

**STATE OF VERMONT  
PUBLIC UTILITY COMMISSION**

Case No. 17-3550-INV

Investigation pursuant to 30 V.S.A. §§ 30 and 209 regarding the alleged failure of Vermont Gas Systems, Inc. to comply with the certificate of public good in Docket 7970 by burying the pipeline at less than required depth in New Haven, Vermont	
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Case No. 18-0395-PET

Notice of Probable Violations of Vermont Gas Systems, Inc. for certain aspects of the construction of the Addison natural gas pipeline	
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**REBUTTAL TESTIMONY OF  
ROBERT ALLEN  
ON BEHALF OF VERMONT GAS SYSTEMS, INC.**

November 1, 2021

**SUMMARY OF TESTIMONY**

Mr. Allen responds to Mr. Liebert's testimony about AC mitigation, explains why the depth of cover in the Clay Plains Swamp does not raise any significant issues for the AC mitigation system on the ANGP, which was designed by ARK Engineering, and describes ARK Engineering's relevant qualifications for performing AC mitigation work.

**EXHIBITS**

Exhibit VGS-RA-1 Resumé

**REBUTTAL TESTIMONY OF  
ROBERT ALLEN  
ON BEHALF OF VERMONT GAS SYSTEMS, INC.**

1 **Q1. Please state your name, occupation, and business affiliation.**

2 **A1.** My name is Robert Allen. I am the Vice President of ARK Engineering & Technical  
3 Services, Inc., 639 Granite St, Ste 200, Braintree, Massachusetts, 02184.

4

5 **Q2. Please describe your educational background, pertinent professional experience,  
6 and current job responsibilities.**

7 **A2.** I received a BS in Electrical Engineering from Northeastern University and an MBA in  
8 Management from Bryant University. I have been involved in the pipeline industry and  
9 associated with analysis of AC interference effects to pipelines, railroads, and other structures  
10 from electric circuits since 1985 and written various published articles on these subjects as  
11 outlined in my resumé. I have presented on these subjects to industry executives, clients, and  
12 through technical organizations around the world. I am an acknowledged Subject Matter Expert  
13 (SME) in the field of electrical interference effects to metallic structures in proximity to electric  
14 circuits. I have been involved in and chaired various international committees on AC interference  
15 effects and AC corrosion mechanisms and mitigation. I am a NACE Certified Cathodic  
16 Protection Specialist (CP4) and a NACE Certified Senior Corrosion Technologist.

17 My current job responsibilities include supervision of analysis, design, installation and  
18 commissioning of AC interference and AC mitigation systems; project management of these  
19 types of projects; expert witness testimony; and speaker and presenter at Corrosion Control and

1 Interference Mitigation seminars and training sessions. My resumé is provided as **Exhibit VGS-**  
2 **RA-1.**

3  
4 **Q3. Have you previously provided testimony before the Vermont Public Utility**  
5 **Commission (the “Commission”)?**

6 **A3.** No.

7  
8 **Q4. Have you previously submitted testimony in this case?**

9 **A4.** No.

10  
11 **Q5. Describe the purpose of your testimony today.**

12 **A5.** I am responding to the testimony of Mr. Liebert alleging that lesser depth of cover in the  
13 Clay Plains Swamp area of the Addison Natural Gas Pipeline (“ANGP”) undermines the validity  
14 of the AC mitigation system. The AC mitigation system on the ANGP was designed by ARK  
15 Engineering, and I have extensive experience with the performance of this system. In my  
16 testimony, I explain why Mr. Liebert’s testimony about AC mitigation is wrong and  
17 demonstrates a lack of understanding about the assumptions used in our AC mitigation design.

18  
19 **Q6. Please explain how the depth of the ANGP affects the general analysis of**  
20 **appropriate AC mitigation.**

21 **A6.** ARK Engineering has worked on thousands of AC interference analysis projects  
22 worldwide over the course of 30 years in business. In our experience, pipeline depth is a factor in

1 AC interference effects to pipelines, but is not a significant factor in wetland areas like the Clay  
2 Plains Swamp. This is because the resistance of the soil around the pipeline determines how  
3 much AC current can be dissipated from the pipeline through a horizontal grounding conductor  
4 or other grounding system in the soil. Wetland soils have a low soil resistivity when compared to  
5 sand or rock, which have a very high resistance. Low soil resistivity increases the capability of  
6 the AC mitigation system to dissipate any induced or conductive AC interference effects to the  
7 pipeline from nearby electrical systems, so the AC mitigation system installed in the area of the  
8 Clay Plains Swamp performs especially well given the wetland soils in that area.

9 As a result, reducing the depth of cover in an area such as the Clay Plains Swamp does  
10 not materially change the AC mitigation needs of the ANGP. In this type of environment, the  
11 difference in depth of cover from the assumed depth of three (3) feet results in only minor  
12 changes in the soil resistivity values and only slightly affects the induced AC interference effects  
13 to the pipeline.

