a safe distance**
20 **from an HVL leak which does not ignite immediately?**

21 A: Citing only the Delaware County risk assessment, I believe we have a base of understanding
22 to work from.

23 **Q: What concerns do you have about unignited vapor clouds?**

1 A: Many, this is a volatile, dynamic force. The cloud can move and flow along the ground for
2 long distances while remaining in the combustible range. Any ignition source, of which there are
3 many in densely populated Delaware County, can ignite the entire cloud and flash back to the
4 point of release. An ignition event can occur explosively and with lethal overpressure, for which
5 buildings do not provide protection. An unignited vapor cloud presents an extreme hazard to life
6 and property for anyone in or near it.

8 **V. Specific Delaware County Concerns**

9 **Q: How big is Delaware County? Is it densely populated?**

10 A: According to the U.S. Census, Delaware County's population numbers more than 564,000,
11 with an average density of more than 3,000 people per square mile. See

12 www.census.gov/quickfacts/fact/table/delawarecountypennsylvania/PST045218.

13 **Q: Are there facilities near the current and proposed Mariner East route for those with**
14 **disabilities? Hospitals? Senior living facilities? Schools? Residential subdivisions?**
15 **Apartment complexes?**

16 A: Yes, many of all of those.

17 **VI. Anatomy of an HVL Accident from Jeff Marx at Quest Consultants**

18 **Q: Have you reviewed the portion of the Quest Consultants Consequence Assessment**
19 **describing the anatomy of emergency response in the context of immediate ignition and**
20 **delayed ignition HVL releases?**

21 A: Yes, I've reviewed the recent assessment.

22 **Q: Do you believe this analysis relating to emergency response is accurate?**

1 **A: Yes, I do, based on my training, background and experience, and I wish to adopt it as**
2 **my own testimony here:**

3 By Quest Consultants:

4 Q: Can you now discuss the matter of emergency response to pipeline release events?

5 A: In the event of a pipeline accident, as was presented in the previous sections of this report,
6 there are two primary things that should happen: (A) the pipeline operator would recognize the
7 event, begin shutting down the pipeline, and notify local responders, and (B) local responders
8 will converge upon the release location to mitigate the effects of the accident.

9 It is helpful to consider the timeline of an event, beginning with the initiation of accident. For
10 larger, energetic releases such as punctures or ruptures, the initial moments of the event can be
11 characterized as an explosion—a sudden release of energy as the pressurized fluid begins to
12 escape. If this is a conventional buried pipeline, the escaping material will blow away the
13 overburden and form a crater, eventually resulting in a free jet of material. This initial release
14 will be audible, easy to see, and will begin to create a large white cloud, which is characteristic
15 of all HVL releases. This occurs because the released material becomes very cold due to the drop
16 in pressure. Upon mixing with air, this cold material condenses water vapor in the air, similar to
17 the natural formation of clouds in the sky or your breath on a cold morning.

18 Pipeline operators, typically at a remote monitoring facility, watch the product flow rate and
19 pressure at various locations along the pipeline. Monitoring points include each pump station, as
20 well as delivery points, and may include pipeline valve stations. As product is being moved, the
21 conditions are expected to be consistent in flow rate along the line, with decreasing pressure, due
22 to frictional losses, between pump stations. In the time frame of several seconds to a few minutes
23 following a pipeline rupture or puncture, the pipeline operators will notice pressure or flow

differentials. When unexpected fluctuations in flowrate (up or down) or unexpected drops in pressure are seen, the operator must (1) identify the event and its location, (2) initiate a shutdown, which involves stopping the supply pumps and closing valves, and (3) notify local responders.

Once local responders are notified, it may require between five and 30 minutes to mobilize and reach the area. A phone call from the pipeline operator initiates a chain of communication that mobilizes people and equipment, typically from several different agencies. These responders must then locate the accident site and determine the best way to approach the scene, keeping in mind the potential hazards to themselves and their equipment that may be present. Initial efforts will involve personnel coordination, command post establishment, and immediate fire response activities. As an understanding of the event develops, evacuation and other response activities can commence.

