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July 28, 2020

VIA ELECTRONIC FILING

Rosemary Chiavetta, Secretary Pennsylvania Public Utility Commission Commonwealth Keystone Building 400 North Street, Filing Room Harrisburg, PA 17120

> Re: Meghan Flynn, et al., Docket Nos. C-2018-3006116 & P-2018-3006117 (consolidated) Melissa DiBernardino, Docket No. C-2018-3005025 (consolidated)
> Rebecca Britton, Docket No. C-2019-3006898 (consolidated)
> Laura Obenski, Docket No. C-2019-3006905 (consolidated)
> Andover Homeowner's Association, Inc.; Docket No. C-2018-3003605 (consolidated)
> v.
> Sunoco Pipeline L.P.

SUNOCO PIPELINE L.P.'S MOTION FOR PARTIAL SUMMARY JUDGEMENT REGARDING INTEGRITY MANAGEMENT, CORROSION CONTROL AND CATHODIC PROTECTION

Dear Secretary Chiavetta:

Attached for electronic filing with the Commission is Sunoco Pipeline L.P.'s Motion for Partial Summary Judgement Regarding Integrity Management, Corrosion Control and Cathodic Protection. Because this document does not contain new averments of fact, it does not require a verification.

If you have any questions regarding this filing, please contact the undersigned.

Very truly yours,

/s/ Thomas J. Sniscak

Thomas J. Sniscak Whitney E. Snyder *Counsel for Sunoco Pipeline L.P.*

WES/das Enclosure cc: Honorable Elizabeth Barnes (by email ebarnes@pa.gov) Per Certificate of Service

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the forgoing document upon the persons listed below in accordance with the requirements of § 1.54 (relating to service by a party).

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Pro se Complainant

/s/ Thomas J. Sniscak

Thomas J. Sniscak, Esquire Whitney E. Snyder, Esquire

Dated: July 28, 2020

BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

MEGHAN FLYNN et al.	:	Docket Nos.	C-2018-3006116 (consolidated) P-2018-3006117
MELISSA DIBERNARDINO REBECCA BRITTON LAURA OBENSKI ANDOVER HOMEOWNER'S ASSOCIATION, INC. V.	::	Docket No. Docket No. Docket No. Docket No.	C-2018-3005025 (consolidated) C-2019-3006898 (consolidated) C-2019-3006905 (consolidated) C-2018-3003605 (consolidated)
SUNOCO PIPELINE L.P.	:		

NOTICE TO PLEAD

Pursuant to 52 Pa. Code § 5.103, you are hereby notified that, if you do not file a written response to the enclosed Motion for Partial Summary Judgment within twenty (20) days from service of this notice, a decision may be rendered against you. Any Response to the Motion for Partial Summary Judgment must be filed with the Secretary of the Pennsylvania Public Utility Commission, with a copy served to counsel for Sunoco Pipeline, L.P., and where applicable, the Administrative Law Judge presiding over the issue.

File with: Rosemary Chiavetta, Secretary Pennsylvania Public Utility Commission Commonwealth Keystone Building 400 North Street, Second Floor Harrisburg, PA 17120

BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

MEGHAN FLYNN et al.	:	Docket Nos.	C-2018-3006116 (consolidated)
	:		P-2018-3006117
MELISSA DIBERNARDINO	:	Docket No.	C-2018-3005025 (consolidated)
REBECCA BRITTON	:	Docket No.	C-2019-3006898 (consolidated)
LAURA OBENSKI	:	Docket No.	C-2019-3006905 (consolidated)
ANDOVER HOMEOWNER'S	:	Docket No.	C-2018-3003605 (consolidated)
ASSOCIATION, INC.	:		
	:		
V.	:		
	:		
SUNOCO PIPELINE L.P.			

SUNOCO PIPELINE L.P.'S MOTION FOR PARTIAL SUMMARY JUDGEMENT REGARDING INTEGRITY MANAGEMENT, CORROSION CONTROL AND CATHODIC PROTECTION

Pursuant to 52 Pa. Code § 5.102, Sunoco Pipeline L.P. (SPLP) moves for partial summary judgment of the above-captioned matter on the grounds that Complainants¹ have failed to present a genuine issue of material fact for hearing and meet their burden of proof to show a violation of the Public Utility Code, Commission regulations, or Commission Order regarding the integrity management, corrosion control, and cathodic protection of the Mariner East 1 and 12-inch pipelines, entitling SPLP to judgment as a matter of law.

¹ Complainants include each party whose Complaint has been consolidated in this proceeding: Megan Flynn *et al*, Melissa DiBernardino, Rebecca Britton, Laura Obenski, and Andover Homeowner's Association, Inc., unless otherwise specified.

I. INTRODUCTION AND SUMMARY OF ARGUMENT

1. Complainants failed to meet their burden of proof² to show that SPLP's integrity management, cathodic protection, and corrosion control are in violation of the Public Utility Code, Commission regulations, or Commission Order. Complainants were required by this point in the proceeding³ to prove this through substantial evidence⁴ to obtain any relief⁵ regarding these allegations. They did not.

2. Substantial evidence requires more than a mere trace of evidence or a suspicion

of the existence of a fact sought to be established.⁶ In short, Dr. Zee's testimony is long on

⁴ *Mill v. Pa. Pub. Util. Comm'n*, 447 A.2d 1100 (Pa. Cmwlth. 1982); *Edan Transportation Corp. v. Pa. Pub. Util. Comm'n*, 623 A.2d 6 (Pa. Cmwlth. 1993); 2 Pa. C.S. § 704.

² 66 Pa. C.S. § 332(a).

³ Complainants have no more opportunities to prove a prima facia case. *See* 52 Pa. Code § 5.243(e) (prohibiting the introduction of evidence during rebuttal which should have been included in the party's case-in-chief or which substantially varies from the party's case-in-chief); Order Granting Sunoco Pipeline, L.P.'s Omnibus Motion, at Ordering Paragraphs 2 (denying request for supplemental direct testimony), 4 (expressly enforcing § 5.243(e)) (Barnes, J.) (Order entered Feb. 11, 2020); Order Amending Procedural Schedule; Denying Flynn Complainants' Motion For Leave To File Supplemental Direct Testimony And Exhibits; And Denying Flynn Complainants' Motion To Determine Sufficiency Of Sunoco Pipeline, L.P.'s Objections And Answer To Request For Admissions, at pp. 2-3 (denying discovery and thus potential later admission of discovery on issues beyond scope of direct and denying request to file supplemental direct testimony) (Barnes, J.) (Order entered May 28, 2020).

⁵ Seese v. PPL Elec. Util's Corp., Docket No. C-2015-2500818, Initial Decision at *5 (ALJ Barnes ID entered Mar. 17, 2016) (Final via Act 294) (citing West Penn Power Co. v. Pa. Pub. Util. Comm'n, 478 A.2d 947 at 949 (Pa. Cmwlth. 1984)); see also Rahn, Township of Spring et al. v. Pennsylvania-American Water Co., Docket Nos. C-20054919 et al, 2007 WL 2198196 at *6 (Order entered Jul. 27, 2007) (denying request for geophysical testing where no credible evidence that some act or omission by utility in violation of the Code or Commission regulations would be remedied by geophysical testing).

⁶ Norfolk and Western Ry. Co. v. Pa. Pub. Util. Comm'n, 413 A.2d 1037 (Pa. 1980); Erie Resistor Corp. v. Unemployment Comp. Bd. of Review, 166 A.2d 96 (Pa. Super. 1960); Murphy v. Dep't. of Public Welfare, White Haven Center, 480 A.2d 382 (Pa. Cmwlth. 1984).

questions and accusations but that is neither evidence nor proof. Moreover, for expert evidence to be competent, it must as a whole demonstrate certainty, not "speculation" or "equivocation" and "[e]xpert testimony based upon mere probability, *e.g.*, 'more probable than not', that the alleged cause 'possibly' or 'could have' led to the result, that it 'could very properly account' for the result, or even that it 'was very highly probable' that it caused the result, lacks the requisite degree of certainty to be accepted as competent evidence."⁷ As discussed below, the testimony at issue is replete with these defects.

3. The testimony Complainants presented, both lay^8 and expert, is speculative, equivocal, and does nothing more than make accusations and raise the suspicion of facts where the testimony merely raises allegations and questions instead of presenting evidence of a material fact

⁷ Vertis Group, Inc. v. Duquesne Light Co., 2003 WL 1605744, Docket No. C-00003643 (Order entered Feb. 24, 2003), *aff*^{*}d 840 A.2d 390 (Pa. Cmwlth. 2003), *appeal denied* 859 A.2d 770 (Pa. 2004) (emphasis added). See also Povacz v. PECO Energy Co., Docket No. C-2015-2475023, Opinion and Order at 61-62 (Order entered March 28, 2019), appeal docketed, No. 492 CD 2019 (Pa. Cmwlth. Apr. 26, 2019) (holding expert opinion fell below required standard and burden of proof and did not constitute competent evidence to support a finding of fact) (citing *Halaski v. Hilton Hotel*, 409 A.2d 367, 369, n.2 (Pa. 1979); *Menarde v. Philadelphia Transp. Co.*, 103 A.2d 681, 684 (Pa. 1954)).

⁸ The subject matter at issue here – integrity management, cathodic protection, and corrosion control is scientific and technical in nature and requires expert testimony. Lay witness "opinions" in these areas are not substantial evidence. The Commission has consistently found that lay witness testimony on technical issues such as health, safety, and the probability of structural failure is not substantial evidence as these necessarily "**require expert evidence to be persuasive enough to support the proposing party's burden of proof.**" *Application of PPL Elec. Utilities Corp.*, Dkt. No. A-2009-2082652, 2010 WL 637063, at *11 (Pa. P.U.C. Jan. 14, 2010) (emphasis added); *Pickford v. Pub. Util. Comm'n*, 4 A.3d 707, 715 (Pa. Cmwlth. 2010) (ALJ "properly disregarded" testimony from 13 lay witnesses related to concerns and personal opinions about damage to pipes, lead leaching, toxicity to fish and home filtration expenses because "the nature of these opinions … was scientific and required an expert."); *Lamagna v. Pa. Elec. Co.*, Dkt. No. C-2017-2608014, 2018 WL 6124353, at *20 (Pa. P.U.C. Oct. 30, 2018) (finding that lay witness testimony and exhibits regarding technical health and safety issues "carry no evidentiary weight and … were properly objected to and excluded.).

in dispute that would show the necessary violation and harm resulting therefrom to obtain the injunctive relief Complainants seek. Complainants only expert witness regarding integrity management, corrosion control, and cathodic protection, Dr. Zee, presented direct testimony⁹ that is the definition of uncertain, speculative, and equivocal, as demonstrated in his ultimate conclusions:

In closing, for an expert to be able to form an opinion as to the present, likely condition of the 12-inch and 8-inch lines, a good deal more information would be required than has been supplied to Matergenics to date. The information needed has been set out in detail above in Part III. The materials furnished, however, raise serious questions as to the condition of these aging pipelines as well as the fitness of Sunoco to operate them.

(1) Based upon the materials we have been permitted to review, Sunoco **may be** operating an inadequate integrity management program for the 8-inch pipeline and the 12-inch pipeline considering the leak incidents, age of pipeline and coatings that, if disbonded, shield cathodic protection.

(2) Based upon the materials we have been permitted to review, important information relative to corrosion data, corrosion risk and corrosion mitigation is lacking.

(3) Sunoco's operation of the 8-inch pipeline and the 12-inch pipeline **should be reviewed** for corrosion risk both externally and internally;

(4) Sunoco's operation of the subject 8-inch pipeline and the 12-inch pipeline **should be reviewed** for safety considerations from a corrosion risk point of view; and

(5) **The question of whether** or not Sunoco should be permitted to continue operating these pipelines **cannot properly be decided without a thorough investigation** by an independent expert.

⁹ The public version of Dr. Zee's direct testimony is included as **Attachment A**. The highly confidential/confidential security version is already in the possession of eligible reviewing representatives pursuant to the Amended Protective Order in this proceeding, including Your Honor.

Dr. Zee Direct at 41:44-42:27 (emphasis added). In essence, Dr. Zee's sole opinion is that he needs more information to render an opinion. That is not sufficient.

4. Dr. Zee's surrebuttal testimony¹⁰ fares no better. He merely repeats his admission that he needs more information to render an opinion reaffirming that by stating his conclusions from his direct testimony (which as demonstrated above are not competent conclusions because they do not contain the requisite certainty) have not changed. Dr. Zee Surrebuttal at 12:17-20, 27:11-13. And he then asserts various possibilities that are not certain enough to be competent expert testimony or establish substantial evidence.

It does **seem possible and even probable** that MIC was responsible. I, personally, suspect that MIC **is more likely than not** as the culprit, but we can never know because of the site contamination and failure by DNV to conduct appropriate testing.

Dr. Zee Surrebuttal at 7:2, 7:18-29 (emphasis added).

Along more than 324 miles of Mariner pipelines **there may be** sections where cathodic protection is quite good and there may be sections where it is quite bad. **Without reference to real data, once again there is simply no way to know.**

Dr. Zee Surrebuttal at 8:1-24 (emphasis added).

This soil chemistry **might be considered** to be conducive to SCC given the proper stress conditions" and that "Mr. Field has not challenged my basic finding that this soil chemistry **might be considered** conducive to development of SCC.

Dr. Zee Surrebuttal at 10:13-11:5 (emphasis added).

¹⁰ The public version of Dr. Zee's surrebuttal testimony is included as **Attachment B**. The highly confidential/confidential security version is already in the possession of eligible reviewing representatives pursuant to the Amended Protective Order in this proceeding, including Your Honor.

Q. Is it your contention that the information gleaned from the Morgantown investigation is sufficient to draw the conclusion that there is a system-wide failure of integrity management?

A. Not at all. What we are saying, however, is that data provided by BI&E and by DNV and by Sunoco itself suggest that there **may be a system-wide failure** and that steps need to be taken to investigate further.

Dr. Zee Surrebuttal at 14:37-15:3 (emphasis added).

I would conjecture that the 12-inch pipeline is probably in worse condition than the 8-inch pipeline. **But this is speculation and we must rely on facts.** You could really only tell if there were a proper investigation, as I have recommended.¹¹

Dr. Zee Surrebuttal at 16:25-31 (emphasis added).

No firm scientific conclusions regarding the leak on April 1, 2017 are possible. At most, one may conclude that it is more likely than not that MIC was involved **but that was never demonstrated**.

Dr. Zee Surrebuttal at 17:33-18:4 (emphasis added). Dr. Zee's statements about what is possible,

what may be, what might be, what he conjectures and what he speculates, do not and cannot satisfy

the requirements for competent expert testimony or for establishing substantial evidence.

5. The reason Dr. Zee does not have the information he seeks is because Complainants

were given notice by at least three orders prior to submitting their direct testimony in January

2020 that they could not pursue allegations related to the Bureau of Investigation and

Enforcement's (BI&E) Morgantown Complaint, but chose to again ignore Your Honor's rulings.¹²

¹¹ Once again, he seeks to base a claim for relief (whatever he means by a "proper investigation" based on conjecture and speculation. One would have to look long and hard for a more legally defective statement to support an order directing a utility to do anything.

¹² Second Interim Order, at p.8 (striking Complainants' attempt to incorporate Morgantown Complaint by reference) (Barnes, J.) (Order entered Mar. 12, 2019); Order Granting In Part And Denying In Part Complainants' Motion For Reconsideration Of Second Interim Order, at pp. 5-7 (denying reconsideration of Complainants' request to include Morgantown Complaint allegations

Moreover, prior to their direct testimony submission, Complainants were expressly denied discovery into these matters.¹³ Complainants chose to ignore these orders when they presented Dr. Zee's testimony which is seeded with speculation, conjecture and innuendo—not to mention second-guessing BI&E with no facts in support. In short, Dr. Zee's testimony is nothing more than a collateral attack on Your Honor's correct rulings. Complainants have the burden of proof and have failed to prove a violation of anything resulting in harm to support the relief they seek.

6. Accordingly, since Complainants' testimony even if taken as true does not present substantial evidence to show a violation of law regarding the integrity management, corrosion control, and cathodic protection of the Mariner East 1 and 12-inch pipelines, there is no material fact in dispute here and SPLP is entitled to judgment as matter of law on these issues.

II. ARGUMENT

A. Legal Standards

7. Pursuant to 52 Pa. Code § 5.102, SPLP moves for partial summary judgment as the pleadings and testimony show that there is no genuine issue as to a material fact and SPLP is entitled to a judgment as a matter of law regarding the integrity management, corrosion control, and cathodic protection of the Mariner East 1 and 12-inch pipelines.

in their Complaint and denying Complainants' request for subpoena to BI&E for documents related to Morgantown Complaint) (Barnes, J.) (Order entered Jun. 6, 2019); Order Granting Preliminary Objections To Second Amended Complaint, at 6-7 (striking portions of Second Amended Complaint identical to Morgantown Complaint and stating Flynn Complainants "ignored [the prior two] orders and filed the Second Amended Complaint that contains allegations nearly identical to those of the Morgantown Complaint") (Barnes, J.) (Order entered Jul. 31, 2019) (emphasis added).

¹³ Order Granting In Part And Denying In Part Complainants' Motion To Compel Responses To Complainants' Interrogatories And Document Request Set 1, at pp. 14-25 (denying approximately 100 discovery requests related to Morgantown) (Barnes, J.) (Order entered Jun. 6, 2019).

8. A ruling for summary judgment, where properly exercised, serves judicial economy by avoiding a hearing where no factual dispute exists. If no factual issue pertinent to the resolution of a case exists, a hearing is unnecessary. 66 Pa. C.S. § 703(a); *Lehigh Valley Power Committee v. Pa. Pub. Util. Comm'n*, 563 A.2d 557 (Pa. Cmwlth. 1989); *S.M.E. Bessemer Cement, Inc. v. Pa. Pub. Util. Comm'n*, 540 A.2d 1006 (Pa. Cmwlth. 1988); *Walter Painter and Donna Painter v. Aqua Pa., Inc.*, Docket No. C-2011-2239556 (Order entered May 22, 2014)."

9. The Commission's regulation at 52 Pa. Code § 5.102(a) permits any party to move for summary judgment. A motion for summary judgment must be based on the pleadings and depositions, answers to interrogatories, admissions and supporting affidavits. § 5.102(c). Testimony served in a proceeding is treated as the affidavit the submitting party. *See, e.g., Re AT&T Commc'ns of Pa., Inc.*, Docket No. P-880306, 80 Pa. P.U.C. 349, 1993 WL 493599, Initial Decision (ALJ Schnierle ID entered Jan. 22, 1993) ("Here, I am treating the direct testimony filed by the Staff as the affidavits of that party."), *aff'd* (Order entered Sept. 13, 1993). Oral testimony may also be considered when deciding a motion for summary judgement. *See, e.g., Application of Kenneth Scott Cobb*, Docket No. A-2011-2280175, 2012 WL 6641340, Initial Decision (ALJ Barnes ID entered Nov. 16, 2012) (Final by Act 294 Jan. 7, 2013).

10. The moving party bears the burden of showing that no genuine issue of material fact exists and that it is entitled to judgment as a matter of law. The Commission must view the record in the light most favorable to the non-moving party, giving that party the benefit of all reasonable inferences. *First Mortgage Co. of Pa. v. McCall*, 459 A.2d 406 (Pa. Super. 1983).

11. However, the nonmoving party may not simply rest upon the mere allegations or denials of its pleading but must set forth facts showing that there is a genuine issue for trial. *Crh Catering Co., Inc.*, No. C-2014-2415277, 2015 WL 849251, at *6 (Pa. P.U.C. 2015), citing *Fiffick*

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v. GAF Corp., 603 A.2d 208 (Pa. Super. 1991) (discussing the Pennsylvania Rules of Civil Procedure). Assertions, personal opinions, or perceptions do not constitute evidence. *Mable Lekawa*, No. F-2017-2629733, 2018 WL 5994785, at *11 (Pa. P.U.C. Nov. 6, 2018), *citing Pa. Bureau of Corrections v. City of Pittsburgh*, 532 A.2d 12 (Pa. 1987).

12. The Commission is granted discretion to dismiss any complaint without a hearing if, in its opinion, a hearing is not necessary in the public interest. 66 Pa. C.S. § 703(b); 52 Pa. Code § 5.21(d). A hearing is necessary only to resolve disputed questions of fact, and when the question presented is one of law, the Commission need not hold a hearing. *Lehigh Valley Power Comm. v. Pa. Pub. Util. Comm'n*, 563 A.2d 548 (Pa. Cmwlth. 1989); *Edan Transp. Corp. v. Pa. Pub. Util. Comm'n*, 623 A.2d 6 (Pa. Cmwlth. 1993). Further hearing in view of Complainants' deficient case in chief is a waste of time and resources.

13. As the proponent of a rule or order, Complainants have the burden of proof in this matter pursuant to 66 Pa. C.S. § 332(a). To establish a sufficient case and satisfy the burden of proof, Complainant must show that the respondent public utility is responsible or accountable for the problem described in the Complaint. *Patterson v. Bell Telephone Co. of Pa.*, 72 Pa. PUC 196 (1990); *Feinstein v. Philadelphia Suburban Water Co.*, 50 Pa. PUC 300 (1976). Such a showing must be by a preponderance of the evidence. *Samuel J. Lansberry, Inc. v. Pa. Pub. Util. Comm'n*, 578 A.2d 600, 602 (Pa. Cmwlth. 1990), *appeal denied*, 602 A.2d 863 (Pa. 1992). A preponderance of the evidence is established by presenting evidence more convincing, by even the smallest amount, than that presented by the other party. *Se-Ling Hosiery v. Margulies*, 70 A.2d 854 (Pa. 1950).

14. Any finding of fact necessary to support the Commission's adjudication must be based upon substantial evidence. *Mill v. Pa. Pub. Util. Comm'n*, 447 A.2d 1100 (Pa. Cmwlth.

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1982); *Edan Transp. Corp. v. Pa. Pub. Util. Comm'n*, 623 A.2d 6 (Pa. Cmwlth. 1993); 2 Pa. C.S. § 704. Substantial evidence has been defined as such relevant evidence as a reasonable mind might accept as adequate to support a conclusion. *Bethenergy Mines, Inc. v. Workmen's Comp. Appeal Bd. (Skirpan)*, 612 A.2d 434 (Pa. 1992). **More is required than a mere trace of evidence or a suspicion of the existence of a fact sought to be established**. *Norfolk and Western Ry. Co. v. Pa. Pub. Util. Comm'n*, 413 A.2d 1037 (Pa. 1980); *Erie Resistor Corp. v. Unemployment Comp. Bd. of Review*, 166 A.2d 96 (Pa. Super. 1960); *Murphy v. Dep't. of Public Welfare, White Haven Center*, 480 A.2d 382 (Pa. Cmwlth. 1984). Thus, substantial evidence requires competent and certain evidence.

15. An expert opinion exhibiting equivocation and speculation based on mere possibilities is not competent evidence. *Vertis Group, Inc. v. Duquesne Light Co.*, 2003 WL 1605744, Docket No. C-00003643 (Order entered Feb. 24, 2003), *aff'd* 840 A.2d 390 (Pa. Cmwlth. 2003), *appeal denied*, 859 A.2d 770 (Pa. 2004). As the Commission explained in *Vertis Group v. Duquesne Light Co.*:

An expert need not testify with absolute certainty or rule out all possible causes of a condition. Mitzfelt v. Kamrin, 526 Pa. 54, 584 A.2d 888 (1990). Likewise, the testimony need not be expressed in precisely the language used to enunciate the legal standard. In re Jones. 432 Pa. 44. 246 A.2d 1149 (1984).Rather, expert testimony must be viewed in its entirety to assess whether it expresses the requisite degree of certainty. McCann v. Amy Joy Donut Shops, 325 Pa. Superior Ct. 340, 472 A.2d 1149 (1984). Expert testimony based upon mere probability, however, e.g., "more probable than not", that the alleged cause "possibly" or "could have" led to the result, that it "could very properly account" for the result, or even that it "was very highly probable" that it caused the result, lacks the requisite degree of certainty to be accepted as competent evidence. Hoffman v. Brandywine Hospital, 443 Pa. Superior Ct. 245, 661 A.2d 397 (1995).

Id. at Exception 20 (agreeing with ALJ that that expert opinions exhibiting equivocation and speculation based upon mere probabilities failed to rise to the level of scientific certainty required by law to accept expert opinion testimony) (emphasis added). *See also Povacz v. PECO Energy Co.*, Docket No. C-2015-2475023, Opinion and Order at 61-62 (Order entered March 28, 2019), *appeal docketed*, No. 492 CD 2019 (Pa. Cmwlth. Apr. 26, 2019) (holding expert opinion fell below required standard and burden of proof and did not constitute competent evidence to support a finding of fact) (citing *Halaski v. Hilton Hotel*, 409 A.2d 367, 369, n.2 (Pa. 1979); *Menarde v. Philadelphia Transp. Co.*, 103 A.2d 681, 684 (Pa. 1954) ("[T]he expert has to testify, not that the condition of claimant might have, or even probably did, come from the cause alleged, but that in his professional opinion the result in question came from the cause alleged. A less direct expression of opinion falls below the required standard of proof and does not constitute legally competent evidence.")).

16. "For the Commission to sustain a complaint brought under this section [66 Pa. C.S. § 1501], the utility must be in violation of its duty under this section. Without such a violation by the utility, the Commission does not have the authority, when acting on a customer's complaint, to require any action by the utility." *Seese v. PPL Elec. Util's Corp.*, Docket No. C-2015-2500818, Initial Decision at *5 (ALJ Barnes ID entered Mar. 17, 2016) (Final via Act 294) (citing *West Penn Power Co. v. Pa. Pub. Util. Comm'n*, 478 A.2d 947, 949 (Pa. Cmwlth. 1984)); *see also Rahn, Twp. of Spring et al. v. Pennsylvania-American Water Co.*, Docket Nos. C-20054919 et al, 2007 WL 2198196 at *6 (Order entered Jul. 27, 2007) (denying request for geophysical testing where no credible evidence that some act or omission by utility in violation of the Code or Commission regulations would be remedied by geophysical testing).

17. To find a violation of 66 Pa. C.S. § 1501, the Commission must find SPLP violated a pipeline safety regulation. *See Bennett v. UGI Central Penn Gas, Inc.*, Docket No. F-2013-2396611, Initial Decision (ALJ Salapa) (Order final via Act 294 on April 10, 2014). Moreover, a utility has managerial discretion in its operations that the Commission cannot interfere with unless it is proven that the utility has manifestly abused that discretion.

