STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Case No. 25-_____

Vermont Gas Systems, Inc.'s Petition to Amend Existing Docket No. 7970 Certificate of Public Good	

DIRECT TESTIMONY OF ADAM GERO ON BEHALF OF VERMONT GAS SYSTEMS, INC.

January 10, 2025

Summary of Testimony

Mr. Gero presents evidence supporting the Commission's approval of five proposed amendments to the Docket No. 7970 Certificate of Public Good ("CPG") that account for the Addison Natural Gas Project "as constructed," including five substantial changes the Commission found during the course of a nearly six-year investigation into construction in Case Nos. 17-3550-INV and 18-0395-PET (the "Investigation"). Mr. Gero's testimony provides a guide to the extensive evidentiary record from the Investigation, explains the relevant background regarding each construction issue that was found to be a substantial change, and provides citations to and explanation of the site plans and locations that are relevant to these construction issues. Mr. Gero also addresses all of the Section 248 criteria, discusses whether each criterion is relevant to the substantial changes, and explains the evidence demonstrating that none of the five substantial changes had any impact on the relevant Section 248 criteria. Finally, Mr. Gero presents five proposed CPG amendments, explains how those proposed amendments account for the recommendations proposed by experts during the Investigation, and discusses why these conditions will ensure that there are no undue adverse impacts in the future and the pipeline will remain in the public good.

Exhibits

See APPENDIX A - EXHIBIT LIST

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DIRECT TESTIMONY OF ADAM GERO
ON BEHALF OF
VERMONT GAS SYSTEMS, INC.

1. Q. State your name, title, and business address.

A. My name is Adam Gero. I am the Director, Operations and Construction, for Vermont Gas Systems, Inc. ("VGS" or "the Company"), 85 Swift Street, South Burlington, Vermont.

2. Q. Describe your professional and educational background.

A. I have been in my current position, Director, Operations and Construction, since September 6, 2023. Prior to that, I was employed by VGS as Engineering Manager since October 19, 2015. My role is to provide engineering and technical support to the Operations Services, Construction, and Engineering Departments. I am responsible for the design of natural gas transmission and distribution systems. Prior to my current position, I held a variety of other positions at the Company beginning as a Gas Engineer in May 2011. As Gas Engineer, my responsibilities included performing system analysis for our distribution and transmission systems, design and cost estimating of new construction projects, and inspection of gate station and transmission projects.

I received my bachelor's degree in civil engineering from the University of Vermont in May 2011 and my master's degree in business administration from Champlain College in 2023. In October 2015, I received my Vermont state Professional Engineering licensure. In addition to receiving my degrees and PE license, I have attended numerous Gas Technology Institute

("GTI") courses, and in July 2016, I completed the certificate program through GTI and became a Registered Gas Distribution Professional.

3. Q. Have you previously testified before the Public Utility Commission (the "Commission")?

A. Yes. I have submitted testimony in Case No. 24-3066-PET, which involves the replacement of the Catamount Gate Station in Milton, Vermont; Case No. 18-4028-PET, which involved VGS's request for Section 248 approval to construct a new pressure regulation station on Beebe Road in Swanton, Vermont; and Docket No. 8679 relating to the rebuilding of an existing pressure-regulation station with the addition of a pipeline heater, a new station building, and the installation of a communications equipment enclosure in Georgia, Vermont.

INTRODUCTION

4. Q. What is the purpose of your testimony and how is it organized?

A. The purpose of my testimony is to provide a guide through the extensive evidentiary record from Case Nos. 17-3550-INV and 18-0395-PET (the "Investigation"), explain the construction issues that were thoroughly investigated in that case, discuss each of the substantial changes that were found at the conclusion of that proceeding, and discuss the five proposed amendments to the existing Certificate of Public Good ("CPG") authorizing the construction and operation of the Addison Natural Gas Project ("ANGP" or "Project") that VGS proposes in this case. Consistent with the Commission's direction, the CPG amendments address each of the five substantial changes found in the Investigation, account for the remedial actions

recommended by the expert witnesses in the Investigation, and explain why these measures will prevent any future undue adverse impacts under the relevant Section 248 criteria.

In **Section I** of my testimony, I discuss each of the "substantial changes" that were identified in the Commission's Final Order in the Investigation, dated April 6, 2023[1] and the evidence from the Investigation that discusses each of the related construction techniques at issue. In this section of my testimony, I provide relevant information about the location of these substantial changes, what the issues were, and how the issues were investigated. This Section of my testimony is intended to provide sufficient background about each of these substantial changes as context to understand where these changes occurred, what potential issues they raised, and why these changes had no actual impact on any of the relevant Section 248 criteria, which is addressed in Section II of my testimony.

In **Section II** of my testimony, I discuss each of the Section 248 criteria. For each of the criteria, I discuss whether the substantial changes have any relevant impact to the Commission's determination in Docket No. 7970 under that criterion and whether the substantial changes have any relevant impact to the existing CPG. Where relevant, I discuss the evidence developed in the Investigation and explain why that evidence demonstrates that—although the Commission found there was a "potential" for impacts in the Investigation—there were no actual impacts on that criterion.

Finally, in **Section III** of my testimony, I present the five associated CPG amendments that VGS proposes in this case, which adopt conditions recommended by various pipeline experts from the Investigation. Regarding each proposed amendment, I explain why these

[1] Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)).

conditions will ensure the pipeline will not have any adverse impact on the relevant Section 248 criteria in the future and operation of the pipeline will remain in the public good.

5. Q. Before discussing each of the substantial changes and related CPG amendments, please provide a little background about the prior Investigation into construction of the Addison Natural Gas Project.

A. The Investigation was an approximately six-year proceeding looking into the construction of the Addison Natural Gas Project ("ANGP" or "Project"). The Commission had issued a Certificate of Public Good ("CPG") for the Project in 2013, which authorized the expansion of VGS's transmission and distribution system into Addison County. The Project involved the construction of approximately 41 miles of 12" transmission line and related distribution mains that extended natural gas service to Middlebury and Vergennes, Vermont. Construction of the Project was completed in 2017.

The Commission opened the Investigation in Case No. 17-3550-INV to review VGS's claim that burial of the pipeline in the Clay Plains Swamp with less than four feet of cover was a non-substantial change because the pipeline met the applicable safety standard in this location even though it was not buried four feet in certain locations. The Investigation was later expanded and the Commission oversaw the review of over a dozen different allegations made by Intervenors in the case claiming that construction of the Project was inconsistent with the plans and evidence submitted in Docket No. 7970. An independent Commission-appointed pipeline expert, William Byrd, was engaged to perform an extensive review of Intervenors' allegations

and "conduct a thorough review of the construction, performance, and safety of the Addison natural gas pipeline."[2] At the conclusion of his review, Mr. Byrd concluded:

> [The pipeline] was thoroughly and competently designed and engineered using modern equipment and technology, and comprehensively inspected during construction by multiple parties. With a few noted exceptions, it was constructed in compliance with applicable rules and commitments, and in many important respects it exceeds the typical requirements. . . . Ongoing inspections and maintenance as well as periodic integrity management assessments and evaluations should identify and resolve any pipeline safety issues that arise in the future and provide assurance of continued safety.[3]

The Commission also heard evidence from multiple pipeline experts engaged by the Department, VGS, and VELCO, all of whom concluded that the construction and operation of the Project did not have any adverse impact on public safety or the environment.

In a Final Order issued in the Investigation on April 6, 2023, the Commission adopted the hearing officer's conclusion that although "the pipeline is safe and was adequately installed," VGS's construction of the Project involved five unapproved changes to the Project in violation of the Docket No. 7970 CPG because these changes had the potential for significant impacts under certain Section 248 criteria. The Commission further concluded that the extensive evidentiary record developed in the investigation detailed:

> (1) the unapproved changes Vermont Gas made to the Project during construction; (2) the potential for significant impacts from those changes under the relevant criteria of Section 248; (3) the absence of any actual harm from those changes under those same criteria; and (4) the remedial actions that Vermont Gas must take to ensure that operation of the as-built pipeline will not, in the future, result in any undue impacts under the relevant Section 248 criteria and will remain in the public good.[4]

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[2] Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 21 (quoting Case No. 17-3550-INV, Order of 12/6/17 at 1-2).
[3] Exhibit VGS-AG-009 (Byrd Report) at 72.
[4] Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 4.

Based on these conclusions, the Commission directed VGS to propose amendments to the Docket No. 7970 CPG as follows:

> [W]e direct Vermont Gas to make a compliance filing that proposes amendments to its CPG that address the pipeline as actually constructed, addressing each of the five changes that we found to be violations of the 2013 Final Order and CPG and Commission Rule 5.408. Vermont Gas's filing must include specific proposed conditions that address each of the five violations identified in this order and account for the remedial actions recommended by the expert witnesses in this proceeding. With respect to those remedial actions, Vermont Gas's filing must explain why those actions will prevent any future instances of undue impacts under the criteria identified as relevant to potential significant impacts in the proposal for decision based on evidence already in the record of this case.[5]

After VGS made the CPG amendment compliance filing in the Investigation proceeding, Intervenors appealed the Commission's process for amending the CPG in the Investigation to the Vermont Supreme Court, arguing that a separate CPG amendment proceeding was required. On appeal, the Court held that a separate CPG amendment proceeding was required and remanded the case back to the Commission.

In September 2024, VGS issued a 45-day advance notice to all entities entitled to notice of a Section 248 proceeding under 30 V.S.A. § 248.[6] This notice explained the procedural posture of the case and why VGS would be filing a Petition to Amend the Docket No. 7970 CPG in this case.

[5] Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 22.

[6] https://vgsvt.com/wp-content/uploads/2024/09/2024-09-12-45-Day-Advance-Submission-FINAL-00645921xE4196.pdf

6. Q. Does VGS's Petition in this case propose any new construction or changes to the construction and operation of the Project since construction was completed in 2017?

A. No. The CPG Amendment Petition does not involve any new proposed construction or new changes to the Project since its construction was completed in 2017. The CPG amendments in this case "address the pipeline as actually constructed," "include specific proposed conditions that address each of the five violations identified" by the Commission's Final Order in the Investigation, and "account for the remedial actions recommended by the expert witnesses" in the Investigation.[7] VGS has also already implemented and is continuing to implement the remedial actions recommended by expert witnesses from the Investigation. In this case, we propose amending the existing Docket No. 7970 CPG to incorporate these actions as CPG conditions and explain why these recommended "actions will prevent any future instances of undue impacts under the criteria identified as relevant to potential significant impacts" associated with each of the five substantial changes.

SECTION I: FACTUAL DETAIL RELATING TO EACH SUBSTANTIAL CHANGE

7. Q. Please explain what it means for there to be a "substantial change" to a project approved under 30 V.S.A. § 248.

A. A substantial change is a defined legal term under Commission Rule 5.400. Under that rule, "a substantial change is one that has the potential for significant impact with respect to any of the criteria of Section 248(b) or on the general good of the State under Section 248(a)." The Commission's rules also provide that, "Commission approval is required for any proposed

[7] Exhibit VGS-AG-001 (Post-Appeal Order Outlining Next Steps (Jun. 25, 2024)) at 4.

substantial change to a project that has been issued a certificate of public good under 30 V.S.A. § 248." If a CPG holder makes a change to a project that has the potential for a significant impact under the criteria of Section 248(b) or Section 248(a), they are required to first obtain Commission approval for that change.

8. Q. In the Investigation, what "substantial changes" did the Commission find that VGS had made to the Project during the course of construction?

A. The Commission found that VGS made five changes to the Project; "(1) burying the pipeline using the sink-in-the-swamp burial method, which had not been discussed or approved in the 2013 Final Order and CPG; (2) failing to achieve the required four-foot depth-of-cover standard at 18 locations in the Clay Plains Swamp; (3) failing to conform to its own specifications regarding pipeline burial on the trench bottom and installation of trench breakers; (4) failing to comply with the compaction requirements for the pipeline in its construction specifications; (5) failing to ensure that staffing for the project included a Vermont-licensed professional engineer to serve as the responsible charge engineer for the Project."[8]

9. Q. Why did VGS make these changes without seeking prior Commission authorization as required by the Commission's rule?

A. VGS maintained throughout the Investigation that none of the allegations raised by Intervenors rose to the level of a "substantial change" under the Commission's rules. The alleged CPG violations all related to technical construction details and related requirements

[8] Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 2-3.

about how those specifications would be implemented during construction in the field. It has been VGS's view that—to the extent these construction techniques and field decisions deviated from the plans and evidence in Docket No. 7970—there was no potential for any significant impacts on the Section 248 criteria and, therefore, no need to obtain prior Commission authorization.

In the end, most of the Intervenors' allegations were rejected in their entirety. And although the evidence in the Investigation also demonstrated that the five changes had no actual impact to the relevant Section 248 criteria, the Commission found they were substantial changes that had the "potential" for a significant impact and should have been reviewed prior to implementation.

10. Q. Does the CPG Petition in this case include "site plan" information as contemplated by Commission Rule 5.404?

A. Yes. Commission Rule 5.404 requires a Section 248 petition to include a site plan with legible scales, showing project features, site improvements, existing natural and constructed features like wetlands and tree lines, the location of the line and other relevant information about a project. In this case, I sponsor a large number of exhibits from the evidentiary record in the Investigation that provide a variety of information that meets the requirements of Rule 5.404. The primary document that encompasses most of the site plan requirements is the Issued for Construction ("IFC") drawings,[9] which were admitted as an attachment to Mr. Byrd's Final Report from the Independent Investigation of the Project (the "Byrd Report"). The IFC drawings

[9] Exhibit VGS-AG-029, Parts 1 through 3 (Byrd Report, Attachment #20 (IFC Plans 5-13-16 in Modification bulletin Trans-09))(hereinafter "Exhibit VGS-AG-029 (IFC Drawings)").

provide maps of the entire Project, detailed specifications (some of which are relevant to the changes discussed in my testimony), and detail sheets that show pipeline station numbering, natural and constructed features, plan and profile views of the pipeline, and other relevant site plan information. Below, I discuss in detail each substantial change and cite to relevant portions of the IFC drawings and other exhibits that provide further detail about those changes.

SUBSTANTIAL CHANGE #1: INSTALLATION OF THE PIPELINE IN THE CLAY PLAINS SWAMP

11. Q. Please describe the relevant location relating to the Commission's finding that VGS's installation of the pipeline in the Clay Plains Swamp was a substantial change.

A. The Clay Plains Swamp is a wetland area along the pipeline corridor in New Haven, close to the northern border of New Haven with Monkton, Vermont. This location of the pipeline can be found on the IFC drawings, the first page of which provides a geographic overview of the location of the ANGP, which begins in Colchester, Vermont, and traverses through Essex, Williston, St. George, Hinesburg, Monkton, and New Haven to Middlebury, Vermont.[10] On the second page of the IFC drawings, there is an index to each detailed sheet of the IFC drawings. The Clay Plains Swamp is located on the very northern end of New Haven, just south of the border with Monkton, and the relevant detail in the Clay Plains Swamp can be found on sheets ANGP-T-C-065 and 066.[11] Page 4 of the IFC drawings also provides a legend to help identify the significant amount of information that is displayed on various sheets of the

[10] Exhibit VGS-AG-029 (IFC Drawings).
[11] Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 8, 10.

plans, including the location of easements, workspaces, and temporary wetland impacts, among other information.

On sheet ANGP-T-C-065 at page 99, the Clay Plains Swamp can be identified toward the right, which is demarcated and labeled the "Red Maple/Green Ash Swamp." The VELCO power line is demarcated with "OHW", which stands for Overhead Wires. The pipeline location is demarcated with a dark black line with station numbers like 1640+00 or 1643+00 and labeled "Proposed 12" Pipeline". Station numbering is a measurement system that identifies reference points along the pipeline. On the ANGP, the northern end of the Project is station 00+00. Each station thereafter is 100 feet further. So station 01+00 is 100 feet from the northern end of the Project, station 02+00 is 200 feet, and so on. As shown on the IFC drawings at Pages 99 and 101, the pipeline is located on the very western edge of the VELCO ROW in the Clay Plains Swamp, effectively as far away from the VELCO line as possible. An aerial photograph of the Clay Plains Swamp area is also included in Exhibit VGS-AG-089 (Exhibit VGS-JSH-6).