[RUPTURE EVENT WITH IMMEDIATE IGNITION SCENARIO]

- The pipeline ruptures, and ignites immediately, forming a large jet fire.
- The remote monitoring operator recognizes the incident within a few seconds of the rupture.
- The operator assesses the data and begins shutdown activities within 1-2 minutes. Pump stations are given the command to shut down and after an appropriate delay, automated valves are closed (often requires an additional 3-4 minutes for shutdown sequences to develop).
- The operator calls local responders, based on an assessment of where the rupture has occurred.
- The operator calls pipeline personnel for notification, and potentially to shut down pipeline valves that are not automated.
- Public in the area of the rupture call 911 reporting an explosion followed by a large fire.
- Local responders arrive at the scene 10-15 minutes after the rupture, set up a command post ½ mile upwind of the rupture site, and begin extinguishing secondary fires. The jet fire from the pipeline is unapproachable and inextinguishable.
- After 20 minutes, the pipeline operator notifies emergency responders that the pipeline has been isolated around the rupture site—3 miles upstream and 8 miles downstream.
- After about 14 hours, the pipeline inventory is depleted and the fire is declared controlled.

[PUNCTURE EVENT WITH DELAYED IGNITION SCENARIO]

- A small corrosion hole in the pipeline begins to release HVL and the hole quickly grows to approximately 2 inches in diameter in the weakened area. The force of the released material results in a crater being formed between the pipeline and the surface.
- Local residents hear the event, but aren't sure what it was.
- As the HVL mixes with air, a flammable vapor cloud develops, spreading over the immediate area, and is transported downwind, settling in low-lying and forested areas.
- Approximately 5 minutes later, a local resident out walking her dog, sees the vapor cloud. Because the weather conditions were not favorable for fog at that time, she realizes this is not a natural occurrence, and calls 911 to report the event.
- The 911 operator dispatches local responders to the area. After further conversation with the resident, the operator determines that is likely a pipeline release due to the proximity of the HVL pipeline, and places a call to the pipeline operator.
- At about 10 minutes into the event, the pipeline operator begins shutdown and isolation activities. Pump stations are given the command to shut down and after an appropriate delay, automated valves begin closing (often requiring an additional 3-4 minutes for shutdown sequences to develop).
- Local responders arrive and begin to assess the situation. After about 15 minutes of assessment, a command post is set up about ¼ mile from the release point. Based on responder reports, the county emergency response office decides to activate its reverse 911 capability to warn residents and recommend evacuation.
- A few minutes later, a car drives through what appears to be a foggy area at a creek crossing about 800 feet from the release site. The car stalls. As the driver attempts to restart the car, the flammable vapor cloud is ignited. The flash fire burns across the roadway and into the surrounding forest. The flames accelerate through the forest, resulting in a vapor cloud explosion that sends a blast wave out in all directions. The flammable cloud burns all of the available material, and forms a jet fire at the release site where HVL material is still being released from the pipeline.
- As responders begin to assess the event, they find that the driver of the car was fatally injured, several responders were injured from the blast, and there are multiple homes in the area that are now on fire. Many more homes were damaged by the blast, from broken windows to moderate structural failure.
- Although a 9-mile segment of the pipeline around the release point has been isolated, an inextinguishable jet fire continues to burn at the release location. Several secondary and structure fires continue to burn within about 500 feet of the release location.
- After about 3 hours into the event, firefighters have the secondary and structure fires under control and have begun recovery operations. Several victims are found in or around homes that were within the flammable vapor cloud or close enough to be damaged by the vapor cloud explosion.
- After about 48 hours, the pipeline inventory is depleted and the fire is declared controlled.

Q: Tables 5-8 and 5-9 in the Quest report describe immediate ignition impact zones. So far as you now, for an HVL pipeline rupture with immediate ignition, are the Quest estimates of the impact zone realistic?

A: Yes, I believe these figures are realistic.

Q: What about the Quest estimates of a delayed ignition impact zone?

Yes, I believe the tables are realistic. Regardless of the exact numbers, it is clear we are talking about a very large impact radius which, anyplace in Delaware County, is likely to encompass a large number of people.

Q: Based on your training, education and experience, can you say that is there any emergency response you are aware of that could possibly evacuate a densely populated area or facility in Delaware County in time to save them from a delayed HVL ignition scenario?

No. The only possible way to prevent injuries and death is to have people well outside of the danger zone before the event. First responders simply cannot effect rapid evacuation of large urban and suburban areas. And successful self-evacuation simply isn't going to happen in the case of a large unignited vapor cloud. It's hard to imagine a scenario where someone was exposed to these materials at a level that could asphyxiate them, or a level that could explode, and then find an ignition source; that emergency responders could take an affirmative action to prevent. With respect to evacuation of a senior living facility or hospital: such an evacuation, even under the best conditions, is likely to result in fatalities and injuries, even without the hazard of a pipeline accident. These facilities are simply not designed for rapid evacuation.

Q: What are your specific concerns about the delayed ignition of an HVL cloud that comes from a Mariner East pipeline leak?