> Under the "management discretion doctrine," the Commission may not interfere with or micromanage utility management decisions, unless there is a manifest abuse of discretion or some showing of arbitrary utility action. *Pa. PUC v. Philadelphia Electric Co.*, 522 Pa. 338, 561 A.2d 1224 (1989); and *Petition of Frank Bankard*, Docket No. P-00052172 (April 21, 2006). A public utility is not a guarantor of either perfect service or the best possible service. *Re: Metropolitan Edison Co.*, 80 Pa. P.U.C. 662 (1993), and *Troutman v. Somerset Rural Electric Cooperative*, 65 Pa. P.U.C. 170 (1987). A spectrum of acceptable behavior exists based upon the particular facts of each case. *Borough of Sewickley v. Verizon Pennsylvania Inc.*, Docket No. C-00003256, 2001 Pa. PUC LEXIS 29 (June 21, 2001).

Rahn, Twp. of Spring et al. v. Pennsylvania-American Water Co., Docket Nos. C-20054919 et al,

2007 WL 2198196 at *6 (Order entered Jul. 27, 2007).

18. Thus, any type of relief from this Commission requires a showing of a violation the

Public Utility Code, Commission regulations, or Commission order. As to injunctive relief, this

is an extreme remedy and must be narrowly tailored to abate the harm complained of.

Injunctive relief must be narrowly tailored to abate the harm complained of. *Pye v. Com. Ins. Dep't*, 372 A.2d 33, 35 (Pa. Cmwlth. 1977) ("An injunction is an extraordinary remedy to be granted only with extreme caution"); *Woodward Twp. V. Zerbe*, 6 A.3d 651, 658 (Pa. Cmwlth. 2010) ("Even where the essential prerequisites of an injunction are satisfied, the court must narrowly tailor its remedy to abate the injury"); *West Goshen Township v. Sunoco Pipeline L.P.*, Docket No. C-2017-2589346 at 17-18 (Order entered Mar. 15, 2018).

West Goshen Twp. v. Sunoco Pipeline L.P., Docket No. C-2017-2589346, Initial Decision at 42 (ALJ Barnes ID entered Jul. 19, 2018), *aff'd* (Order entered Oct. 1, 2018).

B. <u>Complainants' Failed To Meet Their Burden Of Proof And SPLP Is Entitled To</u> Judgement As A Matter Of Law

19. Complainants only expert witness regarding integrity management, corrosion control, and cathodic protection, Dr. Zee, presented direct testimony that is the definition of uncertain, speculative, and equivocal. It is not substantial evidence required to meet Complainants burden of proof on these issues and neither is any of the other testimony presented in this proceeding. There are no material questions of fact here because Complainants' testimony, even if taken as true still does not show a violation and harm for which relief can be granted. Without substantial evidence of a violation of the Public Utility Code, Commission regulations or a Commission Order, Complainants not entitled to any relief based on these allegations.

20. Complainants filed formal complaints alleging issues with SPLP's integrity management program and practices and corrosion control and cathodic protection. Specifically, Complainants allege that SPLP's integrity management plan does not comply with codified minimum safety standards and that SPLP's integrity management practices demonstrate a pattern of non-compliance. Flynn Second Amended Complaint at ¶¶ 13, 128-131, 143; Andover HOA at ¶¶ 68-70.

21. Complainants seek injunctive relief based on these allegations. Specifically, Complainants request that the Commission enter an Order directing SPLP to cease operation of the 8-inch ME1 and the 12-inch pipelines.¹⁴ Flynn Complaint at p. 34; Andover HOA at p. 23;

¹⁴ Complainants have not alleged and supported with evidence issues regarding integrity management or cathodic protection or corrosion control of the ME2 or ME2X newly constructed or currently under construction pipelines.

DiBernardino Complaint at p. 18; Obenski Complaint at p. 9. Complainants further request that the Commission make determinations as to the reasonableness of SPLP's integrity management program and corrosion protection practices. Britton Complaint at p. 5-6; Obenski Complaint at p. 3. Additionally, Complainants request that the Commission order the completion of independent remaining life study of the ME1 and 12-inch pipelines. Flynn Complaint at p. 36; Andover HOA Complaint at p. 23; DiBernardino Complaint at p. 18.

22. To obtain any relief, Complainants, who have the burden of proof, must show through substantial evidence that SPLP violated the Public Utility Code, Commission regulations, or a Commission Order.¹⁵ To obtain the extreme injunctive relief they seek, they must show that there is harm and that the relief requested is "narrowly tailored to abate the harm complained of."¹⁶

23. The time for Complainants to submit any other evidence has passed. Complainants must have presented a *prima facia* case consisting of substantial evidence¹⁷ by this point in the proceeding of a violation the Public Utility Code, a Commission regulation, or Commission Order

¹⁵ "For the Commission to sustain a complaint brought under this section [66 Pa. C.S. § 1501], the utility must be in violation of its duty under this section. Without such a violation by the utility, the Commission does not have the authority, when acting on a customer's complaint, to require any action by the utility." *Seese v. PPL Elec. Util's Corp.*, Docket No. C-2015-2500818, Initial Decision at *5 (ALJ Barnes ID entered Mar. 17, 2016) (Final via Act 294) (citing *West Penn Power Co. v. Pa. Pub. Util. Comm'n*, 478 A.2d 947, 949 (Pa. Cmwlth. 1984)); *see also Rahn, Twp. of Spring et al. v. Pennsylvania-American Water Co.*, Docket Nos. C-20054919 et al, 2007 WL 2198196 at *6 (Order entered Jul. 27, 2007) (denying request for geophysical testing where no credible evidence that some act or omission by utility in violation of the Code or Commission regulations would be remedied by geophysical testing).

¹⁶ West Goshen Twp. v. Sunoco Pipeline L.P., Docket No. C-2017-2589346, Initial Decision at 42, (ALJ Barnes ID entered Jul. 19, 2018), *aff'd* (Order entered Oct. 1, 2018).

¹⁷ *Mill v. Pa. Pub. Util. Comm'n*, 447 A.2d 1100 (Pa. Cmwlth. 1982); *Edan Transp. Corp. v. Pa. Pub. Util. Comm'n*, 623 A.2d 6 (Pa. Cmwlth. 1993).

because they cannot introduce evidence outside the scope of their direct testimony or that is outside the scope of SPLP's rebuttal testimony. There are no more opportunities left for Complainants to prove their allegations.¹⁸ Complainants failed to present the required substantial evidence, despite having had multiple opportunities to do so.

24. Substantial evidence is such relevant evidence as a reasonable mind might accept as adequate to support a conclusion. *Bethenergy Mines, Inc. v. Workmen's Comp. Appeal Bd. (Skirpan)*, 612 A.2d 434 (Pa. 1992). **More is required than a mere trace of evidence or a suspicion of the existence of a fact sought to be established**. *Norfolk and Western Ry. Co. v. Pa. Pub. Util. Comm'n*, 413 A.2d 1037 (Pa. 1980); *Erie Resistor Corp. v. Unemployment Comp. Bd. of Review*, 166 A.2d 96 (Pa. Super. 1960); *Murphy v. Dep't. of Public Welfare, White Haven Center*, 480 A.2d 382 (Pa. Cmwlth. 1984). Thus, substantial evidence requires competent and certain evidence.

25. Complainants' only expert witness testimony fails to present substantial evidence. An expert opinion exhibiting equivocation and speculation based on mere possibilities is not competent evidence. *Vertis Group, Inc. v. Duquesne Light Co.*, 2003 WL 1605744, Docket No. C-

¹⁸ See 52 Pa. Code § 5.243(e) (prohibiting the introduction of evidence during rebuttal which should have been included in the party's case-in-chief or which substantially varies from the party's case-in-chief); Order Granting Sunoco Pipeline, L.P.'s Omnibus Motion, at Ordering Paragraphs 2 (denying request for supplemental direct testimony), 4 (expressly enforcing § 5.243(e)) (Barnes, J.) (Order entered Feb. 11, 2020); Order Amending Procedural Schedule; Denying Flynn Complainants' Motion For Leave To File Supplemental Direct Testimony And Exhibits; And Denying Flynn Complainants' Motion To Determine Sufficiency Of Sunoco Pipeline, L.P.'s Objections And Answer To Request For Admissions, at pp. 2-3 (denying discovery and thus potential later admission of discovery on issues beyond scope of direct and denying request to file supplemental direct testimony) (Barnes, J.) (Order entered May 28, 2020).

00003643 (Pa. P.U.C. Order entered Feb. 24, 2003), aff'd, 840 A.2d 390 (Pa. Cmwlth. 2003),

appeal denied, 859 A.2d 770 (Pa. 2004). As the Commission explained in Vertis Group v.

Duquesne Light Co.:

An expert need not testify with absolute certainty or rule out all possible causes of a condition. *Mitzfelt v. Kamrin*, 526 Pa. 54, 584 A.2d 888 (1990). Likewise, the testimony need not be expressed in precisely the language used to enunciate the legal standard. *In re Jones*, 432 Pa. 44, 246 A.2d 1149 (1984). Rather, expert testimony must be viewed in its entirety to assess whether it expresses the requisite degree of certainty. *McCann v. Amy Joy Donut Shops*, 325 Pa. Superior Ct. 340, 472 A.2d 1149 (1984). Expert testimony based upon mere probability, however, e.g., "more probable than not", that the alleged cause "possibly" or "could have" led to the result, that it "could very properly account" for the result, or even that it "was very highly probable" that it caused the result, lacks the requisite degree of certainty to be accepted as competent evidence. *Hoffman v. Brandywine Hospital*, 443 Pa. Superior Ct. 245, 661 A.2d 397 (1995).

Id. at Exception 20 (agreeing with ALJ that that expert opinions exhibiting equivocation and speculation based upon mere probabilities failed to rise to the level of scientific certainty required by law to accept expert opinion testimony) (emphasis added). Three witnesses presented written direct testimony related to integrity management, cathodic protection and corrosion control – Dr. Zee, Mr. Boyce, and Mr. Kirchgasser. None of this testimony presents substantial evidence of a violation of pipeline safety law or regulations.

26. Witness Dr. Zee presents Complainants' case on integrity management, cathodic protection and corrosion control. However, his testimony is not competent because it does not have the requisite degree of certainty. In short, Dr. Zee's testimony is long on accusations but that is neither evidence nor proof. That Dr. Zee says the magic words "to a reasonable degree of professional certainty" is irrelevant, the testimony must be looked at as a whole to determine if such certainty exists in the testimony. *Id.* When viewing the testimony as a whole, it is equivocal

and speculative, and that is not substantial evidence. *Id.* (opinions exhibiting equivocation and speculation based upon mere probabilities fail to rise to the level of scientific certainty required by law to accept expert opinion testimony). Dr. Zee's ultimate conclusions are the definition of equivocal and speculative and clearly are not substantial evidence of anything because they merely raise the "suspicion of the existence of a fact sought to be established":

In closing, for an expert to be able to form an opinion as to the present, likely condition of the 12-inch and 8-inch lines, a good deal more information would be required than has been supplied to Matergenics to date. The information needed has been set out in detail above in Part III. The materials furnished, however, raise serious questions as to the condition of these aging pipelines as well as the fitness of Sunoco to operate them.

(1) Based upon the materials we have been permitted to review, Sunoco **may be** operating an inadequate integrity management program for the 8-inch pipeline and the 12-inch pipeline considering the leak incidents, age of pipeline and coatings that, if disbonded, shield cathodic protection.

(2) Based upon the materials we have been permitted to review, important information relative to corrosion data, corrosion risk and corrosion mitigation is lacking.

(3) Sunoco's operation of the 8-inch pipeline and the 12-inch pipeline **should be reviewed** for corrosion risk both externally and internally;

(4) Sunoco's operation of the subject 8-inch pipeline and the 12-inch pipeline **should be reviewed** for safety considerations from a corrosion risk point of view; and

(5) **The question of whether** or not Sunoco should be permitted to continue operating these pipelines **cannot properly be decided without a thorough investigation** by an independent expert.

Dr. Zee Direct at 41:44-42:27 (emphasis added).

27. Dr. Zee's surrebuttal testimony fares no better. First, he repeats his speculation,

accusations and admission that he needs more information to render an opinion by stating his

conclusions from his direct testimony (which as demonstrated above are not competent conclusions because they do not contain the requisite certainty) have not changed. Dr. Zee Surrebuttal at 12:17-20, 27:11-13. He then makes various assertions that are not certain enough to be competent expert testimony or establish substantial evidence.

It does **seem possible and even probable** that MIC was responsible. I, personally, suspect that MIC is more likely than not as the culprit, but we can never know because of the site contamination and failure by DNV to conduct appropriate testing.

Dr. Zee Surrebuttal at 7:2, 7:18-29 (emphasis added).

Along more than 324 miles of Mariner pipelines there may be sections where cathodic protection is quite good and there may be sections where it is quite bad. Without reference to real data, once again there is simply no way to know.

Dr. Zee Surrebuttal at 8:1-24 (emphasis added).

This soil chemistry **might be considered** to be conducive to SCC given the proper stress conditions" and that "Mr. Field has not challenged my basic finding that this soil chemistry **might be considered** conducive to development of SCC.

Dr. Zee Surrebuttal at 10:13-11:5 (emphasis added).

Q. Is it your contention that the information gleaned from the Morgantown investigation is sufficient to draw the conclusion that there is a system-wide failure of integrity management? A. Not at all. What we are saying, however, is that data provided by BI&E and by DNV and by Sunoco itself suggest that there may be a system-wide failure and that steps need to be taken to investigate further.

Dr. Zee Surrebuttal at 14:37-15:3 (emphasis added).

I would conjecture that the 12-inch pipeline is probably in worse condition than the 8-inch pipeline. **But this is speculation and we**

must rely on facts. You could really only tell if there were a proper investigation, as I have recommended.¹⁹

Dr. Zee Surrebuttal at 16:25-31 (emphasis added).

No firm scientific conclusions regarding the leak on April 1, 2017 are possible. At most, one may conclude that it is more likely than not that MIC was involved but that was never demonstrated.

Dr. Zee Surrebuttal at 17:33-18:4.

28. The reason Dr. Zee does not have the information he seeks is because Complainants were given notice by at least three orders prior to submitting their direct testimony in January 2020 that they could not pursue allegations related to the BI&E's Morgantown Complaint, but chose (yet again) to ignore Your Honor's rulings. Second Interim Order, at p.8 (striking Complainants' attempt to incorporate Morgantown Complaint by reference) (Barnes, J.) (Order entered Mar. 12, 2019); Order Granting In Part And Denying In Part Complainants' Motion For Reconsideration Of Second Interim Order, at pp. 5-7 (denying reconsideration of Complainants' request to include Morgantown Complaint allegations in their Complaint and denying Complainants request for subpoena to BI&E for documents related to Morgantown Complaint) (Barnes, J.) (Order entered Jun. 6, 2019); Order Granting Preliminary Objections To Second Amended Complaint, at pp. 6-7 (striking portions of Second Amended Complaint identical to Morgantown Complaint that contains allegations nearly identical to those of the Morgantown Complaint") (Barnes, J.) (Order entered Jun. 31, 2019) (emphasis added).

¹⁹ Once again, he seeks to base a claim for relief (whatever he means by a "proper investigation") based on conjecture and speculation. One would have to look long and hard for a more legally defective statement to support an order directing a utility to do anything.

Moreover, prior to their direct testimony submission, Complainants were expressly denied discovery into these matters. Order Granting In Part And Denying In Part Complainants' Motion To Compel Responses To Complainants' Interrogatories And Document Request Set 1, at pp. 14-25 (denying approximately 100 discovery requests related to Morgantown) (Barnes, J.) (Order entered Jun. 6, 2019). Complainants chose to ignore these orders when they presented Dr. Zee's testimony which is seeded with speculation, conjecture and innuendo—not to mention second-guessing BI&E with no facts in support. In short, Dr. Zee's testimony is nothing more than a collateral attack on Your Honor's correct rulings. Complainants have the burden of proof and have failed to prove a violation of anything to support the relief they seek.

29. As shown in the table below, Dr. Zee's testimony repeatedly fails to exhibit the certainty required for a competent expert

opinion and fails to provide substantial evidence of a violation of pipeline safety regulations.

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
A.	Dr. Zee Direct at 8:4- 9:36.	General description of aging pipeline and corrosion, acknowledging that age by itself may not result in corrosion and that damage mechanisms/threats can be identified, controlled and mitigated.	This is merely a general description of corrosion that acknowledges corrosion threats can be identified controlled, and mitigated through corrosion control and integrity management programs. As Dr. Zee testified, SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and use "good engineering practices." Dr. Zee Direct at 39:19-35.
В.	Dr. Zee Direct at 11:1-12:5.	Providing tables of SPLP repair report information and concluding bare pipe had the greatest amount of corrosion.	Does not show a violation of law. Corrosion in and of itself is not a violation of pipeline safety regulations. The federal regulations in fact anticipate that pipelines will experience corrosion and require that operators have effective programs in place to manage that corrosion (49 C.F.R. Part 195 Subpart H). Pursuant to 49 C.F.R. § 195.452(h)(4)(i)(A), metal loss must be immediately repaired when (1) it is located on a pipeline that could affect a high consequence area and (2) the "metal loss [is] greater than 80% of nominal wall regardless of dimensions." Dr. Zee's testimony reflects that SPLP met this criterion. Dr. Zee Direct at 25:34-42.
C.	Dr. Zee Direct at 12:7-16.	Generally describing cathodic protection.	Merely a general description.
D.	Dr. Zee Direct at 12:18-26.	Stating unclear what CP criteria was used on the ME1 pipeline.	Equivocal and speculative, does not show a violation of law.

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
Е.	Dr. Zee Direct at 12:29-36.	Quoting NACE SP0169-2013 standards related to "active" Microbiologically Induced Corrosion.	Merely a general description. Moreover, NACE SP0169-2013 is not incorporated into the Pipeline and Hazardous Materials Safety Administration (PHMSA) 49 C.F.R. Part 195 regulations. Instead, the 2007 version is incorporated into PHMSA regulations. 49 C.F.R. § 195.3(g)(1) (incorporating NACE SP0169-2007, Standard Practice, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems" reaffirmed March 15, 2007). There is no evidence showing that SPLP is required to use a different cathodic protection criterion for the pipelines at issue.
F.	Dr. Zee Direct at 13:4-18.	Stating what SPLP criterion for cathodic protection readings "appears to be" and concludes criterion "is not valid in presence of anaerobic bacteria or galvanic action."	Equivocal and speculative as to criterion, therefore cannot conclude it is inadequate. Dr. Zee fails to acknowledge criteria he states does not indicate alleged criterion is (?) "invalid," but instead states "is not always sufficient to mitigate corrosion." Dr. Zee Direct at 13:25.
G.	Dr. Zee Direct at 13:20-16:5.	General description of NACE criteria for Cathodic Polarization Criterion.	Merely a general description/characterization of standards.
H.	Dr. Zee Direct at 16:8-16:38.	Discussing that polarized potential criterion should be carefully considered in presence of stray current and alternate current interference conditions and stating he did not have data regarding whether SPLP performed stray current surveys or AC interference surveys.	Merely a general characterization which is equivocal and speculative and with the admission that he does not have data regarding these issues.

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
I.	Dr. Zee Direct at 17:1-13.	Generally discussing microbiological induced corrosion and stating SPLP "needs to disclose if any soil analysis was performed at the site of the Morgantown accident."	Merely a general characterization which is equivocal and speculative and with the admission that he does not have data regarding these issues.
J.	Dr. Zee Direct at 17:15-18:1.	General description of cathodic protection shielding and factors that may contribute to corrosion	Merely general characterization and information.
К.	Dr. Zee Direct at 18:8-23:29.	Discussing various documents SPLP produced in discovery, stating some documents " may be important, " admitting he does not have failure analyses.	Equivocal and speculative.
L.	Dr. Zee Direct at 23:32-24:6.	Reviewing report forms and concluding "No leak surveys were conducted by Sunoco."	Irrelevant. Leak surveys are not required for SPLP's Mariner East pipelines pursuant to 49 C.F.R. Part 195. Leak surveys are a requirement for certain natural gas pipelines pursuant to 49 C.F.R. Part 192.
M.	Dr. Zee Direct at 24:9-25:2.	Reviewing reports and inspection data and concluding: "Nothing abnormal was found in the inspection data."; and "Nothing abnormal was reported in the monitoring reports."	Does not show or allege a violation of pipeline safety regulations.

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
N.	Dr. Zee Direct at 25:3-29.	Reviewing discovery production and finding documents irrelevant.	Does not show or allege a violation of pipeline safety regulations.
0.	Dr. Zee Direct at 25:31-28:10.	Reviewing discovery production and concluding "documents may be relevant."	Equivocal and speculative.
Р.	Dr. Zee Direct at 25:36-42.	Reviewing SPLP integrity summaries and concluding from summaries the key criterion for repair requirement for metal loss based on when repair made.	Does not show a violation of law. Pursuant to 49 C.F.R. § 195.452(h)(4)(i)(A), metal loss must be immediately repaired when (1) it is located on a pipeline that could affect a high consequence area and (2) the "metal loss [is] greater than 80% of nominal wall regardless of dimensions." Records as reflected in Dr. Zee's testimony show repairs made prior to reaching this criterion.
Q.	Dr. Zee Direct at 26:1-27.	Reviewing SPLP ILI inspection anomaly reports for ME1 identifying corrosion and pit depth measurements.	Does not show a violation of law. Corrosion in and of itself is not a violation of pipeline safety regulations. The federal regulations in fact anticipate that pipelines will experience corrosion and require that operators have effective programs in place to manage that corrosion (49 C.F.R. Part 195 Subpart H). Pursuant to 49 C.F.R. § 195.452(h)(4)(i)(A), metal loss must be immediately repaired when (1) it is located on a pipeline that could affect a high consequence area and (2) "metal loss [is] greater than 80% of nominal wall regardless of dimensions." No evidence presented that SPLP did not meet this criterion.
R.	Dr. Zee Direct at 26:29-35.	Stating there are certain anomalies or imperfections including corrosion threats cannot reliably determine and concluding "many cases of external metal loss (corrosion) may have been overlooked by	Speculative and equivocal in use of the word "may". Moreover, does not show a violation of law. Pursuant to 49 C.F.R. § 195.452(j)(5)(i)-(iv), "an operator must assess the integrity of the line pipe by any of the following methods," the first method listed is In-Line Inspection tools, and the inspection methods use the conjunctive "or." Moreover, as Dr. Zee testified, SPLP's Integrity Management Plans are "reasonably

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
		ILI inspection and, and thus this list of [SPLP] anomaly reports does not reflect the extent of the probably external metal loss/corrosion problem along the ME1 pipeline.	comprehensive and detailed" and use "good engineering practices." Dr. Zee Direct at 39:19-35.
S.	Dr. Zee Direct at 26:37-39.	Discussing a pipeline inspection report but failing to discuss any relevancy.	Does not show a violation of law.
Т.	Dr. Zee Direct at 26:41-27:7.	Discussing inspection and maintenance reports for 2013- 2016, noting condition/type of coating and concluding "cathodic protection may not be effective."	Does not show a violation of law. Speculative and equivocal. The federal regulations in fact anticipate that pipelines will experience corrosion and detecting signs of possible corrosion is not a regulatory violation. Rather, PHMSA regulations require that operators have effective programs in place to manage corrosion and implement remediation and mitigation where necessary (49 C.F.R. Part 195 Subpart H).
U.	Dr. Zee Direct at 27:13-28:10.	Discussing specifications and concluding "these specifications do not have an impact on our analysis conclusion and opinions concerning the current condition of the aging pipeline coatings." Noting disagreement with use of certain coatings without adequate preparation and application.	Equivocal and speculative. Does not present facts to conclude if SPLP used adequate preparation and application.

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
V.	Dr. Zee Direct at 28:13-30:21.	Discussing SPLP close interval survey (CIS) plots and noting additional information needed. Generally discussing NACE SP0207-2007. Discussing findings of CIS documents and concluding " possible presence of anodic conditions," wanting to know "if direct assessment was performed," noting Dr. Zee's firm would "like to perform CIS," "very high potentials could result in coating disbondment," and expressing interest to know soil conditions and perform soil resistivity measurements and collect soil samples for detailed lab analysis.	Equivocal and speculative. Demonstrates lack of information to form conclusions. Under PHMSA regulations, operators are required to determine the potential for damage mechanisms that may impact the pipeline such as corrosion and implement remediation and mitigation where necessary (49 C.F.R. Part 195, Subpart H). In addition, where applicable operators must implement an integrity management program to analyze and identify potential integrity threats and mitigate them (49 C.F.R. § 195.452). Close interval surveys are but one of a variety of monitoring mechanisms permissible under PHMSA regulations to monitor integrity threats such as pipeline corrosion.
W.	Dr. Zee Direct at 30:24-38.	When asked if from the CIS plots Dr. Zee could conclude whether the CIS survey was performed in accordance with the Integrity Management Plan, Dr. Zee notes CIS can be performed in three conditions and expresses interest to know	Equivocal and speculative. Demonstrates lack of information to form conclusions.