12. Q. Please explain the construction issues that are relevant to the Commission's determination in the Investigation that installation of the pipeline in this area was a substantial change.

A. In Docket No. 7970, VGS presented evidence of the methods it would use to install the pipeline, which included both open-cut trenching and horizontal directional drilling depending on the location. When the pipeline is installed using a typical open-cut trenching method, a full trench is first excavated and the pipeline is staged (laid out and welded together in preparation for burial) adjacent to the trench before it is lowered into the trench and then

backfilled. Faced with wet construction conditions in the Clay Plains Swamp, VGS's pipeline contractor Michels Corporation, utilized "a type of open cut installation that involves staging the pipeline in a shallow trench and then excavating a deeper trench adjacent to the staging trench."[12]

The Commission-appointed pipeline safety expert, Mr. Byrd, reviewed the installation method in the Clay Plains Swamp and concluded:

> The project plans and specifications gave the [Construction Management Team] the authority and responsibility to address site specific conditions, and they acted appropriately when addressing the conditions in the Clay Plains Swamp (and other swamps). I believe this was entirely consistent with the project plans and specifications and the CPG. This variation in construction technique was not in violation of the law nor applicable pipeline safety regulations.[13]

VGS also retained third-party pipeline expert John F. Godfrey to review the installation methods used in the Clay Plains Swamp. Mr. Godfrey testified that the installation methods used in the Clay Plains Swamp were reasonable, explaining:

> There seems to be some confusion regarding the term "open cut" trenching or ditching. The common understanding of open cut in the pipeline industry is where a ditch is open to the surface when excavated. This is in contrast to other installation methods such as boring, directional drilling, or tunneling. Open cut trenches can employ different techniques depending on the route and soil conditions. These may include shoring, sheeting, terracing, benching, or blasting. In wetland conditions it is not uncommon to excavate a "wet" ditch and allow the weight of the pipe to settle the pipe in the ditch. This is still considered an open cut method.[14]

While the experts did not find any problems with this installation method, the Commission ultimately concluded that it was not an approved installation method, explaining:

> The sink-in-the-swamp installation method had not been briefed to or approved by the Commission. The dry open-cut trenching method presented in detail to the Commission by Vermont Gas in Docket 7970 was not the same as the sink-in-the-

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[12] Exhibit VGS-AG-082 (2020-07-31 Rebuttal Testimony of John St. Hilaire) at 12; see also Exhibit VGS-AG-009 (Byrd Report) at 57 (" This method involved excavation of an initial trench shallower than ultimately required but not so deep that it would collapse in the muck, installing the pipe in that ditch, and then excavating adjacent to the pipe to allow the pipe to sink deeper into the excavation.").

[13] Exhibit VGS-AG-009 (Byrd Report) at 70.

[14] Exhibit VGS-AG-098 (2020-07-31 Rebuttal Testimony of John F. Godfrey) at 12-13.

> swamp method that was ultimately used in the Clay Plains Swamp. Among other differences, the open-cut trenching method used only one trench, while the sink-in-the-swamp installation method relied on two trenches.[15]

Based on this, the Commission determined installation in the Clay Plains Swamp was a substantial change from the Docket No. 7970 CPG.

13. Q. What criteria under Section 248 did the Commission determine were relevant to its substantial change finding?

A. The Commission found that the installation method in the Clay Plains Swamp "had the potential for significant impact, at a minimum, under the natural resources criteria of Section 248."[16] The hearing officer also indicated that the installation process in the Clay Plains Swamp contributed to the depth of cover issue discussed below.

SUBSTANTIAL CHANGE #2: DEPTH OF COVER IN THE CLAY PLAINS SWAMP

14. Q. Please describe the relevant location relating to the Commission's finding that the installed depth of cover in the Clay Plains Swamp was a substantial change.

A. This substantial change relates to the same area discussed above, the Clay Plains Swamp.[17] The specific locations where the pipeline was not installed four feet deep in the VELCO ROW are also listed on VGS's certification of the depth of cover along the entire pipeline corridor, sponsored by VGS witness John St. Hilaire.[18]

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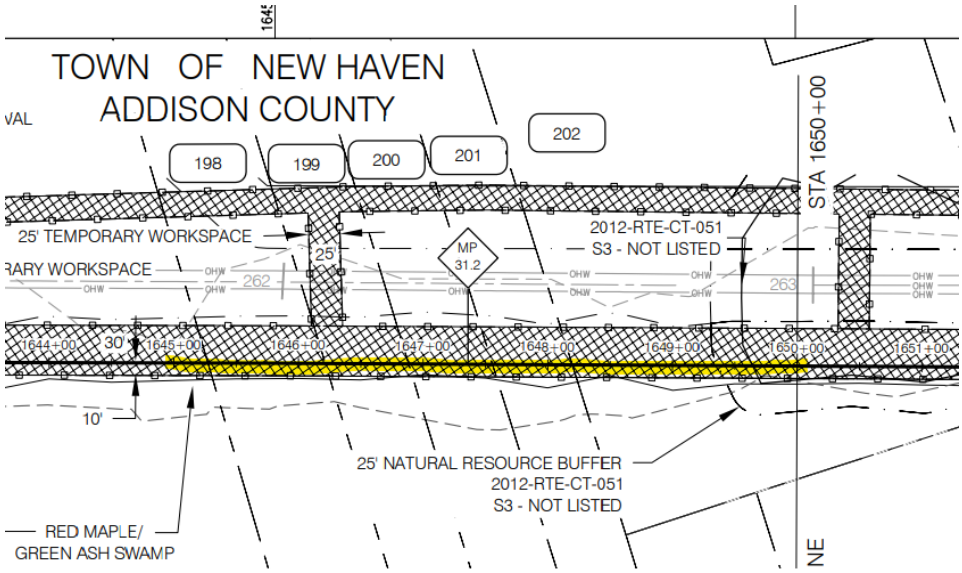
15 Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 36.
16 Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 20-21.
17 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 8, 10.
18 Exhibit VGS-AG-085 (Exhibit VGS-JSH-2) at 75-76.

The specific 500-foot section where the pipeline was not installed with four feet of cover is also identified on Mr. Byrd's ANGP Site Visit Summary. On page 8, Mr. Byrd identified the approximate northern end of this area at station 1642+00.[19] His field measurements of the depth of cover are listed under the "DOC Reading" column, which can be compared to the surveyed depth at the time of installation under the "kmz depth" column. The precise area where there is less than four feet of cover in the Clay Plains Swamp runs from approximately station 1645+20 to 1650+25.[20] The following highlighted section of the Page 99 of the IFC drawings shows this area:[21]



[19] Exhibit VGS-AG-018 (Byrd Report, Attachment #9 (WRB Site Visit Summary Findings) at 8.
[20] Exhibit VGS-AG-018 (Byrd Report, Attachment #9 (WRB Site Visit Summary Findings) at 8-9.
[21] Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 8.

15. Q. Please explain the construction issues that are relevant to the Commission's determination that the depth of cover in the Clay Plains Swamp was a substantial change.

A. The "depth of cover" refers to the distance between the top of the installed pipeline and the surface of the ground. In Docket No. 7970, the evidence presented indicated that the pipeline would be installed with at least 36 inches of cover per federal guidelines, but would have four feet of cover in agricultural areas and within the VELCO right-of-way ("ROW").[22] As discussed in more detail below, VGS agreed to bury the pipeline four feet in the VELCO ROW per a Memorandum of Understanding with VELCO (the "VELCO MOU") that was adopted as part of the Commission approval of the Docket No. 7970 CPG. The VELCO MOU provided that VGS "will design the Project in VELCO's [right-of-way] and access roads into VELCO's [right-of-way] to meet an HS-20+15% standard, which VGS plans to meet by using Class 3 pipe interred at a depth of 4 feet."[23] This "HS-20+15%" standard is relevant to public safety because it relates to maintaining pipeline integrity under conditions where there is a surface load crossing the pipeline. The area known as the Clay Plains Swamp is within the VELCO ROW, so the Project was permitted based on the assumption that the pipeline would be buried with four feet of cover in the Clay Plains Swamp.

VGS construction crews were not able to achieve four feet of cover in all areas in the Clay Plains Swamp due to wet conditions during construction of the pipeline on September 15, 16, 19, and 20, 2016.[24] The post-construction depth of cover surveys conducted in 2016 "demonstrated that all locations in this area had at least 3' of cover" after construction was

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22 See Exhibit VGS-AG-009 (Byrd Report) at 51-53 (discussing the depth of cover requirements).
23 Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 6.
24 Exhibit VGS-AG-085 (Exhibit VGS-JSH-2) at 8.

completed, including locations in the Clay Plains Swamp.[25] The installation of the pipeline with at least 3' of cover is consistent with applicable federal pipeline safety regulations, which establish a 3' depth of cover requirement at the time of installation.[26] But as noted above, the Project was permitted in Docket No. 7970 based on the expectation that VGS would install the pipeline with four feet of cover in the VELCO ROW, which includes the Clay Plains Swamp.

16. Q. Why didn't VGS request approval from the Commission to install the pipeline with less than four feet of cover in this location?

A. The installed depth of the pipeline in this location was intended to be four feet at the time of construction. As discussed by Mr. St. Hilaire, VGS was aware in September 2016 that its contractor was having a difficult time with wet conditions in this area and that the contractor may not achieve four feet of cover. VGS also discussed this possible outcome contemporaneously with VELCO and Mr. St. Hilaire provided a timeline of VGS's assessment of this issue in the Investigation.[27]

Throughout the Investigation, VGS maintained that the installed depth of cover was not a substantial change because the pipeline still meets the AASHTO HS-20+15% standard with less than four feet of cover, which VGS knew in September 2016 when the pipeline was installed in the Clay Plains Swamp. The AASHTO HS-20+15% standard is a highway loading standard that represents the surface weight of a semi-tractor trailer that is fully loaded.[28] Prior to construction in the Clay Plains Swamp, VGS's engineers at Mott MacDonald conducted a general surface

[25] Exhibit VGS-AG-082 (2020-07-31 Rebuttal Testimony of John St. Hilaire) at 8.
[26] Exhibit VGS-AG-082 (2020-07-31 Rebuttal Testimony of John St. Hilaire) at 8.
[27] Exhibit VGS-AG-085 (Exhibit VGS-JSH-2) at 10-12.
[28] Exhibit VGS-AG-006 (2020-09-02 Evidentiary Hearing Transcript Day II) at 15.

loading study to determine whether the pipeline could withstand this kind of loading under a variety of conditions and depths of cover.[29] As discussed in more detail below, the ANGP is very conservatively designed and surface loading on the pipeline is not a concern under any anticipated scenarios.[30] Because Mott's 2016 loading study showed that the pipeline met this loading standard as installed in the Clay Plains Swamp, VGS maintained that the depth of cover in the Clay Plains Swamp was a non-substantial change because it could not create a potential for a significant impact.

17. Q. What did the Commission-appointed pipeline safety expert, Mr. Byrd, conclude about the depth of cover in the Clay Plains Swamp?

A. Mr. Byrd conducted an independent review of the depth of cover along the entire pipeline, including the Clay Plains Swamp. He assessed VGS's depth of cover survey and compared the results to his own measurements of depth of cover.[31] Mr. Byrd described his review of depth of cover in the Clay Plains Swamp area as follows:

> We took DOC readings in 23 locations, all by probing. About 500' of the ROW was less than 4' depth, plus one other isolated location at 3'9" of depth. It is relevant to note that the location indicated in the intervenor's photo and video (a.k.a. "Cisco's video") was around station 1641+75, where the pipe is currently buried 4'7" (in excess of the requirements for that area). The shallow depth of cover areas are towards the middle of the swamp. None of these shallow locations are close to the edge of the swamp.[32]

Mr. Byrd also analyzed the extent to which the depth of cover in the Clay Plains Swamp could impact safety, explaining:

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29 Exhibit VGS-AG-102 (Exhibit VGS-CC-2) at 5.
30 Exhibit VGS-AG-009 (Byrd Report) at 67
31 Exhibit VGS-AG-009 (Byrd Report) at 51(discussing the depth of cover requirements).
32 Exhibit VGS-AG-009 (Byrd Report) at 56.

> [T]he HS20+15% loading criteria in the CHA bedding and backfill specification was excessively conservative for a pipeline ROW (i.e. not under a road or other load bearing area) – but it doesn't matter because ANGP can meet that loading standard at any reasonable burial depth or level of compaction. Per the CEPA surface loading report in Attachment A#49, ANGP would easily pass the "very conservative" screening analysis and require no further analysis, while greatly exceeding HS20+15% standards - regardless of soil compaction. Surface loading under any anticipated scenarios isn't a concern for ANGP. This has been confirmed by multiple analyses from different engineers using different software.

Mr. Byrd was also cross-examined by counsel for Intervenors in the Investigation and testified that he and his team had run loading calculations to confirm the pipeline met the loading standard as installed. He also opined—again—that the standard was excessively conservative because you'd "never be able to get a tractor-trailer truck into the Clay Plains Swamp, much less impose this kind of external load on it."[33]

18. Q. What criteria under Section 248 did the Commission determine were relevant to its substantial change finding?

A. The hearing officer initially found the loading standard was not met in the Clay Plains Swamp, resulting in "a potential impact principally on public safety under § 248(b)(5)."[34] The hearing officer also initially found that because the "failure to meet the loading standard may limit the ability of VELCO to build a second transmission line in its right-of-way, the deviation also has a potential impact on meeting future electrical transmission needs under § 248(b)(2) and the future stability and reliability of the electric transmission system under

[33] Exhibit VGS-AG-006 (2020-09-02 Evidentiary Hearing Transcript Day II) at 17.
[34] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 28.

§ 248(b)(3)."[35] Based on these same conclusions, the hearing officer concluded that this change has "a potential impact on the economy of the State under § 248(b)(4).[36]

After taking further evidence from Mott MacDonald and a third-party engineer retained by VELCO, however, the hearing officer concluded that the loading standard had in fact been met and that the pipeline was adequately installed and is safe.[37] This did not change his determination that there had been a potential for an impact, explaining that, "despite the fact that we now know that the loading standard was achieved, I recommend that the Commission conclude that Vermont Gas's use of the sink-in-the swamp installation method and the failure to achieve the four-foot burial depth each had the potential for a significant impact in September 2016, were substantial changes, should be penalized, and require CPG amendments."[38]

SUBSTANTIAL CHANGE #3: SPECIFICATIONS REGARDING PIPELINE BURIAL ON THE TRENCH BOTTOM AND INSTALLATION OF TRENCH BREAKERS

19. Q. Please describe the relevant location relating to the Commission's finding that VGS's installation of the pipeline on the trench bottom and the installation of trench breakers was a substantial change.