1 A: That is the worst-case scenario. In the delayed ignition scenario, the public in harm's way is
2 its own "first responder." The only option for them is on-foot, self-evacuation, in the correct
3 direction, assuming they are able to do so. I am confident that a large release of HVLs in
4 Delaware County will find an ignition source, so any such self-evacuation must be rapid to have
5 any hope of success.

6 **VII. Noll-Related Comments**

7 **Q: How hard is it to evacuate a nursing home?**

8 There are many difficulties inherent in physically trying to accomplish an actual evacuation of a
9 nursing home. The two most obvious are the time involved in moving people who have various
10 degrees of physical disabilities and the impossibility of getting some people away from a scene
11 at all. The answers to this question are really at the heart of the difficulty of managing HVL
12 accidents. There are so many factors: weather, time of day, the number and training of
13 responders, the absence of any other ongoing emergency.

14 **Q: In your experience, in Delaware County, do all first responders have combustible vapor** 15 **monitoring devices?**

16 A: No, not at all. I am not aware of any standard requirement or assurance that all responders
17 have these devices. Additionally, I am not aware of any members of the public or facility
18 managers (such as school principals) who have these monitoring devices.

19 **Q: How will emergency responders even know if any event involves HVLs?**

20 A: You might not. And if you do not know it's a hazardous materials release then you may
21 never institute proper response protocols. Also, mutual aid companies may have no experience
22 whatsoever on the specific plan, nor access to it in real time.

1 **Q: Does the fact that some first responders are volunteer forces have any bearing on**
2 **dealing with an HVL release event?**

3 A: Yes. There may enormous resource demands that are inconsistent with volunteer response
4 forces.

5 **X. Sunoco Pipeline Reported Accidents**

6 ~~**Q: Have you reviewed Exhibit Boyce-2, the attached list of Sunoco Pipeline reported**~~
7 ~~**accidents?**~~

8 ~~A: Yes.~~

9 ~~**Q: Do they appear to occur with regularity?**~~

10 ~~A: Yes, I counted over 300 reported Sunoco accidents since 2010.~~

11 **Q: Do you know about the pump station explosion event in East Goshen Township, about**
12 **the release of gasoline from a valve site in Middletown, and about calls to Delaware County**
13 **Emergency Services to report odors near Mariner East?**

14 A: Yes.

15 **Q: To the best of your knowledge, did any member of the public in any of those cases, self-**
16 **evacuate?**

17 A: No, I am not aware of any that did.

18 **Q: Why not?**

19 A: I believe that most members of the public don't see on-foot self-evacuation as something
20 they can realistically accomplish, especially at night or during inclement weather. I believe
21 people who are capable of doing so will run away from a fire. But it is virtually impossible for
22 the public to accurately assess the size, shape, and extreme hazard associated with an unignited
23 combustible vapor cloud.

XI. “Public Awareness Program” Flyer

Q: Are you familiar with Sunoco’s so-called “public awareness program” flyers?

A: Yes.

Q: Here is an excerpt from the 2018 flyer:

811 Know what's below. Call before you dig.

Don't ever assume you know where the underground utilities are located.

One of the greatest single challenges to safe pipeline operations is the accidental damage caused by excavation. In accordance with state and federal guidelines, a damage prevention program has been established to prevent damage to our pipelines from excavation activities, using non-mechanical or mechanical equipment or explosives to move earth, rock or other material below existing grade. Laws vary by state, but most require a call to 811 between 48 to 72 hours before you plan to dig. Your local One-Call Center will let you know if there are any buried utilities in the area, and the utility companies will be notified to identify and clearly mark the location of their lines at no cost to you.

ALWAYS CALL 811 BEFORE YOU DIG

WAIT THE REQUIRED AMOUNT OF TIME.

RESPECT THE MARKS.

DIG WITH CARE.

If you should happen to strike the pipeline while working in the area, it is important that you phone us immediately. Even seemingly minor damage, such as a dent or chipped pipeline coating, could result in a future leak if not promptly repaired.

What should I do if I suspect a leak?

- Leave the area immediately on foot and warn others to stay away.
- Abandon any equipment being used in or near the area.
- Avoid any open flame or other sources of ignition.
- Call 911 or local law enforcement from a safe location.
- Notify the pipeline company immediately.
- Do not attempt to extinguish a pipeline fire.
- Do not attempt to operate pipeline valves.

Wait for the site to be marked. Marking could be either by paint, flags or stakes.