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
		the reason for choosing condition used.	
X.	Dr. Zee Direct at 30:40-31:3.	Reviewing CIS data and concluding "This means the pipe can be at high risk for corrosion."	Equivocal and speculative. Does not show a violation of law. Corrosion in and of itself is not a violation of pipeline safety regulations. The federal regulations in fact anticipate that pipelines will have corrosion and require that operators have effective programs in place to manage that corrosion (49 C.F.R. Part 195 Subpart H). Pursuant to 49 C.F.R. § 195.452(h)(4)(i)(A), metal loss must be immediately repaired when (1) it is located on a pipeline that could affect a high consequence area and (2) "metal loss [is] greater than 80% of nominal wall regardless of dimensions."
Y.	Dr. Zee Direct at 31:7-15.	Noting CIS data shows locations where ON potential are very low and "expresses interest to know the proactive measures taken at the locations where ON potentials are very low."	Demonstrates lack of information to form conclusions. Fails to show a violation of law. The federal regulations in fact anticipate that pipelines will experience corrosion and detecting signs of possible corrosion is not a regulatory violation. Rather, PHMSA regulations require that operators have effective programs in place to manage corrosion and implement remediation and mitigation where necessary (49 C.F.R. Part 195 Subpart H). As Dr. Zee testified, SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and use "good engineering practices." Dr. Zee Direct at 39:19-35.
Z.	Dr. Zee Direct at 31:18-39:6.	Dr. Zee recommends "the scope of work needed for proper evaluation and assessment of the [ME1 and 12-inch] pipelines."	Does not show a violation of law and inconsistent with pipeline safety regulations. Pursuant to 49 C.F.R. § 195.452(j)(5)(i)-(iv), "an operator must assess the integrity of the line pipe by any of the following methods," the first method listed is In-Line Inspection tools, and the inspection methods use the conjunctive "or." Moreover, this is inconsistent with Dr. Zee's conclusion that SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and uses "good engineering practices." Dr. Zee Direct at 39:31-35. As Dr. Zee testified, SPLP's Integrity Management

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
			Plans are "reasonably comprehensive and detailed" and use "good engineering practices." Dr. Zee Direct at 39:19-35.
AA.	Dr. Zee Direct at 39:19-35.	SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and uses "good engineering practices."	Shows compliance with the law and pipeline safety regulations and thus does not show a violation of law.
BB.	Dr. Zee Direct at 39:37-40:2.	Concludes SPLP's integrity management practices have not followed good engineering standards or its integrity management plan because: - Dr. Zee does not have root cause analyses - CIS surveys do not meet integrity management plan standards - Documented instances of failure to maintain the pipe-to-soil ON potential of greater than -850 mV, falling below SPLP's written standards.	Does not show a violation of law. Regarding root cause analyses, Dr. Zee gets the burden of proof backwards and ignores that if he wanted this information, Flynn Complainants should have moved to compel it. That Dr. Zee does not have some documents does not present substantial evidence as to whether or not they exist. Regarding results of CIS surveys and maintenance of pipe-to-soil potentials, just because a survey or tests shows that segment of pipeline is not meeting the criteria of an operator's corrosion control procedures or its integrity management plan does not mean a violation of law has occurred. Pursuant to 49 C.F.R. 195 Subpart H and § 195.452(h), when issues are discovered, the regulations provide timelines for repair or remediation of the condition depending on whether the pipeline is located in a high consequence area. <i>See also</i> 49 C.F.R. § 195.573 ("You must correct any identified deficiency in volves a pipeline in an integrity management program under § 195.452, you must correct the deficiency as required by § 195.452(h)."). Neither CIS surveys nor pipeto-soil readings falling below a certain threshold have specific remediation timelines and thus they fall under "other conditions." For other conditions, "an operator must evaluate any condition identified by an integrity assessment or information analysis that could impair the integrity of the pipeline, and as appropriate, schedule the condition for remediation." <i>Id.</i> at § 195.452(h)(iv). Moreover, 49 C.F.R. § 195.452(i)(1) expressly

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			provides that where corrosion is a concern, an operator can take actions including but not limited to implementing "better monitoring of cathodic protection." Thus, the question as to a violation of pipeline safety regulations is not whether surveys and test results met criteria, but if they did not, what remedial actions were taken. Dr. Zee concludes numerous places in his testimony that he does not have this information. <i>See, e.g.</i> , Dr. Zee Direct at 30:24-38, 31:7-15.
CC.	Dr. Zee Direct at 40:9-41:2.	Repetitive of prior testimony addressed above.	See above.
DD.	Dr. Zee Direct at 41:4-8.	Generalization of managing pipeline integrity.	Irrelevant. Pipeline safety regulations provide the standards for integrity management. 49 C.F.R. § 195.452.
EE.	Dr. Zee Direct at 41:10-13.	States his review of documents produced in discovery shows "a pipeline integrity system that lacks a centralized source sufficient to document corrosion incidents, factual corrosion data, corrosion risk assessments/aspects of the	No basis for this conclusion and does not show a violation of law. For Dr. Zee to draw this conclusion, he would have to review all of SPLP's records related to these issues and he admits at numerous places that he did not. Moreover, SPLP was not required to produce all documents related to its integrity management program. Further, PHMSA integrity management regulations are performance based and provide operators with the discretion and flexibility to develop their own procedures based on specifics of their pipeline systems, including relevant data integration, risk assessments, and preventive and mitigative measures. ²⁰

Rather than telling operators what to do, the regulations tell them what level of safety to achieve. [...] There is tremendous variation between pipeline operators and between pipeline facilities. In order for one set of regulations to be comprehensive in scope, it would have to be quite lengthy and detailed. It would have to prescribe what operating, maintenance and emergency procedures are appropriate for all

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		aging pipeline and corrosion mitigation."	
FF.	Dr. Zee Direct at 41:15-24.	Concluding pipeline failure is made " more likely " under certain circumstances and that given documents he reviewed "it is more likely than not that accelerated corrosion is taking place that will cause serious damage."	Equivocal and speculative.
GG.	Dr. Zee Direct at 41:26-42.	Opinion regarding performance of a remaining life study and advertisement for Matergenics to perform it.	Irrelevant. Does not show a violation of law. Remaining life studies are not a regulatory requirement under federal or state pipeline safety regulations. Dr. Zee admits this. Dr. Zee Surrebuttal at 26:28-29.
нн.	Dr. Zee Direct at 41:44-42:4.	Opinion admitting that to form an opinion as to "the present, likely condition of 12-inch and 8-inch lines, a good deal more information would be needed. "	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.

Final Order, In re: Kaneb Pipe Line, PHMSA CPF No. 53509 (Feb. 26, 1998).

conceivable scenarios. The performance-based regulations reject this approach. The tell operators what level of safety must be achieved but do not spell out all of the steps necessary to get there.

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П.	Dr. Zee Direct at 42:10-27.	Concluding: SPLP " may be operating an inadequate integrity management program"; important information is lacking ; SPLP's operation " should be reviewed "; " question of whether or not [SPLP] should be permitted to continue operating cannot be properly decided ."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.
JJ.	Dr. Zee Surrebuttal at 4:10-34, 9:8- 14.	Discussing SPLP Exhibit JF-3 (various standard operating procedures and engineering standard) and alleging updated standards were put in place "in response to the absence of such practices leading up to the incident" and alleging just because these practices were adopted does not mean they were implemented.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. There is no basis for the allegation that updated standards were put in place in response to the incident or the allegation that these practices were not implemented. Dr. Zee has no basis for either of these speculative allegations, which do not raise material questions of fact. Implementing new standards does not prove or mean prior standards were not compliant with law or regulation. Dr. Zee admits he does not know whether the adopted practices he references were in fact implemented and instead offers speculation that they might not be implemented. Moreover, as Dr. Zee testified, SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and use "good engineering practices." Dr. Zee Direct at 39:19-35.
KK.	Dr. Zee Surrebuttal at 4:37-5:4.	Discussing SPLP Exhibit JF-4 (table of historical inspection dates, tools, and vendors) and stating "exhibit does nothing to change my opinion" and	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Dr. Zee admits he does not have the information he would need to reach such conclusion. As referenced above, Dr. Zee did not reach a competent conclusion as to the state of the ME1 and 12-inch pipelines. So that his conclusions have not changed is immaterial.
	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
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		"[t]o be useful, a detailed inspection file containing the details and the results of the individual inspections would be required."	
LL.	Dr. Zee Surrebuttal at 5:7-6:21.	Discussing SPLP Exhibit JF-5 (DNV Metallurgical Analysis of Morgantown incident) stating DNV was not on site for removal of portion of pipe to be inspected and that only eight feet of pipe was inspected and that over 83 feet of pipe were replaced in the area and questioning why SPLP will not address the absence and condition of missing pipe and stating no records have been supplied to Matergenics that address this matter.	Raises nothing more than irrelevant assertions and speculation.
MM.	Dr. Zee Surrebuttal at 6:26.	Dr. Zee admits he does not know what caused the leak at Morgantown.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.
NN.	Dr. Zee Surrebuttal at 6:27-7:15, 18:24-32.	Alleging SPLP contaminated section of pipe DNV tested, tampered with evidence and questioning why this was done or allowed to happen and that	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.

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		"this is something that needs to be addressed."	
00.	Dr. Zee Surrebuttal at 7:2, 7:18-29.	"It does seem <i>possible and</i> <i>even probable</i> that MIC was responsible." "I, personally, suspect that MIC is more likely than not as the culprit, but we can never know because of the site contamination and failure by DNV to conduct appropriate testing."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.
PP.	Dr. Zee Surrebuttal at 7:32-38, 14:22-28.	Discussing active corrosion and stating "perforation of an underground pipeline by corrosion process is certainly an indication of active corrosion and inadequate corrosion control."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. The federal regulations in fact anticipate that pipelines will experience corrosion and detecting signs of possible corrosion is not a regulatory violation. Rather, PHMSA regulations require that operators have effective programs in place to manage corrosion and implement remediation and mitigation where necessary (49 C.F.R. Part 195 Subpart H). Dr. Zee expressly states earlier in his testimony he does not know what cause the leak at Morgantown, therefore no basis for this conclusion applying to Morgantown. Moreover, this does not raise a question of material fact. Just because a leak has occurred does not mean there has been a violation of law. <i>See Bennett v. UGI Central Penn Gas, Inc.</i> , Docket No. F-2013-2396611, Initial Decision (ALJ Salapa) (Order final via Act 294 on April 10, 2014); <i>Rahn, Twp. of Spring et al. v. Pennsylvania-American Water Co.</i> , Docket Nos. C-20054919 et al, 2007 WL 2198196 at *6 (Order entered Jul. 27, 2007).

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QQ.	Dr. Zee Surrebuttal at 8:1-24.	Taking issue with Field's conclusions. Stating: "Along more than 324 miles of Mariner pipelines there may be sections where cathodic protection is quite good and there may be sections where it is quite bad. Without reference to real data, once again there is simply no way to know ."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established
RR.	Dr. Zee Surrebuttal at 8:27-9:5.	Taking issue with Field's testimony regarding repairing or replacing sections of pipelines or increasing cathodic protection current to reduce growth of corrosion, alleging documentation of percentage of metal loss and repair requirements, alleging he can conclude integrity of pipe was compromised at Morgantown location because percent of metal loss greater than alleged percent at which it must be repaired based on "prior document review."	Does not show a violation of law. The federal regulations in fact anticipate that pipelines will experience corrosion and detecting signs of possible corrosion is not a regulatory violation. Rather, PHMSA regulations require that operators have effective programs in place to manage corrosion and implement remediation and mitigation where necessary (49 C.F.R. Part 195 Subpart H). Corrosion in and of itself is not a violation of pipeline safety regulations. Pursuant to 49 C.F.R. § 195.452(h)(4)(i)(A), metal loss must be immediately repaired when (1) it is located on a pipeline that could affect a high consequence area and (2) "metal loss [is] greater than 80% of nominal wall regardless of dimensions." Dr. Zee's prior testimony reflects SPLP met this criterion. Dr. Zee Direct at 25:34-42. Dr. Zee's reference to percentage for repair based on prior document review is thus inconsistent and it is also false. Dr. Zee is referring to the requirement that an operator must address within 180 days of discovery a condition where predicted metal loss is greater than 50% of nominal wall. 49 C.F.R. § 195.452(h)(4)(iii)(E). Discovery of a condition occurs when an operator has adequate information to determine that a condition presenting a potential threat to the integrity of the pipeline exists. 49 C.F.R. §

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			195.452(h)(2). Dr. Zee presents no facts as to when he believes SPLP discovered the condition, and thus cannot show a violation of law.
SS.	Dr. Zee Surrebuttal at 9:17-21.	Stating "I cannot say for sure" why SPLP increased cathodic protection in the Morgantown area."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.
TT.	Dr. Zee Surrebuttal at 9:24-10:4	Stating "I cannot say for sure" whether cathodic protection readings 1,030 feet from Morgantown leak were correct and that pipe-to-soil potentials more negative "would be more appropriate." Admits he previously addressed in earlier testimony.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law. Regarding results of CIS surveys and maintenance of pipe-to-soil potentials, just because a survey or tests shows that segment of pipeline is not meeting the criteria of an operator's procedures or its integrity management plan does not mean a violation of law has occurred. Pursuant to 49 C.F.R. 195 Subpart H and § 195.452(h), when issues are discovered, the regulations provide timelines for repair or remediation of the condition depending on whether the pipeline is located in a high consequence area. <i>See also</i> 49 C.F.R. § 195.573 ("You must correct any identified deficiency in corrosion control as required by § 195.401(b). However, if the deficiency involves a pipeline in an integrity management program under § 195.452, you must correct the deficiency as required by § 195.452(h)."). Neither CIS surveys nor pipe-to-soil readings falling below a certain threshold have specific remediation timelines and thus they fall under "other conditions." For other conditions, "an operator must evaluate any condition identified by an integrity assessment or information analysis that could impair the integrity of the pipeline, and as appropriate, schedule the condition for remediation." <i>Id.</i> at § 195.452(h)(iv). Moreover, 49 C.F.R. § 195.452(i)(1) expressly provides that where corrosion is a concern, an operator can take actions including, but not limited to, implementing "better monitoring of cathodic protection." Thus, the question as to a violation of pipeline safety regulations is not whether surveys and test results met criteria, but if they did not, what

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			remedial actions were taken. Dr. Zee concludes numerous places in his testimony that he does not have this information. <i>See, e.g.</i> , Dr. Zee Direct at 30:24-38, 31:7-15.
UU.	Dr. Zee Surrebuttal at 10:6-10, 15:14-19.	Noting Dr. Zee does not have records of side drain measurements and alleging Field may agree with Dr. Zee's report because Dr. Zee was not provided information.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law.
VV.	Dr. Zee Surrebuttal at 10:13-11:5.	Describing stress corrosion cracking, reviewing DNV report on soil analysis and concluding "This soil chemistry might be considered to be conducive to SCC given the proper stress conditions" and that "Mr. Field has not challenged my basic finding that this soil chemistry might be considered conducive to development of SCC."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Moreover, Dr. Zee is now asserting in surrebuttal for the first time that these soil conditions "might be considered conducive to development of SCC" and Mr. Fields has not yet had a chance to respond. Regardless, the opinion is not competent to raise a material issue of fact because it is speculative.
WW.	Dr. Zee Surrebuttal at 11:8-23.	Addressing Field's testimony and stating Fields fails to identify recorded presence or absence of stray current or interference bonds.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Dr. Zee's Direct Testimony did not conclude that stray current or interference bonds were in fact occurring. Dr. Zee Direct at 16:8- 16:38. He gets the burden of proof exactly wrong – SPLP does not have the burden of proof and does not have to rebut speculative and hypothetical assertions because they are not substantial evidence.

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XX.	Dr. Zee Surrebuttal at 11:26-12:15.	Making assertions that "[g]ood engineering practices may call for more than meeting regulatory requirements."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law – Complainants must show SPLP violated a regulatory standard to obtain relief. <i>West Penn</i> .
YY.	Dr. Zee Surrebuttal at 12:22-27.	Stating: "The presence of accelerated corrosion and perforation is a regulatory violation. An inadequate or improper corrosion control program is a regulatory violation."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law. Dr. Zee has no basis to conclude there was "accelerated corrosion" regarding the Morgantown incident or that SPLP's corrosion control is inadequate or improper. He expressly concludes he does not know the cause of the Morgantown incident. Dr. Zee Surrebuttal at 6:26. Moreover, neither the presence of accelerated corrosion or perforation is a regulatory violation. First, just because a leak has occurred (a perforation) does not mean there has been a violation of law. <i>See Bennett v. UGI Central Penn Gas, Inc.</i> , Docket No. F- 2013-2396611, Initial Decision (ALJ Salapa) (Order final via Act 294 on April 10, 2014). Second, regarding accelerated corrosion, that is not a violation of regulation and runs contrary to actual regulations. Pursuant to 49 C.F.R. 195 Subpart H and § 195.452(h), when issues are discovered, the regulations provide timelines for repair or remediation of the condition depending on whether the pipeline is located in a high consequence area. <i>See also</i> 49 C.F.R. § 195.573 ("You must correct any identified deficiency in corrosion control as required by § 195.401(b). However, if the deficiency involves a pipeline in an integrity management program under § 195.452, you must correct the deficiency as required by § 195.452(h)."). Neither CIS surveys nor pipe-to-soil readings falling below a certain threshold have specific remediation timelines and thus they fall under "other conditions." For other conditions, "an operator must evaluate any condition identified by an integrity assessment or information analysis that could impair the integrity of the pipeline, and as appropriate, schedule the

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ZZ.	Dr. Zee	Describing and taking issue	condition for remediation." <i>Id.</i> at § 195.452(h)(iv). Moreover, 49 C.F.R. § 195.452(i)(1) expressly provides that where corrosion is a concern, an operator can take actions including but not limited to implementing "better monitoring of cathodic protection." Thus, the question as to a violation of pipeline safety regulations is not whether surveys and test results met criteria, but if they did not, what remedial actions were taken. Dr. Zee concludes numerous places in his testimony that he does not have this information. <i>See, e.g.</i> , Dr. Zee Direct at 30:24-38, 31:7-15. Regarding inadequate or improper corrosion control, Dr. Zee expressly stated SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and uses "good engineering practices." Dr. Zee Direct at 39:31-35. He did not make a competent conclusion that SPLP's corrosion control is improper or inadequate, instead making speculative assertions. Dr. Zee Direct at 41- 42.
	Surrebuttal at 12:30-39, 13:17-21, 13:35-39, 15:6-11.	with DNV report.	
AAA.	Dr. Zee Surrebuttal at 13:6-14.	Taking issue with SPLP Witness Garrity finding of SPLP records not revealing findings of MIC.	Irrelevant and does not show a violation of law even if allegations true. Dr. Zee to meet Complainant's burden must make conclusions with certainty. He makes no conclusion that MIC is in fact present on the ME1 or 12-inch pipelines.
BBB.	Dr. Zee Surrebuttal at 13:24-32.	Making allegations regarding inadequacy of ILI use in general.	Does not show a violation of law and inconsistent with pipeline safety regulations. Pursuant to 49 C.F.R. § 195.452(j)(5)(i)-(iv), "an operator must assess the integrity of the line pipe by any of the following methods," the first method listed is In-Line Inspection tools, and the inspection methods use the conjunctive "or." Moreover, this is inconsistent with Dr. Zee's

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			conclusion that SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and uses "good engineering practices." Dr. Zee Direct at 39:31-35.
CCC.	Dr. Zee Surrebuttal at 14:2-10, 21:35-22:2.	Alleging no records support SPLP utilizing alternative standards and that because different criteria established after Morgantown incident, SPLP must have realized there was a problem.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law. Just because a survey or tests may show that segment of pipeline is not meeting the criteria of an operator's corrosion control procedures or its integrity management plan does not mean a violation of law has occurred. Pursuant to 49 C.F.R. Part 195 Subpart H and § 195.452(h), when issues are discovered, the regulations provide timelines for repair or remediation of the condition depending on whether the pipeline is located in a high consequence area. <i>See also</i> 49 C.F.R. § 195.573 ("You must correct any identified deficiency in corrosion control as required by § 195.401(b). However, if the deficiency involves a pipeline in an integrity management program under § 195.452, you must correct the deficiency as required by § 195.452(h)."). Neither CIS surveys nor pipe-to-soil readings falling below a certain threshold have specific remediation timelines and thus they fall under "other conditions." For other conditions, "an operator must evaluate any condition identified by an integrity assessment or information analysis that could impair the integrity of the pipeline, and as appropriate, schedule the condition for remediation." <i>Id.</i> at § 195.452(h)(iv). Moreover, 49 C.F.R. § 195.452(i)(1) expressly provides that where corrosion is a concern, an operator can take actions including but not limited to implementing "better monitoring of cathodic protection." Thus, the question as to a violation of pipeline safety regulations is not whether surveys and test results met criteria, but if they did not, what remedial actions were taken. Dr. Zee concludes numerous places in his testimony that he does not have this information. <i>See, e.g.</i> , Dr. Zee Direct at 30:24-38, 31:7-15.

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DDD.	Dr. Zee Surrebuttal at 14:13-19.	Addressing SPLP Witness Garrity and stating "if Sunoco had plans that were adequate AND was following those plans, how do they explain what happened at Morgantown and why they devised new standards and procedures a year later?"	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law. Dr. Zee never concluded SPLP's integrity management plans and practices were inadequate. To the contrary, Dr. Zee stated SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and uses "good engineering practices." Dr. Zee Direct at 39:31-35. Dr. Zee admits he cannot conclude whether SPLP follows its plans. Dr. Zee Direct at 41-42.
EEE.	Dr. Zee Surrebuttal at 14:31-34.	Stating Dr. Zee is unaware of what CP criteria SPLP uses on the ME1 and 12-inch pipelines.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law.
FFF.	Dr. Zee Surrebuttal at 14:37-15:3.	"Q. Is it your contention that the information gleaned from the Morgantown investigation is sufficient to draw the conclusion that there is a system-wide failure of integrity management? A. Not at all. What we are saying, however, is that data provided by BI&E and by DNV and by Sunoco itself suggest that there may be a system-wide failure and that steps need to be taken to investigate further "	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law.

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GGG.	Dr. Zee Surrebuttal at 15:22-29.	Generally explaining current flowing away from pipeline can be sign of corrosion.	Irrelevant, generalized statement.
ННН.	Dr. Zee Surrebuttal at 15:31-34, 16:17-22.	Admitting he does not have information on CIPS measurements and then taking issue with potential problems with information he does not have.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law.
Ш.	Dr. Zee Surrebuttal at 15:37-16:14.	Discussing metal loss found by ILI inspections and concluding "[f]urther corrosion risk assessment and repair may be required, depending on the depth of metal loss and that he drew no conclusion as to cause of metal loss, stating "[c]orrosion is one possible cause."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Does not show a violation of law. The federal regulations in fact anticipate that pipelines will experience corrosion and detecting signs of possible corrosion is not a regulatory violation. Rather, PHMSA regulations require that operators have effective programs in place to manage corrosion and implement remediation and mitigation where necessary (49 C.F.R. Part 195 Subpart H). Thus, corrosion or metal loss in and of itself is not a violation of pipeline safety regulations. Pursuant to 49 C.F.R. § 195.452(h)(4)(i)(A), metal loss must be immediately repaired when (1) it is located on a pipeline that could affect a high consequence area and (2) "metal loss [is] greater than 80% of nominal wall regardless of dimensions." No evidence presented that SPLP did not meet this criterion.
JJJ.	Dr. Zee Surrebuttal at 16:25-31.	"I would conjecture that the 12-inch pipeline is probably in worse condition than the 8- inch pipeline. But this is speculation and we must rely on facts. You could really only	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.

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		tell if there were a proper investigation, as I have recommended."	
ККК.	Dr. Zee Surrebuttal at 16:34-17:26.	General description of Dr. Zee's general view of key criterion for determining safety of a pipeline.	Irrelevant generalizations. Does not show violation of law.
LLL.	Dr. Zee Surrebuttal at 17:28-30.	Stating integrity assessment must be in place and must include external corrosion direct assessment, internal corrosion direct assessment and stress corrosion cracking direct assessment.	Undisputed that integrity assessment must be in place. However, integrity assessment does not require use of these methods and thus this statement does not show a violation of law. Pursuant to 49 C.F.R. § 195.452(j)(5)(i)-(iv), "an operator must assess the integrity of the line pipe by any of the following methods," the first method listed is In-Line Inspection tools, and the inspection methods use the conjunctive "or." Moreover, as Dr. Zee testified, SPLP's Integrity Management Plans are "reasonably comprehensive and detailed" and use "good engineering practices." Dr. Zee Direct at 39:19-35.
MMM.	Dr. Zee Surrebuttal at 17:33-18:4.	Taking issue with DNV Report and stating: "No firm scientific conclusions regarding the leak on April 1, 2017 are possible. At most, one may conclude that it is more likely than not that MIC was involved but that was never demonstrated."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.
NNN.	Dr. Zee Surrebuttal at 18:7-14.	"MIC is more likely than not a cause of the corrosion in question."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.

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000.	Dr. Zee Surrebuttal at 18:17-21.	Explaining important to know whether MIC was involved at Morgantown because that "suggests that cathodic protection is insufficient" and if CP is not sufficient, corrosion will take place, metal will be lost and leaks can develop.	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Dr. Zee admits he can only conclude "it is more likely than not that MIC was involved." Dr. Zee Surrebuttal at 17:33-18:4. Moreover, this assertion is irrelevant as Dr. Zee admits SPLP replaced the pipeline in the area. Dr. Zee Surrebuttal at 5:7-6:21.
PPP.	Dr. Zee Surrebuttal at 18:35-21:18.	Discussing and analyzing DNV report regarding MIC and concluding the level of certainty of MIC at the Morgantown leak site is " more likely than not ."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.
QQQ.	Dr. Zee Surrebuttal at 21:23-26.	Regarding approximately 75 feet of pipe removed and replaced after Morgantown incident, Dr. Zee states: "For all he knows; that pipe was thoroughly corroded and his client, Sunoco,25 disposed of it so that there would be no evidence of corrosion."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established.
RRR.	Dr. Zee Surrebuttal at 21:26-32.	Dr. Zee alleges SPLP Witness Garrity did not "critique any of our direct testimony detailing many examples where [SPLP	Mischaracterizes Dr. Zee's prior testimony. Dr. Zee made no such definitive conclusions. <i>See, e.g.</i> , Dr. Zee Direct at 41-42.

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
		having robust corrosion control and integrity management programs and SOPs] is shown not to be true."	
SSS.	Dr. Zee Surrebuttal at 22:4-23:24.	Various assertions that SPLP CIS data allegedly show criterion not met and that different data collection methods used.	Even if true, does not show a violation of law. Just because a survey or tests may show that segment of pipeline is not meeting the criteria of an operator's corrosion control procedures or its integrity management plan does not mean a violation of law has occurred. Pursuant to 49 C.F.R. Part 195 Subpart H and § 195.452(h), when issues are discovered, the regulations provide timelines for repair or remediation of the condition depending on whether a pipeline is located in a high consequence area. <i>See also</i> 49 C.F.R. § 195.573 ("You must correct any identified deficiency in corrosion control as required by § 195.401(b). However, if the deficiency involves a pipeline in an integrity management program under § 195.452, you must correct the deficiency as required by § 195.452(h)."). Neither CIS surveys nor pipe-to-soil readings falling below a certain threshold have specific remediation timelines and thus they fall under "other conditions." For other conditions, "an operator must evaluate any condition identified by an integrity assessment or information analysis that could impair the integrity of the pipeline, and as appropriate, schedule the condition for remediation." <i>Id.</i> at § 195.452(h)(iv). Moreover, 49 C.F.R. § 195.452 (i)(1) expressly provides that where corrosion is a concern, an operator can take actions including but not limited to implementing "better monitoring of cathodic protection." Thus, the question as to a violation of pipeline safety regulations is not whether surveys and test results met criteria, but if they did not, what remedial actions were taken. Dr. Zee concludes numerous places in his testimony that he does not have this information. <i>See, e.g.</i> , Dr. Zee Direct at 30:24-38, 31:7-15.