A. This issue was initially raised by the Department of Public Service in a Notice of Probable Violation ("NOPV"), which was assigned Case No. 18-0395-PET. That case was later stayed pending the conclusion of the investigation in Case No. 17-3550-INV, and the two cases

35 Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 28.
36 Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 28.
37 Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 4-5.
38 Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 33.

were then consolidated before the Commission issued its Final Order in the Investigation. The Department's NOPV allegations were examined by the Commission-appointed pipeline safety expert Mr. Byrd as part of the Investigation, however, the Department and VGS had also already agreed to a Stipulated Remedial Action Compliance Plan that addressed the Department's NOPV.[39]

The locations that relate to this construction issue fall into two categories. First, the Department's NOPV raised concerns about whether it was appropriate to install the pipeline directly on the trench bottom in two locations. One location was identified in the vicinity of Station 1635+00 and the other location is "a segment between project Station 1642+00 and 1660+00."[40] This area is the Clay Plains Swamp and a location just north of the Clay Plains Swamp, both shown on the IFC drawings, discussed above, at Page 99.[41] The pipeline was also installed directly on the trench bottom in an area where the native soil was sandy from station 240+26 to station 279+75.[42]

Trench breakers are located throughout the pipeline, but the Department's NOPV raised concerns about installation of trench breakers on the segment of pipeline that was installed in 2014. In general, this part of the pipeline is the northernmost eleven miles of the pipeline, from the northern end of the Project in Colchester, through Essex, and into Williston. ANR also raised questions in the Investigation about whether certain permanent bentonite trench breakers were installed at the limits of wetlands and wetland buffer areas. There were four specific areas of

[39] Exhibit VGS-AG-076 (Byrd Report, Attachment #67 (Stipulated Remedial Action Compliance Plan – DRAFT – to Bedding TB NOPV)).
[40] Exhibit VGS-AG-074 (Byrd Report, Attachment #65 (Bedding / TB NOPV of 2-13-2018)) at 3.
[41] Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 8.
[42] Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 38-39.

concern where there was both a wetland or wetland area and construction in bedrock involved blasting,[43] which included the following:

- Class II Wetland 2012-CM-91 located at Station 652+52 to 653+16 (MP 15.36);[44]
- Class II Wetland 2012-CM-219 located at Station 765+50 to 765+70 (MP 14.50);[45]
- Class II Wetland 2012-RS-3 located at Station 1398+16 to 1399+18 (MP 26.48);[46] and
- Class II Wetland buffer of 2012-JB-12 located at Station 1536+26 (MP 29.09).[47]

20. Q. Please explain the construction issues that are relevant to the Commission's determination that the installation of the pipeline on the trench bottom and installation of trench breakers was a substantial change.

A. This substantial change relates to the requirement that VGS construct the Project in accordance with written specifications. As explained by Mr. Byrd:

> The pipeline operator must have "comprehensive written specifications or standards" that are "consistent with this part" (i.e. the pipeline regulations) – and then they must comply with them. Non-compliance with a procedure or specification made by a pipeline operator pursuant to the regulations is considered non-compliance with the regulation that required that procedure or specification in the first place.[48]

Because the CPG required VGS to construct the pipeline in accordance with applicable pipeline regulations, and those regulations require construction to be consistent with comprehensive

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43 Exhibit VGS-AG-009 (Byrd Report) at 32.
44 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 53.
45 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 58.
46 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 87.
47 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 2.
48 Exhibit VGS-AG-009 (Byrd Report) at 11.

written specifications, this substantial change was about whether VGS had installed the pipeline and trench breakers consistent with the comprehensive written specifications.

21. Q. Did VGS have written specifications that addressed the installation of the pipeline on the trench bottom and installation of trench breakers?

A. Yes, VGS had comprehensive written specifications, developed by Vermont-licensed engineers, that addressed nearly every aspect of construction, including the installation of the pipeline on the trench bottom and the installation of trench breakers. As noted in the Department's NOPV, specification 31233 required installation of the pipeline either on "stacked sandbags" or another approved pipe support, or to be installed with continuous support using select backfill.[49] CHA initially informed VGS that per the specification details on IFC sheet ANGP-T-G-015,[50] installation of the pipeline on "in-situ native material… is not acceptable."[51] Based on this instruction, the Department thought VGS's installation in the locations discussed above was not consistent with the written specifications contain in 31233.

As discussed by Mr. Byrd, however, CHA also issued written specifications that stated, "The pipe shall rest on undisturbed trench bottom provided the material does not include rocks, sharp objects and / or debris that may cause damage to the pipe."[52] Although Mr. Byrd concluded that this specification clearly permitted installation on the trench bottom, he acknowledged that the different specifications could be construed as inconsistent with each other. In the case of the installation of the pipeline near station 240+26, CHA issued a written "Project Directive," dated

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49 Exhibit VGS-AG-074 (Byrd Report, Attachment #65 (Bedding / TB NOPV of 2-13-2018)) at 3.
50 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 16.
51 Exhibit VGS-AG-074 (Byrd Report, Attachment #65 (Bedding / TB NOPV of 2-13-2018)) at 3.
52 Exhibit VGS-AG-009 (Byrd Report) at 36.

September 1, 2015, that expressly authorized installation of the pipeline on the trench bottom, stating, "This document serves to direct the construction without pipe supports in the sand area from station 240+26 to station 279+75, as the uniform sand in the trench meets requirements for select backfill."[53] The pipeline was also installed in similar in-situ conditions at station 564+24 to 567+84 based on the Construction Management Team's knowledge that it complied with the backfill specification cited above and direction from CHA.[54]

In July 2016, after discussions with the Department expressing the Department's interest in written methodology that reduced the discretion of the construction team, VGS determined that it would no longer allow installation of the pipeline on the trench bottom.[55] Thereafter, the pipeline was installed in the Clay Plains Swamp on the trench bottom, however, as explained in VGS's response to the Department's NOPV, this field adjustment was necessary based on conditions in the Clay Plains Swamp. The pipe is adequately supported, and the pipeline is also coated with concrete in this location, which provides an extra level of protection to the pipeline and pipeline coating.[56]

22. Q. Why did the Department's NOPV allege that trench breaker installation was not consistent with the written specifications?

A. In 2014, Section 31233 of the specifications did not specify, as it did in later versions, that "trench breakers shall be installed per construction plan details prior to backfilling

[53] Exhibit VGS-AG-009 (Byrd Report) at 37-38.
[54] Exhibit VGS-AG-075 (Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)) at 9-10.
[55] Exhibit VGS-AG-075 (Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)) at 10.
[56] Exhibit VGS-AG-075 (Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)) at 10.

operations begin[ning]."[57] The construction plans show a chart for reference that stated that trench breaker "spacings shown are recommended minimum guidelines, OSPC representative may adjust spacing in the field."[58] In 2014, field personnel adjusted the location of installed trench breakers based on conditions in the field, however, VGS did not document the installation of trench breakers where field personnel had determined installation was appropriate. VGS subsequently issued a Corrective Action Report ("CAR") and monitored these locations to determine if trench breaker installation created any concern. Pursuant to that CAR, this segment of the pipeline was monitored through aerial and walking surveys and continues to be monitored as part of VGS's overall transmission line patrols. After 2014, trench breaker installation was specified and documented.

23. Q. Were ANR's concerns about trench breaker installation based on the same construction issue?

A. No. During the Investigation, ANR raised concerns specifically about installation of trench breakers at the limits of wetlands and wetland buffers as discussed above. As discussed by Mr. Byrd, there are two kinds of trench breakers, sandbag trench breakers and bentonite trench breakers. Sandbag trench breakers prevent erosion, isolate trench segments, and stabilize the trench during construction. After construction is complete, these trench breakers have little importance.[59] Bentonite trench breakers are built with clay to "create a plug in the trench that

[57] Exhibit VGS-AG-075 (Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)) at 12.
[58] Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 16 (Permanent Trench Break Spacing Guideline).
[59] Exhibit VGS-AG-009 (Byrd Report) at 47.

prevents future water flow down the trench, even after construction."[60] ANR's concern was related to the installation of bentonite trench breakers because VGS's MOU with ANR required the installation of that kind of trench breaker in wetlands and wetland buffer locations where blasting occurred.

24. Q. Were ANR's concerns addressed in the Investigation?

A. Yes. As discussed by Mr. Byrd, VGS's environmental consultant VHB studied the installation of bentonite trench breakers and issued and submitted a "Condition J" memo to ANR detailing the basis for VHB's conclusion that a bentonite plug was installed at all Class II wetland and Class II wetland buffer locations where blasting occurred. VHB also evaluated the potential absence of trench breakers at five wetlands where installation had not been initially documented and reached the conclusion that there were no observable or significant alterations to the wetland hydrology to the extent that any Class II wetland boundaries or functions were impacted beyond what was permitted. VHB also concluded that bentonite trench breakers were installed at all stream locations as specified.[61]

25. Q. What criteria under Section 248 did the Commission determine were relevant to its substantial change finding regarding trench bottom and trench breaker installation?

A. The hearing officer's Liability Order in the Investigation determined VGS's "failure to conform with the Project's trench bottom and trench breaker specifications [had] a

60 Exhibit VGS-AG-009 (Byrd Report) at 47.
61 Exhibit VGS-AG-009 (Byrd Report) at 50.

potential for significant impact on public health and safety."[62] As discussed in Section II below, however, the installation of the pipeline on the trench bottom and trench breakers had no actual impact on public health and safety. Initial Department concerns about corrosion risk relating to installation on the trench bottom were dispelled by Mr. Byrd's review and further study of ANR's initial concerns about bentonite trench breakers found that there were no impacts to wetlands.

SUBSTANTIAL CHANGE #4: COMPLIANCE WITH COMPACTION SPECIFICATIONS

26. Q. Please describe the relevant locations relating to the Commission's finding that VGS failed to comply with the compaction specifications on the Project.

A. There are 15 locations where the pipeline was installed using an open cut trenching method to cross a public road. These locations are listed on Exhibit VGS-AG-093 (Exhibit VGS-JSH-10) and including the following (citations also provide the relevant page number on the IFC drawings): Lincoln Road in Williston (STA 755+95),[63] Breezy Valley Lane in St. George (STA 788+10),[64] Hickory Place in Hinesburg (STA 947+95),[65] Charlotte Road in Hinesburg (STA 1048+25),[66] Baldwin Road in Hinesburg (STA 1114+40),[67] Rotax Road in Monkton (STA 1293+85),[68] Stillson Road/Cedar Lane in Monkton (STA 1379+10),[69] Post Road

62 Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 31.
63 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 58.
64 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 59.
65 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 66.
66 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 70.
67 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 74.
68 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 82.
69 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 86.

in Monkton (STA 1424+25),[70] Old Stage Road in Monkton (STA 1547+60),[71] Old Stage Road in in Monkton (STA 1553+55),[72] Old Stage Road in Monkton (STA 1565+50),[73] Parks Hurlburt Road in Monkton (STA 1588+45),[74] Quarry Road in New Haven (STA 1768+45),[75] Hunt Road in New Haven (STA 2011+60),[76] and Belden Falls Road in New Haven (STA 2129+45).[77]

27. Q. Please explain the construction issue that relates to the Commission's determination that VGS's failure to adhere to compaction specifications was a substantial change.

A. This issue related to the compaction of the pipeline after its installation in an open cut trench. The hearing officer's Liability Order found that VGS had failed to comply with compaction specifications that "required compaction of all backfill and satisfaction of a compaction testing standard."[78] Although compaction of backfill is relevant along almost the entire length of the pipeline, as discussed by Mr. Byrd, compaction is not a pipeline integrity issue. Instead, the question was whether there was a potential for impacts at the open cut roads discussed above.

70 Exhibit VGS-AG-029 (IFC Drawings) Part 1 at 88.
71 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 4.
72 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 5.
73 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 5.
74 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 6.
75 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 14.
76 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 22.
77 Exhibit VGS-AG-029 (IFC Drawings) Part 2 at 28.
78 Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 31.

28. Q. What did VGS's compaction specifications require?

A. As discussed by the hearing officer in the Liability Order, the specifications contemplated compaction to 95% of maximum dry density for trenches dug under pavement and roadways and compaction to 90% of maximum dry density for all other trenches.[79] It is not that the ANGP was not compacted. The evidence in the Investigation demonstrated that construction crews compacted the trench well and there was no indication that soil settlement or other related issues have occurred on the ANGP.[80] The problem was that VGS did not document compaction testing as contemplated by the specifications. As a result, VGS could not prove its compliance with the compaction specifications.

29. Q. What criteria under Section 248 did the Commission determine were relevant to its substantial change finding regarding compaction?

A. The Commission, citing Mr. Byrd's discussion of the 15 road crossings identified above, found that the compaction violation had a "potential impact on public health and safety." As discussed in more detail below, however, a third-party engineer reviewed these road crossings at the recommendation of Mr. Byrd and there were no serious impacts relating to the pipeline installation in these locations.

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79 Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 32.

80 Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 7-8 ("compaction on the ANGP was performed largely by mechanical means using an excavator bucket. The excavators used on the ANGP were large machines capable of significant compaction. We know the ANGP was adequately compacted because, again, we have continually conducted inspections of the entire ANGP and have identified no locations of concern, such as natural settling of the pipeline trench or unexpected erosion along the pipeline.").

SUBSTANTIAL CHANGE #5: RESPONSIBLE CHARGE ENGINEER

30. Q. Please describe the relevant location relating to the Commission's finding that it was a substantial change to not have a Vermont-licensed engineer serve as the responsible charge engineer on the Project.

A. This substantial change was not related to a specific location. As discussed below, this change stemmed from review of the role of VGS's engineers, their development of comprehensive specifications and IFC drawings, and their role on the Project during construction.

31. Q. Please explain the construction issue that relates to the Commission's determination that VGS's failure to "ensure that staffing for the Project included a licensed professional engineer that served as the responsible charge engineer for the Project" was a substantial change.

A. This issue relates to allegations made by the Intervenors in the Investigation claiming that VGS's Issued for Construction drawings were not developed by Vermont-licensed engineers. This allegation was false. As discussed by VGS witness John St. Hilaire, "VGS contracted for engineering services with Clough Harbor Associates Consulting ("CHA") in 2012 and CHA remained the Engineer of Record throughout the entire course of ANGP construction. CHA is a highly competent full-service engineering and consulting firm and they provided continuous consultation and engineering services on the ANGP. The ANGP pipeline was constructed in accordance with CHA's sound engineering practices, design and final plans."[81]

[81] Exhibit VGS-AG-081 (2020-07-10 Direct Testimony of John St. Hilaire) at 6.

In the Investigation, the Commission reviewed whether the "Issued for Construction" plans were signed and sealed by a Vermont-licensed engineer. VGS conceded that the "plans that were provided to VGS for construction were stamped 'Issued for Construction' and the seal of the responsible engineer was not affixed to the plans prior to construction."[82] VGS's contract with CHA, however, required CHA to perform all its work in compliance with "all applicable laws, statutes, ordinances, rules, regulations and orders enacted by or promulgated by federal, state, municipal or other governmental authority," and when VGS raised this issue with CHA, they promptly provided signed and sealed plans and affirmed that all of the plans used in construction were developed under the supervision of Vermont-licensed engineers.

32. Q. Was there any evidence in the Investigation that CHA's engineering work on the ANGP was not adequate?

A. No. Mr. Byrd conducted an extensive review of the engineering work on the Project—including the plans, quality assurance program, independent third-party inspections, and other technical engineering and construction matters and concluded:

> [The pipeline] was thoroughly and competently designed and engineered using modern equipment and technology, and comprehensively inspected during construction by multiple parties. With a few noted exceptions, it was constructed in compliance with applicable rules and commitments, and in many important respects it significantly exceeds the typical requirements. . . . Ongoing inspections and maintenance as well as periodic integrity management assessments and evaluations should identify and resolve any pipeline safety issues that arise in the future and provide assurance of continued safety.[83]

Mr. Byrd also concluded:

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82 Exhibit VGS-AG-081 (2020-07-10 Direct Testimony of John St. Hilaire) at 16.
83 Exhibit VGS-AG-009 (Byrd Report) at 72.

> While the letter of the professional engineering requirements in the State of Vermont was arguably not met in this instance, the spirit clearly was. I have seen no evidence that the engineering or design work for the ANGP was deficient, was not performed by competent engineers, or posed a risk to "public health, safety, and welfare.". The specifications also provided a comprehensive and technically sound basis for quality assurance during the project.[84]

33. Q. What criteria under Section 248 did the Commission determine were relevant to its substantial change finding regarding Vermont-licensed engineers?

A. The Commission did not conclude that the engineering work performed by CHA had the potential for any significant impacts. The substantial change was based on the hearing officer's conclusion that CHA was not part of the organizational oversight of the Project during construction and that that had the potential to contribute to the other substantial changes, such as the installation of the pipeline in the swamp. Accordingly, the relevant Section 248 criteria are the same criteria discussed above with respect to the other four substantial changes.

SECTION II: SECTION 248 CRITERIA

SECTION 248(B)(1): ORDERLY DEVELOPMENT OF THE REGION

34. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not unduly interfere with the orderly development of the region?