APWA Color Code

- Proposed excavation
- Temporary survey markings
- Electric power lines, cables, conduit and lighting cables
- Gas, oil, steam, petroleum or gaseous materials
- Communication, alarm or signal lines, cables or conduit
- Potable water
- Reclaimed water, irrigation and slurry lines
- Sewers and drain lines

CONTACT KNOW RECOGNIZE RESPOND

Q: Do you see the instructions to the public are to “leave the area immediately on foot” if they “suspect a leak.” Do you think this is a plausible plan for school children, elderly people, or those with physical or cognitive disabilities?

A: Not at all.

Q: Is it a plausible plan for HVL accidents that occur at night or during inclement weather?

A: No, I don’t think it’s a realistic instruction for anyone, at any time.

1 **Q: It says “call 911 or local law enforcement from a safe location.” Does this flyer provide**
2 **any information about how to identify a “safe location”?**

3 A: No, it doesn't.

4 **Q: The flyer implies that an impacted member of the public should not make a phone call**
5 **from an unsafe location. Is there any information here about how to identify an unsafe**
6 **location?**

7 A: No, and that's a problem given that HVLs in gaseous form are colorless and odorless.

8 Certainly I am aware that the federal pipeline regulator warns against using phones and cell
9 phones the area of a suspected pipeline leak because of a concern about these devices providing
10 an ignition source.

11 **Q: You see the flyer refers to moving upwind or uphill. Does this flyer provide any**
12 **guidance in the event that “upwind” and “uphill” are in opposite directions?**

13 A: No, it doesn't.

14 **Q: Does this flyer say anything about pipeline ruptures, as distinct from leaks?**

15 A: No, it does not.

16 **Q: Does this flyer talk about the possibility of death or burns from an explosion?**

17 A: No, it does not.

18 **Q: Does this flyer provide any information about how to determine wind direction?**

19 A: No, it does not.

20 **Q: Based on your training and experience, would most members of the public know the**
21 **wind direction in real time at any given moment?**

22 A: No, of course not.

1 **Q: What about managers of facilities like elementary schools? Would they know the wind**
2 **direction at any given moment?**

3 A: I don't believe so.

4 **Q: What about Delaware County Emergency Services?**

5 A: My Department would like to develop a network of wind sensors, but doesn't have that
6 capability presently.

7 **Q: Are you aware that in this case the Flynn Complainants are complaining about the**
8 **inadequacy of Sunoco's public awareness program guidance?**

9 Yes.

10 **Q: Are you aware that in this case the Flynn Complainants are complaining about the**
11 **location of HVL pipelines in high consequence areas full of dense, immobile populations**
12 **such as schools and senior living facilities?**

13 A: Yes, and I share those concerns.

14 **XII. CONCLUSIONS AND OPINION**

15 **Q: Isn't it a fact that all activities involve some level of risk.**

16 Yes. As a public safety official, I understand that all actions involve some level of risk.
17 The best method is always to prevent an event from occurring. For those events that cannot be
18 prevented, however, planning for the consequences needs to be appropriate to serve those at risk.

19 **Q: What kind of planning could be done?**

20 We would want to mitigate the damage to life and property which would involve stand
21 off distances from the pipelines. Improving our response capability to all types of hazards is
22 important which would include a heightened focus on evacuations.

1 **Q: How about recovery planning?**

2 Recovery planning needs to be developed to restore the community in the event of a
3 catastrophic event so that it could return to some sense of normalcy following the tragedy.

4 **Q: Mr. Boyce, based upon your education, training, and experience, as well as what you've**
5 **now testified to, do you have an opinion to a reasonable professional certainty about the**
6 **dangers of the Mariner East pipelines in Delaware County, Sunoco's public awareness**
7 **flyers, and the challenges presented by the present communication system relative to**
8 **Sunoco petroleum product pipeline releases?**

9 A: Yes, I do:

10 (1) As regards the dangers posed by the Mariner East pipelines, HVLs are more
11 dangerous than natural gas. It would be misleading for anyone to suggest they are the
12 same. Most significant, the potential for delayed ignition is just frightening.

13 (2) As regards the public awareness flyers, they do not adequately inform the public of the
14 true dangers of a possible Mariner East pipeline accident, including the
15 likelihood of burns and fatalities prior to the time first responders could arrive.

16 (3) With respect to emergency communications, our emergency notification system is very
17 good but it takes time to operate. By the time our first responders arrive at the scene of an
18 accident, it could easily be the case that burns and fatalities already have occurred.

19 **Q: Mr. Boyce, have all of your opinions above been given within a reasonable degree of**
20 **professional certainty?**

21 A: Yes.

- 1 **Q: Mr. Boyce, would you agree that if additional information becomes available it is**
- 2 **conceivable you would have to review that information to determine whether it affects your**
- 3 **opinion in this case?**
- 4 A: Yes, of course.