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
TTT.	Dr. Zee Surrebuttal at 23:27-25:23.	Discussing PHMSA Notice of Probable Violation CPF 1- 2019-5002, noting "I do not know how this situation resolved."	Does not show a violation of law or proof of harm for which relief can be granted. The PHMSA Notice of Probable Violation (NOPV) enforcement action cited by Dr. Zee shows that any claims raised under the NOPV related to the adequacy of SPLP's cathodic protection of the ME1 pipeline are moot, as they had already been addressed at the time PHMSA initiated the enforcement action. In the NOPV, PHMSA alleged two separate violations related to cathodic protection ("Item 1") and corrosion control records ("Item 2"). ²¹ On March 6, 2019, SPLP responded to PHMSA's allegations stating that (1) while it did not admit the allegations, it was not contesting the NOPV, and (2) "SPLP updated its procedures in April 2018 as part of the merger and subsequent integration of SPLP into the Energy Transfer Partners family of partnerships. SPLP has been implementing the updated procedures since that time, and as a result and prior to receipt of the NOPV and [proposed compliance order] PCO, SPLP already initiated the very actions required by the PCO as well as others." ²² On August 9, 2019, PHMSA issued a Final Order and compliance order acknowledging that "compliance has been achieved with respect to Item 1." PHMSA therefore declined to include any compliance terms with respect to Item 1, and only required SPLP to prepare certain records and provide them to

 $^{^{21}}$ This information is publicly available on PHMSA's website at https://primis.phmsa.dot.gov/comm/reports/enforce/documents/120195002/120195002_NOPV%20PCO_02042019_text.pdf

²² This information is publicly available on PHMSA's website at https://primis.phmsa.dot.gov/comm/reports/enforce/documents/120195002/120195002_Operator_Response%20to%20Notice_03062 <u>019.pdf</u>

Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
		PHMSA related to Item 2. ²³ On November 26, 2019, PHMSA issued a closure letter stating "Based on our review of the documentation you provided, it has been determined that you have complied with the terms of this Order. Accordingly, this case is now closed and no further action is contemplated with respect to the matters involved in this case." ²⁴ Based on PHMSA's own determination, SPLP is in compliance with all of the terms of the compliance order cited by Dr. Zee. As a result, there is no harm for which Complainants can obtain the relief they seek. In this case, Complainants seek extreme injunctive relief – shutting down the ME1 and 12-inch pipelines until a remaining life study is completed. Injunctive relief must be narrowly tailored to abate the harm complained of. ²⁵ But here, there is no harm because SPLP resolved the issue voluntarily, expeditiously, and prior to any enforcement action initiated by PHMSA.

²³ This information is publicly available on PHMSA's website at <u>https://primis.phmsa.dot.gov/comm/reports/enforce/documents/120195002/120195002_Final%20Order_08092019_text.pdf</u>

²⁴ This information is publicly available on PHMSA's website at https://primis.phmsa.dot.gov/comm/reports/enforce/documents/120195002/120195002 Closure%20Letter 11262019 text.pdf

²⁵ Injunctive relief must be narrowly tailored to abate the harm complained of. *Pye v. Com. Ins. Dep't*, 372 A.2d 33, 35 (Pa. Cmwlth. 1977) ("An injunction is an extraordinary remedy to be granted only with extreme caution"); *Woodward Twp. V. Zerbe*, 6 A.3d 651, 658 (Pa. Cmwlth. 2010) ("Even where the essential prerequisites of an injunction are satisfied, the court must narrowly tailor its remedy to abate the injury"); *West Goshen Township v. Sunoco Pipeline L.P.*, Docket No. C-2017-2589346 at 17-18 (Order entered Mar. 15, 2018).

West Goshen Twp. v. Sunoco Pipeline L.P., Docket No. C-2017-2589346, Initial Decision at 42, (ALJ Barnes ID entered Jul. 19, 2018), aff'd (Order entered Oct. 1, 2018).

	Cite	Testimony	Not Substantial or Certain Evidence Does Not Show Violation of Law For Which Relief Can Be Obtained
			PHMSA subsequently confirmed that SPLP's compliance and the allegations cited by Dr. Zee are therefore moot and immaterial to this proceeding.
UUU.	Dr. Zee Surrebuttal at 25:26-33.	Discussing costs of various testing.	Irrelevant, fails to raise a question of material fact.
vvv.	Dr. Zee Surrebuttal at 25:36-27:4.	Repetitive assertions already addressed above.	See above.
www	Dr. Zee Surrebuttal at 27:7-13.	"Nothing in Mr. Garrity's rebuttal testimony has caused me to change my mind. Except as noted above, the information and conclusions set out in my initial direct testimony stand."	Equivocal, speculative, merely raises suspicion of existence of fact sought to be established. Dr. Zee did not reach any competent conclusions in his direct testimony. <i>See, e.g.</i> , Dr. Zee Direct at 41-42.

30. Complainants'^{26, 27} and Intervenors'²⁸ lay witness testimony likewise fails to present substantial evidence. First, the subject matter at issue here – integrity management,

²⁶ Complainants did not present substantial evidence through lay witness testimony. Lay witness hearing occurred on October 23, 24 and November 20, 2020. Review of the evidence from those hearings shows nothing more than non-expert and unsupported allegations regarding SPLP's integrity management, cathodic protection, and corrosion control, which are impermissible opinions by laypersons and are not substantial evidence:

Witness	N.T.	Testimony
McMullen	N.T. 972:8-9, 985:8-986:11	Alleging "[regarding West Whiteland Township Cathodic test station] The cover's off. The screws are rusted. The wires are corroded" but admitting on cross examination that he knew testing station was operational, nothing wrong with it, and that it was replaced.
Moll	N.T. 1396:17-22	"I think it's [a remaining life study] extremely important, given the age of the repurposed 12-inch line, that a remaining life study be done, especially a remaining life study that is appropriate to identify those corrosions that would be due to the MIC, which I understand is not linear and it is unpredictable. So we need a study that is comprehensive."
Marcille- Kerslake	N.T. 1632:11-15	"So that [groundwater] flow along Mariner 1 is a concern because it could lead to corrosion of that 90-year-old pipe. It can also lead to erosion. Mariner East 1 is only six or seven feet below the surface there, and it's not sitting in rock." ²⁶
Britton	N.T. 1687:15-17	"The State talks about corrosion being a major cause of pipeline failure, also the age of the pipelines. The age of the lines are from the 1930s."

²⁷ Complainants' witness Mr. Boyce, an emergency service professional, **not a pipeline safety expert**, alleges that accidents on SPLP's pipelines occur with regularity and that he counted over 300 reported SPLP accidents since 2010, referring to Exhibit Boyce-2. Boyce Direct at 20:6-10. This testimony is not competent expert testimony regarding integrity management, corrosion

cathodic protection, and corrosion control is scientific and technical in nature and requires expert testimony. Lay witness "opinions" in these areas are not substantial evidence. The Commission has consistently found that lay witness testimony on technical issues such as health, safety, and the probability of structural failure is not substantial evidence as these necessarily **"require expert evidence to be persuasive enough to support the proposing party's burden of proof."** *Application of PPL Elec. Utilities Corp.*, Dkt. No. A-2009-2082652, 2010 WL 637063, at *11 (Pa. P.U.C. Jan. 14, 2010) (emphasis added); *Pickford v. Pub. Util. Comm'n*, 4 A.3d 707, 715 (Pa. Cmwlth. 2010) (ALJ "properly disregarded" testimony from 13 lay witnesses related to concerns and personal opinions about damage to pipes, lead leaching, toxicity to fish and home filtration expenses because "the nature of these opinions … was scientific and required an expert.");

control, or cathodic protection. Exhibit Boyce-2 is not a list of SPLP reported accidents and thus Mr. Boyce's allegation has not shown a basis in fact and it is therefore not certain or competent. Moreover, Mr. Boyce is not competent to provide testimony regarding these topics because it is beyond his alleged expertise. Exhibit Boyce-2 is a Notice of Probable Violation (NOPV) and Proposed Compliance Order from PHMSA dated May 17, 2019, Case No. CPF 1-2019-5006. While that NOPV did allege noncompliance of certain recordkeeping requirements to support the yield strength of the pipe for SPLP's 12-inch pipeline, PHMSA issued a Final Order in that case withdrawing this allegation and thus PHMSA did not make a finding of violation of pipeline safety regulations on this issue. In re: Sunoco Pipeline L.P., CPF No. 1-2019-5006, Final Order at p.3 (Issued Jun. 26, 2020) ("the preponderance of the evidence shows that Respondent had adequately documented that the segment of pipe in question was Grade B with a SMYS of 35,000 psi. The Region's justification for demanding that the operator perform additional, random tensile testing was neither necessary nor reasonable in light of the operator's production of adequate documentation demonstrating its knowledge and confidence about the internal design pressure specifications for the pipeline segments at issue in this case. Based upon the foregoing, I hereby order Item of Notice withdrawn."), available that 1 the be at https://primis.phmsa.dot.gov/comm/reports/enforce/documents/120195006/120195006 Final%2 0Order_06262020.pdf.

²⁸ The only written direct testimony from Intervenors related to integrity management presented was from Mr. Mark Kirchgasser, Chairman of Middletown Township Council. He merely testified that he was unaware of whether SPLP has integrity testing or routine inspection in place. Kirchgasser Direct at 4:13-28.

Lamagna v. Pa. Elec. Co., Dkt. No. C-2017-2608014, 2018 WL 6124353, at *20 (Pa. P.U.C. Oct. 30, 2018) (finding that lay witness testimony and exhibits regarding technical health and safety issues "carry no evidentiary weight and … were properly objected to and excluded.").

31. As demonstrated above, Complainants have not established the required substantial evidence to show SPLP violated the Public Utility Code, Commission regulations, or a Commission Order. There is no question of material fact here to raise. A material fact means one party alleges X while another party alleges Y and the determination of whether the fact is X or Y has an impact on the result of the case. Here, Complainants have not alleged X, they have alleged that there is a question as to whether X is a fact. That is not a dispute of material fact where, as here, Complainants have the burden of proof.

III. CONCLUSION

WHEREFORE, SPLP respectfully requests Your Honor grant its Motion for Partial Summary Judgment and rule that allegations regarding SPLP's integrity management, corrosion control, and cathodic protection are dismissed from this proceeding and that Complainants cannot obtain the requested relief of a remaining life study or shutting down the ME1 or 12-inch pipeline based on these allegations.

Respectfully submitted,

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Attorneys for Respondent Sunoco Pipeline L.P.

Dated: July 28, 2020

BEFORE THE

PENNSYLVANIA PUBLIC UTILITY COMMISSION

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DIRECT TESTIMONY OF

MEHROOZ ZAMANZADEH, Ph.D.

ON BEHALF OF

FLYNN COMPLAINANTS

Q.	Please state your name, position and business address.
A.	My name is Mehrooz Zamanzadeh, Ph.D. ("Dr. Zee") I am the founder, president, technical director and chief scientist at Matergenics Inc. in Pittsburgh, Pennsylvania. My business address is 100 Business Center Drive, Pittsburgh, PA 15205.
Q.	Please describe Matergenics, Inc.
А.	Matergenics Inc. is a state-of-the-art materials testing laboratory and corrosion engineering firm. We provide root cause failure analysis determinations, inspection and corrosion risk assessment of aging infrastructure and equipment, pipelines, metallurgical testing, coating testing, materials analysis, and cathodic protection analysis. We serve industries including the electric power utility, telecommunication, oil and gas, pipeline, aerospace, automotive, water and wastewater, medical, and manufacturing industries.
Q:	Dr. Zee, is Exhibit Zee-1 a current version of your Curriculum Vitae?
A:	Yes, it is.
	EXHIBIT ZEE-1 IS OFFERED INTO EVIDENCE
Q.	Please describe your educational and professional experience.
А.	I hold a Bachelor of Science and Master of Science in Material Science and Engineering and a Ph.D. in Material Sciences from Pennsylvania State University. I joined the National Iranian Oil Company in 1980 upon completion of my doctoral work. In 1985, I joined Carnegie Mellon University in the capacity of Post-Doctoral Research Associate under a corrosion grant from IBM. From 1987 to 1994, I was employed at Professional Service Industries, Inc. (PSI), a consulting engineering and materials testing firm in Pittsburgh, Pennsylvania as a Technical Manager. In 1994, I established Matco Associates, an engineering and corrosion firm in downtown Pittsburgh, Pennsylvania. In 2008, Valmont Industries, a publicly traded company, acquired Matco Associates and later sold it to Exova Group PLC in 2015. In 2017, I was able to regain ownership of the engineering firm that I established and renamed it Matergenics, Inc., where I serve as the founder, president, technical director and chief scientist. I am a National Association of Corrosion Engineers ("NACE") Certified Corrosion Specialist with over 25 years of practical experience in the corrosion engineering management, materials selection and cathodic protection/coatings fields. NACE is the global leader in developing corrosion prevention and control standards, certification and education. Specifically, with respect to corrosion

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1 2		have provided a wide range of materials and corrosion engineering solutions for these industries.
3	Q.	Have you received any industry recognition or awards?
4 5 6 7 8 9	А.	I have been the recipient of the Colonel Cox Award for the Appalachian Underground Corrosion Short Course (2010), the NACE International Fellow Award (2008), the American Society for Metals (ASM) International Fellow Award (2006), the ASM Entrepreneur of the Year (2004), and the NACE Outstanding Service Award (1996).
10	Q.	Have you taught courses that are relevant to this matter?
11 12 13 14 15 16 17 18 19 20 21	A.	Yes. I have lectured and taught frequently on materials selection, corrosion, coatings, cathodic protection, and failure analysis (fracture mechanics). I have lectured at Carnegie Mellon University and Pennsylvania State University. For technical societies, I have lectured at NACE, American Foundry Society (AFS), ASM, and American Society for Non-Destructive Testing (ASNT). I have also presented at the Electrical Power Research Industry's BC Hydro Corrosion and Degradation Conference, and West Virginia University's Appalachian Underground Short Course. I am a certified NACE Instructor for corrosion engineering, cathodic protection, and condition assessment courses. I am approved NACE instructor for Condition Assessment and Cathodic Protection
22	Q.	Have you occupied any leadership positions in the corrosion prevention industry?
23	A.	Yes. I have been the chairman and a trustee of the NACE Local Pittsburgh Section.
24 25 26 27	Q.	Do you have experience working with pipeline corrosion assessment and evaluating the integrity of underground pipelines?
28 29 30 31 32 33 34 35	А.	Yes. After getting my PhD in Material Sciences, I was employed by NIOC, PSI, Matco and Matergenics, all dealing with pipeline corrosion risk assessment and corrosion mitigation. In addition, I have been a consultant for Kern River Gas Transmission, Schlumberger Subsea Division, Dura-Bond Industries (including Dura-Bond Coating Duquesne, Dura-Bond Pipe Steelton, and Dura-Bond Pipe McKeesport), and many others.
36	Q.	What is the scope of your current responsibilities?
 37 38 39 40 41 42 	A.	 Management of Capital Projects Setting Up Corrosion Risk Assessment/Corrosion Mitigation Programs, Coating Selection/Application, Cathodic Protection, Corrosion Inhibitors System Design and Selection

1 2 3 4 5 6 7 8		 Technical CP Audits and Troubleshooting in Corrosion Control Programs Failure Analysis Root Cause Determination Engineering Studies and Technical Consultation Writing Standards/Certification Programs for Corrosion Assessment and Corrosion Control Managing and setting up Big QA/QC Corrosion Risk Data Centers Setting up Corrosion Engineering Courses: NACE Approved Instructor
9 10	Q.	Can you identify some of the standard practices that you have been active in developing?
11 12	A.	STG 05 Cathodic/Anodic Protection
13		STG 08 Corrosion Management
14		<u>STG 41</u> Electric Utility Generation, Transmission, and Distribution
15		STG 35 Pipelines, Tanks, and Well Casings
16		TGC 527 Consensus-Corrosion Prevention and Control Planning Standard and
17		TEG 187X Microbiologically Influenced Corrosion
18		
19	Q.	How much writing have you done in your field?
20 21 22 23 24	А.	I've published dozens and dozens of articles in professional journals, some of them having been professionally referred. Topics that are pertinent to this proceeding include (a) AC interference and corrosive soils; (b) corrosion risk assessment and mitigation strategies; (c) coating selection; (d) cathodic protection.
25		
26	Q.	Are you the holder of any patents?
27 28 29	A.	Yes, I was the principal investigator and lead contributor for more than three dozen patents. Some of them have related to coatings and corrosion resistant materials.
30	0	
31	Q.	What are some examples of projects that Matergenics has worked on?
32		
33	A.	Project examples:
34		
35		• Corrosion control and cathodic protection in oil and gas production: transmission and distribution
30 37 38		 Corrosion Risk Assessment and Corrosion Mitigation in Electrical Utility and Oil/Gas Industries. His analysis and identification of serious corrosion and stress corrosion 3

1		cracking problem within a refinery after Hurricane Katrina saved the company
2		approximately 1 million dollars in corrosion repair costs.
3		• Corrosion control in refining units, Atmospheric Unit Overhead, Hydrogen Units,
4		Water/Waste Water Treatment systems in refinery applications for NIOC.
5		• Development of an innovative corrosion monitoring and investigative technique for
6		high mass utility poles for Valmont Industries. This method enables the client to
7		assess whether a structure should be repaired or replaced. He has also provided
8		product and process improvements for enhanced corrosion protection for utility poles.
9		• Corrosion control of underground pipelines through application of coatings and
10		cathodic protection
11		 Corrosion control: storage tanks/nining
12		 Corrosion control, storage tanks, piping Corrosion monitoring: test coupons, electrochemical techniques and NDT
12		• Corrosion monitoring, test coupons, electrochemical techniques and ND1
13		
14	0	Here we have a life does a second with a in some in a second in the second
15	Q.	Have you been qualified as an expert witness in corrosion prevention by courts
16		and/or administrative tribunals?
17		
18	А.	Yes. I was qualified as an expert witness in corrosion prevention in the following
19		matters:
20		
21		• Alcan International Limited and Solvay Fluorides, Inc. v The S.A. Day Manufacturing
22		Co., Inc., No. 94–CV–286H, 1999 WL 605702, United States District Court, W.D.
23		New York (July 14, 1999)
24		• Barrett v. Renz TDBA et al., No. GD-00-011610, 2001 WL 3700087, Court of
25		Common Pleas of Pennsylvania (November 12, 2001)
26		• Sports & Exhibition, et al. v Johnstown Welding, et al., No. GD04007881, 2001 WL
27		36265390, Court of Common Pleas of Pennsylvania (November 30, 2001)
28		• Michael Schmelzer v Hilton Hotels Corp., No. 05-cv-10307, 2007 WL 4247050,
29		United States District Court, S.D. New York (October 3, 2007) and
30		• McWane. Inc. d/b/a Clow Valve Company v Chevron U.S.A., Inc.: Diamond Oil Co.
31		and Oskaloosa Gas & Oil. Inc., No. LALA074105, 2008 WL 6259643, District Court
32		of Iowa. Mahaska County (August 11, 2008).
33		01 10 // w, 1/1wilwollw 000 willy (11wguot 11, 2000).
34		
35	0.	Have you testified at trials and hearings as an expert witness on corrosion issues?
55	χ.	There you testified at thats and nearings as an expert withess on correston issues.
36	A.	Yes. In addition to the cases listed above, I have testified in trials and hearings in the
37		following matters: William Paul, et al. v CDG Engineers & Associates et al., Circuit
38		Court of Pike County, Alabama (July 22nd, 2007); Panama City Beach Condos Limited
39		Partnership v Axis Surplus Insurance Co., No. 5:06-cv-00198-RS-AK, 2007 WL
40		4659621. United States District Court, N.D. Florida, Panama City Division (October 18,
41		2007): Steinberg v Hussev Cooper et al., San Diego Superior Court Case No. GIC784469
42		(October 2007): Kane County Public Building Commission v Wight and Company. Kane
43		County Judicial Center, St. Charles, IL: Gen. No. 03 LK 475 (October 2007).
44		,,,,,,,,
45		

1	Q.	Do you have other relevant experience as a corrosion expert in legal matters?
2 3 4 5 6 7 8	А.	Yes. I have provided deposition testimony in the following matters: <i>Lang v Progressive Exp. Ins. Co. No.</i> 11-C-0188, 2012 WL 1409936, United States District Court, E.D. Wisconsin (April 20, 2012); and <i>Elkins Constructors, Inc. v American Builders & Contractors Supply Co., Inc., et al.</i> , Nos. 312010CA085219, 312010CA075220, 2013 WL 12321353, Florida Circuit Court (October 30, 2013).
9 10 11 12	Q.	Dr. Zee, are you generally familiar with the allegations of the Flynn defendants concerning the condition of the 8-inch ME1 pipeline and the 12-inch bypass pipeline?
13	A.	Yes, I am.
14		
15 16	Q.	Dr. Zee, are you generally familiar with the allegations of the PUC's bureau of Investigation & Enforcement in its December, 2018 Complaint against Sunoco?
17		
18	A.	Yes, I am.
19		
20 21 22 23	Q.	Then, is it safe to say that issues have been raised in both cases that implicate cathodic protection, pipeline coatings, side drain measurements, close interval surveys, microbiological induced corrosion, ILI tools, integrity management and other aspects of evaluating and maintaining HVL pipelines?
24		
25 26	A.	Yes, those issues are all involved in this case.
27	0.	Are those all aspects of integrity management with which you are familiar?
28	τ.	
29	Α.	Yes, they all are matters with which I am very familiar.
30		
31	0	Do you believe that based upon your education, training and experience you are
32 33	v	capable of rendering an opinion to a reasonable professional certainty on the following matters:
34		
35 36 37 38		(1) whether or not Sunoco's integrity management program complies with good engineering practices as well as its own internal integrity management plan document;

	(2) whether or not Sunoco's operation of the 8-inch pipeline and the 12-inch pipeline should be reviewed for corrosion risk both externally and internally;
	(3) whether or not Sunoco's operation of the subject 8-inch pipeline and the 12-inch pipeline should be reviewed for safety considerations from a corrosion risk point of view; and
	(4) whether or not Sunoco should continue operating these pipelines without a thorough investigation by an independent expert.
A.	The answer to this question is definitely "yes."
FLYN TO T AN O	IN DEFENDANTS OFFER DR. ZEE AS AN EXPERT QUALIFIED TO TESTIFY AS THE MATTERS TO WHICH HE HAS STATED HE IS CAPABLE OF RENDERING PINION TO A REASONABLE PROFESSIONAL CERTAINTY.
Q.	What was your firm, Matergenics, retained to do in this case?
Α.	We were retained to (a) review certain public and highly confidential documents, and (b) review the condition of the 8-inch Mariner East 1 (ME1) and the 12-inch portion of the Mariner East 2 (ME2) workaround pipelines. Both of these pipelines date back to the 1930's. Finally, we were asked to make recommendations concerning their future maintenance and/or operation from corrosion point of view.
Q.	Dr. Zee, how did Matergenics go about preparing your analysis?
A.	At Matergenics my staff and I work collaboratively under my supervision.
Q.	Can you provide an overview of the materials that you reviewed?
A.	Documents were provided by Flynn attorney Michael Bomstein to Matergenics, Inc. as pdf files. These included both public documents and confidential and highly confidential documents. 31,521 pages of materials were supplied. Of these, 3390 were identified as "public." The balance were marked "Confidential/Highly Confidential."
	On August 9, 2019, an <i>in camera</i> inspection took place on premises of Matergenics. Under supervision of a Sunoco attorney, Matergenics staff were permitted to examine additional documents stamped "Confidential Security Information" ("CSI"). Staff were not allowed to take notes or photocopy any of the CSI materials.

The initial *in camera* review has shown that the CSI materials consisted of a pipeline integrity management ("IM") manual and hazard assessments dated 2013, 2017 and 2018. Matergenics does not here comment on the hazard assessments.

On January 6, 2020, we were given the opportunity to examine the IM data as well as ancillary material referred to in the CSI documents. We were allowed to take notes on this occasion.

Matergenics further notes that it understands Flynn counsel has requested an opportunity for us to participate in the excavation and condition assessment of portions of the ME1 and ME2 pipeline. At the time of this report we have not yet been able to do so.

Pursuant to certain discovery orders in this case relative to production of documents, we also reviewed:

- Records confirming tests and upgrades in Chester and Delaware Counties since January 1, 2013
- Integrity Management Plans

- Documents summarizing maintenance and upgrades in Chester and Delaware Counties performed since January 1, 2015
- Documents reflecting leaks, punctures and ruptures on the 8-inch and 12-inch pipelines since January 1, 1986
- 1052 pages (39 pdf files) of Close Interval Surveys (CIS) furnished in late, December, 2019

We have examined the documents produced by Sunoco and find that there are 215 inspection and repair records covering 2013 to 2016 and one comprehensive inspection report from April 2014. We have seen three pipeline integrity summaries for ME1 covering 2016 to 2018. There also were ILI inspection anomaly reports for ME1 covering 2017 to 2018.

There also were right of way (ROW) reports for the period April 20, 2019 to June 16, 2019. There were documents reflecting leaks, punctures and ruptures going back to 2002.

Finally, there were numerous records extraneous to the purpose of our technical review, including legal documents, a first responders' manual, and so on.

Relative to the Morgantown accident of April, 2017, we have reviewed a summary report as well as the pleadings and the joint motion for settlement approval.

It is our understanding that Flynn counsel was unable to secure access to the Reliable searchable software platform in its review of the Sunoco documents. Matergenics was able to obtain the Foxit PhantomPDF software and that software was used to look for key words in the 31,521 pages of materials. As with any such software,

no one claims it has a 100% success rate and it is acknowledged, therefore, that relevant documents may not have been identified.

Q. Can you comment on aging pipelines and corrosion failure in general?

A. In general, aging underground pipelines are at risk of corrosion failure due to coating degradation, external corrosion and stress corrosion cracking. Corrosion failures in aging pipelines are either sudden catastrophic ruptures or gradual leaks due to localized corrosion and cracking. Many factors associated with these corrosion areas are coating failure, degradation, disbondment, blistering, delamination, mechanical pressure and stress concentration, galvanic action, corrosive ions, the presence of moisture, corrosive soils, stray current interference, AC interference, inadequate cathodic protection and shielding. These areas have a much higher statistical probability of catastrophic failure and rupture.

Most of the time initiation of stress corrosion cracking (SCC) and pitting corrosion are detected by coincidence in excavation and digs and is not targeted or predicted by analysis of corrosion performance parameters. Internal or ILI tools have limited capability for detecting or identifying stress corrosion cracking and pitting corrosion initiation.

It may be noted that aging, by itself, may not result in corrosion of a steel pipeline. In theory, it is possible that there will be constant/consistent soil conditions, coating conditions, absence of potential damage mechanisms/threats throughout the service life. But in reality, this just does not happen. Coating degrade and disbondment take place.

A pipeline will be exposed to various potential damage mechanisms/threats throughout its service life. If these damage mechanisms/threats are not identified, controlled and/or mitigated in time, it could result in pipeline failure. Typically, aging presents corrosion problems as well as corrosion induced cracking.