A. No. The substantial changes in this case are limited to (1) installation methods in the Clay Plains Swamp, (2) depth of cover in the Clay Plains Swamp, (3) specifications

[84] Exhibit VGS-AG-009 (Byrd Report) at 64.

regarding trench bottom and trench breaker installation, (4) compaction specifications, and (5) engineering. The Commission's conclusion that the pipeline would not unduly interfere with the orderly development of the region was based on VGS's MOUs with a variety of towns and the Addison County Regional Planning Commission; the fact that the pipeline would largely be located underground; and the fact that a large portion of the pipeline would be located in existing public use rights-of-way, like the VELCO ROW.

The substantial changes do not impact VGS's compliance with a variety of municipal MOUs or change the pipeline's general routes and installation in existing public use rights of way. As discussed in more detail below, the pipeline was safely and adequately installed and none of the changes had any impact on public safety, pipeline integrity, or the environment. Accordingly, there are no relevant impacts on the Commission's conclusions regarding orderly development of the region.

SECTION 248(B)(2); NEED FOR PRESENT AND FUTURE DEMAND FOR SERVICE

35. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project is required to meet the need for present and future demand for service?

A. No. The Commission's conclusion that the Project is needed to meet the present and future demand for service is not impacted in any way by the substantial changes in this case. In Docket No. 7970, the Commission approved the Project under this criterion because there was a "need" for the Project based on demand for natural gas in Addison County. The Commission also concluded that "demand cannot realistically be met by efficiency or demand-side

management measures to reduce the demand for natural gas to a level that would make the Project unwise or meet all of the customer demand."[85] The Commission further concluded that, **"**The projected availability, greater efficiency, and lower cost of natural gas lead to the conclusion that there is a demand for natural gas service that cannot be met by energy efficiency."[86] The substantial changes in this case have no relevant impact on either demand or energy efficiency.

The Commission also noted that the Project would have the added benefit of enabling VGS to provide energy efficiency services in Addison County, it would displace other fossil fuels and lower emissions, expand potential farm methane opportunities, and is consistent with the 2011 Comprehensive Energy Plan. The substantial changes in this case have no relevant impact on the energy efficiency services VGS provides, the extent to which natural gas service can displace other fuels, or the extent to which the pipeline lowers emissions or is consistent with energy policy.

85 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 75.
86 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 76.

36. Q. In the Investigation, however, the hearing officer concluded that the depth of cover "may limit the ability of VELCO to build a second transmission line in its right-of-way" and therefore has a potential impact under Section 248(b)(2)(meeting future electrical transmission needs) and Section 248(b)(3)(the stability and reliability of the electric transmission system). Why are the proposed CPG amendments and substantial changes in this case consistent with these criteria in light of this finding?

A. In the Liability Order, the hearing officer did initially conclude there were potential impacts under Section 248(b)(2) and (b)(3), but that was based on the hearing officer's initial conclusion that the pipeline was not installed in accordance with the surface loading standard and could therefore limit VELCO's use of the right of way. After the issuance of this finding, however, the Commission directed the hearing officer to take more evidence on this issue and VELCO testified that ANGP would not limit VELCO's future use of the VELCO ROW: "The Project does not limit VELCO's future use of the ROWs. With specificity to the K43 ROW where the pipeline was installed at depths less than 4 feet, the pipeline was installed along the western edge of the ROW in order to preserve VELCO's ability to build, if necessary, additional infrastructure on the opposite, eastern side of the ROW."[87] Based on this evidence, the substantial changes in the Clay Plains Swamp will not limit VELCO's use of the right of way and have no impact under Section 248(b)(2) and Section 248(b)(3).

Additionally, the hearing officer's conclusion that these were "potential impacts" at the time the Liability Order issued was also corrected in his Proposal for Decision. In the Liability Order, the hearing officer concluded that, "Unfortunately, VELCO relied on an engineering

[87] Exhibit VGS-AG-112 (2021-07-23 Prefiled Direct Testimony of Brian Connaughton) at 9.

study that concluded that the loading standard would be achieved using HDD, not the sink-in-the-swamp burial method. By relying on this incorrect study, VELCO inadvertently accepted limits on the future use of its right-of-way."[88] After taking further evidence, however, the hearing officer amended the findings from the Liability Order, concluded that the loading standard had been met in the Clay Plains Swamp, and concluded that the above conclusion from the Liability Order regarding VELCO's future use of the ROW was "not accurate and should not be considered by the Commission."[89]

SECTION 248(B)(3): SYSTEM STABILITY AND RELIABILITY

37. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not adversely affect system stability and reliability?

A. No. The conclusion that the Project would not have an adverse impact on system stability and reliability was based on the Commission's findings that the Project would increase the reliability of the existing system through looping the system through Williston, providing capacity needed to all VGS customers on the system; reduce the demand on the existing 10-inch line between Colchester and Burlington; enable back feeding into the Burlington system; and increase the strength and reliability of the whole Burlington area while also providing capacity to Addison County. The substantial changes in this case have no relevant impact on these findings or the stability or reliability of the system.

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88 Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 30.
89 Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 30.

As discussed above under my discussion of Section 248(b)(2), although the hearing officer's initial Liability Order found that installation of the pipeline in the Clay Plains Swamp had potential impacts on VELCO's future use of the VELCO ROW, the hearing officer subsequently concluded that finding was wrong and the Commission should not consider it.[90] The pipeline meets the loading standard, and as the hearing officer and Commission found in the Investigation, it will not have any impact on VELCO's future use of the VELCO ROW or any impact on the stability and reliability of the electrical transmission system.

SECTION 248(B)(4): ECONOMIC BENEFIT

38. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would result in economic benefit to the State and its residents?

A. No. The Commission's approval of the Project in Docket No. 7970 under this criterion was based on findings that the Project would have economic benefits, including tangible benefits to households and businesses in Addison County, primarily as a result of access to lower cost thermal energy. The Commission also relied on economic analysis from VGS and the Department, which included information about greenhouse gas emission reduction. Future natural gas prices were also related to the Commission's assessment. None of the substantial changes in this case has any relevant impact on these economic benefit assumptions.

Additionally, although the hearing officer initially found there were potential impacts on economic benefits relating to the installation in the Clay Plains Swamp, that conclusion was also

[90] Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 30.

based on potential limitations on the future use of the VELCO right of way. For the reasons discussed above, that finding was later corrected in the Proposal for Decision, where the hearing officer concluded the pipeline was adequately installed and is safe. There are no impacts on VELCO's use of the right of way in the Clay Plains Swamp or any related economic impacts.

SECTION 248(B)(5): PUBLIC HEALTH AND SAFETY

39. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not have any undue adverse effect on aesthetics, historic sites, air and water purity, the natural environment, use of natural resources, or public health and safety, with due consideration given to the criteria specified in 10 V.S.A. § 1424a(d) and § 6086(a)(1) through 8 and 9(K), impacts to primary agricultural soils and greenhouse gas impacts?

A. The five substantial changes are relevant to Section 248(b)(5) because the Commission determined in the Investigation that the five substantial changes had the potential for a significant impact on public health and safety and the environment-related criteria of Section 248. As discussed in more detail below, however, while Section 248(b)(5) is relevant to the substantial changes because the Commission found there was a potential for significant impacts in the Investigation, none of the changes resulted in any actual impacts on public health and safety or the environment-related criteria of Section 248.

Public Health and Safety [30 V.S.A. § 248(b)(5)]

40. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not have an undue adverse impact on public health and safety?

A. Yes, several of the changes are relevant to public health and safety but none of the changes had an undue adverse impact on public health and safety because the evidence shows that the pipeline was adequately installed and safe, as discussed in more detail below.

41. Q. Which substantial changes are relevant to public health and safety?

A. Based on the Commission's findings in the Investigation, all five substantial changes are relevant to public health and safety.

42. Q. Please explain why Substantial Change #1 regarding installation methods in the Clay Plains Swamp is relevant to public safety.

A. The installation method in the Clay Plains Swamp is not directly relevant to public safety, but the Commission found that this change contributed to VGS's failure to achieve four feet of cover in the Clay Plains Swamp, so it is indirectly relevant. For reasons discussed below, however, the depth of cover in the Clay Plains Swamp has no undue adverse impact on public safety. So to the extent the installation method contributed to the depth of cover, it also had no impact on public safety.

43. Q. Please explain why Substantial Change #2 regarding the depth of cover is relevant to public safety.

A. Based on the Commission's findings in the Investigation, the depth of cover in the Clay Plains Swamp had potential impacts on public safety. This conclusion related to whether the pipeline was installed consistent with VGS's agreement with VELCO to bury the pipeline with four feet of cover and meet a surface loading standard of HS-20+15%. As discussed by Mr. Byrd and in associated attachments to the Byrd Report, this is relevant to public safety because the surface-loading standard relates to maintaining pipeline integrity under conditions where there is a surface load crossing the pipeline.

44. Q. Does the depth of cover in the Clay Plains Swamp as constructed result in an undue adverse impact on public safety?

A. No. The depth of cover in the Clay Plains Swamp has no impact at all on public safety. The pipeline meets the conservative surface loading standard required in the VELCO MOU, which is primarily intended to ensure that, "Pipeline route segments under VELCO's access routes and roads and inside the transmission line ROW" are "installed at a depth and manner that will not preclude VELCO's movement of heavy construction equipment over the pipeline (e.g., HS-20 crush loading integrity)."[91] While this requirement applies throughout the VELCO ROW, access routes and roads in the VELCO ROW are the locations where that standard is most relevant because those locations are where heavy equipment actually does cross

[91] Exhibit VGS-AG-115 (Exhibit VELCO-BC-2) at 5.

the pipeline route. These locations were installed with four feet of cover and tested for compaction, as discussed in Mr. Byrd's Report.[92]

Additionally, as discussed by Mr. Byrd, the pipeline was conservatively designed and constructed with steel that is nearly twice as strong as normal, with a thickness twice that required by most pipeline safety design codes and will operate at pressures no more than 50% of the theoretical maximum.[93] As discussed below, these design specifications ensure the pipeline meets the loading standard.

To corroborate this conclusion, VGS retained Mott MacDonald during the Investigation—both to review the initial 2016 loading calculations and to employ their expertise to assess whether the ANGP meets the loading standard under a variety of potential conditions. Mott's verification calculations and sensitivity analyses demonstrate that the pipeline meets the HS-20+15% loading standard with as little as two feet of cover even when assuming low soil strength properties that represent weak soils or an absence of soil compaction.[94]

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[92] Exhibit VGS-AG-009 (Byrd Report) at 66 ("The test results given in Attachment A#50 are for 4 different locations where ANGP is in or crosses a VELCO ROW. Aerial images of all 4 crossings are included in Attachment A#10. Each of these locations shows well-established vehicle traffic patterns along the VELCO ROW, indicating that these locations were treated differently than 'normal' VELCO ROW. In all the other areas VGS did not 'Test the compaction of backfill over the pipeline.'"); see also Exhibit VGS-AG-059 (Byrd Report, Attachment #50 (Compaction Testing Results and email of 5-24-2016)) (showing compaction testing results provided to VELCO for access points); Exhibit VGS-AG-019 (Byrd Report, Attachment #10 (Selected Images)) (showing aerial images of the access points).

[93] Exhibit VGS-AG-009 (Byrd Report) at 16 ("ANGP was constructed with steel that is about twice as strong as normal, with a thickness twice that which causes concern in most design codes, with twice as many supports during construction and backfilling as might have been necessary, and will operate at pressures no more than 50% of the theoretical maximum.")

[94] Exhibit VGS-AG-102 (Exhibit VGS-CC-2) at 1 ("[W]e have performed a variety of sensitivity analyses using different methods (provided in Attachment B) for calculating the loading on the ANGP. These analyses, as well as our prior calculations, demonstrate that the ANGP meets the HS-20+15% loading standard with as little as 2 feet of cover even when assuming low soil strength properties that represent weak soils and/or an absence of soil compaction. In our professional judgment, after analyzing the loading calculations based on a variety of sensitivity assessments, the ANGP meets the HS-20+15% loading standard in areas where it is buried at least two feet."); Exhibit VGS-AG-109 (2021-07-23 Prefiled Direct Testimony of Kevin Bodenhamer) at 6 ("A depth of soil cover of 4' is not necessary for the pipe to support a HS-20+15% loading, as confirmed in the above-referenced documents

It is also helpful to understand that even Mott's sensitivity analysis relies on surface loading calculations that are extremely conservative. For example, as discussed by Mott's witness, Carlos Chaves, the HS-20+15% loading standard evaluates whether the pipeline can withstand the stresses imposed by a vehicle with a 18,400-pound wheel load, which represents a fully loaded 18-wheeler plus a margin of 15%.[95] The API calculation tools run by Mott in 2016 show that a HS-20+15% load of 18,400 is just barely under the "allowable" effective stress and passes the API calculation tool.[96] Mott's subsequent calculations in 2021 were also layered with conservative assumptions.[97] By comparison, as discussed by Mr. Byrd, a more simplified surface loading method that is also considered "very conservative" shows that the maximum axle load on the ANGP with the same amount of cover is 145,000 pounds—nearly eight times as heavy as the HS-20+15% standard.[98] In other words, the API calculations use extremely conservative assumptions to verify what is itself a conservative standard, the HS-20+15%. This is why Mr. Byrd concluded the pipeline meets that standard under any anticipated scenarios, explaining:

> [T]he HS20+15% loading criteria in the CHA bedding and backfill specification was excessively conservative for a pipeline ROW (i.e. not under a road or other load bearing area) – but it doesn't matter because ANGP can meet that loading standard at any reasonable burial depth or level of compaction. Per the CEPA surface loading report in Attachment A#49, ANGP would easily pass the "very conservative" screening analysis and require no further analysis, while greatly exceeding HS20+15% standards - regardless of soil compaction. Surface loading under any anticipated scenarios isn't a concern for ANGP.

utilizing API RP 1102 calculations for this pipeline as installed. As discussed previously, a soil cover anywhere in the range of 2' to 4' is sufficient for this pipeline as installed. In addition, the depth of cover required for this pipeline by PHMSA and Vermont Public Utility Commission regulations is 36 inches.").

95 Exhibit VGS-AG-103 (2021-11-01 Rebuttal Testimony of Carlos J. Chaves) at 3.

96 See, e.g., Exhibit VGS-AG-102 (Exhibit VGS-CC-2) at 8.

97 Exhibit VGS-AG-103 (2021-11-01 Rebuttal Testimony of Carlos J. Chaves).

98 Exhibit VGS-AG-009 (Byrd Report) at 42-43.

The pipeline experts who assessed this issue in the Investigation all concluded that surface loading on the ANGP poses no risk to the integrity of the ANGP. Because the pipeline meets this excessively conservative safety standard in the Clay Plains Swamp, this substantial change does not result in any undue impact on public safety.

In addition to confirming the pipeline meets the loading standard, VGS has also implemented recommendations that "provide additional assurance of safety in the future",[99] including Mr. Byrd's recommendation to install large warning signs at each end of the ROW in the Clay Plains Swamp directing people to contact VGS before moving heavy equipment into this area and VELCO's recommendation to install more pipeline markers in the Clay Plains Swamp. As I discuss below, these are proposed conditions that accompany VGS's proposed CPG amendments in this case.

45. Q. Please explain why Substantial Change #3 regarding installation of the pipeline on the trench bottom and installation of trench breakers is relevant to public safety under Section 248(b)(5).

A. Based on the Commission's findings in the Investigation, the compliance with specifications regarding trench bottom and trench breaker installation is relevant under Section 248(b)(5) because the Commission concluded that it had the potential for significant impacts related to public safety.

[99] Exhibit VGS-AG-009 (Byrd Report) at 73.