14

15 **Q7. What does the resistivity of the soil in the Clay Plains Swamp tell you about the**  
16 **validity of your original AC mitigation design?**

17 **A7.** When we initially designed the AC mitigation system for the ANGP, we conducted soil  
18 resistivity measurements along the proposed pipeline route, including in an area parallel to the  
19 ANGP in the Clay Plains Swamp. Those measurements were taken on higher ground adjacent to  
20 the Clay Plains Swamp, so they represent a conservative assessment of the resistivity of the soils  
21 located in the right-of way location in the swamp. Those resistivity measurements show only a  
22 minimal difference in the average soil resistivity values between 2 and 3 feet of depth. As

1 indicated in the previous question, with these kinds of soil resistivity values, we are not  
2 concerned that our prior analysis assumed a depth of cover of three feet because there is no  
3 material difference in soil resistivity at a lesser depth of cover of 2 or 2.5 feet.

4  
5 **Q8. Do you think that the initial assumptions about the depth of cover at 3 feet**  
6 **undermine the results?**

7 **A8.** No. As explained above, we have no concerns about our prior assumptions because the  
8 depth of cover does not materially change the soil resistivity values in a location like the Clay  
9 Plains Swamp. Accordingly, had we performed our prior analysis assuming a two-foot depth of  
10 cover, our simulations would have yielded the same overall results and our AC mitigation design  
11 would be the same for this area of the pipeline. To confirm this initial conclusion, we completed  
12 additional simulations on the AC interference effects that the pipeline may be subject in this area  
13 at an installation depth of 2 feet. As expected, the result of that analysis demonstrated no  
14 significant change in the results and thus no related changes to the AC mitigation system are  
15 needed on the ANGP.

16

17 **Q9. Is there any other information that confirms your confidence in the AC mitigation**  
18 **design in the Clay Plains Swamp?**

19 **A9.** Yes. In addition to the above reasons, ARK Engineering has been involved in AC  
20 interference surveys that have been conducted along the pipeline since the ANGP was installed.  
21 All recorded readings in this area over the years indicate that the AC mitigation system is

1 operating as designed and meeting all the Vermont Gas and industry standards for effective AC  
2 mitigation to pipelines.

3

4 **Q10. Do you have any concerns about the allegation that the AC mitigation plans should**  
5 **have been stamped by a Vermont-licensed engineer?**

6 **A10.** No. Mr. Liebert is not correct about that issue either. The specific engineering skill set  
7 necessary to review and stamp this type of design is not entirely based on Electrical Engineering  
8 experience and a degree. This skill set is more closely aligned with Corrosion Engineering and  
9 Electrical Power Systems. Corrosion Engineering is a specialty area that is not a registered  
10 engineering discipline. In the past, California had a corrosion engineering registration for  
11 corrosion engineers, but subsequently discontinued that practice. There are no states with a  
12 corrosion engineering registration, and we regularly perform work all over the country based on  
13 our NACE certifications rather than as registered electrical engineers. There was no requirement  
14 that AC mitigation system design drawings be stamped by an engineer licensed in the state at the  
15 time of construction of the ANGP and there is no such requirement now. ARK Engineering does  
16 have Vermont-licensed engineers, but based on the specialization required for these types of  
17 projects, it does not make sense for just any engineer—even if licensed in the relevant state—to  
18 be reviewing and stamping the adequacy of AC mitigation plans. ARK Engineering guarantees  
19 all our work, which is performed in accordance with relevant NACE standards and practices.

1 **Q11. Would a higher voltage transmission line in the VELCO right-of-way present a**  
2 **greater risk to the ANGP?**

3 **A11.** No. Mr. Liebert's testimony about the potential risk of a 345kW line being constructed in  
4 the VELCO right-of-way is inaccurate. As an initial matter, the AC mitigation for the ANGP is  
5 working as designed in the ANGP, so the depth of cover in the Clay Plains Swamp is not at all  
6 relevant to what would be required in the event that an additional transmission line was proposed  
7 in this area.

8 Additionally, if such a project were proposed in this area, the depth of cover in the Clay  
9 Plains Swamp would not change the way we would assess the potential need for AC mitigation  
10 on the ANGP as a result of a new electric transmission line. Additional evaluations of the effects  
11 of the new project would be evaluated, whether it was a 345kW project or any other kind of  
12 voltage change in the transmission line. Those evaluations would likely result in three potential  
13 outcomes—all of which would be very feasible. First, the evaluation could demonstrate that the  
14 AC mitigation system is adequate as currently installed. Second, the evaluation could  
15 demonstrate that the AC mitigation system needed to be extended in certain areas. Third, the  
16 evaluation could demonstrate that additional AC mitigation would be appropriate. Any one of  
17 these solutions could be implemented, so there is no basis for Mr. Liebert's concerns about  
18 future transmission line projects.

1 **Q12. Do you think that Mr. Liebert has adequate engineering experience to testify about**  
2 **the AC mitigation on the ANGP?**

3 **A12.** Based on his resumé, I do not think he has adequate engineering experience in the areas  
4 of AC interference, AC mitigation, Cathodic Protection, and Corrosion Control to comment on  
5 AC interference analysis, AC mitigation system design, AC mitigation installations, and testing  
6 and data analysis of AC induction effects to the Vermont Gas pipeline system. This area of  
7 engineering involves a unique skill set that can only be obtained through field testing, AC  
8 interference modeling software experience, AC mitigation system design and installation  
9 experience, and actual testing and commissioning experience in the field to understand the  
10 constantly changing effects of AC interference to pipelines and other metallic structures in  
11 proximity to electric circuits due to varying electric circuit load conditions.

12

13 **Q12. Does this conclude your testimony?**

14 **A12.** Yes.