Cast iron, wrought iron and bare steel pose the highest risk compared to coated carbon steel. As the pipeline ages, coating on the pipeline could damage/disbond/delaminate and result in corrosion with age at the exposed areas in the aggressive soil conditions.

In our opinion, integrity assessment must be in place for aging pipelines. It is necessary that there be (a) External corrosion direct assessment (ECDA); (b) Internal corrosion direct assessment (ICDA); and (c) Stress Corrosion Cracking Direct assessment (SCCDA).

43 Q. What are the primary forms of corrosion attack in corrosive soils?

A. The two main forms of corrosion that have been observed are localized, (pitting) 2 corrosion and stress corrosion cracking. Both pitting corrosion and stress corrosion cracking are localized in nature and occur when corrosive ions are exposed to the steel 3 surface under disbonded/delaminated coating or at coating defects. 4

Pitting corrosion is a type of corrosion that is confined to small area. It usually is an autocatalytic process in the absence of AC/DC stray current corrosion. Active pitting corrosion is considered structural corrosion when the corrosion penetrates the steel. Pitting corrosion can be initiated due to presence of corrosive ions under a disbonding coating that acts as a shield to cathodic protection or in the presence of AC interference.

Stress corrosion cracking (SCC) is a form of corrosion cracking that is associated 12 with near-neutral pH or high pH. For near neutral pH stress corrosion cracking, the 13 electrolyte contains a dilute solution of carbon dioxide and bicarbonate ions with a pH 14 between 6 and 7. This type of corrosion cracking is associated with limited branch 15 transgranular cracking and the crack walls contain corrosion products. High pH SCC is 16 caused by a solution of carbonate ions with pH between 9 and 10.5 exhibiting 17 intergranular cracking with limited branching. Stress corrosion cracking can initiate 18 under disbonded coatings that may shield cathodic protection. 19

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Q. Can you explain the role of coatings in corrosion protection?

- 23 A. One of the oldest measures of corrosion protection is to coat the substrate with a polymeric material. An organic coating can protect a metal substrate by two 24 mechanisms: 25
 - Serving as a barrier for the reactants: water, oxygen, and various ions.
 - Serving as a reservoir for corrosion inhibitors that may assist the surface in resisting corrosion attack.
- 29 30 31

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Are there different types of coatings? Q.

- There are a number of different types of coatings that have been used specifically to 33 A. provide corrosion protection for buried or submerged metal structures including coal-tar 34 based coatings, polyolefins, shrink sleeves, wax-based coatings, asphalt, urethanes and 35 blends, epoxy phenolics, polyureas, esters, and fusion bonded epoxy coatings (FBEs). 36
- **Q**. Have you prepared summaries that identify repair reports that show the coatings 38 found on the 8-inch and 12-inch pipelines? 39
- Yes as you can see from the two tables below. Exhibit 2 shows the documents reviewed. 41 A.

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- 2
- 3





1Q.For the 12-inch pipeline, what did you notice about corrosion associated with bare2pipes?

4 A. For the seven months that we had information for, bare pipe had the greatest amount of corrosion.

7 Q. What is cathodic protection?

- 9 A. Cathodic protection ("CP") is a method for reducing corrosion by minimizing the 10 potential difference between the anode and cathode. In this method, a current is applied 11 from an outside source to the structure to be protected, such as a pipeline. When enough 12 current is applied, the whole structure, (pipeline) will exhibit one potential and the anodic 13 sites on a pipe will cease to exist.
- In soil environments, cathodic protection is effective if the real potential of steel (without the ohmic drop) is more negative than -850 mV with respect to a copper/saturated copper sulphate reference electrode.
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Q. Can you tell from the documents what CP criteria were used on the ME1 pipeline?

- A. From the documents, it is not clear what CP criteria was used on ME1 pipeline. Sunoco's answer to the I&E complaint acknowledges not meeting the minimum -850mV CSE (Copper-Copper Sulphate reference Electrode) NACE SP0169 CP criterion. Lab analysis reported that the leak is due to microbiologically influenced corrosion, or MIC. In the case of MIC, the polarized potential of -950 mV CSE or more negative should be considered. No data or reference that shows that the potential is maintained at more negative than -950 mV CSE.
- 27

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- 2829 **Q.** Are there NACE standards that have a bearing on this issue?
- 31 A. Yes, for example:
- 32 33 34

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NACE SP0169-2013 Extract:

6.2.1.4 Special Conditions Applicable to Steel and Gray or Ductile Cast-Iron Piping Systems
6.2.1.4 When active MIC has been identified or is probable, (e.g., caused by acid-producing or sulfate-reducing bacteria), the criteria listed in Paragraphs 6.2.1.2 and 6.2.1.3 might not be sufficient. Under some conditions, a polarized potential of –950 mV CSE or more negative^{63,66} or as much as 300 mV of cathodic polarization might be required.⁶⁶
6.2.1.4 At elevated temperatures (> 40 °C [104 °F]), the criteria listed in Paragraphs 6.2.1.2 and 6.2.1.3 may not be sufficient. At temperatures greater than 60 °C (140 °F), the polarized potential of –950 mV CSE or more negative might be required.^{63,66,68}
6.2.1.4.3 On mill-scaled steel, cathodic polarization greater than 100 mV might be required.⁶⁶

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1Q.What did you learn about Sunoco's cathodic protection from review of records in2the I&E proceeding?

A. From Appendix C of the Joint Settlement motion, at page 8, it was reported that "At station 2459±00, which is approximately 1,030 feet from the leak, SPLP's records indicated cathodic protection readings of -628 mV in 2016 and -739 mV in 2015.
Adequate cathodic protection is achieved at a negative cathodic potential of -850 mV or lower". From readings, it is evident that the potentials are maintained at more positive than -850 mV CSE. Moreover, ON potentials are recorded. There is no mention of OFF potentials."

From those documents, including Sunoco's Answer, it appears that Sunoco's position is that a negative potential of -850 mV need not be maintained because Sunoco has taken other approved steps to protect against corrosion. This alternative scheme is referred to below as the "100 mV criterion". Sunoco gives the impression that the 100 mV criterion was used as the pipe is 9 decades old, the coating might have degraded, and, could be due to economic reasons. However, this criterion is not valid in the presence of anaerobic bacteria or galvanic action.

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20 Q. Can you explain the role of anaerobic bacteria in this process?

21 A. Yes, we can start with an NACE standard:

NACE Publication 35108-2008-SG, One Hundred Millivolt (mV) Cathodic Polarization Criterion Extract:

24

Although most pipeline operators using the 100 mV cathodic polarization criterion follow a procedure similar to the above, they typically consider the applicability of the 100 mV criterion before undertaking these. As previously discussed, the effectiveness of the 100 mV cathodic polarization criterion is problematic on pipelines operating at elevated temperature or exposed to anaerobic bacteria because in either condition, 100 mV of polarization is not always sufficient to mitigate corrosion.

25

Effect of Anaerobic Bacteria

The presence of anaerobic bacteria, as demonstrated in one investigation,18 suggests an increase in the minimum polarization value to the 200 to 300 mV range. A similar increase in the -850 mV_{CSE} potential criterion is also true in the presence of anaerobic bacteria.

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Can you explain the challenges with 100? Q.

4 A. Moreover, the major disadvantage of this criterion is that polarized potentials could fall in the range of Stress Corrosion Cracking (SCC) on a pipeline. At room temperature of 5 about 21°C, the potential range is from about -550 mV CSE to -700 mV CSE. For 6 susceptible pipelines in ambient temperature conditions, polarized potentials within this range should be avoided.

Q. Are there any charts that help explain the difficulty of successfully maintaining the 11 100 mV criterion? 12



Yes, see below: 13 A.

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FIGURE - SCC Range in Carbonate/Bicarbonate Environments

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Reference: NACE Publication 35108-2008-SG, One Hundred Millivolt (mV) Cathodic Polarization Criterion (Figure 23)



Flow diagram for decision-making with respect to the use of the 100 mV cathodic polarization criterion^(A) to avoid the possibility of high-pH SCC.

^(A) The safe use of the 100 mV cathodic polarization criterion in accordance with this chart does not guarantee that high pH SSC does not occur, only that it is extremely unlikely.
 ^(B) SMYS = specified minimum yield strength.
 ^(C) Based on laboratory analysis of limited field data.

FIGURE – Flow Diagram for Decision-making with Respect to the Use of the 100mV Cathodic
 Polarization Criterion to Avoid the Possibility of High-pH SCC

- 4 Reference: NACE Publication 35108-2008-SG, One Hundred Millivolt (mV) Cathodic
- 5 *Polarization Criterion (Figure 24)*
| 1 | Q. | Then, can you summarize your view on the -850 mV criterion? |
|--|----|---|
| 2
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7 | А. | Yes. To summarize, just as the -850 mV CSE polarized potential criterion needs to be
more electronegative in the presence of sulfate reducing bacteria, the same is the case for
the 100 mV cathodic polarization criterion. |
| 8
9 | Q. | What are the other conditions where -850 mV criterion should be carefully considered? |
| 10
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12 | A. | In the presence of Stray current and Alternate Current Interference conditions. |
| 13
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15 | Q. | What is stray current corrosion? |
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20 | A. | Stray current corrosion is due to currents following through paths other than the intended circuit. This type of corrosion is localized in coated pipes and takes place at discharge points (pinholes and mechanically damaged areas). Failure can occur in a rather short service time. |
| 21
22
23
24
25 | | No information was provided to us regarding stray current surveys. Sunoco needs to disclose if any stray current survey was performed on this ME1 line. If performed, data should be submitted for review. Stray current corrosion is a major concern for accelerated corrosion. |
| 26
27 | Q. | What is the role of alternating current interference in pipeline corrosion? |
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35 | А. | Typically, coated pipelines are located near electric transmission lines and run parallel to high voltage transmission lines (HVTL). AC interference can take place by conduction or an induction mechanism causing corrosion in the blistered areas of the coating. The presence of AC interference can cause serious pitting corrosion even on pipes under cathodic protection. This is even the case if the -850 mV CSE criterion is met. Uncertainties exist as to the reason for this. |
| 36
37
38
39 | | No information was provided on AC interference surveying. Sunoco needs to disclose if any survey was performed on this ME1 line. If performed, data should be submitted for review. |
| 40 | | |
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| | | |

1 Q. What is the role of microbiological induced corrosion (MIC) in pipelines?

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coating.

A. Generally, underground pipelines are protected from corrosion by coating and CP. However, the protective measures are not always effective to protect the pipelines, especially when the coating is disbonded and the CP current is shielded from reaching the trapped water/liquid. As a result, bacteria growth occurs on pipelines under disbonded

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13 14 Since nearly all soils are naturally rich with microbiological activity, detecting presence of MIC on external side of the buried structures and pipelines is really challenging. CP and coating are the only mitigation options for MIC on direct buried pipe. Sunoco needs to disclose if any soil analysis was performed at the site of the Morgantown accident.

15 Q. Can you explain Cathodic Protection Shielding by Protective Coatings

16

A. Cathodic protection shielding is defined as preventing or diverting the cathodic protection
 current from its intended path. Many companies are aware of the problems with CP
 shielding, yet some continue to use the same coating types and construction practices that
 have tendencies to cause CP shielding because of economics involved. Information
 relating to this problem in the case of ME1 is missing.

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28 29 Several pipeline operators now list *CP shielding disbonded coatings* as their leading root cause of external corrosion. Coating systems like coal tar can cause increased demands on a CP system and often present difficulties in achieving adequate protection levels. If coatings disbond from the pipe and if electrolytes can enter into this area, a serious corrosion condition can result because the protective CP current may be shielded from reaching any active corrosion cells.

30 Depending on a coating resistivity, water absorption, pH and oxygen permeation, 31 the risk of corrosion of the underlying metal can be light uniform to significant corrosion, 32 SCC or bacterial corrosion.

33

Q. Have you prepared an overview of factors that may contribute to corrosion?

35

A. Yes, see the chart below: Presence of DC power source near the pipeline, and shielding
 coatings for MIC.



1 2 3		Manual (SPLP00004529), and Energy Transfer Standard Operating Procedure (SOP) documents related to the following
1		 Aboveground Components / Overhead Crossings - SPI P00003961
4		Annual Components / Overhead Clossings – 51 Er 00005701
3		• Annual Corrosion Control Surveys – SPLP00004140
6		• Emergency Response Training Exercises – SPLP00004817
7		 Investigation of Pipeline Anomalies -SPLP00004244
8		 Hazardous Liquids Pipeline Shutdown and Startup – SPLP00003838
9		• Structure to Electrolyte Potential Measurement – SPLP00004042
10		 Pressure Protection and Relief Valve Capacity Verification – SPI P00004330
11		Dublic Awareness Plan SDI D00004447
11		• Fublic Awareness Flair – SFLF00004447
12		Numerous other Energy Transfer CODs are found in these 9 mostific document
13		flag of well. These SOPs were he important in acceptaining the elegence of the Super-
14		Directions / Energy Transfer energy in a section of the subscent
15		Pipenne / Energy Transfer operating procedures.
16		
1/	0	
18	Q.	what did you find from the public 115 documents? (Exhibitit Zee-4)
19	4	
20	А.	Public 113 Documents:
21		
22		A total of / document files were identified in this folder. These documents all fall within
23		the range of SPLP00005715 to SPLP00005777.
24		
25		A total of 6 documents are United States Department of Transportation Accident
26		Reports – Hazardous Liquid Pipeline Systems for the Mariner East 1 (MEI) pipeline
27		from 3-22-2002 to 4-26-2017. Failure causes include pinhole leaks, Viton O-ring leaks,
28		improper plug installation, and "undetermined." These may be important. They are
29		summarized as follows:
30		
31		
32		• SPLP00005715: Report dated 3-22-2002. Accident occurred at Tinicum,
33		Delaware County, PA, on 2-21-2002. Summary follows.
34		
35		"COMPLAINT OF ODORS BY PROPERTY OWNER LED TO INTEGRITY TESTING AND
36 37		EXCAVATION ALONG A PARALLEL SECTION OF 8-INCH AND 12-INCH PETROLEUM PRODUCT
38		LEAKING ADJACENT TO COMMERCIAL BUSINESS (HOTEL). NO EVACUATIONS WERE
39		NECESSARY. RESPONSE WAS LIMITED TO LOCAL FIRE DEPARTMENT AND TOWNSHIP
40		OFFICIALS. PA DEP, US COAST GUARD, US FISH & WILDLIFE AND OPS HAVE MADE ON-SITE
41 42		ROOT CAUSE OF THIS FAILURE CAN NOT CONCLUSIVELY BE DETERMINED SINCE THE
43		FAILED SECTION OF PIPELINE CAN NOT BE RETRIEVED BECAUSE OF THE RISK OF
44		DAMAGING AN ADJACENT BUILDING DUE TO ITS CLOSE PROXIMITY TO THE PIPELINE.
45 46		THE PIPELINE SECTION AT THE LEAK IS APPROXIMATELY 12 FEET DEEP FOR A CROSSING OF DARBY CREEK. THE PIPELINE HAD ILL BY A HIGH-RESOLUTION UI TRASONIC PIG DEVICE
47		IN OCTOBER 2001 WITH REPORT BEING RECEIVED IN JANUARY 2002. THE SECTION OF LINE
48		THAT LEAKED HAD A REPORTED FEATURE AND WAS SCHEDULED TO BE FIELD
49		INVESTIGATED AFTER THE DISCOVERY OF THE LEAK. IN ORDER TO GATHER ADDITIONAL

INFORMATION ABOUT THE FAILED SECTION OF PIPE, A VIDEO CAMERA WAS RUN INSIDE THE FAILED PIPE SECTION TO LOCATE AND EXAMINE THE FAILURE LOCATION. THIS INTERNAL VIDEO INSPECTION CONFIRMED THE LOCATION OF THE LEAK AS BEING THE SAME LOCATION AS THAT REPORT BY THE ILI. BASED ON THE AVAILABLE INFORMATION, THE LEAK APPEARS TO BE CORROSION RELATED, EXACT CAUSE UNKNOWN."

• SPLP00005721: Report dated 12-23-2008. Accident occurred at Murrysville, Westmoreland County, PA, on 11-25-2008.

KIEFFNER FAILURE ANALYSIS REVEALED IMPROPER INSTALLATION OF THE PLUG AS THE PRIMARY CAUSE OF THE FAILURE AND DEFORMATION OF THE TOR FITTING AS A CONTRIBUTING FACTOR. OUR PROCEDURES WERE AMENDED PER PHMSA REQUEST AND EMPLOYEES WERE RE-QUALIFIED WITH THE NEW PROCEDURES.

• SPLP00005725: Report dated 5-6-2015. Accident occurred at Glen Mills, Delaware County, PA, on 4-10-2015. Summary follows.

"On 4/10/2015 at approximately 15:05 a landowner telephonically reported a petroleum odor to the SPLP Control Center. The line was shutdown and field personnel were dispatched to the area and detected a rainbow sheen on an intermittent drainage swale in a wooded area adjacent to the pipeline ROW. Emergency Response and Incident Command was initiated and the source of the odor was traced to the Point Breeze to Montello 12" refined products pipeline system. This area of the pipeline was excavated and a Plidco repair clamp was used to effect repair at the failure location. Permanent repair via cut out and replacement was planned however the area of the failure was located in a wetland area that is subject to PA DEP permitting. Permit approval process significantly delayed permanent repair. As of 7/10/2017 the failed section was cut out and replaced. The failed section was sent to a laboratory for failure analysis. The failure analysis report confirmed that the cause of the failure was external corrosion. The most likely mechanism for the external corrosion was coating failure which caused localized shielding of the CP. In 2016, Def/MFL/SMFL/LFM and UT Crack ILI tools were run and subsequent repairs and replacement of sections of this pipeline were affected including the cut out and replacement of this failed section of pipe. Subsequent to the repair program a hydrostatic pressure test was completed to requalify the MOP."

• SPLP00005738: Report dated 6-22-2016. Accident occurred at Aston, Delaware County, PA on 5-27-2016. Summary follows.

"On Friday, 5/27/2016 at 13:04, a High-High LEL Alarm Condition Triggered a Facility Lockout at Twin Oaks meter station and pipeline shut down. Event notification was sent to supervision and field personnel were dispatched to investigate. Leak was discovered at the receiving pig trap door. Response included isolation of the pig trap and flaring of the remaining product contained in the pig trap. When purged and made safe to open, the pig trap door was assessed and it was determined that the O-Ring door seal had failed which caused the release. A new O-Ring was installed, leak tested and the pipeline was returned to normal operation."

• SPLP00005751: Report dated 9-13-2016. Accident occurred at Allegheny Township, Blair County, PA, on 8-16-2016.

"On Tuesday, 8/16/2016, a High-High Alarm Condition triggered a Facility Lockout at Hollidaysburg Pump Station. Event notification was sent to supervision. Field personnel were dispatched to investigate. Leak was discovered at the receiving pig trap closure. Response included isolation of the pig trap and flaring of the remaining product contained in the pig trap. When purged and made safe to open, the pig trap closure assembly was assessed. Investigation determined the pig trap closure O-Ring had failed which was the immediate cause of the release. A new O-Ring was installed, leak tested and the pipeline was returned to normal operations."

SPLP00005764: Report dated 4-26-2017. Accident occurred at Morgantown, Berks County, PA, on 4-1-2017. Summary follows.

"On April 1, 2017 at 15:57, a call was received by the Sunoco Pipeline LP (SPLP) Control Center via the company emergency number from a landowner reporting a possible leak along the pipeline ROW at 5530 Morgantown Rd, Morgantown, PA. Internal notifications were made and SPLP field personnel were immediately dispatched to the field to investigate. Field personnel arrived onsite at approximately 17:00 and confirmation of the release was made at approximately 17:04. NRC notification was made at 17:59 (Report 1174615) that same day. Required follow up report to NRC was made on April 3, 2017 at 15:46 (Report 1174748) updating the volume released to 20bbls and also providing updated coordinates of the release location."

"The pipeline was shut down and the affected area was isolated via upstream and downstream mainline valves. Product was displaced and the isolated segment was nitrogen purged. Subsequent excavation revealed the source of the leak as an external corrosion pinhole. The affected section of piping was cut out and replaced and the failed section was sent to a 3rd party laboratory for failure analysis. Failure analysis indicated that the leak occurred at the bottom of the pipe at an area of external corrosion coincident with the heat affected zone of a girth weld. The failure analysis confirmed the cause as external corrosion and indicated that microbiologically induced corrosion (MIC) may have contributed to the observed external corrosion."

Even though the performance of failure analyses were mentioned in some of the accident reports, the technical review of documents did not identify any such failure analyses. Failure analysis of an accident should be made available in the public domain. Two of the reports in particular, are important (SPLP00005725 and SPLP00005764) because they specifically state external corrosion as the root cause of failure.

1 file (SPLP00005777) is an unreadable (too small) spreadsheet which may be presumed to be a summary of ME1 accidents over time. Even under high magnification the text lacks sufficient resolution to be readable. It would be very useful to obtain this spreadsheet, or at least a readable copy.

1 2 2	Q.	Please 19.	comment on the documents you found in Public 165, 166 and 169 from 6-17-
3 4	А.	Public	165 166 169 Documents (6.17.19):
5 6 7		A tot SPLP0	al of 3 document files were identified in this folder (SPLP00005786, 00005837, SPLP00005843).
8 9 10 11 12 13		Enviro major (SPLP	All are incomplete segments of hearing testimony from the PUC and the PA onmental Hearing Board ranging from 3-2-2017 to 5-10-2018. A search of the keywords using the Foxit PhantomPDF software found only 1 document 00005843) with much discussion/comment related to the keywords.
14 15 16 17		•	Pennsylvania Environmental Hearing Board meeting, March 2, 2017, pages 559, 567-568. Tree roots are attracted to pipe by the cathodic protection system; and can cause coating failure (p. 559). Coating over welded areas; and installation of pipe (pp. 567-568).
19		p. 559	
20 21 22		Q.	Why can't you replant trees in the right-of-way itself?
22 23 24 25 26 27 28 29 30 31 32		A.	Trees in relationship to the pipeline right-of-way cause two issues. It obstructs visibility from an areal patrol inspection, we ' re required to inspect our right-of-way very often by the federal government. And from the sky is the most efficient way to perform that inspection. The other problem is trees for the most part can have invasive roots and they're attracted to the pipe by the cathodic protection system. Electrical current that we use to protect the pipeline. Those roots will wrap around the pipe and they can actually damage the coating that we use to protect the pipe and failure that needs — cause to go repair the pipe.
33 34 35		pp. 56'	7-568
36 27		Q.	Can you tell me the purpose of the timber mats?
 37 38 39 40 41 		A.	Timber mats is another means of dispersing the load of the equipment and prevent compaction. The equipment itself has low pressure design in both low pressure tires or tracks, depending on the type of equipment.
41 42 43			So definitely when you get to wetlands and soft areas, you put timber mats down so the equipment won't sink and/or compact the ground.
44 45 46			After the travel lane's established, the surveyors come back through and they'll stake out a center of where the pipe is supposed to go for the ditch crew, and that's

1 2		basically a backhoe or another type of rotary excavator that will excavate the ditch, separate the topsoil and the subsoil. Behind them comes a crew with the
3 4 5		truck crew, sometimes at the same time, sometimes ahead or behind, will string out the pipe along one side of the right-of-way.
6		Union welders come in. They weld up every joint of pipe. Every joint of pipe gets
7		x-ray inspected to make sure the welds are solid and good. After the welds are
o 9		over the welded areas because the pipe is coated but the weld areas have to be
10		bare steel for the welding process.
11 12 13 14		So then they inspect the coating to make sure that it's that there's no dents, gouges, scrapes, pock marks. They lower the pipe into the excavation. They once again inspect the coating to make sure it didn't get damaged during the lowering
15 16		in process. Coating is very important to the pipe.
17 18 19	Q.	Please comment on the documents you found in Public 165, 166 and 169 from 6-19- 19.
20 21	A	Public 165 166 169 Documents (6 19 19):
22		
23 24 25		A total of 3 document files were identified in this folder (SPLP00006922, SPLP00006941, SPLP00006952.
23 26 27 28 29 30		Two (SPLP00006922 and SPLP00006941) are Sunoco direct testimony before the PUC dated 3-1-2018; and one is an incomplete segment of hearing testimony from the PUC dated 7-18-2017 (SPLP00006952). A search of the major keywords using the Foxit PhantomPDF software found little of relevance.
31	0	
32 33	Q.	did you find in No. 104, the ROW walking reports?
34 35	A.	Highly Conf 104 – ROW Walking Reports (6.17.19) (Exhibit Zee-5)
36		A total of 56 document files were identified in this folder renains from SPI P00000047
37 38		to SPLP00000263.
39		
40		Sunoco right-of way (ROW) patrol reports of ME1 to PUC covering the time
41		period from 4-20-2019 to 6-16-2019, as one of the requirements of PUC to allow re-
42 43		establishment of ME1 operation. The following four pdf documents provide in an abbreviated form the data included in all the daily reports for the Sunoco ME1 right-of-
44		way (ROW) inspections as required by PUC: extending from 4-20-2019 to 6-16-2019.
45		
46		• SPLP00000103 (ROW Inspection 4-20-2019 to 5-6-2019).

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	The one document in the 175-177 sub-folder was a set of 33 aerial surveys of Mariner East 1.
Q.	Did you review 6-26-19 document production 1, 10 and 13 (Exhibit Zee-6)
А.	6.26.19 SPLP Production – Highly Conf CSI Docs Highly Confidential 1, 10, 13
	A total of 1647 document files were identified in this folder, ranging from SPLP00015477 to SPLP00028647.
	Of these, 1406 document files are judged to be irrelevant to the purposes of our litigation support. These documents fall into the following general categories.
	Upreadable test results
	 Test plans and requests
	 Discussion outlines
	 Mill test reports
	 ISNetworld OO reports.
	 Personnel lists and personnel qualifications of all types (including welding and NDT).
	 Radiological inspections and qualifications.
	• Line testing task reports.
	• ILI inspection anomaly reports for anomalies such as deformation and other non-
	corrosion/coating types.
	Welding procedure specifications/
	• Weld coupon test reports.
	• Site inspections.
	• Work permits.
	• Work site safety and hazard analyses.
	• Instrument calibration.
	document types include:
	document types merude.
	• Integrity summaries. There are 3 integrity summaries (SPLP00008132,
	SPLP00008142, SPLP00008154) For Mariner East 1. All three summaries provide
	metal loss (corrosion) summaries in table form, post-repairs.

ILI inspection anomaly reports for Mariner East 1, specifically identifying external

metal loss (corrosion). All of these reports were generated during the 2017-2018 time

period. These reports also include pit depth measurements. There are 22 documents



of this type, identified as the following.