46. Q. Did VGS's installation of the pipeline on the trench bottom have an undue adverse impact on public safety?

A. No. The installation of the pipeline on the trench bottom had no impact at all on public safety because the evidence in the Investigation demonstrated there was no impact on pipeline integrity. As discussed above, the Department raised concerns about the installation of the pipeline on the trench bottom in its NOPV filed in Case No. 18-0395-PET. The safety concern was related to whether installation on the trench bottom could have an increased susceptibility to corrosion due to differing soil conditions above and below the pipe, and unknown materials in the soil below the pipe that could damage the pipeline coating. Both concerns were assessed by Mr. Byrd in his report.

With respect to susceptibility to corrosion, Mr. Byrd explained that the Department's concerns were based on a white paper that VGS and the Department discussed during the construction process,[100] which contemplated potential corrosion issues that could occur "when a pipeline is directly placed on 'oxygen-starved compacted clay soil' when surrounded by 'oxygen rich sand backfill.'"[101] Mr. Byrd addressed this issue by explaining that, "Differential oxygen corrosion between 2 different soil types for a buried pipeline isn't impossible but is highly unlikely," and further, "[e]ven if this phenomenon were a threat for a buried pipeline … [t]here are no locations where the pipe was BOTH installed directly on the trench bottom AND backfilled on 3 sides with clean sand or non-native backfill."[102] This is why Mr. Byrd concluded this installation had no impact on pipeline safety:

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[100] Exhibit VGS-AG-075 (Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)) at 220-229.
[101] Exhibit VGS-AG-009 (Byrd Report) at 39.
[102] Exhibit VGS-AG-009 (Byrd Report) at 65-66 (emphases in original).

> The only areas where ANGP was installed directly on the trench bottom were also areas that used native backfill – which eliminates the potential for this problem. The potentially corrosive situation described in Bushman's paper simply doesn't exist on ANGP. Even if it did, the coating and cathodic protection for ANGP is in excellent condition and should be more than adequate to address this relatively weak corrosion process.[103]

There were also no impacts to pipeline safety in connection with concerns about native materials that could damage the pipeline coating. As discussed above, the areas where the pipeline was installed directly on the trench bottom included locations where the native soils were consistent with select sand backfill and the wetland muck in the Clay Plains Swamp. The pipeline was also coated in concrete in the Clay Plains Swamp, which provides an added layer of protection from coating damage.[104] Additionally, we know there have been no impacts to the condition of the pipeline's coating because, as discussed by Mr. Byrd, the condition of the coating has been tested and is in excellent condition:

> The fact that the cathodic protection system requires less than 10% of its design current, and less than 2% of its capacity, is clear evidence that the coating of ANGP is in excellent condition. ANGP was and is properly coated, as evidenced by subsequent inspections and the minimal amount of cathodic protection current required to meet acceptable cp levels.[105]

In summary, there are no impacts on pipeline safety relating to installation of the pipeline on the trench bottom because there are no locations on the ANGP where the pipeline was installed directly on the trench bottom and backfilled with non-native backfill, there were no impacts relating to initial concerns about differential oxygen corrosion, and the pipeline coating is in excellent condition.

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[103] Exhibit VGS-AG-009 (Byrd Report) at 66.
[104] Exhibit VGS-AG-075 (Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)) at 10.
[105] Exhibit VGS-AG-009 (Byrd Report) at 71.

47. Q. Did VGS's installation of trench breakers have an undue adverse impact on public safety?

A. No. The Department's NOPV identified concerns about installation and documentation of trench breakers during the 2014 construction season. These concerns related to installation of sand trench breakers. I discuss the installation of bentonite trench breakers at wetlands below under the wetland criteria, 10 V.S.A. § 6068(a)(1)(G). The Department's NOPV discussed how sand trench breakers "are used to 'break' the flow of groundwater along the buried pipeline to reduce soil erosion around the pipe," and expressed concern "that this installation may have an increased susceptibility to soil erosion around the pipe, which may affect the integrity of the pipe."[106]

Mr. Byrd reviewed the Department's concerns about sand trench breakers and explained the purpose of these trench breakers in the following terms:

> Sandbag trench breakers are to prevent erosion of the trench during construction, isolate trench segments during construction, and physically stabilize the trench during construction. The drawings refer to these as "Permanent Trench Break" (and they are in fact permanent, since they are never removed), but their presence after construction is of little importance. They neither impede nor facilitate the flow of water along the trench and do not provide long term stability to the trench (although they do provide some physical stability for a while – at least until the sandbags degrade).[107]

We know there are no impacts from trench breaker installation because construction from the 2014 construction season has been complete for over ten years. Pipeline integrity has not been impacted and trench breakers were installed in 2014 based on the discretion of field personnel.[108]

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106 Exhibit VGS-AG-074 (Byrd Report, Attachment #65 (Bedding / TB NOPV of 2-13-2018)) at 4.
107 Exhibit VGS-AG-009 (Byrd Report) at 47 (emphases in original).
108 Exhibit VGS-AG-075 (Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)) at 12.

Following the 2014 construction season when this was an issue, VGS issued a Corrective Action Report, stating "This line segment was monitored throughout 2016 through aerial patrols and the 2016 walking survey. No areas of concern were observed. VGS continues to monitor this segment of the 12-inch transmission line as part of its overall transmission line patrols."[109] The lack of any impact was also confirmed by Mr. Byrd, who noted that he saw no water migration along the subsurface of the pipeline during his onsite investigations.[110]

48. Q. Please explain why Substantial Change #4 regarding compliance with compaction specifications is relevant to public safety under Section 248(b)(5).

A. Based on the Commission's findings in the Investigation, compliance with specifications regarding compaction had potential impacts at public road crossings where the pipeline was installed using open cut trenching rather than directional drilling or boring.[111] Notably, the Commission found that compliance with compaction specification was not a pipeline integrity concern.[112]\

[109] Exhibit VGS-AG-075 (Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)) at 12-13.
[110] Exhibit VGS-AG-009 (Byrd Report) at 67.
[111] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 33.
[112] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 32 ("However, while backfill compaction is required by Federal Minimum Pipeline Safety Standards, there is no section of those regulations that mentions how to ensure compaction around transmission pipelines. Mr. Byrd opines that this is because the settling of backfill materials due to sub-optimal compaction does not pose a threat to high-strength welded-steel pipelines. Lack of compaction poses no danger to the pipeline itself. The steel and welded joints have more than adequate strength to resist earth settlement.").

49. Q. Did VGS's failure to ensure the pipeline met compaction specifications through compaction testing have an undue adverse impact on public safety?

A. No. As discussed above, compaction was performed along the ANGP largely by mechanical means using an excavator bucket. The excavators used on the ANGP were large machines capable of significant compaction. The evidence in the Investigation also demonstrated that compaction along the ANGP had been verified by field inspections of the entire ANGP showing no locations of concern, such as natural settling of the pipeline trench or unexpected erosion along the pipeline.[113] The potential impacts regarding compliance with compaction specifications were related to the absence of compaction testing that documented the compaction of the pipeline during construction, particularly at open cut roads where an absence of compaction could impact road integrity.

After Mr. Byrd's report issued, and consistent with his recommendation, VGS hired a third-party engineer to conduct an independent review of road crossings for any signs of erosion, compaction, or other issues caused by the pipeline construction. That assessment demonstrated that 14 of the 15 locations showed no signs of compromised roadbed performance, erosion, or settlement above the pipeline at all.[114] At one location the review found a "small depression" that was not actionable beyond further monitoring.[115] As part of the CPG amendment and conditions relating to this issue, VGS will conduct a similar review after each winter season to determine if any frost heave at these locations require any repair.[116]

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113 Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 7-8.
114 Exhibit VGS-AG-093 (Exhibit VGS-JSH-10).
115 Exhibit VGS-AG-093 (Exhibit VGS-JSH-10) at 6-7.
116 Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 5; Exhibit VGS-AG-093 (Exhibit VGS-JSH-10) at 7; Exhibit VGS-AG-009 (Byrd Report) at 67 (explaining that compaction has no impact on pipeline integrity); *id.* at 73-74 (recommending review of compaction at 15 road crossings).

50. Q. Please explain why Substantial Change #5 regarding professional engineering is relevant to public safety under Section 248(b)(5).

A. The Commission's findings in the Investigation did not identify any specific Section 248 criteria in connection with this substantial change, however, the Commission did adopt the hearing officer's conclusion that failure to staff the Project with a Vermont-licensed responsible charge engineer "may have contributed to the engineering deviation in the swamp discussed above," and had the potential to impact the criteria that are relevant to other violations.[117]

51. Q. Did this change have any impact on public safety?

A. No. As discussed in the Investigation, in 2012, VGS contracted for engineering services with CHA, a full-service engineering and consulting firm that provided continuous consultation and engineering services for the Project.[118] Mr. Byrd reviewed the engineering on the Project and concluded:

> [The pipeline] was thoroughly and competently designed and engineered using modern equipment and technology, and comprehensively inspected during construction by multiple parties. With a few noted exceptions, it was constructed in compliance with applicable rules and commitments, and in many important respects it exceeds the typical requirements. … Ongoing inspections and maintenance as well as periodic integrity management assessments and evaluations should identify and resolve any pipeline safety issues that arise in the future and provide assurance of continued safety.[119]

The design and engineering on the Project had no impact on public safety. To the extent that engineering for the Project related to the installation deviations in the Clay Plains Swamp and

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117 Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 38.
118 Exhibit VGS-AG-081 (2020-07-10 Direct Testimony of John St. Hilaire) at 6.
119 Exhibit VGS-AG-009 (Byrd Report) at 72.

other changes discussed above, there was no impact on public safety because, as discussed above, none of those changes had an impact on pipeline integrity or public safety. Initial concerns raised by Intervenors about CHA's failure to sign and seal the IFC drawings were addressed by CHA, who affirmed that all engineering was performed by Vermont-licensed engineers. CHA also produced stamped plans without any change to the IFC drawings and the quality of that engineering work was confirmed throughout the Investigation.

Outstanding Resource Waters [10 V.S.A. § 1424(a)(d); 30 V.S.A. § 248(b)(8)]

52. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. As the Commission found in Docket No. 7970, "There are no waters in the immediate Project vicinity that have been designated as outstanding resource waters."[120]

Air and Water Pollution and Greenhouse Gas Impacts [30 V.S.A. § 248(b)(5); 10 V.S.A. § 6086 (a)(1)]

53. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that there would be no undue impacts on air and water pollution given compliance with certain conditions about the hours of

[120] Exhibit VGS-AG-014 (PUC Final Order of CPG for ANGP) at 93.

construction, noise associated with horizontal drilling, blasting, and equipment at gate stations.[121] None of the substantial changes in this case has any relevant impact on these issues.

54. Q. Section 248(b)(5) requires the Commission to give due consideration to the greenhouse gas impacts of the Project. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would result in a net reduction in greenhouse gas emissions?

A. No. None of the substantial changes in this case has any relevant impact on the greenhouse gas impacts of the Project. The ANGP has been serving customers since 2017, and none of the changes have had any relevant impact on VGS's compliance with enhanced energy efficiency requirements imposed by the Commission in Docket No. 7970.

Headwaters [10 V.S.A. § 6086(a)(1)(A)]

55. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding regarding the limited drainage areas of the Project and the Project's design and adherence to Department of Environmental Conservation ("DEC") rules and the 2011 Vermont Water Quality Standards.[122] None of the

[121] Exhibit VGS-AG-014 (PUC Final Order of CPG for ANGP) at 94-95.
[122] Exhibit VGS-AG-014 (PUC Final Order of CPG for ANGP) at 103.

substantial changes in this case has any relevant impact on the Project's compliance with these requirements.

Waste Disposal [10 V.S.A. § 6086(a)(1)(B)]

56. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that the Project would meet applicable health and environmental conservation department regulations regarding the disposal of waste involving the injection of waste materials into groundwater or wells.[123] The Commission's findings were based on the minimization of new impervious surface, protection of drainage patterns, restoration of the surface to pre-construction contours, and compliance with stormwater discharge permits, among other related recommendations. None of the substantial changes in this case has any relevant impact on these findings.

[123] Exhibit VGS-AG-014 (PUC Final Order of CPG for ANGP) at 103-104.

Water Conservation [10 V.S.A. § 6086(a)(1)(C)]

57. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an adverse impact under this criterion was based on the Commission's finding that the Project would involve temporary and limited use of water that would not unreasonably burden existing water supply.[124] None of the substantial changes in this case has any relevant impact on these findings.

Floodways [10 V.S.A. § 6086(a)(1)(D)]

58. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that the Project would not involve permanent alterations to waterways, flood elevations, or the ability of the land to hold water or permanently restrict or divert the flow of flood waters, or endanger the health, safety, and welfare of the public or of riparian owners during flooding.[125] None of the substantial changes in this case has any relevant impact on these findings.

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124 Exhibit VGS-AG-014 (PUC Final Order of CPG for ANGP) at 105-106.
125 Exhibit VGS-AG-014 (PUC Final Order of CPG for ANGP) at 106-108.

Streams [10 V.S.A. § 6086(a)(1)(E)]

59. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that the Project would maintain the natural condition of involved streams, avoid temporary impacts on streams where feasible, and minimize impacts to these resources.[126] None of the substantial changes in this case have any relevant impact on these findings.

Shorelines [10 V.S.A. § 6086(a)(1)(F)]

60. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that there would be no undue adverse impact to shorelines, identifying four shorelines that would be impacted by construction: the Winooski River, LaPlatte River, Lewis Creek, and New Haven River.[127] None of the substantial changes in this case are located near these shorelines or has any relevant impact on the shorelines.

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126 Exhibit VGS-AG-014 ((PUC Final Order of CPG for ANGP)) at 108-111.
127 Exhibit VGS-AG-014 ((PUC Final Order of CPG for ANGP)) at 111-112.

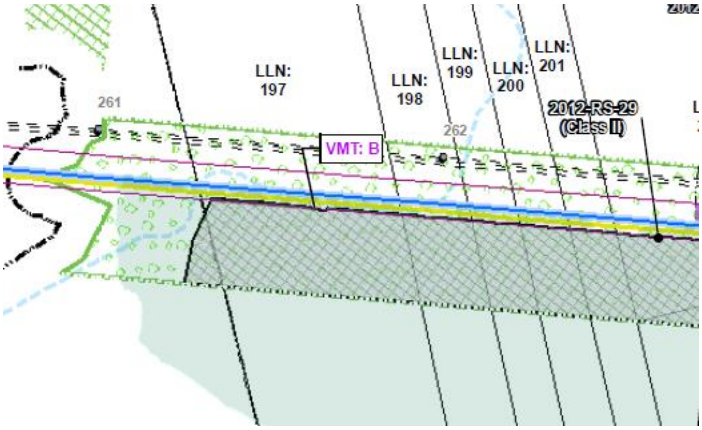
Wetlands [10 V.S.A. § 6086(a)(1)(G)]

61. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

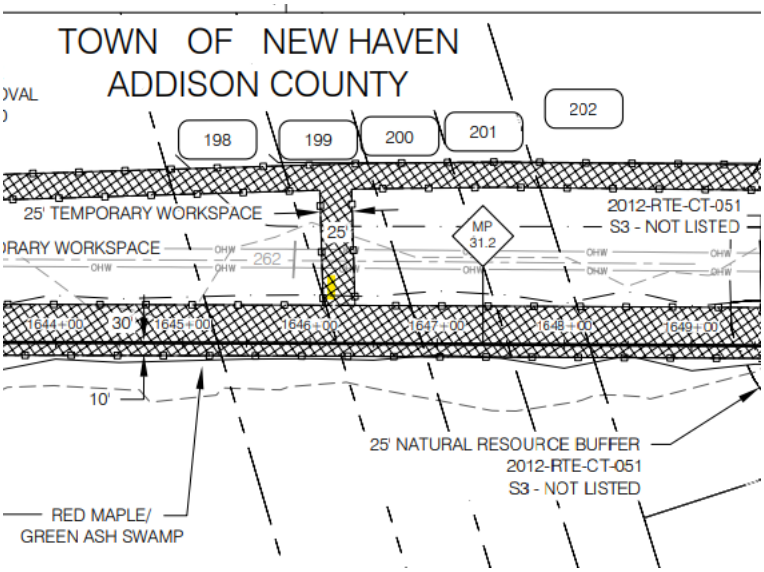
A. Yes, Substantial Change #1 and #2 regarding the installation in the Clay Plains Swamp are relevant to this criterion because the Clay Plains Swamp is a wetland. Similarly, Substantial Change #3 regarding the installation of trench breakers is relevant because bentonite trench breakers were designed to be installed to protect wetlands and wetland buffer areas from Project impacts.