We concur with the opinion of Richard B. Kuprewicz that "There are certain anomalies or imperfections in pipelines, including corrosion threats, that ILI assessments cannot reliably determine." The implication is that many cases of external metal loss (corrosion) may have been overlooked by ILI inspection, and this this list of anomaly reports does not reflect the extent of the probable external metal loss / corrosion problem along the Mariner East 1 pipeline. ILI cannot detect initiation of corrosion and certain type of coating disbondments.

- Pipeline Inspection. There is 1 comprehensive pipeline inspection report dated 4-3-• 14; SPLP00018052. (Exhibit Zee-7) Although corrosion data was not identified, it was decided to keep this document in the relevant category.
- Pipeline Inspection and Repair Maintenance Record. There are 215 such reports (Exhibit Zee-2); and the SPLP numbers will not all be listed here These documents all fall within the range of SPLP00008166 to SPLP00030663. This classification is based on an inclusion of a pipeline inspection and repair maintenance form by itself;

	or including other documentation. These reports cover the time period from 2013 to 2016.
Q.	What did you find from the 12-11-19 document production relative to coating specs (Exhibit Zee-8)
А.	Flynn 12.11.19 SPLP Production – Highly Conf CSI Files \ Flynn Se 2, No. 19 - Coatin Specs
	A total of 10 document files were identified in this folder, ranging from SPLP0003173 to SPLP00031805. These are coating specification documents, with effective date ranging from $2/6/15$ to $11/1/18$. They are titled as follows.
	• SPLP00031735 – Coating Selection Criteria, Effective Date 2/6/15.
	• SPLP00031737 – Coating for Above Ground Piping or Structures, Effective Dat 11/1/18.
	 SPLP00031744 – Coating of Transition Piping From Below to Above Ground Effective Date 10/1/15.
	 SPLP00031747 – Wax Coating for Buried or Submerged Fittings, Valves, Tie-Ins, & Repairs to Linepipe Coating; Effective Date 10/1/15.
	 SPLP00031752 – Coating of Field Joints, Valves, Tie-Ins, Girth Welds, and Shor Sections of Pipe Using Two Part Epoxy; Effective Date 11/1/16.
	 SPLP00031756 – Plant Applied External Fusion Bonding Epoxy Pipe Coating Effective Date 2/6/15.
	• SPLP00031776 – External Coating of Girth Welds with Fusion Bonded Epoxy Effective Date 10/1/15.
	 SPLP00031783 – Concrete Over-Coating for Pipe Coated with Fusion Bonder Epoxy; Effective Date 2/6/15.
	• SPLP00031798 – Concrete Overcoating for Pipe Form Method for Field Application Effective Date 2/6/15.

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2		• SPLP00031805 – Application of "Rapid Set" Concrete Over Pipeline Girth Welds:
3		Effective Date 2/06/15.
4		As these are all relatively recently issued specifications, covering the period 2015
5		to 2018, it is our opinion that these specifications do not have an impact on our analysis.
6		conclusions, and opinions concerning the current condition of the aging pipeline coatings.
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13 14	Q.	Did you review the recent document production stamped SPLP 32110 – 33161?
15 16	A.	Yes, Flynn December 23, 2019 Production, SPLP 32110 – 33161. (Exhibit Zee-9)
17	0	
18	Q.	What are these documents?
19	•	These desuments are close interval survey relate
20	А.	These documents are close interval survey plots.
21		
22	0	What information is present in the plots?
23 24	v٠	what mormation is present in the plots.
25	A.	The plots consists of ON potential survey data.
26		1 1 2
27	Q.	Is the provided information sufficient or do you want more information?
28		-
29	A.	Along with the plots, it would have been better if the following information was also
30		provided:
31		• Type of CP System
32		• CP Design
33		• Date of CP system Installation
34		• If CP system is Impressed Current, Details of Rectifier settings/reads
35		Procedure followed for CIS and additional measurements
36		
37	Q.	Does these plots contain any information on additional measurements?
38		
39	А.	Yes, lateral potentials or side-drain potential data is also recorded.
40		
41	-	
42	Q.	What standard could be referenced for lateral potentials or side-drain potential
43		survey?
44 45	۸	NACE SP0207-2007
т 3 46	л.	11AOL 51 0207-2007
10		

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2		
3 4 5	Q.	Can you provide an overview of lateral potentials or side-drain potential survey?
5 6 7 8 9	A.	Side-drain potential survey, additional measurements, must be performed at the same time and same locations along the pipeline as the close-interval survey (CIS) measurements. Side-drain potentials should be measured and recorded on both sides of the pipe at the start of each survey run or may also be measured and recorded at areas
9 10 11 12		indicating possible problems i.e., at low-potential sites and at the sites where structure-to- soil potentials changes abruptly.
13 14 15		Side-Drain Potential Survey:
16 17		A cell-to-cell surface potential gradient survey consisting of a series of side-drain potentials measured along a pipeline.
18 19		It is recommended that side-drain potentials should be compared with potentials taken directly over the pipeline. More electronegative side-drain potentials compared to
20 21		the potentials taken directly over the pipeline indicates that the flow of current in the soil is towards the pipeline; assuming steady soil conditions, current density and coating
22 23		conditions.
24 25	Q.	What are the challenges with lateral potentials and side-drain potential survey?
26	A.	
27 28		• Minor measurement errors due to incorrect placement of the reference electrodes can result in misinterpretation of the data.
29 30		• Under certain conditions, a relatively strong localized anodic cell could exist on the bottom of the pipe with the top of the pipe serving as a cathode and negative side-
31 32		drain readings could be measured while severe corrosion is actually occurring on the bottom of the pipe at this location.
33		
34	Q.	What are the findings from the review of CIS documents?
35		
36	A.	A summary of the newly produced documents is attached as Exhibit 10. Review of CIS
37		data suggests that the electrode placed directly above the pipe is connected to the positive
38		terminal of the voltmeter and the offset electrode to the negative terminal and side-drain
39		potentials were measured on both sides of the pipe. Negative side-drain potential reads
40		indicate that current is flowing towards the pipe.
+1 42		\circ Corrpro measured and recorded depolarized potential (A) and ON potential (B) This
43		data assists in determining the voltage shift $(B - A)$. However, Titan Corrosion
44		Services (TSC) and CP Data manager has measured and recorded only ON
45		potentials, no baseline information is available.



receiving adequate cathodic protection and the locations are highlighted in Exhibit 10. From the low potential reads it is evident that the goal mentioned in IM is not achieved. This means the pipe can be at high risk for corrosion.

Can you classify the pipeline regions based on the potential survey data?

Matergenics expresses interest to know the proactive measures taken at the locations where ON potentials are very low.

18Q.At my request, Dr. Zee, have you delineated the proper scope of pipeline evaluation19and assessment relative to the Mariner East 8-inch ME1 and 12-inch bypass20pipelines?

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A.

Based on Matergenics' technical expertise and years of experience in pipeline corrosion risk assessment, the scope of work needed for proper evaluation and assessment of the 8inch Mariner East 1 ("ME1") and 12-inch Mariner East ("ME2") workaround pipelines can be divided into two parts for better evaluation and assessment of the coating, cathodic protection (CP) system, CIS on the selected areas of the pipeline, and soil resistivity measurements.

Part 1 covers on-site testing on the live pipeline which is a non-destructive testing (NDT). The tests covered under NDT are soil resistivity/corrosivity measurements, collection of soil samples close to the pipeline and potential measurements. The recommended non-destructive testing will not have any adverse effects on the mechanical integrity of the live pipeline.

1		
2		Part 2 covers lab testing of the ME1 pipe remnant samples from the independent
3		lab that has performed the analysis. Also, part 2 covers testing of soil samples collected
4		from site, corrosion products if present on the ME1 pipe remnant samples, liquid samples
5		from coating blisters and coating samples collected from the ME1 pipe remnant samples.
6		The testing described in part 2 is a destructive testing.
7		
8	Q.	Please provide an overview of the on-site testing protocol.
9		
10 11	A.	The following should be performed based on pre-assessment/In-Line Inspection (ILI) in selected areas:
12		A. CIS in selected areas based on the previous ILI data:
13		B. Soil Resistivity and Barnes Layer Testing and Analysis:
14		C. Soil Sampling and Field Testing for Corrosivity
15		
16		A. Description of CIS Survey at Selected Areas
17		L v
18		During CIS, there is not any disruption to the service of the pipeline and most importantly
19		the CIS test does not result in any compromise to the pipeline. During CIS, a connection
20		is made to the pipe test lead in a test station or the structure, and the pipe to soil potential
21		is measured at 5-foot increments along the pipeline. Distance measuring is conducted
22		using the survey wire in conjunction with an electronic distance counter to measure how
23		much wire has been dispensed.
24		Pipe to soil potentials are measured as the reference electrodes are moved down the
25		pipeline. These potentials are the basis of the CIS and provide a continuous pipe to soil
26		profile of the pipeline in the form of graph.
27		Interruption: During CIS survey, both ON and OFF potentials are recorded. To record
28		OFF potentials, all the line rectifiers that affect the line section being surveyed are
29		interrupted using synchronized interrupters. Synchronized interrupters switch the rectifier
30		current at various ratios of "on" time to "off" time mostly at 4:1.
31		Data Logger: The data loggers or computerized voltmeters Allegro QX is used for CIS to
32		record all of the required data during a CIS. Apart from the data loggers or computerized
33		voltmeters, a wire dispensing system should also be used. The survey wire, 1.5-mile
34		spool of #32 awg or 3-mile spool of #34 awg coated copper wire, would be used for
35		maintaining constant electrical contact with the pipeline through connections made at test
36		stations.
37		<i>Pipe Locator:</i> In order to accurately record the pipeline pipe to soil potentials, pipe
38		locator is used to place the reference electrodes over the pipeline. In this case, the

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engineer recording the CIS data would follow the engineer locating the pipeline immediately ahead of him.

B. Soil Resistivity and Barnes Layer Testing and Analysis

In general, we consider two methods to measure soil resistivity, as follows:

- 1. Wenner four-pin method, recommended for in-situ soil resistivity measurement and soil layer analysis (Barnes analysis);
 - 2. Soil box method, recommended for resistivity measurement of soil samples.

ASTM G57 - This standard covers the equipment and procedures for measurement of soil resistivity. The standard describes two sets of equipment and procedures. One for *in situ* measurement of soil resistivity in the field, and another for measurement of soil resistivity of collected soil samples from the field. The latter can be performed in the laboratory or in the field. Our soil resistivity field measurements involve the use of four metallic pins (1 ft length approximately) driven into the ground. The instrument supplies a current to soil through outer pins and the voltage difference is read between the inner pins. To measure the soil resistivity at different depths, measurements can be performed with different spacing between the pins.

C. Soil Sampling and Field Testing for Corrosivity

In accordance with ASTM D4220 / D4220M, the following procedure needs to be used to collect soil samples:

- 26 Soil samples will be collected from area (>8 ft) to the pipeline and 5 feet deep.
- 1. The collected soil samples will be placed in <u>clean plastic container</u>.
- Soil samples will be identified with tags, labels, and markings prior to transporting
 them.
 - 1. Job name or number, or both,
 - 2. Sampling date,
- 32 3. Sample/boring number and location,
 - 4. Depth or elevation, or both,
 - 5. Sample orientation,
 - 6. Collector name (minimum CP1 Technician)
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1 2 3		500 grams of soil is the minimum amount needed to perform the basic protocol. Once the soil samples are received at Matergenics Pittsburgh Lab, the procedures described in Part 2, Laboratory Testing, will be used for corrosivity determination.
4		
6	0	What is the recommended on-site testing protocol for digs?
7	v٠	what is the recommended on-site testing protocor for digs.
8	A.	Three 500 ft segments of the pipe should be selected for close interval survey (provided
9		the pipe segments in these areas are not replaced and are the original coated pipes). The
10		dig location selections should be based on previous CIS data, soil resistivity and
11		corrosion characteristics. Excavation would be the responsibility of SPLP.
12		At all dig sites (3), soil, corrosion products and disbonded coating samples should
13		be collected, labeled, logged in chain of custody form, and submitted to an independent
14		lab. If no disbondment or other feature of interest was identified, samples would be
15		discarded in the field. If SCC, localized corrosion or another feature of interest was
16		found, small pipe sections should be cut and the samples should be shipped overnight to
17		the lab.
18		The following tests will be performed on the exposed pipe section:
19		1. Visual examination, photographic documentation and macro-examination by digital
20		microscope (Non-Destructive testing).
21		2. Coating Thickness Measurement by Positector 6000 (Non-Destructive testing).
22		3. pH measurement under disbonded coating by pH paper (Non-Destructive testing).
23		4. Blister liquid sampling for laboratory analysis (Non-Destructive testing).
24		5. Delaminated coating sample collection for laboratory analysis.
25		6. Adhesion testing near delaminated areas (Destructive testing).
26		7. Collection of corrosion products if present.
27		
28	Q.	What is your recommended laboratory testing protocol?
29		
30	A.	The following laboratory testing of collected samples (soil, corrosion products, disbonded
31		coating samples and cut pipe sections) should be performed: Metallurgical Failure
32		Evaluation and Soil Corrosivity Determination.
33		
34		A. Metallurgical Failure Evaluation
35 26		(1) The failure analysis of out nine sections should include the following:
20 27		(1) The junure analysis of cut pipe sections should include the jollowing:
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1	(a) Photographic documentation throughout project work
1	(a) Flotographic documentation unoughout project work.
2	(b) Visual examination including close-up inspection for contamination, texture,
3	magnification stores microscope
4	(c) Metallographic preparation and examination (cutting, mounting and etching with
5	a 2% nital solution) of selected steel nine areas
0	(d) Metallurgical cross-sectional ontical microscopy to evaluate coating and substrate
/ Q	(u) Metanuigical closs-sectional optical incloseopy to evaluate coating and substrate characteristics including microstructure defects voids porosity number of
0 0	coating layers layer thickness contamination and general characteristics
10	(e) Fourier transform infrared spectroscopy (FTIR) on both sides of coating sample to
11	identify the coating system functional group chemistry and determine if
12	degradation or contaminants are present.
13	(f) Scanning electron microscopy - energy dispersive x-ray spectroscopy (SEM-EDS)
14	on fracture surface(s) of runtured nine at fracture initiation. If inorganic
15	contaminants are identified on the coating surface x_{-ray} diffraction (XRD) may
15	be performed
16	be performed. () $X = 1$ (C) $(x = 1 + 1)$
17	(g) X-ray diffraction of corrosion products on fracture surface(s).
18	(h) Tensile, Charpy and Hardness testing to determine mechanical properties of steel
19	pipe.
20	(i) Chemical analysis of steel pipe to determine properties.
21	(j) Adhesion testing of coating per ASTM D3359 and / or ASTM D4541 to
22	determine adhesion.
23	(k) Soil testing (chlorides, sulfates, resistivity, corrosion rate, etc.) of collected soils.
24	(Description of soil testing detailed separately below.
25	(1) Final technical report providing the results of the examination, including analysis
26	of data, determination and conclusions as to the cause of failure.
27	
28	
29	(2) Examination of the coating chip and dollies with backside of the coating includes:
30	
31	• Fourier Transform infrared spectroscopy (FTIR) on both sides of coating sample
32	to identify the coating system functional group chemistry and determine if
33	degradation or contaminants are present.
34	• Scanning electron microscopy - energy dispersive x-ray spectroscopy (SEM-EDS)
35	on both sides of coating sample to perform elemental analysis of coating and
36	possible contaminants. If inorganic contaminants are identified on the coating
37	surface, x-ray diffraction (XRD) may be performed.
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40	(3) Examination of the liquid sample includes:
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42	• Test for chlorides, sulfates, resistivity, corrosion rate.
43	• MIC test.
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2	(4) Examination of the corrosion products and calcareous deposits include:
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4	• SEM/EDS of corrosion products and AC nodules, if AC corrosion is present.
5	• ARD analysis of corrosion products and AC nodules, if AC corrosion is present.
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10	B. Laboratory Soil Testing to Determine Corrosivity
11 12 13	Soil corrosivity analysis is very important when coating shields CP.
13	A. Introduction
15	
16	A soil from field should be representative of the area of interest, where the stratum of
17	interest contains a variety of soil types. It is desirable to sample each type separately.
18	It may also be necessary to prepare a mixed sample. The sample should be reasonably
19	large and thoroughly mixed so that it will be representative. The soil should be well-
20	compacted in layers in the soil box, with air spaces eliminated as far as practicable.
21	The measured resistivity will be dependent on the degree of compaction, moisture
22	content, constituent solubility, and temperature. The effect of variations in
23	compaction and moisture content can be reduced by fully saturating the sample before
24	placing it in the soil box. The saturated measurement will provide an approaching
25	minimum resistivity, and can be usefully compared with "as-received" resistivity
26	measurements.
27	
28	B. Soil pH Test Methods
29	
30	The recommended standard test method for soil pH is ASTM G51, Standard Test
31	Method for Measuring pH of Soil for Use in Corrosion Testing. In ASTM G51, two
32	apparatus are recommended for pH measurement: Calomel and glass electrodes and a
33	portable, battery-powered pH meter
34	
35	C. Sulfate Test Methods
36	Based on condition (soil, water, or combination) the following standard test methods for
37	sulfate content are recommended: ASTM C1580, Standard Test Method for Water-
38	Soluble Sulfate in Soil and ASTM D4327, Standard Test Method for Anions in Water by
39	Suppressed Ion Chromatography

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D. Sulfides Content

Sulfide ion, S^{-2} , is found in ground waters and wastewater, causing odor and serious corrosion problems. If acidified, these waters can release hydrogen sulfide (H₂S) which is extremely toxic even at low levels. There is no specific standard to measure soil sulfides; however, since sulfide ions play a critical role in internal corrosion of pipelines in water system, a specific standard test method for sulfide ions in water is developed in ASTM D4658.

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E. Sulfides Test Methods

Recommended standard test method for water sulfides content is ASTM D4658, *Standard Test Method for Sulfide Ion in Water*. This test method uses an ion-selective electrode in conjunction with a double junction sleeve type reference electrode to potentiometrically detect Sulfide ions, S^{-2} , in water.

The potentials are read using a pH meter with proper resolution (0.1 mV). Alternatively, ion meters with direct concentration scale for sulfide ions can be used. This test method is applicable in the range from 0.04 to 4,000 milligrams per liter (mg/L) of sulfide.

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20 F. Chloride Content

The presence of chloride ion, Cl⁻, significantly aggravates the conditions for pitting corrosion of most metals. Chloride ions can attack and destroy the passive films (corrosion product layers) and expose the bare metal substrate to corrosive environment.

Like sulfides, there is no direct standard to measure soil chlorides; however, since chloride ion is under regulation in the water industry, and must be measured accurately, a specific standard test method for chloride ions in water is developed in ASTM D512 and ASTM D4327.

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29 G. Chlorides Test Methods

Recommended standard test method for water chlorides content is ASTM D512,
 Standard Test Methods for Chloride Ion in Water. In this standard, the following three
 test methods are suggested: Test Method A: mercurimetric titration; Test Method B:
 silver nitrate titration: and Test Method C: ion-selective electrode method.

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35 H. Soil Water Content

36 A dry soil, regardless of its type and texture, is a non-corrosive environment, and its

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resistivity is usually very high—a very good insulator. It is the moisture in soil that turns it into a corrosive environment. In fact, for most soils resistivity values decreases rapidly until approximately 20% of a soil weight is water. Variations in soil water content is usually drastic due to seasonal variations in rainfall and temperature. Water content of soils also depends on soil drainage capability—a function of soil type and texture (ASTM D2487), particle size (ASTM D422), porosity, and mechanical pressure—which all change with lateral location and depth.

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I. Water Content Test Method

Recommended standard test method for water (moisture) content of soil is ASTM D2216, 11 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of 12 Soil and Rock by Mass. This test method is used to determine the water (moisture) 13 content by mass of soil, rock, and aggregate where the reduction in mass by drying is due 14 to loss of water. The recommended drying temperature in ASTM D2216 is 110°C; 15 nonetheless, this temperature may result in decomposition of organic materials, and 16 conversion of calcium sulfate dihydrate (gypsum) to calcium sulfate hemihydrate that is 17 not normally present in natural materials except in some desert soils. In order to reduce 18 the degree of dehydration of gypsum or to reduce decomposition in highly/fibrous 19 organic soils, it may be desirable to dry the materials at 60°C or in a desiccator at room 20 temperature. 21

Two test methods are provided in this standard. The methods differ in the significant digits reported and the size of the specimen (mass) required. In method A, the water content by mass is recorded to the nearest 1%. For cases of dispute, method A is the referee method. In method B, the water content by mass is recorded to the nearest 0.1%.

This standard requires the drying of soil in an oven, which takes several hours for proper drying. The following test methods provide less time-consuming processes for determining water content:

- ASTM D4643, Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating;
 - ASTM D4944, Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester;
 - ASTM D4959, Standard Test Method for Determination of Water Content of Soil by Direct Heating

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J.

Corrosion Rate Measurement

Recommended standard test method for evaluating the corrosion rate of test specimens is: ASTM G102, *Standard Practice for Calculation of Corrosion Rates and Related Information from Electrochemical Measurements*. This standard covers the conversion of electrochemical measurements to rates of uniform corrosion. The conversion of polarization resistance values to corrosion rates is reported as mass loss in mils per year for a variety of metals and alloys.

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Q. In light of your review of documents, are you in a position to discuss your findings 9 in this case?

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A. The Flynn Complainants allege that the aging 8-inch and 12-inch Mariner East pipelines are in poor condition and must be evaluated by an independent expert. The Complaint seeks (a) appointment of an independent expert to conduct a "remaining life study," and (b) such other relief as may be appropriate.

Initially, Matergenics was retained to assess the condition of these pipelines and make recommendations concerning their future maintenance and/or operation as well as the need for an independent expert to conduct a remaining life study.

As noted more in detail above, we reviewed tens of thousands of pages of materials supplied by Sunoco to Flynn counsel. Among those was Sunoco's integrity management ("IM") manual.

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The initial *in camera* review of Sunoco's integrity management ("IM") manual was notable in two respects. First, the material supplied did not include a great deal of ancillary material that was expressly referred to in the CSI documents: procedures, inspections, data collection processes and reports Second, we were not permitted the opportunity to copy or make notes on the material that was provided to us. On January 6, 2020 we were allowed a fuller review of the IM materials and were permitted to take notes.

We have now reviewed the entire Integrity Management Plan. The review of the planning document shows it to be reasonably comprehensive and detailed. The plan calls for root cause analyses, close interval surveys, and cathodic protection by maintenance of pipe-to-soil ON potential of greater than -850mV. These are all good engineering practices, as my testimony has otherwise indicated.

Unfortunately, Sunoco's IM practices have not followed good engineering standards or its own IM plan. For example, even though the Plan specifies the undertaking and completion of root cause analyses (RCAs) for any and all pipeline failures, we have not seen satisfactory documented evidence for these analyses. The close interval surveys that Sunoco recently furnished do not meet the IM plan standards.

We also have documented instances of failure to maintain the pipe-to-soil ON potential of greater than -850 mV, again falling below Sunoco's own written standards.

Failure Analysis Root Cause Determination

Matergenics further notes that it understands Flynn counsel has requested an opportunity for us to participate in condition assessment and the excavation of portions of the ancient pipeline. At the time of this report we have not yet been able to do so.

In the public documents, 8 documents were provided which included multiple Energy Transfer Standard Operating Procedures (SOPs). These SOPs may be important in ascertaining the adequacy of the Sunoco Pipeline / Energy Transfer operating procedures. A total of 6 documents are United States Department of Transportation Accident Reports – Hazardous Liquid Pipeline Systems for the ME1 pipeline from 3-22-2002 to 4-26-2017. Two of the reports in particular, are important (SPLP00005725 and SPLP00005764) because they specifically state external corrosion as the root cause of failure. However, accompanying failure analysis and root cause analysis reports were not included in the document production. One Pennsylvania Environmental Hearing Board meeting, March 2, 2017 (SPLP00005843) briefly touched the point that tree roots are attracted to pipe by the cathodic protection system; and can cause coating failure; and also discussed coating over welded areas; and installation of pipe.

In the highly confidential documents, a series of 56 Sunoco right-of way (ROW) patrol reports of ME1 to PUC covering the time period from 4-20-2019 to 6-16-2019, as one of the requirements of PUC to allow re-establishment of ME1 operation. What is important here is that the report forms were designed for both right-of-way patrols and leak surveys. No leak surveys were conducted by Sunoco, as they do not appear to have been required by PUC in order for Sunoco to reopen the pipeline.

A total of 3 integrity summaries were found in the highly confidential documents. A total of 22 in-line inspection (ILI) anomaly reports obtained during the 2017-2018 time period were related to external metal loss; and include pit depth measurements. We concur with the opinion of Richard B. Kuprewicz that "There are certain anomalies or imperfections in pipelines, including corrosion threats, that ILI assessments cannot reliably determine." The implication is that many cases of external metal loss (corrosion) may have been overlooked by ILI inspection, and this list of anomaly reports does not reflect the extent of the probable external metal loss/corrosion problem along the Mariner East 1 pipeline.

A total of 215 Pipeline Inspection and Repair – Maintenance Records were found among the highly confidential documents. This classification is based on an inclusion of a pipeline inspection and repair maintenance form by itself; or including other documentation. These reports cover the time period from 2013 to 2016.

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Pipeline integrity is mostly managed by: (1) close interval surveys; (2) coating surveys; (3) internal corrosion monitoring; and (4) technical training of people in charge. Many pipeline operators don't know the extent of what they have in the ground, or the corrosion conditions that are critical for designing an effective corrosion monitoring/corrosion control strategy.

Our review of over two thousand Sunoco technical documents shows a pipeline integrity system that lacks a centralized source sufficient to document corrosion incidents, factual corrosion data, corrosion risk assessments/aspects of the aging pipeline and corrosion mitigation.

Corrosion failures, ruptures and explosions of aging pipelines are made more likely in corrosive soils and when there is a lack of an effective integrity management program that considers disbonded coatings, shielding, MIC and cathodic protection.

Based on PUC formal complaint dated December 13th 2018 (Appendix C) and the fact that (a) the 8-inch line and the 12-inch line date back to the 1930s, and the records we have been supplied reflect (b) coatings that shield (interfere with) cathodic protection (c) corrosive soils and (d) past incidents/accidents, it is more likely than not that accelerated corrosion is taking place that will cause serious damage to people and property in high consequence areas.

A remaining life study can only be performed by acquiring solid data regarding corrosion risks and corrosion performance parameters of the pipeline under review. These data should include internal and external corrosion data, AC/DC interference, evaluation of CP performance, evaluation of coating type and adhesion condition, soil corrosivity mapping and DA condition assessment particularly in areas that the protective coating is degrading and shield cathodic protection or corrosion protection is not adequate.

An appropriate expert will be guided by the well-settled standards set out in ASME B31.4-2002 (Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids) as well as ANSI/NACE SP0502-2010 (Pipeline External Corrosion Direct Assessment

Matergenics as an independent corrosion firm is well qualified to perform the remaining life study on the basis of its technical expertise, and years of experience in pipeline corrosion risk assessment, as well as its existing practice as an independent corrosion engineering consulting business.

In closing, for an expert to be able to form an opinion as to the present, likely condition of the 12-inch and 8-inch lines, a good deal more information would be

required than has been supplied to Matergenics to date. The information needed has been set out in detail above in Part III. The materials furnished, however, raise serious questions as to the condition of these aging pipelines as well as the fitness of Sunoco to operate them.

Q. Based upon Matergenics' review of the materials supplied to date, do you have an opinion, to a reasonable professional certainty, concerning the matters you were asked to review?

- (1) Based upon the materials we have been permitted to review, Sunoco may be operating an inadequate integrity management program for the 8-inch pipeline and the 12-inch pipeline considering the leak incidents, age of pipeline and coatings that, if disbonded, shield cathodic protection.
- 15 (2) Based upon the materials we have been permitted to review, important 16 information relative to corrosion data, corrosion risk and corrosion mitigation is 17 lacking.
 - (3) Sunoco's operation of the 8-inch pipeline and the 12-inch pipeline should be reviewed for corrosion risk both externally and internally;
 - (4) Sunoco's operation of the subject 8-inch pipeline and the 12-inch pipeline should be reviewed for safety considerations from a corrosion risk point of view; and
 - (5) The question of whether or not Sunoco should be permitted to continue operating these pipelines cannot properly be decided without a thorough investigation by an independent expert.

29Q.Dr. Zee, would you agree that if additional information becomes available it is30conceivable you would have to review that information to determine whether it31affects your opinion in this case.

- 33 A. Yes, of course.
- 34

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7	MICHAEL WALSH	•	
, 8	NANCY HARKINS	•	
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10	CAROLINE HUGHES and	•	P-2018-3006117
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1			
2	0.	Before proceeding with surrebuttal testimony. I would like you to state your	
4	certifi	ication related to corrosion	
5			
6	A.	I'm a NACE certified Corrosion Specialist.	
7			
8	Q	Is either Mr. Field of Mr. Garrity a Corrosion Specialist?	
9 10	٨	No. Mr. Corrity corned a PS in Electrical Engineering. He is a cortified	
10		FCP Specialist Mr. Field correct a PS in Machanical Engineering. He is a	
11	NACE CP Specialist. Mr. Field earned a BS in Mechanical Engineering. He is a		
12	cerum	ed NACE CP Specialist.	
13	0		
14	Q.	what is the difference between a CP Specialist and a Corrosion Specialist?	
15			
16	A.	A Corrosion Specialist has earned NACE Institute's highest level of	
17	certifi	cation. The Corrosion Specialist certification is geared towards very	
18	experi	enced corrosion control personnel, with broad and extensive expertise, in both	
19	the the	eory and practice of multiple areas of corrosion and corrosion control, and	
20	capab	le of performing work at a very advanced level. A CP Specialist has not taken	
21	the high	gher level examination that a Corrosion Specialist has.	
22		Libelieve there are around seven (7) NACE certified Corrosion Specialists in Pennsylvania	
22	151 N	ACE certified Corrosion Specialists in the USA and 286 NACE certified Corrosion Specialists	
24	in the	world.	
25			
26	Q.	What are the steps to corrosion specialist certification?	
27			
28	A.	The NACE requires you first to have qualified as one of several lower level specialists,	
29	includ	ang CP Specialist. You then appear to take the certification exam. I took it, passed it and was	
30 31	then c	ertified as a Corrosion Specialist.	
32	0.	Dr. Zee, have you had an opportunity to review the Rebuttal Testimony of John G.	
33	Field	III and the Rebuttal Testimony of Kevin C. Garrity that have been submitted in this	
34	proce	eding?	
35	-		
36	A.	Yes, I have.	
37			
38	0 77		
39	Q. Ha	ave you had an opportunity to review the exhibits that accompanied the testimony of and Convity?	
40 41	rield	and Garriy:	
42	A.	Yes, I have.	

1

2 Q. Can you identify the Field exhibits?

3 A. Sure. The exhibits noted in Mr. Field's testimony were identified as JF-1 through JF-5.

4

5 Q. What were JF-1 and JF-2?

The first two were stated by Mr. Field to consist of the Energy Transfer Integrity
Management Plan applicable to Mariner East pipelines in May 2018 (ETIM Plan) and the Sunoco
IM Plan applicable prior to that date. I am assuming that Mr. Field examined the same documents
that my team and I examined at Matergenics in 2019.

10

11 Q. How about JF-3 through JF-5?

A. JF-3 is identified by Mr. Field as a document reflecting 32 standard operating procedures and
 one engineering standard. JF-4 is spreadsheet purporting to show various MFL, deformation and UT
 in-line inspection tool runs for each pipeline. JF-5 is a metallurgical leak analysis prepared by DNV
 GL USA, Inc. (DNV Report).

16

Q. Until you received Mr. Field's testimony, had you ever seen exhibits JF-3 through JF5?

19 A. The answer is definitely not. JF-3 appears to be a compilation that Mr. Field prepared for his June 15, 2020 testimony. It was not available to me at the time I submitted my direct testimony on 20 January 15, 2020, six months earlier. JF-4 is a table of inspection dates. Again, it appears to be a 21 compilation by Mr. Field for his rebuttal testimony. Some of the information underlying the 22 document may have been produced previously. As for JF-5, the DNV report, the first time I saw it 23 was in connection with Field's rebuttal testimony. I should note that Sunoco's PHMSA report in 24 connection with the April 1, 2017 leak incident may have contained some information provided by 25 DNV but I am uncertain of that. 26

27

28 Q. Can you identify the Garrity exhibits?

A. Mr. Garrity's testimony includes two tables he prepared that are identified as Figure 1 and
 Figure 2. It also includes his curriculum vitae, marked as Exhibit KG-1. He refers to the five Field

exhibits as well as information available on the PHMSA website. I'm not aware of any other Garrity
 exhibits.

3

6

4 Q. For the testimony that you are about to give, have you reached your own conclusions to 5 a reasonable degree of professional and scientific certainty?

A. Yes, I have. All of my comments as well as conclusions in this surrebuttal testimony are
given to a reasonable degree of professional and scientific certainty.

- Q. Let's start then with Mr. Field's testimony. Regarding Exhibit JF-3, have you
 determined which of those operating procedures and one engineering standard went into effect
 after the Morgantown incident?
- 13

A. Yes, all of them. Every single one went into effect one year or longer after the ME1 April 1,
2017 leak in Morgantown. I have prepared a table that identifies all of these by procedure number,
title, effective date, and code (49 CFR 195) reference for each. I have attached that table as Exhibit
Zee-1.

Q. Mr. Field states in his rebuttal testimony that "SPLP has and follows robust integrity and corrosion control assessment and management practices..." Was that statement true at the time of the April 1, 2017 Morgan leak incident?

22

23 A. No, it was not. First, as to the integrity assessment and corrosion control assessment and management practices in the immediate vicinity of the leak incident, the practices newly adopted 24 and shown in my table are good practices. Obviously, they were adopted in response to the absence 25 of such practices leading up to the incident. Second, the fact that they were adopted does not by 26 itself mean they were *implemented*. If there are data that reflect implementation of these practices in 27 the Morgantown vicinity, those data have not been shared with Matergenics. Mr. Field does not 28 identify any records that support the sweeping generality that on April 1, 2017 or later on "SPLP has 29 and follows robust integrity and corrosion control assessment and management practices." This is 30 true both respect to Morgantown in particular and the entire Mariner pipeline system as well. This 31 32 also is obvious from the fact that many of Sunoco's sub-part practices are specifically identified in my initial direct testimony and not one of my comments identifying those practices is criticized by 33 Mr. Field. 34

35

36 Q. Dr. Zee, have you reviewed Field Exhibit JF-4?

A. Yes, I have reviewed Exhibit JF-4. The two tables presented in the exhibit provide
historical details concerning ILI segments, inspection dates, inspection tools, and inspection
vendors for both the 8-inch ME1 pipeline and the 12-inch GRE pipeline. The inspection dates
for the 8-inch ME1 pipeline range between 1990 and October 15, 2019. The inspection dates
for the 12-inch GRE pipeline range between 1996 and August 31, 2018. This exhibit does

1 2 3	nothing to change my opinion, as it only provides very generalized information concerning the occurrence of the ILI inspections, and does not provide a record of the details or the results of any of the inspections. To be useful, a detailed inspection file containing the details and the
4	results the individual inspections would be required.
5	1 1
6	
7	Q. Regarding the DNV Report, Exhibit JF-5. do you agree that the report makes clear that
8	the pipe segment that is the subject of the report ("the pipe segment") was removed from the
9	pipeline by Sunoco, and not by DNV?
10	
11	A. Yes. On page 1 of the DNV report the following statement was made, showing that DNV did
12 13	not remove the pipe section, but that the pipe section was shipped to DNV. Figures 1 and 2 on page 25 of the DNV report are documentary photographs of the arrival of the pipe segment at DNV. The
14	report specifically says, "The pipe section containing portions of the upstream (U/S) and
15	downstream (D/S) joints and a chill ring was sent to DNV for analysis. The objectives of the
16	analysis were to determine the likely metallurgical cause(s) of the leak and to identify any
1/ 10	contributing factors.
10 10	
20	O. Do you agree that the nine segment removed by Sunoco and delivered to DNV was
21	approximately 8 feet long?
22	
23	A. Yes. The photograph provided in Figure 4 on page 27 of the DNV report documents the length
24 25	of the pipe segment at approximately 8 feet.
26	
27	Q. Did you find any reference in the DNV Report to the existence or condition of ME1 pipe
28 29	adjacent to the pipe segment?
30	A. No, I did not. Nothing in the report suggests that DNV made an on-site investigation of the
31	pipe. Nothing in the report comments on the existence or condition of the ME1 pipe adjacent to the
32	pipe section they received for failure analysis.
33	
34	
35	Q. Is that concerning to you?
36 27	A Vas it is Look the grap of the look itself can be thought of as a small potch. Think of
27 20	A. Tes, it is. Look, the area of the leak risen can be thought of as a small patch. Think of cancer surgery for a moment. The doctor removes more than just the tumor: there is a margin
39	around the tumor that also is removed. So, it was reasonable to remove a length of nine bigger than
40 41	the leak site. But now go back to a cancer patient whose tumors may have metastasized. When you're doing the surgery, do you look around to see if there might be more tumors? Of course you
71	you to doing the surgery, do you look around to see it there might be more tumors. Of course you



- 2 protection for many decades. Mr. Field is a corrosion engineer. He knows that there was a
- 3 reasonable suspicion after April 1st at least that there were other spots of corrosion adjacent to the
- 4 leak. Indeed, in his testimony he states, "Many corrosion features on these pipelines were a result of
- 5 corrosion occurring during the first 30-40 years of service life, before cathodic protection was
- 6 applied to the entire pipeline." But Field was not at the site at the time the 8 foot section was taken
- out and neither were the authors of the DNV Report. I understand that ME1 is over 300 miles longand the 12-inch line may be 24 miles long.
- 8
- 9 10

11

Here is a simple graphic that makes this obvious point:



12 13

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Given these concerns, it is puzzling that the DNV Report and Mr. Field simply fail to see an elephant in the room when Sunoco installs a new 83 foot, hydrostatically tested pipe segment into the 8 foot opening left by the removal of pipe to send to the DNV lab. This is not mentioned by DNV. It is not mentioned by Mr. Field either. Obviously, 83 feet (more or less) of ME1 pipe was removed by Sunoco after the leak incident. Where did the other 75 feet go? What was its condition? Why is Sunoco going out of the way not to address the absence and the condition of the missing pipe? Importantly, no records have been supplied to Matergenics that address this matter.

23 24

25

Q. Do you know definitively what caused the leak at Morgantown?

A. No. First, not based on the DNV report or on any records previously supplied. In fact, the DNV Report notes that the leak portion of the 8 foot pipe segment had been contaminated before it arrived at the DNV laboratory for examination. Again, people are familiar from television with the work that crime scene technicians do at the scene of crimes. Contamination of a crime scene often makes it impossible to obtain a definitive forensic result. Now look at the DNV Report. It states in part that

This is an example of tampering with or contaminating the evidence, so
that a proper examination and analysis of the leak location could not be undertaken. In data

1 2 3 4 5	processing they have a saying, "Garbage in, garbage out." So, too, DNV was doomed from the start. It does seem possible and even probable that MIC was responsible. In order to get a clearer picture, however, an investigator would have needed an uncontaminated scene and also would have had to perform other tests that DNV apparently did not perform.
7	Q. You said "first." Is there a "second?"
8	
10 11 12 13 14 15 16	I cannot think of a better way to make it impossible to determine the cause of a leak on a corroded pipe. DNV must have been informed by a Sunoco agent or employee that this had occurred. Was the decision to do this made by someone in the field or by someone higher up? Once again, I have been given no records that explain how this was allowed to happen. In the context of a decision to remove 75 additional feet of possibly corroded pipe, this is something that needs to be addressed.
17	
18 19 20	Q. Do you agree that the DNV Report concludes that MIC "may have contributed to the observed corrosion?"
21 22 23	A. In the Executive Summary of page iii, and in the Conclusions on page 12, both in the DNV report, the following statement was made. "Given the lack of corrosive species and neutral pH of the soil, microbiologically influenced corrosion (MIC) may have contributed to the observed corrosion."
25 26 27 28 29 30 31	I, personally, suspect that MIC is more likely than not as the culprit, but we can never know because of the site contamination and failure by DNV to conduct appropriate testing. In my previous testimony, based solely on the PHMSA report and on my own experience, I was more definitive. I did not know at the time about Sunoco having contaminated the site; if I had I would have been less definitive.
32	Q. What is "active" corrosion and why is this an issue?
33 34 35 36 37 38 39	A. Active corrosion in this case is defined as the degradation of metal by soil environment through electrochemical process. Active corrosion can be identified by direct and indirect assessments and thickness loss measurements in advance prior to perforation on a pipeline. Perforation of an underground pipeline by corrosion process is certainly an indication of active corrosion and inadequate corrosion control.

Q. Field states in his rebuttal testimony, "Many corrosion features on these pipelines were
a result of corrosion occurring during the first 30-40 years of service life, before cathodic
protection was applied to the entire pipeline. The vast majority of the corrosion observed in
these tables is not active." Do you have a comment on what Mr. Field is saying here?

- 6 A. Mr. Field's statement is based on a number of assumptions and data that he has not shared with us. First, for both the 8-inch line and the 12-inch line, he offers no data, no facts based upon 7 shared records concerning whether or not documented corrosion that occurred 40 - 50 years ago is 8 active or not. Sunoco's records say nothing about whether documented corrosion is active, so his 9 comment is nothing more than surmise. Second, and more troubling, he is making the unwarranted 10 assumption that any corrosion that existed from inception of cathodic protection is now under 11 control and, therefore, not active. It cannot be assumed that corrosion ceased entirely on the 12 pipeline since the application of cathodic protection, and that all observed pipeline corrosion 13 14 occurred during the first 30-40 years of service life. Along more than 324 miles of Mariner pipelines there may be sections where cathodic protection is quite good and there may be sections 15 where it is quite bad. Without reference to real data, once again, there simply is no way to know. 16 This assumption is not technically sound without proper and extensive field evaluation of 17 effectiveness by measurements, such as pipe-to-soil potentials. 18 19 20 Q. Same quote from Mr. Field. Do you have any idea to which corrosion features he is 21 referring? 22 23 24 A. No, I don't. Again, he makes reference to no records, no data, that support his statement. 25 26 **O**. Mr. Field states in his rebuttal testimony, "SPLP has taken steps to either repair or 27 replace the pipe where corrosion limits its integrity. Steps have also been taken to stop the 28 corrosion from growing or to reduce its growth by increasing the cathodic protection 29 current..." Do you have any idea at what locations Field believes that corrosion limited the 30 31 integrity of either of the two old Mariner pipelines? 32 Mr. Field does not say. From our own review of the records, in particular the integrity 33 A. management summary documents that we discuss on page 25 of my report, there is documentation 34 35 The twenty-two ILI inspection anomaly report documents discussed on page 26 of the Zee report 36 37 38
- **39 Q. Did corrosion limit the integrity of the 8 foot Morgantown pipe segment?**
- 40

A.	Mr. Field does not comment on that. In Table 3 on page 14 of the DNV report, however,
Mor	at the location of the external conosion of the 8 100t
mair	nipeline Based on prior document review
The	refore we can state that the integrity of the pipe was compromised at this location
1 1101	erore, we can state that the integrity of the pipe was compromised at this rocation.
Q.	Your table covers the changes made in IM that began in April, 2018, a year after the
Sun	gantown incluent. Does that table actually identify locations on WIE1 and WIE2 where
Sull	beo has documented it has increased the cathodic protection current:
Δ	No not at all. You could state that Sunoco purports to have adopted new standards. That, by
itsel	f does not mean they have implemented the standards or if they have whether cathodic
prote	ection has effectively been increased
proc	
0.	What is the reason that Sunoco increased the cathodic protection current in the
Mor	gantown area?
A.	Sunoco has not shared any records with me so I cannot say for sure. It seems likely it was
beca	use of the failures at Morgantown.
Q.	Do you agree that, prior to the Morgantown incident Sunoco's records indicated
cath	odic protection readings of -628 millivolts ("mV") in 2016 and -739 mV in 2015 at station
2459	0+00, which is approximately 1,030 feet from the leak,
	This information serves from the DIPE complaint. Groups the matches descende
A.	Inis information came from the Black complaint. Sunoco has not shared any records
conc	reading and with the solution of the state state in the second state and the second state and the second state state state in the second state s
cath	adje protection if MIC is not present. As indications of possible MIC are mentioned in the DNV
reno	rt _950 millivolts or lower would be more appropriate
Tepo	rt, -950 minivoits of lower would be more appropriate.
	I would like to highlight that during the review of IM within a limited time, our team has
notio	the following statement in the document No. SPLP00032079: "The goal is to have nine-to-
soil	ON potential of greater than -0.85V ". Also, in the document No. SPLP00032019, under sub-
secti	on 10.6 of <i>indirect inspections</i> and sub-section 10.6 of <i>classification of survey indications</i> the
follo	wing was mentioned:
1	Table 10-1: Severity Classification
-------------	---
4	This was mentioned in my earlier testimony.
5 6 7	Q. Have you found any place in the Field testimony that comments on the presence or
7 8	absence of records of side drain measurements in Sunoco's records?
9	A. It's not there. This is significant in a conversation about cathodic protection and corrosion.
) 1	This may be because he agrees with my report but he did not say so.
2 3	Q. Mr. Field's rebuttal testimony notes the absence of documentation of stress corrosion
4 5	cracking on the ME1 and ME2 pipelines. Can you identify the factors that contribute to stress corrosion and state whether or not any of those factors have been noted in ME1 and ME2
6	records?
7 8	A. Let me quote from my own direct testimony, from page 9:
9	"Stress corrosion cracking (SCC) is a form of corrosion cracking that is associated with near-
0	neutral pH or high pH. For near neutral pH stress corrosion cracking, the electrolyte contains a dilute
1	solution of carbon dioxide and bicarbonate ions with a pH between 6 and 7. This type of corrosion
2	cracking is associated with limited branch transgranular cracking and the crack walls contain corrosion products. High pH SCC is caused by a solution of carbonate ions with pH between 0 and 10.5
с 2	exhibiting intergranular cracking with limited branching. Stress corrosion cracking can initiate under
5	disbonded coatings that may shield cathodic protection."
6	
/	Reviewing the tables of soil analysis data, Tables 11 and 12, on page 19 of the DNV report,
0	

1	
2	The suggestion that stress corrosion cracking has not occurred yet means that it will never
3	occur is unfounded. As part of cathodic protection one wants to make sure the conditions that lead
4	to SCC do not take place. Mr. Field has not challenged my basic finding that this soil chemistry
5	might be considered conducive to development of SCC.
6	
7	
8	Q. Mr. Field's rebuttal testimony discusses stray current and interference bonds. Do you
9	have any comment on that discussion?
10	
11	A. Yes, once again he makes sweeping generalizations without reference to records, data, facts.
12	For instance, he says that "SPLP corrosion technicians are very active in the Eastern Pennsylvania
13	and Western Pennsylvania Corrosion Control Committees." With all due respect, attending meetings
14	is not the same as meeting engineering standards and implementing proper practices. Fields fails to
15	identify anything in my direct testimony on this topic that is erroneous and he fails to identify any
16	records that document the actual presence or absence of stray current or interference bonds on the
17	ME1 and ME2 pipelines.
18	
19	
20	Q. Do you have any comment on what Mr. Field says about Kevin Garrity's testimony?
21	
22	A. I reserve my comment on that to my testimony regarding Mr. Garrity. I will say, however,
23	that for the most part Mr. Field's testimony is untethered from any discernible data.
24	
25	
26	Q. Do you have anything further to add relative to Mr. Field's conclusions?
27	
28	A. Yes. First, Mr. Field's testimony does not state it is given to a reasonable degree of
29	professional or scientific certainty. Second, there is no portion of the testimony identified as
30	Conclusions." Counsel asks him on page 4 to discuss issues that I raised in my earlier direct
31	testimony. Pernaps those are his conclusions. There are 7 points he mentions, and I will now
32	address those briefly:
33	(1) Cl. : . Zee identifies inspection to the inner that each to be followed. Dert 105 however
34 25	(1) <i>Claim</i> : Lee identifies inspection techniques that ought to be followed. Part 195, however
35	does not require those techniques. <i>Response</i> : Good engineering practices may call for more than
30 27	meeting regulatory requirements.
ว/ วก	(2) Claim. Zoo foils to provide significant contact recording correction heing active or not
55 20	(2) Chaim. Let fails to provide significant context regarding corrosion being active of not.
40 23	Response. I have alleauy audiessed difs in my suffedultat lestimolity.
4U	

1 2	(3) <i>Claim:</i> Regarding MIC, Sunoco has changed its practices since Morgantown: <i>Response:</i> I have already addressed this in my surrebuttal testimony.
3	nave aneualy addressed and ming surresultar testimony.
4	(4) <i>Claim:</i> Regarding stress cracking, it's never been a problem on the Mariner East pipes.
5	<i>Response:</i> I have already addressed this in my surrebuttal testimony.
6	
7	(5) Claim: Regarding stray current and interference bonds, Sunoco technicians attend
8	meetings. Response: I have already addressed this in my surrebuttal testimony.
9	
10	(6) <i>Claim:</i> Dr. Zee can find publicly available data on PHMSA's website to replace the poor
11	copy of a previously produced document. Response: Since we cannot read the data in question we
12	don't know what to look for on the PHMSA site.
13	
14	(7) <i>Claim:</i> Dr. Zee says Sunoco does not do leak surveys. We are not required to do so.
15	<i>Response:</i> Once again, good practice should trump minimum regulatory standards.
16	
17	Q. Dr. Zee, having read Mr. Field's rebuttal testimony, what conclusions you have
18	reached?
19	A. Nothing in Mr. Field's rebuttal testimony has caused me to change my mind. Except as
20	noted above, the information and conclusions set out in my initial direct testimony stand.
~ .	
21	O Now lat's noview Constitute testimony. Mr. Constitution his solution testimony states that
22 23	"Dr. Zee presumes that the presence of corrosion is a regulatory violation." Is Mr. Garrity
24	correct?
25	
26	A. The presence of accelerated corrosion and perforation is a regulatory violation. An
27	inadequate or improper corrosion control program is a regulatory violation
28	
29	O Convity refers to the DNV Depart of a "Dept Course Failure Analysis Depart"
30	Q. Garrily refers to the DNV Report as a "Root Cause Fahure Analysis Report". What is a Doot Cause Failure Analysis Deport?
31 22	what is a Koot Cause Fanure Analysis Report?
32 22	A In general terms, a root sauce failure englysis is a method of problem solving used for
55 24	A. In general terms, a root cause randre analysis is a method of problem solving used for identifying the root causes of failures or problems. Poot cause failure analysis generally serves as
54 25	input to a remediation process whereby corrective actions are taken to prevent the failure or problem.
36	from occurring. The DNV report does not proceed to the final step to provide recommendations for
37	remediation. They did not perform soil testing which is significant in corrosion failure analysis and
38	determination of primary cause. The DNV report may more properly be called a metallurgical failure
39	analysis report but not a root cause failure analysis report
40	

1 Mr. Garrity refers to a review of "216 Dig Reports." He says that a review of the 2 **O**. reports "did not reveal findings of MIC." Can you explain why these reports did not and 3 would not reveal findings of MIC? 4 5 A. 6 Dig reports consist of forms completed by Sunoco field technicians. I've provided a sample report, and it's been marked as Surrrebuttal Exhibit Zee-2. These reports were inspection and repair 7 They were not prepared to evaluate or classify the corrosion mechanism. A finding of MIC 8 reports. would require familiarity with MIC testing. It was not performed on site due to lack of knowledge. 9 Non-certified corrosion technicians are not trained to evaluate MIC. Also, as you can easily see, the 10 reports do not call for a root cause failure analysis and so there is none. Hence, you would not 11 expect findings of the presence or absence of MIC in the 216 Dig Reports. The absence of such 12 findings, therefore, does not mean that there was no MIC and the suggestion by Mr. Garrity to the 13 14 contrary is entirely unfounded. 15 16 How can reports that do not contain a root cause failure analysis be compared to the 17 0. 18 DNV Report that does have a root cause failure analysis? 19 20 A. It's a case of apples and oranges. The comparison is simply not valid. Apparently, Mr. Garrity does not understand the difference between primary cause and root cause determination. 21 22 23 24 **Q**. Mr. Garrity suggests that you have ignored the significance of ILI. Is it Garrity's position that ILI does not monitor internal corrosion? 25 26 27 A. I have not ignored the significance of ILI. It is my contention that other state-of-the-art technologies exist to complement ILI, and they should be employed as well. It is a mistake to say 28 that ILI together with CP is the "best technology." They are important tools, when used properly. 29 The report on the 2016 failed ILI suggests that ILI is not always successful. Furthermore Mr. 30 Garrity does not recognize ILI cannot detect initiation of corrosion. ILI cannot detect the initiation 31 of corrosion and obviously perforation was not detected. 32 33 34 35 0. With all of Garrity's comment on the importance of root cause failure analyses, have you found any at all in your records review? 36 37 Except for the DNV Report that was just produced to us, we have found none. And the DNV A. 38 report is incomplete and does not address the source for accelerated corrosion and perforation. 39 40

1 2	\mathbf{O} Sunace has insisted that it was not required to meet the -850 my standard for eathedic
∠ 3	protection. You've reviewed the company's IM plans. Do the IM plans call for the -850 mv
4	standard or the alternative criteria standard?
5	
6	A. Sunoco's IM plans explicitly call for the -850 my standard. The company has not even
7	followed its own manual. I believe that the suggestion that they actually followed the alternative
8	standard is not supported by their own records. If there are records that demonstrate they did, let
9	Sunoco produce them. It is noteworthy that after the incident they realized the problem and
10	established -950 mv as the criterion.
11	
12	
13	Q. Mr. Garrity concludes that the Sunoco and Energy Transfers' IM plans are adequate.
14	Have you found anything in his testimony that explicitly critiques your analysis of the
15	deficiencies in those plans?
16	
17	A. No, I have not. Furthermore, if Sunoco had plans that were adequate AND was following
18	those plans, how do they explain what happened at Morgantown and why they devised new
19	standards and procedures a year later?
20	
21	
22	Q. Garrity notes that the data presented in pages 11-12 of Dr. Zee's testimony "does not
23	identify whether the observed corrosion was active or inactive." What is the significance of
24	corrosion being active or inactive?
25	
26	A. I have addressed this in my testimony in response to Mr. Field's testimony. Accelerated
27	corrosion and perforation is considered an active corrosion. This is a very basic, fundamental
28	concept in corrosion science.
29	
30 21	O Have you found in Sunceo's records decumentation that actually shows what CP
31 22	Q. Have you found in Sunoco's records documentation that actuary shows what Cr
32 22	criteria have been used on the 8-men and 12-men pipennes:
21	A No. I have not other than in the DNV Report, which was denied to us until recently
35	7. Two, I have not, other than in the Divy Report, which was defined to us until recently.
36	
37	O. Is it your contention that the information gleaned from the Morgantown investigation is
38	sufficient to draw the conclusion that there is a system-wide failure of integrity management?
39	surrent to use of the conclusion that more is a system where fundice of integrity management.