62. Q. Did Substantial Change #1 and #2 regarding installation of the pipeline in the Clay Plains Swamp have an undue adverse impact on the wetlands in the Clay Plains Swamp?

A. No. The area designated as the Red Maple/Green Ash Swamp is technically delineated just outside of the cleared VELCO ROW to the west of the area where VGS was engaged in construction in what is referred to as the Clay Plains Swamp. The following excerpt from VHB's special areas assessment from Docket No. 7970 shows the northern end of the Clay Plains Swamp and associated delineations:



The designated vegetation natural community is demarcated with black cross-hatches. In this location, VGS's construction areas were reduced to limit impacts on the natural resources in this area as depicted in the following excerpt from the IFC drawings:



Construction in pipeline corridors was limited to the 30' wide areas shown in black cross-hatching in this image, in which you can also see the end of the Red Maple/Green Ash Swamp delineated to the west (bottom) of the pipeline. The instances where depth of cover was less than four feet in the Clay Plains Swamp had no impact on the wetland.

Similarly, the burial methods used in the Clay Plains Swamp did not result in any actual impacts on natural resources. The Agency of Natural Resources reviewed VGS's construction in the Clay Plains Swamp and concluded that "[T]he pipeline burial [in the swamp] does not change the disturbance footprint and does not raise any significant concern with regard to impacts to the natural environment. In addition, the described work does not require any [ANR] permits."[128] Additionally, VGS's environmental consultant on the Project, VHB, conducted a post-construction review of whether the pipeline, including this area, had been returned to "pre-construction conditions" as required by the CPG, concluding that:

> [T]he Project corridor, including those areas where supplemental re-contouring was completed, has been restored to pre-construction conditions, consistent with the representations [in Docket No. 7970]. In these areas, the Project corridor landscape blends well with the surrounding topography and the existing drainage patterns and other uses have been restored or maintained. There are no mounds or berms over the pipe that would impede surface water flow, no indication of soil erosion due to Project construction and appropriate preconstruction cover conditions have been restored.[129]

To the extent that there were any "soil horizons" in this case, crews may have had a hard time keeping them segregated based on challenging construction conditions, but efforts were made to segregate soils as depicted on the following EPSC report photograph:

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128 Exhibit VGS-AG-118 (2017-06-19 Letter from Donald J. Einhorn, Esq. to PUC Clerk).
129 Exhibit VGS-AG-097 (Exhibit VGS-JAN-3) at 3.

Photograph 4: Station 1649+00; trenching and lowering in the pipe through Clay Plains. Topsoil and subsoil are segregated and placed on timber mats. Photograph taken looking north.

There have been no adverse impacts to this area resulting from construction of the Project. VGS conducts physical on-the-ground patrol and leak surveys of the pipeline four times per year to identify anything that looks out of place, including encroachment on the right of way, erosion along the pipeline, irregularities at road and stream crossings, and the adequacy of line of sight markers, all of which will all ensure there are no future adverse impacts on the area.[130]

63. Q. Did Substantial Change #3 regarding installation of bentonite trench breakers have an undue adverse impact on wetlands?

A. No. As discussed above, VGS's environmental consultant VHB studied ANR's initial concerns about bentonite trench breaker installation and submitted a "Condition J" memo

[130] Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 3.

to ANR detailing the basis for VHB's conclusion that a bentonite plug was installed at all Class II wetland and Class II wetland buffer locations where blasting occurred. VHB also evaluated the potential absence of trench breakers at five wetlands where installation had not been initially documented and reached the conclusion that there were no observable or significant alterations to the wetland hydrology to the extent that any Class II wetland boundaries or functions were impacted beyond what was permitted. VHB also concluded that bentonite trench breakers were installed at all stream locations as specified.[131] Accordingly, the substantial change regarding bentonite trench breakers did not result in any undue adverse impacts to wetlands.

Sufficiency of Water and Burden on Existing Water Supply [10 V.S.A. §§ 6086(a)(2)&(3)]

64. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that sufficient water exists to meet the needs of the Project and the Project will not cause an unreasonable burden on an existing water supply.[132] None of the substantial changes in this case has any relevant impact on these findings.

131 Exhibit VGS-AG-009 (Byrd Report) at 50.
132 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 117-118.

Soil Erosion [10 V.S.A. § 6086(a)(4)]

65. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that the Project would require a stormwater discharge permit, including compliance with an Erosion Prevention and Sediment Control Plan ("EPSCP").[133] The Commission found that in specifically identified areas, the construction would involve the segregation of soils such that the topsoil is placed back at the ground surface and subsoils placed beneath to avoid impacts on prime agricultural soils.[134] The Commission also found that trench breakers would be installed to limit ground water flow.[135] As discussed above, the installation of trench breakers did not have any impact on water flows or the integrity of the pipeline, and the installation of the pipeline in the Clay Plains Swamp had no undue adverse impact on natural resources in that area. None of the substantial changes in this case has any relevant impact on these findings.

133 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 118.
134 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 119-120.
135 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 120.

66. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 regarding primary agricultural soils ("PAS")?

A. No. The Commission addressed potential impacts on PAS in Docket No. 7970 and concluded that in areas of farming and PAS, the pipeline would be buried four feet deep and would be expected to cause only temporary disturbance. The area in the Clay Plains Swamp is not a farming or PAS location and so there are therefore no impacts on PAS in the Clay Plains Swamp. The other substantial changes do not involve any changes to the depth of the pipeline in PAS locations. The temporary impacts during construction that were contemplated by the Commission in Docket No. 7970 are not impacted by those substantial changes and there are no further temporary impacts because construction was completed years ago.

Transportation Systems [10 V.S.A. § 6086(a)(5)]

67. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that VGS would use horizontal directional drilling under street and railway crossings, employ standard traffic control measures where pipeline is installed with traditional open-cut methods across roadways, and that roadways would be restored if impacted by construction.[136] None of the substantial changes in this case had

[136] Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 122-123.

any relevant impact on locations that were installed using HDD or has any relevance to traffic control during construction. Similarly, the substantial change regarding compaction had no undue adverse impact on roadways where the pipeline was installed using traditional open-cut methods, as discussed above.

Educational Services [10 V.S.A. § 6086(a)(6)]

68. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that the Project would not cause an unreasonable burden on the ability of a municipality to provide educational services.[137] None of the substantial changes in this case has any relevant impact on these findings.

Municipal Services [10 V.S.A. § 6086(a)(7)]

69. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that the Project would not place an unreasonable burden on the ability of the local governments to provide municipal or

[137] Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 123.

governmental services.[138] None of the substantial changes in this case has any relevant impact on these findings.

Aesthetics [10 V.S.A. § 6086(a)(8)]

70. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that most of the Project is located underground and is not visible, and that impacts where gate stations are located above ground would be limited or mitigated.[139] None of the substantial changes in this case has any relevant impact on these findings or is related to the areas where there is above-ground infrastructure.

Historic Sites [10 V.S.A. § 6086(a)(8)]

71. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that VGS would use HDD to avoid some sites and use approved methodologies to avoid or mitigate impacts on archaeological

138 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 123-124.
139 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 124-127.

resources.[140] None of the substantial changes in this case has any relevant impact on these findings.

Rare and Irreplaceable Natural Areas [10 V.S.A. § 6086(a)(8)]

72. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. Yes, Substantial Change #1 and #2 regarding installation of the pipeline in the Clay Plains Swamp are relevant to this criterion because the Clay Plains Swamp was identified as a significant natural community in Docket No. 7970.[141] The Commission found that the Project would not result in undue adverse impacts on these areas by use of HDD in some locations, "narrowed construction corridors, invasive species monitoring/control, and special vegetation management practices."[142] As discussed under the Wetlands criteria above in Q. 60, the construction in the Clay Plains Swamp complied with these findings. There was no disturbance of the footprint, no additional ANR permits required, and no natural resource impacts. None of the other substantial changes in this case has any relevant impact on these findings and did not involve locations identified as significant natural communities.

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140 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 127-128.
141 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 129 (the Clay Plains Swamp is identified as the "Red/Silver Maple Green Ash Swamp at the Monkton-New Haven town line.").
142 Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 130.

Wildlife, Including Necessary Wildlife Habitat and Endangered Species [10 V.S.A. § 6086(a)(8)(A)]

73. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The conclusion that the Project would not have an undue adverse impact under this criterion was based on the Commission's finding that the Project would not have an undue adverse impact on any necessary wildlife habitat or any endangered species based on studies of necessary wildlife habitat, including deer wintering areas.[143] None of the substantial changes in this case has any relevant impact on these findings.

Development Affecting Public Investments [10 V.S.A. § 6086(a)(9)(K)]

74. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not result in an undue adverse impact under this criterion?

A. No. The Commission concluded in Docket No.7970 that the Project would not unnecessarily or unreasonably endanger the public or quasi-public investment in public facilities, services, or lands, or materially jeopardize or interfere with the function, efficiency, or safety of, or public's use or enjoyment of or access to the public facility, service, or lands because the Project would be a "public investment" in "gas pipelines" in Chittenden County, bring natural

[143] Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 131-132.

gas service to locations in Addison Country, and be constructed with state and local highway permits.[144] None of the substantial changes in this case has any relevant impact on these findings.

SECTION 248(B)(6): INTEGRATED RESOURCE PLANNING

75. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project is consistent with VGS's Integrated Resource Plan?

A. No. The Commission determined in Docket No. 7970 that the Project was consistent with VGS's Integrated Resource Plan based on evidence that VGS's IRP contemplated the expansion and that it was consistent with the State's comprehensive energy plan. The substantial changes in this case have no relevant impact on that conclusion.

SECTION 248(B)(8): OUTSTANDING RESOURCE WATERS

76. Q. Are any of the substantial changes relevant to or have an impact on the Commission's conclusion in Docket No. 7970 that the Project would not impact any outstanding resource waters?

A. No. The Commission found that there are no waters in the immediate Project vicinity that have been designated as outstanding resource waters, and therefore the construction and operation of the Project would not result in any undue adverse impact under this criterion.

[144] Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 132-133.

The substantial changes in this case do not change the location of the Project and therefore have no relevant impact on the Commission's findings in Docket No. 7970.

77. Q. Have you addressed all applicable Section 248 criteria in this Petition?

A. Yes. The criteria in Sections 248(b)(7), (b)(9), (b)(10), and (b)(11) are not applicable.[145]

SECTION III: PROPOSED CPG AMENDMENTS

78. Q. Please explain how you have organized this Section of your testimony.

A. This Section of my testimony proposes five amendments and associated conditions to the Docket No. 7970 CPG that account for the pipeline as constructed and address each of the substantial changes identified by the Commission in the Investigation. For each substantial change, I discuss the evidence from the Investigation that supports the conclusion that the change had no impact under the relevant Section 248 criteria and propose specific findings based on that evidence. Additionally, I discuss why the CPG amendment and associated conditions in each case will ensure there will be no undue adverse impacts from the pipeline as constructed in the future.

[145] Exhibit VGS-AG-014 (Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)) at 134-135 ((248(b)(7), (b)(9) and (b)(10) are not applicable). Section 248(b)(11) is not applicable because the Project does not produce electric energy using woody biomass.

CPG AMENDMENT #1: TRENCHING TECHNIQUES IN THE CLAY PLAINS SWAMP

79. Q. Please explain what the first proposed CPG amendment addresses.

A. The first proposed CPG amendment addresses the Commission's determination that the burial method used to install the pipeline in the Clay Plains Swamp was a substantial change. The Commission identified the "natural resources criteria of Section 248" as relevant to this change; no other Section 248 criteria were found to be relevant.[146] I discussed the relevant background regarding this substantial change above at Pages 13-16 and why this change had no impact under the relevant Section 248 criteria at Pages 52-67. A detailed description of the burial methods used in the Clay Plains Swamp can also be found at Paragraphs 15–32 of the Hearing Officer's Liability Order.[147]

80. Q. What findings support the conclusion that this CPG amendment should be approved because there are no actual impacts on the relevant Section 248 criteria?

A. The evidentiary record from the Investigation demonstrates that the burial methods in the Clay Plains Swamp had no undue adverse impact under the relevant Section 248 criteria:

- The burial methods used in the Clay Plains Swamp did not result in any actual impacts on natural resources. Based on review by the Agency of Natural Resources, the burial method VGS used in the Clay Plains Swamp does not raise any significant

[146] The Hearing Officer indicated that this substantial change also contributed to the depth of cover in the Clay Plains Swamp. Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 21, n.26.
[147] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 17-20.

concerns with regard to impacts on the natural environment and did not require any Agency of Natural Resources ("ANR") permits.[148]

- Expert analysis of the construction process used in the Clay Plains Swamp has shown that the use of the sink-in-the-swamp burial method will not have an undue adverse impact on public health and safety.[149]
- The experts that reviewed the burial methods in the Clay Plains Swamp, including ANR and Mr. Byrd, did not recommend any remedial measures regarding natural resources.
- Additionally, while the Commission found that the burial method was a substantial change, Mr. Byrd reviewed the construction techniques used in the Clay Plains Swamp and found them to be consistent with the project plans and specifications and applicable pipeline safety regulations.

The trenching techniques in the Clay Plains Swamp were thoroughly examined by multiple experts in the Investigation and the above portions of the record demonstrate that there are no significant concerns with regard to impacts on the natural environment. The record also supports that the burial methods did not result in any undue adverse impacts under the natural resources criteria of Section 248.[150]

[148] Exhibit VGS-AG-118 (2017-06-19 Letter from Donald J. Einhorn, Esq. to PUC Clerk) ("[T]he pipeline burial [in the swamp] does not change the disturbance footprint and does not raise any significant concern with regard to impacts to the natural environment. In addition, the described work does not require any [ANR] permits."); *see also* Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 17.

[149] Exhibit VGS-AG-009 (Byrd Report) at 70; *see also* Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 17.

[150] The Hearing Officer also found that the burial methods led to the failure to achieve four feet of cover in the Clay Plains Swamp, Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 21, but as discussed in the next section, there are no impacts on public health or safety, or any other Section 248 criteria, associated with the depth of cover in the Clay Plains Swamp.

81. Q. How does VGS propose to amend the Docket No. 7970 CPG to address the pipeline as constructed with respect to this substantial change?

A. VGS requests that the Commission amend the CPG to recognize the pipeline as constructed in the following manner:

> *VGS is authorized to install the pipeline as constructed in the Clay Plains Swamp using what is known as the "sink-in-swamp" burial method, provided that it complies with all of the conditions herein.*

82. Q. How does this proposed CPG amendment account for the remedial recommendations of experts from the Investigation and why will those measures ensure there are no impacts in the future?

A. This CPG amendment is sufficient to ensure there are no future undue adverse impacts relating to the burial methods used in the Clay Plains Swamp because installation of the pipeline has been completed since 2017. The evidence shows construction caused no undue adverse impacts with regard to the natural resources criteria because installation did not change the disturbance footprint and did not raise any other concerns under the natural resources criteria.[151] Further, there will be no future impacts because no future VGS construction is expected on the pipeline in the Clay Plains Swamp. This proposed amendment also accounts for the remedial actions recommended by the expert witnesses in the Investigation because no remedial actions were recommended in connection with this issue, so there are no related conditions to impose regarding future operation of the pipeline.

[151] Exhibit VGS-AG-118 (2017-06-19 Letter from Donald J. Einhorn, Esq. to PUC Clerk).