1 2	A. Suno	Not at all. What we are saying, however, is that data provided by BI&E and by DNV and by co itself suggest that there may be a system-wide failure and that steps need to be taken to			
3	investigate further.				
4					
5					
6	Q.	What additional data would DNV have needed in order to determine more definitively			
7	whet	her or not MIC was the cause of the corrosion in the Morgantown incident?			
8					
9	A.	Soil analysis, onsite spot analysis, collection of corrosion products, FTIR analysis of			
10	depos	sits. Direct microscopic examination of the leak pit was made and described on page 10 of the			
11	DNV	report, with cross-section metallography, as being characteristic of MIC.			
12					
13					
14	Q.	From your examination of Sunoco's records and exhibits, are you aware of whether or			
15	not a	t station 2459+00 Sunoco performed side drain measurements on ME1prior to April 1,			
16	2017	?			
1/	٨	It is possible that Suppose shared that information with DI&E as well as DNW but not team			
18 10	A. did n	It is possible that Sunoco shared that information with BI&E as well as DINV but my team of find that information in the records supplied by sourced			
20 19	ulu li	or find that information in the records supplied by counsel.			
20 21					
22	0.	If current is flowing away from the pipeline rather than towards the pipeline, is that a			
23	sign (of corrosion?			
24	. 8				
25	A.	Some conditions can establish anodes and cathodes on pipeline to allow the corrosion cells to			
26	exist.	At the anodic area, current leaves the pipe to enter the surrounding earth, steel pipe will be			
27	corro	ded at this area as the current flow through earth from anodic area to cathodic area. There is a			
28	direc	t current flowing from anodic areas into the soil and onto the cathodic area, and back through			
29	the p	ipe itself to complete the circuit.			
30					
31	Q.	Did Sunoco perform CIPS on ME1 prior to April 1, 2017?			
32					
33	A.	It is possible that Sunoco shared that information with BI&E as well as DNV but my team			
34	did n	ot find that information in the records supplied by counsel.			
35					
36	0				
37	Q.	Did the result of the 2017 ILI inspection on ME1 indicate any metal loss?			
38	А.	Yes. The twenty-two ILI inspection anomaly report documents discussed on page 26 of the			
39 40	Zee r	report document This indicates presence of This indicates presence of			
40	active	e corrosion which would result in perforation at a later time.			

1		
2 3	O .	What if any significance was there to a finding of metal loss?
4	C	
5	A.	Further corrosion risk assessment and repair may be required, depending on the depth of
6	metal	loss.
7		
8		
9	Q.	What conclusions did you draw as to the cause of metal loss identified in the 2017
10	inspe	ction?
11		
12	A.	From the report itself, none. Corrosion is one possible cause. The depth of metal loss
13	obser	ved in the ILI report means that one cannot rule out active corrosion as a possible cause. CP
14	record	ds should have been reviewed and soil investigation should have been performed.
15		
16		
17	Q.	I will suggest to you that BI&E asserted in its complaint against Sunoco that the CIPS
18	perfo	rmed on ME1 prior to April 1, 2017 did not align with footages and test station points. If
19	that v	were true, how you could Sunoco be sure that its assessment of ME1 cathodic protection
20	was a	accurate and reliable?
21		
22	A.	In that situation Sunoco could not be sure.
23		
24		
25	Q.	Do you have any reason to believe that the 12-inch pipeline is in any better condition or
26	any v	vorse condition than the 8-inch ME1 pipeline?
27		
28	A.	Based on the data summarized from the 216 Inspection and Repair - Maintenance Record
29	report	ts in the two tables on page 11 of the Zee report, I would conjecture that the 12-inch pipeline is
30	proba	bly in worse condition than the 8-inch pipeline. But this is speculation and we must rely on
31	facts.	You could really only tell if there were a proper investigation, as I have recommended.
32		
33	•	
34	Q.	Mr. Garrity says on page 9 of his testimony that "the age of a pipeline is not a key
35	criter	fion for determining the safety of an operating pipeline." Is it your claim that age in fact
36	1s a "	key criterion?"
3/	٨	
38 20	A.	For aging structures and pipelines, past is not indication of future. I would not use the phrase
39 40	key of the laid of	ut in detail in my direct testimony. In general, aging underground pipelines are at risk of
40	iaiu 0	at in detail in my uncet testimony. In general, aging underground pipelines are at fisk of

1	corrosion failure due to coating degradation, external corrosion and stress corrosion cracking.
2	Corrosion failures in aging pipelines are either sudden catastrophic ruptures or gradual leaks due to
3	localized corrosion and cracking. Many factors associated with these corrosion areas are coating
4	failure, degradation, disbondment, blistering, delamination, mechanical pressure and stress
5	concentration, galvanic action, corrosive ions, the presence of moisture, corrosive soils, stray current
6	interference, AC interference, inadequate cathodic protection and shielding. These areas have a
7	much higher statistical probability of catastrophic failure and rupture.
8	
9	Most of the time initiation of stress corrosion cracking (SCC) and pitting corrosion are
10	detected by coincidence in excavation and digs and is not targeted or predicted by analysis of
11	corrosion performance parameters. Internal or ILI tools have limited capability for detecting or
12	identifying stress corrosion cracking and pitting corrosion initiation.
13	
14	It may be noted that aging, by itself, may not result in corrosion of a steel pipeline. In theory,
15	it is possible that there will be constant/consistent soil conditions, coating conditions, absence of
16	potential damage mechanisms/threats throughout the service life. But in reality, this just does not
17	happen. Coating degradation and disbondment take place.
18	
19	A pipeline will be exposed to various potential damage mechanisms/threats throughout its
20	service life. If these damage mechanisms/threats are not identified, controlled and/or mitigated in
21	time, it could result in pipeline failure. Typically, aging presents corrosion problems as well as
22	corrosion induced cracking.
23	
24	Cast iron, wrought iron and bare steel pose the highest risk compared to coated
25	carbon steel. As the pipeline ages, coating on the pipeline could damage/disbond/delaminate and
26	result in corrosion with age at the exposed areas in the aggressive soil conditions.
27	
28	In our opinion, integrity assessment must be in place for aging pipelines. It is necessary that
29	there be (a) External corrosion direct assessment (ECDA); (b) Internal corrosion direct assessment
30	(ICDA); and (c) stress corrosion cracking direct assessment (SCCDA).
31	
32	
	Q. Mr. Garrity in his rebuttal testimony does not address the finding by DNV
35	Do you have a view as to whether this failure to comment is
36	significant?
37	
38	A. Yes, I do. There is a Greek myth about a man named Procrustes. When travelers came to
39	spend the night at his house, they slept in a bed that was used either to stretch or cut off the traveler's
40	limbs. That way the travelers could be made to fit the bed. So it is sometimes with expert

1	testimony. If you change enough facts, or ignore enough facts, you can reach any conclusion you	ou		
2	like. The DNV Report was flawed by contamination; that is a fact that cannot be ignored. No firm			
3	scientific conclusions regarding the leak on April 1, 2017 are possible. At most, one may conclu	ıde		
4	that it is more likely than not that MIC was involved but that was never demonstrated.			
5				
6				
7	Q. Mr. Garrity suggests that you have overstated the likelihood of the presence of MIC	C at		
8	the Morgantown leak site. Do you agree with that viewpoint?			
9				
10	A. Not at all. I have explained already in response to Mr. Field's comment that my previou	s		
11	view was based on limited data: Sunoco's PHMSA summary. I now have had a chance to look			
12	carefully at the DNV lab analysis and my view is even stronger. The suggestion that MIC is on	y a		
13	possibility is not borne out by Tables 9 and 10 or the additional data gleaned from Figures 26 and	d 27.		
14	MIC is more likely than not a cause of the corrosion in question.			
15				
16				
17	Q. Why is it important to know whether or not MIC was involved at Morgantown?			
18				
19	A. The conclusion as to whether or not there was MIC is important because the presence of	MIC		
20	suggests that cathodic protection is insufficient. If CP is not sufficient, then ultimately corrosion	1		
21	will take place, metal will be lost and leaks can develop.			
22				
23				
24	Q. Can you put the DNV report in better context?			
25 26 27	A. Sure. To start with, DNV's analysis was constrained by the actions of Sunoco. Before D even saw the 8 foot segment, Sunoco had (a) disposed of 75 additional feet of adjacent pipe with adequate condition assessment and documentation that may have had similar conditions; (b)	NV iout		
22				
32 33				
34				
35	Q. With all those concerns, can you testify whether or not there were any meaningful			
36 37	results in the DNV analysis?			
38	A. Yes, there were. We can start with tables 9 and 10. The results of bacteria culture tests	on		
39	swab samples as well as optical microscopy examination are reflected in DNV Tables 9 and 10.			
40	Those tables can be seen here:			
41				



11

Table 9 refers to bacteria culture testing. Bacteria culture testing is designed to determine the quantity of a given bacterium in a fixed-size sample. The objective is to count how many there are in that sample.

15

16 It is often the case that there are too many bacteria in a sample to count. The principle of 17 serial dilution is that if the sample is substantially diluted in a solution, it will make it easier to count 18 the number of bacterial cells.

1	
2	For example, if you dilute the sample in solution by 1000 times and you are able to count 100
3	cells, then you can readily project the actual number of cells in the original sample. In this case, it is
4	1000 times 100 cells for a total of 100,000 cells. Dilution is often done enough times by a factor of
5	10 until there are no cells that can be counted in the last sample.
6	
7	When you do serial dilution of samples taken from four distinct locations, you can
8	quantitatively compare the concentration of bacteria among four separate sites. Thus, if Sample A
9	tests positive in only one vial (the original vial containing bacteria), but Sample B tests positive in
10	three vials, that implies that even with two 10 to 1 dilutions (a factor of 100x), Sample B still tests
11	positive – therefore it appears to have a higher number or concentration of bacteria by a factor of
12	100x as compared to Sample A. Note: A result showing zero indicates that no bacteria of a given
13	type were detected at a given location, as even the original undiluted vials did not show the presence
14	of the bacteria.
15	
19	
2.0	
20	The connection between number of bacteria and MIC is this. In general, we may say that a
21	low to moderate number of all bacteria types were detected at the sampling location on the pipe, and
22	this suggests that MIC may exist on the pipe.
1 2	The major issue here is that correction products and heateris colonies on nitted group/goil were
25	The major issue here is that conosion products and bacteria colonies on pitted areas/son were
24	not analyzed, photographed or considered. This is a serious shortcoming in corrosion risk
25	assessment and quantification of risks for a pipeline that exhibits perforation due to corrosion.
26	
27	
28	Q. What does Table 10 tell us?
29	
	A. Table 10 reflects a separate approach to bacteria identification.
35	
36	The overall nicture is further completed by cross-section microscopy of corrosion pits at the
20	look site
3/	leak site.
28	
50	

1 Q. With these three separate sets of tests, can you draw any conclusions about the presence 2 or absence of MIC at the leak site?

A. Yes, I can. In total, the DNV laboratory undertook three distinct approaches to explore the possibility of MIC at the leak site. Taken together, they constitute scientific proof of the existence of MIC at the leak site. The level of certainty is higher than simply "suggestive" or a "possibility." It is "more likely than not."

Further, the fact that Sunoco later on saw fit to adopt standards that required an increased CP
potential clearly indicates that Sunoco believed either that (a) the Morgantown leak was the result of
insufficient cathodic protection, or (b) the company saw MIC in other locations of the pipe, or (c)
both (a) and (b).

11

Q. Do you have any concerns about Mr. Garrity's failure to discuss these three separate tests in his testimony?

14

A. Yes, of course. This goes back to the Greek story of Procrustes. Mr. Garrity has drawn
conclusions about a report that he either never read or that he decided to ignore. Data from three
separate sets of tests is completely ignored. The most polite way to describe what he has done is
simply to say it is unscientific.

19 20

22

21 Q. How about the missing pipe?

Well, there is also missing testimony, is there not? Mr. Garrity has chosen to ignore DNV 23 A. 24 data and he also pointedly ignores the same elephant in the room ignored by Mr. Field: the missing 75 feet of ME1 pipe. For all he knows; that pipe was thoroughly corroded and his client, Sunoco, 25 disposed of it so that there would be no evidence of corrosion. Mr. Garrity writes that Sunoco and 26 Energy Transfer have robust corrosion control and integrity management programs and SOPS. He 27 does not, however, critique any of our direct testimony detailing many examples where this is shown 28 29 not to be true. Moreover, along with Mr. Field, he deliberately fails to distinguish Sunoco's practices leading up to April 1, 2017 from its practices after April 1, 2018. In fact, he talks about 30 Sunoco's "program" but he does not pay any attention to actual data that would support or not 31 32 support the claim that the program is actually operational. 33

34

Q. On page 15 of his testimony, Mr. Garrity says that prior to May 2018, SPLP used the
 net protective current criterion on bare or ineffectively coated segments of the pipeline. Have
 you found any place in the IM plans that says that?

38

A. If it's there, I haven't seen it. So far as I know, this is something that Sunoco came up with
 in response to the BI&E complaint proceeding.

3

Q. On page 15 of his testimony, Mr. Garrity says that SPLP uses a combination of CP criteria as listed in the applicable NACE standard RP (SP) 0169 Control of External Corrosion on Underground or Submerged Metallic Piping Systems as provided for under 49 C.F.R. § 195.571. Do you have any comments on his statement?

8

A. According to him, SPLP uses a combination of CP criteria: a) ON Pipe-to-Soil potential
of -0.85 volt, or more negative, with respect to a copper-copper sulfate (CSE) reference electrode
and b) net protective current criterion (special condition as per NACE SP0169-2007).

Garrity does not discuss the findings highlighted in Exhibit 13 – Summary of Sunoco CIS
 document review, where it is evident that at most of the locations ON potentials are more positive
 than -0.85 Volt. So, ON Pipe-to-Soil potential of -0.85 volt, or more negative, with respect to a
 copper-copper sulfate (CSE) reference electrode criterion is not satisfied.

17

Regarding net protective current criterion, he is hiding the fact that though net protective
 criterion is sufficient for bare or ineffectively coated pipelines, in some situations, such as the
 presence of sulfides, **bacteria**, elevated temperatures, acid environments, and dissimilar metals, this
 criterion may not be sufficient.

22

Earlier, we were not sure of the CP criteria used so we did not comment on the righteousness of the CIS data. However, from Garrity's testimony it is clear that SPLP is claiming that it used net protective current criterion. From the CIS data, however, it is evident that net protective current measurement techniques set out in NACE TM0497 were not actually followed. Mr. Garrity should have highlighted this but he did not.

28

Net protective current criterion is used as a last resort criterion. Moreover, it is used in
situations where another criterion cannot be easily or economically met. Application of net
protective current measurement technique as per NACE TM0497-2002 is as follows: a) Depolarize
structure, b) Perform pipe-to-electrolyte survey or two-reference-electrode surface survey to locate
anodic areas. c) Energize CP system and d) Use side drain method at anodic locations.

- Exhibit 11 shows that CIS data was collected by a) CP Data Manager in 2009, b) TITAN TSC in 2013, 2016 and 2017 and c) Corrpro. Only Corrpro has followed NACE TM0497-2002 requirements. However, they did not collect side drain potential readings. CP Data Manager did not measure side drain potential readings at all anodic areas. CIS data collected by CP Data Manager in 2009 reveals that almost the entire length of the pipeline surveyed is more electropositive than -
- 40 850mV. At some locations the side drain potentials were around -261mV.

1 2 3 4 5 6 7 8 9 10 11	proced criteria followa applica method SP0207 method	Here is a good example that each contractor that performed CIS has followed different ures which clearly indicates that SPLP has no standard procedure and no clarity on the CP to be followed. If IM is technically sound as claimed by Garrity, all contractors would have ed same procedure for structure-to-soil potential survey. I also would like to mention that some pipeline companies use the side drain method for the tion of net protective current criterion. In response to BI&E, SPLP claimed that they used this No reference is found in 49 CFR 195 regarding the acceptability of this method. NACE addresses the measurement survey technique. It is worth stating that the results of side drain could be misleading if there are any outside sources of influence such as other pipelines or redicat acument survey commute. The results also he questionable in graces with
13	high re	esistivity surface soil, for deeply buried pipelines, or where local corrosion cell exists.
14 15 16		We haven't seen any soil data to comment whether soil has high or low resistivity.
17 18 19 20 21 22 23	caution anodic and neg the bot	Moreover, we must bear in mind that side drain measurement technique should be used with a. Under certain conditions such as presence of bacteria (SRB), a relatively strong localized cell could exist on the bottom side of the pipe with the top of the pipe serving as a cathode gative side-drain readings could be measured while severe corrosion is actually occurring on tom of the pipe at this location. I would like to bring to your notice that net protective current criterion is specified in older
24 25 26	versior	as (RP0169-2002, SP0169-2007) but is no longer specifically listed in SP0169-2013.
27 28 29 30	Q. integri PHMS cathod	Dr. Zee, in connection with Sunoco's experts testifying that the company has solid ty management plans as well as robust practices, did you have occasion to review a A Notice of Probable Violation notice to Sunoco dated February 4, 2019, that relates to ic protection practices in Honeybrook, Pennsylvania?
31	A.	Yes, this was brought to my attention recently.
32		
33	Q.	Do you recognize surrebuttal Ex. Zee-3 as that PHMSA notice?
34	A.	Yes, I do.
35		
36	Q.	Do you know where Honeybrook, Pennsylvania is located?

1	A.	Well, now I do. It's in Chester County.
2		
3 4	Q. pipeli	So this notice is not about Morgantown, but rather a separate area on the ME1 ne?
5	A.	Yes, that's right.
6		
7	Q	Before we go into the details, can you just summarize what the notice says?
8 9 10 11 12 13	A. syster Sunoc NACI adequ the IL	Sure. PHMSA say that their representatives performed inspections on the ME1 pipeline in at Honeybrook in Chester County during the period from March 19, 2018 to March 23, 2018. The is alleged by PHMSA to have failed to provide cathodic protection that complies with E criteria. PHMSA also says that Sunoco's records were not sufficient to demonstrate acy of its corrosion control measures. Finally, PHMSA talks about limitations on the utility of I techniques.
14		
15 16	Q. invest	From the information in the PHMSA notice, can you tell if the inspectors confined their tigation to just one location on the MEI pipeline?
17 18	A.	They did not. PHMSA identified nine (9) distinct locations at which they took readings.
19	Q.	Would you quote from the third page of the notice in § 6.3 relative to ILI?
20 21 22	A. exterr are no	Yes. "The in-line inspection technique, however, may not be capable of detecting all types of all corrosion damage, has limitations in its accuracy, and may report as anomalies items that at external corrosion."
23	Q.	Do you have a belief as to whether this supports your view or Mr. Garrity's view?
24 25	A. emph	I believe ILI is an important tool but it is just one of several. I think Mr. Garrity has over- asized its importance and under-emphasized other important tools.
26		
27 28	Q. meas	As you read the PHMSA notice, what are they saying about the cathodic protection urements that they took?
29 30	A. earth	Basically, they are saying that the -850 mv criterion has not been met and the alternative current technique criteria have not been demonstrated either.

1

2 Q. How many years' records were reviewed by PHMSA in connection with this violation 3 notice?

A. 2015 – 2017. I'd like to point out that the inspectors noted that "no IR free readings were
provided when utilizing the -850 mV SP 0169 criterion...Additionally, Sunoco did not provide a
valid explanation for how IR drop was being considered when evaluating the adequacy of the
readings that were taken."

8

9 Q. What are IR free readings and why is their absence a problem?

A. IR free readings are those reads that consider IR drop in soil. Their absence introduces
 extensive errors in the data and corrosion risk assessment.

12

Q. Do you have any idea if Sunoco responded to this notice or satisfied PHMSA that the notice was in error?

15

I do not know how this situation resolved. I can tell you, however, a number of things. 16 A. First, PHMSA's explanation of NACE standards is correct. Second, the inspectors report that they 17 did not find "records in sufficient details to demonstrate the adequacy of corrosion control 18 measures." This is consistent with our findings during the review of tens of thousands of pages of 19 Sunoco's records provided during this case. This supports our contention that the conclusions of Mr. 20 21 Field and Mr. Garrity, that Sunoco's integrity management practices are robust and compliant with federal regulations, is unsupported by real-world data and has no foundation in Sunoco's own 22 23 records. 24

25

Q. It has been suggested that you are calling for a massive program of laboratory sample testing. Dr. Zee, are you calling for a massive program of laboratory sample testing?

28

A. No, not at all. The soil testing is less than \$500, Spot testing is less than \$200.

30 Miscellaneous tests at about \$500; all less than \$2,000. This provides fantastic results with other

31 data if unacceptable risks at this site (pretty much like indications of cancer in blood). Massive cost?

32 Apparently, they have never approached these types of problems with testing to have high

- 33 confidence...or trying to scare the audience.
- 34 35

36 Q. Do you have anything further to add relative to Mr. Garrity's conclusions?

37

- Yes. Mr. Garrity sets out 7 conclusions: 1 Α. 2 (1) Claim: There's no evidence the IM plans are inadequate. Response: That conclusion is 3 not supported by the facts as set out in the initial Zee direct testimony. Nowhere in Garrity's 4 5 testimony does he specifically attack any of Zee's factual findings as to the IM plans. 6 7 (2) Claim: ILI and CP surveys are the "best technology." Response: They are very good tools when properly used but insufficient. Further, the 2016 ILI proved ILI is not always the "best." ILI 8 does not indicate the initiation of corrosion and acceleration rate...indirect assessment and direct 9 assessment should be utilized to have high confidence. 10 11 (3) Claim: Pipeline age is not a "key criterion." There are other factors that are important. 12 *Response:* This argument is a red herring. Zee direct testimony never implied that pipeline age by 13 14 itself is a concern. For aging structures past is not indication of future. 15 16 (4) *Claim:* The Morgantown leak and investigation do not support conclusion MIC is a current threat. Response: We do not know how much of a threat it is. The Morgantown 17 18 investigation was bungled and information regarding the 75 feet of missing pipe has not been disclosed. Records of dig reports are no basis to conclude MIC is not a threat. The examination in 19 the DNV report do show sound evidence for MIC. More testing would have confirmed. 20 21 22 (5) Claim: A massive lab testing program is not warranted. Response: As noted above, soil 23 corrosivity testing and microbiological (bacterial) testing are not expensive, and they are critically important in determining the corrosiveness of the local environment of a buried pipeline. 24 25 26 (6) *Claim:* A remaining life assessment is not necessary. No regulations require it. The facts don't justify it. Response: A remaining life study for a 70-year old pipe that is poorly maintained 27 and has experienced perforation is warranted by the facts as set out in the Zee direct testimony. The 28 fact regulations do not require it does not preclude a judge from ordering it. Counsel advises that 29 state law permits imposition of standards higher than federal minimums. Our tasks as responsible 30 31 corrosion engineers is not to follow the minimum requirement for regulations; rather it is to do all 32 we can to keep pipelines safe for the public. (7) Claim: Evidence of wall thickness is key in deciding safety and there is no evidence of 33 wall thickness inadequacy in this case. Response: The statement is both false and misleading. What 34 is the wall thickness at a through-pit, where a leak is occurring? The wall thickness was zero at the 35 location of the leak in Morgantown. Is Mr. Garrity suggesting that so long as a pipe does not leak, 36 37 its thickness is adequate? It sounds that way, even though he knows better. Wall thickness
- problems were identified in my direct testimony. Garrity has not pointed to any of that testimony on
 wall thickness where my statements on thickness were inaccurate.

1	Further, in connection with the Morgantown investigation, we did not have any data from the
2	DNV analysis or direct assessments. That includes pipeline thickness data. It should be noted we
3	also do not know anything about the wall thickness of the missing 75 feet of ME1. We should rely
4	on field data and not speculation for high confidence corrosion risk assessment.
5	
6	
7	Q. Dr. Zee, having read Mr. Garrity's rebuttal testimony, what conclusions have you
8	reached?
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10	A. His approach to life limiting mechanisms for aging pipelines is not based on sound corrosion
11	engineering fundamentals. Nothing in Mr. Garrity's rebuttal testimony has caused me to change my
12	mind. Except as noted above, the information and conclusions set out in my initial direct testimony
13	stand.
14 1 -	
15	O Have all of your aninians and conclusions as stated in your supported testimony
10 17	Q. Have an or your opinions and conclusions as stated in your surrebuttal testimony regarding Messers Field and Carrity's rebuttal testimony been given to a reasonable degree of
12	nrofessional and scientific certainty?
10	professional and scientific certainty.
19	A. Yes, they have. In the event that Sunoco or aligned intervenors provide additional testimony
20	or documents, however, I reserve the right to modify my opinion or furnish additional evidence.
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22	COMPLAINANTS OFFER SURREBUTTAL EXHIBITS ZEE – 1 THROUGH ZEE – 3 INTO
23	EVIDENCE.

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