CPG AMENDMENT #2: DEPTH OF COVER IN THE CLAY PLAINS SWAMP

83. Q. Please explain what the second proposed CPG amendment addresses.

A. The second proposed CPG amendment addresses the Commission's determination that the depth of cover in the Clay Plains Swamp was a substantial change. The Commission identified several Section 248 criteria that were relevant to this change, including "public safety under § 248(b)(5)," "meeting future electrical transmission needs under § 248(b)(2) and the future stability and reliability of the electric transmission system under § 248(b)(3)," and as a result of these potential impacts, a "potential impact on the economy of the State under § 248(b)(4)."[152] I discuss the relevant background regarding this substantial change above at Pages 16-22 and why this change had no impact under the relevant Section 248 criteria at Pages 36-67. A detailed description of the depth of cover in the Clay Plains Swamp is also set forth in Pages 26–29 of the Proposal for Decision, amending and supplementing the initial findings set forth in Paragraphs 33–56 of the Hearing Officer's Liability Order.[153]

84. Q. What findings support the conclusion that this CPG amendment should be approved because there are no actual impacts on the relevant Section 248 criteria?

A. The evidentiary record from the Investigation demonstrates that the depth of cover in the Clay Plains Swamp had no undue adverse impacts under the relevant Section 248 criteria:

- Verification calculations and sensitivity analyses demonstrate that the pipeline meets the HS-20+15% loading standard with as little as two feet of cover even when

[152] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 28.
[153] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 21-24.

assuming low soil strength properties that represent weak soils or an absence of soil compaction.[154]

- The pipeline was conservatively designed. It was constructed with steel that is nearly twice as strong as normal, with a thickness twice that required by most pipeline safety design codes and will operate at pressures no more than 50% of the theoretical maximum.[155]
- Burial of the pipeline with less-than-four-foot depth-of-cover in the Clay Plains Swamp will not result in undue adverse impacts under any relevant Section 248 criteria or the public good of the State because, although Mr. Byrd concluded the pipeline as constructed is safe, VGS has also agreed to comply with remedial measures recommended by Mr. Byrd that "will provide additional assurance of safety in the future."[156]

The Hearing Officer's findings also demonstrate that burial of the pipeline in the Clay Plains Swamp will have no impact on public safety, VELCO's future use of the right-of-way, or the economy of the State.[157] In particular, the hearing officer revised his initial findings on this issue

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[154] Exhibit VGS-AG-102 (Exhibit VGS-CC-2) at 1 ("[W]e have performed a variety of sensitivity analyses using different methods (provided in Attachment B) for calculating the loading on the ANGP. These analyses, as well as our prior calculations, demonstrate that the ANGP meets the HS-20+15% loading standard with as little as 2 feet of cover even when assuming low soil strength properties that represent weak soils and/or an absence of soil compaction. In our professional judgment, after analyzing the loading calculations based on a variety of sensitivity assessments, the ANGP meets the HS-20+15% loading standard in areas where it is buried at least two feet."); Exhibit VGS-AG-109 (2021-07-23 Prefiled Direct Testimony of Kevin Bodenhamer) at 6 ("A depth of soil cover of 4' is not necessary for the pipe to support a HS-20+15% loading, as confirmed in the above-referenced documents utilizing API RP 1102 calculations for this pipeline as installed. As discussed previously, a soil cover anywhere in the range of 2' to 4' is 120 sufficient for this pipeline as installed. In addition, the depth of cover required for this pipeline by PHMSA and Vermont Public Utility Commission regulations is 36 inches."); *see also* Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 18.

[155] Exhibit VGS-AG-009 (Byrd Report) at 16 ("ANGP was constructed with steel that is about twice as strong as normal, with a thickness twice that which causes concern in most design codes, with twice as many supports during construction and backfilling as might have been necessary, and will operate at pressures no more than 50% of the theoretical maximum."); see also Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 18.

[156] Exhibit VGS-AG-009 (Byrd Report) at 73-74; Exhibit VGS-AG-065 (Byrd Report, Attachment #56 (VELCO letter of 4-25-2017 re Clay Plains Swamp)); *see also* Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 18.

[157] Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 29 (citing Exhibit VGS-AG-112 (2021-07-23 Prefiled Direct Testimony of Brian Connaughton)(supporting the conclusion that Vermont Gas provided the 2016 MM Study to VELCO as an engineering study to support Vermont Gas's assertion that the less-than-four-foot burial depth of the gas pipeline would still meet the HS-20+15% loading factor agreed upon in the VELCO MOU and CO&M Agreement"); Exhibit VGS-AG-109 (2021-07-23 Prefiled Direct Testimony of Kevin Bodenhamer) (supporting the conclusion that "VELCO's technical review concluded that the pipeline was designed and installed

in the Proposal for Decision, concluding that the loading standard was met and that there will be no limitation on VELCO's use of the ROW.[158]

85. Q. How does VGS propose to amend the Docket No. 7970 CPG to address the pipeline as constructed with respect to this substantial change?

A. VGS proposes that the Docket 7970 CPG be amended as follows:

VGS is authorized to install the pipeline as constructed in the Clay Plains Swamp with less than four feet of cover in certain locations, provided that it complies with the following conditions:

- *VGS (or VELCO) shall install large warning signs at each end of the ROW in the Clay Plains Swamp with the following (or similar) text "WARNING. SHALLOW HIGH PRESSURE GAS PIPELINE IN THIS AREA. NOTIFY VGS AT (phone number) BEFORE MOVING HEAVY EQUIPMENT INTO THIS AREA."*
- *VGS shall install additional yellow location markers in the Clay Plains Swamp as recommended by VELCO. See Byrd Report, Attachment 56.*
- *VGS shall inspect the pipeline in the Clay Plains Swamp on an annual basis for two years (from when the Byrd Report was issued in January 2020) to ensure that settlement of the back-filled material has not occurred, which may reduce the buried depth of the pipeline. See Byrd Report, Attachment 56.*

to safely accept HS-20+15% loading at all locations within its right-of-way, including those with less than four feet of ground cover above the pipe"); Exhibit VGS-AG-112 (2021-07-23 Prefiled Direct Testimony of Brian Connaughton) (supporting the conclusion that the "pipeline is largely sited along the western edge of the existing electric transmission line right-of-way, with limited areas sited on the eastern side of the right-of-way" which "allows for the future use of the easterly portion of the right-of-way to host a new electric transmission line and reduces the amount of future VELCO uses that could conflict with the pipeline")).

[158] Exhibit VGS-AG-003 (Proposal for Decision (Oct. 3, 2022)) at 29.

86. Q. How does this proposed CPG amendment account for the remedial recommendations of experts from the Investigation and why will those measures ensure there are no impacts in the future?

A. The above CPG amendment and related conditions are sufficient to ensure the prevention of any future undue adverse impacts under the relevant Section 248 criteria because the depth of cover in the Clay Plains Swamp meets a very conservative loading standard, which has been verified by multiple pipeline safety experts, including Mr. Byrd;[159] the Department's pipeline safety expert, Mr. Berger;[160] VELCO's safety expert, Kevin Bodenhamer;[161] and VGS's pipeline expert, Carlos Chaves of Mott MacDonald.[162]

The above conditions also ensure there will be no future undue adverse impacts and account for the remedial measures recommended by experts because, as directed by the Commission, the conditions formally adopt the additional assurances of safety proposed by Mr. Byrd and the conditions VGS agreed to with VELCO. VGS has already complied with Mr. Byrd's recommendation to place signage near the Clay Plains Swamp, which provides added safety by ensuring that people are aware of the pipeline and are directed to communicate with VGS before entering that area with heavy equipment. The above conditions also incorporate

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159 Exhibit VGS-AG-009 (Byrd Report) at 16; *id*. at 67 ("[T]he HS20+15% loading criteria in the CHA bedding and backfill specification was excessively conservative for a pipeline ROW (i.e. not under a road or other load bearing area) – but it doesn't matter because ANGP can meet that loading standard at any reasonable burial depth or level of compaction.").

160 Exhibit VGS-AG-138 (David Berger Letter to the Department of Public Service (Jun. 21, 2017)) ("[T]he loading on the pipeline by heavy equipment does not impair the integrity of the pipeline.").

161 Exhibit VGS-AG-109 (2021-07-23 Prefiled Direct Testimony of Kevin Bodenhamer) at 6 (testifying that the depth of cover is sufficient to meet the HS-20+15 loading standard).

162 Exhibit VGS-AG-100 (2021-09-10 Direct Testimony of Carlos J. Chaves) at 3; Exhibit VGS-AG-102 (Exhibit VGS-CC-2) at 1 ("These analyses, as well as our prior calculations, demonstrate that the ANGP meets the HS-20+15% loading standard with as little as 2 feet of cover even when assuming low soil strength properties that represent weak soils and/or an absence of soil compaction.").

VELCO's April 2017 request that VGS: (1) confirm that the loading standard has been met, (2) place additional location markers in the Clay Plains Swamp, and (3) perform additional inspections in the Clay Plains Swamp annually for two years after Mr. Byrd's report. As discussed above, confirmation of the loading standard has been reviewed by multiple third-party engineers, Mr. Byrd performed additional depth of cover inspections during the Investigation that confirm prior loading calculations, and VGS has installed additional line markers as requested by VELCO in the Clay Plains Swamp.[163]

Finally, in addition to the foregoing measures, and consistent with federal regulations regarding pipeline integrity management, VGS conducts constant monitoring of the pipeline, including monthly aerial inspections and quarterly physical on-the-ground patrols and leak surveys to assess potential encroachments, erosion along the pipeline, irregularities along road and stream crossings, and the adequacy of line-of-sight markers. [164] For all of these reasons, the above CPG amendment and related conditions are sufficient to ensure that there will be no future undue adverse impacts relating to the depth of cover in the Clay Plains Swamp.

CPG AMENDMENT #3: TRENCH BOTTOM & TRENCH BREAKERS

87. Q. Please explain what the third proposed CPG amendment addresses.

A. The third proposed CPG amendment addresses the Commission's determination that the installation of the pipeline on the trench bottom and installation of trench breakers was a substantial change. The Commission identified "public health and safety" as the relevant

163 Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 6.
164 Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 3.

criteria.[165] I discuss the relevant background regarding this substantial change above at Pages 22-29 and why this change had no impact under the relevant Section 248 criteria at Pages 40-67. A detailed description of the installation of the pipeline on the trench bottom and installation of trench breakers can also be found in Paragraphs 57–70 of the Hearing Officer's Liability Order.[166]

88. Q. What findings support the conclusion that this CPG amendment should be approved because there are no actual impacts on the relevant Section 248 criteria?

A. The evidence in the Investigation demonstrates that the installation of the pipeline on the trench bottom and installation of trench breakers had no actual impact on public health and safety:

- Laying the pipeline directly on the trench bottom raises a potential corrosion issue caused by differential oxygen corrosion between two different soil types near a buried pipeline. Differential oxygen corrosion only occurs when a pipeline is laid on a trench bottom and the backfill used is non-native backfill. There are no locations where the pipeline was both installed directly on the trench bottom and backfilled with non-native backfill. Therefore, the burial techniques used to install the VGS pipeline, including burial directly on the trench bottom in some locations, had no deleterious effects on corrosion control and did not create a corrosive environment for the pipeline.[167]

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[165] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 31. Although the Commission identified only public health and safety as the relevant criteria, the evidence also demonstrates there is no impact on wetlands and streams associated with trench breaker installation, as discussed below.

[166] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 28-30.

[167] Exhibit VGS-AG-009 (Byrd Report) at 65, 66 ("There are no locations where the pipe was BOTH installed directly on the trench bottom AND backfilled on 3 sides with clean sand or non-native backfill. The only areas where ANGP was installed directly on the trench bottom were also areas that used native backfill – which eliminates the potential for this problem. The potentially corrosive situation described in Bushman's paper simply doesn't exist on ANGP."); Exhibit VGS-AG-074 (Byrd Report, Attachment #65 (Bedding / TB NOPV of 2-13-2018)) at 3; see also Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 18.

- VGS installed bentonite trench breakers to protect wetlands and streams as appropriate. There have been no adverse impacts to wetlands caused by a lack of trench breakers.[168]
- While installation of trench breakers and installation of the pipe on the trench bottom may have been a deviation from written specifications, these changes will have no future undue adverse effects on public health and safety both because they have no actual impacts and because VGS has committed to the relevant remedial measures recommended in the Byrd Report and in the Notice of Proposed Violation filed in Case No. 18-0395-PET.[169]

This evidence demonstrates that installation of the pipeline on the trench bottom and installation of trench breakers had no undue adverse impacts on public health and safety or wetlands.

89. Q. How does VGS propose to amend the Docket No. 7970 CPG to address the pipeline as constructed with respect to this substantial change?

A. VGS proposes that the Docket No. 7970 CPG be amended as follows:

VGS is authorized to install the pipeline as constructed with respect to burial on the trench bottom and installation of trench breakers, provided that it complies with the following conditions:

- *Vermont Gas shall reduce the maximum time between ILI runs for both metal loss and geometry to once every five years, with a maximum interval of 63 months.*
- *Within six months of the ILI, Vermont Gas also shall conduct a CIS of the effectiveness of the cathodic protection. Vermont Gas shall integrate the results with the ILI results. All areas of poor cathodic protection should be remedied and mitigated promptly. For purposes of this plan, "Poor cathodic protection" shall*

[168] Exhibit VGS-AG-009 (Byrd Report) at 50, 68 (discussing installation of trench breakers); Exhibit VGS-AG-079 (Byrd Report, Attachment #70 (VGS email re ANR TB Follow Up Activities 11-12-19)) (explaining that VHB's assessment of potential impacts concluded that the installation of trench breakers "did not observably or significantly alter the wetland hydrology to the extent that any Class II wetland boundaries or functions were impacted beyond what was permitted. VHB also concludes that bentonite trench breakers were installed at all stream locations as specified"); Exhibit VGS-AG-118 (2017-06-19 Letter from Donald J. Einhorn, Esq. to PUC Clerk); see also Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 18.

[169] Exhibit VGS-AG-009 (Byrd Report) at 74 and Exhibit VGS-AG-076 (Byrd Report, Attachment #67 (Stipulated Remedial Action Compliance Plan – DRAFT – to Bedding TB NOPV)); Exhibit VGS-AG-074 (Byrd Report, Attachment #65 (Bedding / TB NOPV of 2-13-2018)) at 6; see also Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 18-19.

mean any area with a reading that does not meet the minus 0.85 VDC standard for both 'on' and 'off'. Furthermore, if metal loss of greater than 20% is noted, the mitigation of the affected pipe shall take place within 12 months of discovery. The Department and Vermont Gas agree that a 12-month time period for remediating these areas is appropriate and necessary for planning and construction in light of seasonal weather issues that may bear on when mitigation work can occur provided that the pipeline's safety factor remains above 10% of the class location (Class 3 or 50% SMYS) factor during the entire period when taking corrosion rates into account. Corrosion rates will be used as defined in NACE SP0502 (16 mils per year as the default rate) unless the actual rate is known for the exact location or can be calculated per the standard.

- *Within six months of the ILI described above, Vermont Gas also shall conduct a coating survey using either DCVG or ACVG. Vermont Gas will integrate the results of the coating survey with other surveys set forth above. All moderate and severe coating anomalies identified by the integrated data, as those terms are defined in VGS's Transmission IMP Plan (Section 7A), shall be excavated and remediated within 12 months. Furthermore, during the inspection of coating damage, measurements shall be taken to determine if metal loss is present. If over 40% of wall loss is found, the pipe shall be repaired to its original strength.*
- *Within 90 days of the completion of the ILI, Vermont Gas shall have a final report on the ILI findings. The Department and VGS agree that this period provides adequate time for Vermont Gas to require its ILI contractor to provide its findings for review, and for Vermont Gas to complete the final report of the ILI survey.*
- *Within 120 days of the completion of the ILI runs, Vermont Gas shall complete a report integrating and analyzing the ILI results (both geometry and metal loss); the cathodic protection CIS survey results; and the coating survey results. The integrated report shall note all metal loss of 10% or greater; all areas where the cathodic protection does not meet the minus 0.85 VDC standard for either on or off potentials; and all moderate or severe coating anomalies, as those terms are defined in Vermont Gas's Transmission IMP Plan (Section 7A). The Department and Vermont Gas agree that this period provides adequate and appropriate time for the company to integrate the results of all of these inspections, particularly given the amount of data that will be generated over time after the initial round of testing.*
- *Vermont Gas shall provide all of the above final reports to the Department promptly upon completion but no later than 10 business days, and shall make available all raw data, surveys and analyses received or produced regarding these required*

inspections. Vermont Gas will also document its steps taken to remedy any findings from these inspections that require action as noted.

90. Q. How does this proposed CPG amendment account for the remedial recommendations of experts from the Investigation and why will those measures ensure there are no impacts in the future?

A. The above CPG amendment and related conditions are sufficient to ensure the prevention of any future undue impacts under the relevant Section 248 criteria relating to installation of the pipeline on the trench bottom and installation of trench breakers for the following reasons.

First, the installation of the pipeline on the trench bottom and the installation of trench breakers had no actual impacts on public health and safety because, as discussed above, the evidence demonstrates that initial concerns about differential oxygen corrosion were not warranted because there are no locations where the pipe was installed on the trench bottom and backfilled with non-native soils. In particular, Mr. Byrd's investigation specifically concluded that there are no concerns about installation on the trench bottom because there were no locations where the potential for differential oxygen levels between native and non-native soils was present.[170] Installation on the trench bottom, therefore, "had no deleterious effect on corrosion control and did not create a corrosive environment for the pipeline."[171] Additionally, investigation of potential impacts has demonstrated that trench breaker installation was adequate

[170] Exhibit VGS-AG-009 (Byrd Report) at 66.
[171] Exhibit VGS-AG-009 (Byrd Report) at 66.

to ensure no adverse impacts to wetlands.[172] Thus, even without any further conditions, there will be no undue adverse impacts on the relevant Section 248 criteria.

Second, the above conditions further ensure that there will be no impacts because they adopt measures VGS and the Department agreed upon in the Stipulated Remedial Action Compliance Plan initially filed in Case No. 18-0395-PET.[173] Those remedial measures shorten the federally required timeframe for in-line inspections of the pipeline[174] and require VGS to conduct Close Interval Surveys ("CIS") and coating surveys using either DCVG or ACVG, which provide targeted assessments of cathodic protection and corrosion control. These measures will ensure there are no undue adverse impacts relating to this CPG amendment going forward. The Department has agreed that these amendments will ensure no future impacts under the relevant Section 248 criteria.[175]

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[172] Exhibit VGS-AG-009 (Byrd Report) at 50, 68; Exhibit VGS-AG-079 (Byrd Report, Attachment #70 (VGS email re ANR TB Follow Up Activities 11-12-19)); Exhibit VGS-AG-118 (2017-06-19 Letter from Donald J. Einhorn, Esq. to PUC Clerk).

[173] Exhibit VGS-AG-076 (Byrd Report, Attachment #67 (Stipulated Remedial Action Compliance Plan – DRAFT – to Bedding TB NOPV)).

[174] In this manner, the above CPG conditions adopt pipeline integrity monitoring that is both in excess of federal regulations and that provides robust ongoing remedial actions. While Mr. Byrd did not agree that the ILI period should be reduced to five years from the standard pipeline integrity interval of seven years, VGS has already committed to that inspection interval, and VGS completed the first ILI and related testing in 2018. Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 4-5; Exhibit VGS-AG-009 (Byrd Report) at 72 ("The in-line-inspection (ILI) of July 9-18, 2018, found no actionable anomalies. The cathodic protection close-interval survey (CIS) and direct current voltage gradient (DCVG) surveys found no problems with the pipe or coating (Attachment A#33)."(citing Exhibit VGS-AG-042 (Byrd Report, Attachment #33 (ARK DCVG & CIS Analysis)).

[175] Exhibit VGS-AG-076 (Byrd Report, Attachment #67 (Stipulated Remedial Action Compliance Plan – DRAFT – to Bedding TB NOPV)); Exhibit VGS-AG-137 (Case Nos. 17-3550-INV & 18-0395-PET, PSD Comments on Compliance Filing (May 24, 2023)).

CPG AMENDMENT #4: COMPACTION

91. Q. Please explain what the fourth proposed CPG amendment addresses.

A. The fourth proposed CPG amendment addresses the Commission's determination that failure to comply with compaction requirements was a substantial change. The Commission identified "public health and safety" as the relevant criteria based on the extent to which a potential lack of compaction and compaction testing could have impacts at public road crossings.[176] I discuss the relevant background regarding this substantial change above at Pages 29-32 and why this change had no impact under the relevant Section 248 criteria at Pages 40-67. A detailed description of the compaction issue is also set forth in Paragraphs 71–78 of the Hearing Officer's Liability Order.[177]

92. Q. What findings support the conclusion that this CPG amendment should be approved because there are no actual impacts on the relevant Section 248 criteria?

A. The evidence in the Investigation demonstrates that there were no actual impacts on public health and safety relating to the failure to comply with compaction testing requirements.

- As recommended by Mr. Byrd, VGS hired a third-party engineer to conduct an independent review of road crossings for any signs of erosion, compaction, or other issues caused by the pipeline construction. That assessment demonstrated that 14 of

[176] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 33.
[177] Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 31-32.

the 15[178] locations showed no signs of compromised roadbed performance, erosion, or settlement above the pipeline at all.[179]

- Additionally, appropriate remedial measures, including conducting a similar independent review after each winter season to determine if there is any frost heave at locations where the pipeline is buried beneath roadways, and repairing any damage, will ensure there are no adverse effects on public safety in the future.[180]

93. Q. How does VGS propose to amend the Docket No. 7970 CPG to address the pipeline as constructed with respect to this substantial change?

A. VGS proposes that the Docket 7970 CPG be amended as follows:

VGS is authorized to install the pipeline as constructed with regard to compaction requirements, provided that it complies with the following conditions:

- *VGS shall hire a Vermont-licensed professional civil engineer with expertise in dirt road construction and maintenance to inspect each of the 15 open cut road crossings for evidence of frost heave, settlement, and potholing, at times of the engineer's choosing but at least twice (once during cold weather to look for frost heave and once during warm weather to look for settlement and potholing), and have them develop and certify a remediation plan for any deficiencies that are discovered. VGS should inform the engineer in writing prior to the inspections of any complaints received concerning these crossing locations. VGS should report to the Department and any relevant local agency, municipality, or authority for each crossing within 18 months of Mr. Byrd's report (which issued January 2020) concerning the results of these inspections and any remedial actions taken or planned. VGS should provide periodic updates to these parties until all deficiencies (if any) have been corrected.*

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178 "In just one location, the review found a 'small depression' in the edge of the road over the gas line." Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 5. VGS will continue to monitor all 15 locations during quarterly patrols, id., and the proposed CPG amendment below requires an independent annual review after each winter season.

179 Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 5; Exhibit VGS-AG-093 (Exhibit VGS-JSH-10); Exhibit VGS-AG-009 (Byrd Report) at 67 (explaining that compaction has no impact on pipeline integrity); *id.* at 73-74 (recommending review of compaction at 15 road crossings); *see also* Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 19.

180 Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 19 (citing Exhibit VGS-AG-083 (2021-09-10 Direct Testimony of John St. Hilaire) at 5; Exhibit VGS-AG-093 (Exhibit VGS-JSH-10); Exhibit VGS-AG-009 (Byrd Report) at 73-74.

- *VGS shall conduct a similar independent review of open cut road crossings after each winter season to determine if there is any frost heave at locations where the pipeline is buried beneath roadways and repair any damage.*

94. Q. How does this proposed CPG amendment account for the remedial recommendations of experts from the Investigation and why will those measures ensure there are no impacts in the future?

A. The above CPG amendment and related conditions are sufficient to ensure that there will be no future undue adverse impacts to road crossings or public safety due to compaction. As noted above, VGS has already conducted the road crossing inspection recommended by Mr. Byrd in accordance with the above condition.[181] That inspection demonstrated that fourteen of the fifteen locations showed no signs of compromised roadbed performance, erosion, or settlement.[182] Additionally, VGS will continue to monitor these locations during quarterly physical inspections and will conduct "a similar independent review after each winter season" as contemplated by the Commission's Final Order. This will ensure that there will be no future undue adverse impacts to open cut road crossings relating to compaction.

CPG AMENDMENT #5: DESIGN & ENGINEERING

95. Q. Please explain what the fifth proposed CPG amendment addresses.

A. The fifth proposed CPG amendment addresses the Commission's determination that failure to staff the Project with a Vermont-licensed professional engineer to serve as the

181 *Id.*
182 *Id.*

responsible charge engineer was a substantial change. The Hearing Officer and Commission did not identify any relevant Section 248 criteria relating to this change, however, the Hearing Officer stated that this issue had the potential to have a significant impact under the Section 248 criteria addressed in other substantial changes. I discuss the relevant background regarding this substantial change above at Pages 32-34 and why this change had no impact under the relevant Section 248 criteria at Page 34. A detailed description of this issue is also set forth in Paragraphs 79–95 of the Hearing Officer's Liability Order.[183]

96. Q. What findings support the conclusion that this CPG amendment should be approved because there are no actual impacts on the relevant Section 248 criteria?

A. The evidence in the Investigation demonstrated there were no actual impacts on public health and safety or any other Section 248 criteria relating to the licensure of engineers who designed the pipeline:

- In 2012, VGS contracted for engineering services with CHA, a full-service engineering and consulting firm that provided continuous consultation and engineering services for the Project.[184]
- CHA affirmed to VGS that all of its engineering work, including the plans used to construct the pipeline, were "prepared under the supervision of a Vermont-licensed engineer and in accordance with professional standards."[185]
- There is no evidence of any deficiencies in the engineering and design of the Project or any actual safety or integrity issues that arose out of the lack of a seal on the plans.[186]

183 Exhibit VGS-AG-004 (Liability Order (Jan. 29, 2021)) at 33-36.
184 Exhibit VGS-AG-081 (2020-07-10 Direct Testimony of John St. Hilaire) at 6; *see also* Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 19.
185 Exhibit VGS-AG-081 (2020-07-10 Direct Testimony of John St. Hilaire) at 16; Exhibit VGS-AG-087 (Exhibit VGS-JSH-4) at 5; *see also* Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 19.
186 Exhibit VGS-AG-081 (2020-07-10 Direct Testimony of John St. Hilaire) at 16-17.

- Additionally, as noted above, Mr. Byrd concluded: "[The pipeline] was thoroughly and competently designed and engineered using modern equipment and technology, and comprehensively inspected during construction by multiple parties. With a few noted exceptions, it was constructed in compliance with applicable rules and commitments, and in many important respects it exceeds the typical requirements. … Ongoing inspections and maintenance as well as periodic integrity management assessments and evaluations should identify and resolve any pipeline safety issues that arise in the future and provide assurance of continued safety."[187]
- VGS has committed to ensuring that any and all future pipeline or related construction projects are overseen by a Vermont-licensed engineer, and therefore there will be no future undue adverse effect on public health and safety associated with this issue. Duties of such an engineer include the approval and signing of construction drawings and specifications and any and all changes made to those drawings and specifications.[188]

97. Q. How does VGS propose to amend the Docket No. 7970 CPG to address the pipeline as constructed with respect to this substantial change?

A. VGS proposes that the Commission amend VGS's Docket 7970 CPG to address staffing the Project with a Vermont-licensed professional engineer to serve as the responsible charge engineer as follows:

> *VGS is authorized to install the pipeline as constructed with respect to compliance with professional engineering requirements, provided that it complies with the following condition:*
>
> - *Vermont Gas shall continue to ensure that any and all future pipeline or related construction projects are overseen by a Vermont-licensed engineer, the duties of*

[187] Exhibit VGS-AG-009 (Byrd Report) at 72; *see also* Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 2, n. 4

[188] Exhibit VGS-AG-139 (VGS Compliance Filing Regarding Proposed Amendments to the Docket 7970 Certificate of Public Good (Apr. 27, 2023)); see also Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 19-20 (citing Exhibit VGS-AG-119 (2021-09-10 Prefiled Testimony of Gregory R. Liebert) at 3-6); Exhibit VGS-AG-120 (Liebert Exh. 2 – Liebert Report September 12, 2019) at 1-3; Exhibit VGS-AG-121 (2021-10-04 Rebuttal Testimony of Gregory R. Liebert) at 5; 26 V.S.A. § 1161(2).

which will include the approval and signing of construction drawings and specifications, and any and all changes made to those drawings and specifications.

98. Q. How does this proposed CPG amendment account for the remedial recommendations of experts from the Investigation and why will those measures ensure there are no impacts in the future?

A. The above CPG amendment and related condition are sufficient to ensure that there will be no future undue adverse impacts regarding professional engineering and pipeline design for the following reasons.

First, VGS has committed to ensuring that all professional engineering on future projects complies with Vermont licensing requirements. The above condition ensures that for any future VGS project, a Vermont-licensed engineer will approve and sign construction drawings and specifications and any and all changes made to those drawings and specifications.

Second, as the Commission discussed in the Final Order, the ANGP was designed and engineered by CHA, a full-service engineering and consulting firm that provided continuous consultation and engineering services for the Project.[189] While the original issued for construction drawings were not initially signed and sealed by a Vermont-licensed engineer, CHA subsequently affirmed that all of the plans used to construct the pipeline were "prepared under the supervision of a Vermont-licensed engineer and in accordance with professional standards."[190]

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189 Exhibit VGS-AG-002 (Final Order (Apr. 6, 2023)) at 19.

190 Exhibit VGS-AG-081 (2020-07-10 Direct Testimony of John St. Hilaire) at 16-17; Exhibit VGS-AG-087 (Exhibit VGS-JSH-4) at 5.

Finally, Mr. Byrd's investigation concluded that there was no evidence in this case that the engineering or design was deficient; not performed by competent engineers; or posed a risk to public health, safety, or welfare.[191] On the contrary, Mr. Byrd concluded that the specifications for the project "provided a comprehensive and technically sound basis for quality assurance during the project,"[192] and that, "Extensive specifications of all types were prepared in advance of construction, and extensive inspections were performed by multiple parties to ensure conformance with those specifications."[193]

Accordingly, the above CPG amendment and condition are adequate to ensure that there are no future undue adverse impacts on safety relating to the supervision of projects by a Vermont-licensed engineer.

ADDITIONAL REMEDIAL ACTIONS

99. Q. In addition to the above conditions, what other conditions does VGS propose to account for the remedial recommendations of experts from the Investigation and why will those measures ensure there are no impacts in the future?

A. VGS has committed to undertaking other remedial recommendations that are not related to the above-referenced substantial changes, proposed CPG amendments, or expert remedial action and conditions.[194] These recommendations were provided by Mr. Byrd and VGS has been following these recommendations since Mr. Byrd made them in his report in 2020:

- *The zinc ribbon/SSD system should be routinely inspected and quickly repaired as necessary to ensure that AC interference currents do not cause corrosion of the*

191 Exhibit VGS-AG-009 (Byrd Report) at 64.
192 *Id.*
193 *Id.*
194 See Exhibit VGS-AG-009 (Byrd Report) at 73-74.

pipeline. VGS should conduct and document detailed inspections of all SSDs twice a year (not to exceed 7.5 months between inspections) and correct any problems within 2 months of discovery.

- *VGS should conduct over-the-line (OTL) surveys every 3 ½ years (not to exceed 48 months between inspections), with the specific types of OTL survey to be determined by a competent corrosion consultant independent of VGS. All indications should be investigated and corrected as necessary within six months of discovery. The surveys should be able to detect AC interference/stray current issues.*
- *VGS should perform a DOC survey in all actively cultivated agricultural areas every 3 years, and address any DOC less than 4' (or landowner agreements – whichever is greater) to ensure agricultural activities will not impact the pipeline. This does not mean that DOC must be maintained at the original installation depth, but that any loss of cover must be managed in cooperation with the landowner/farmer to ensure agricultural activities do not interfere with pipeline safety.*
- *VGS should ensure its line locating procedures, training, and qualification programs address the potential for zinc ribbon interference with line locating equipment. The procedures should require disconnection of the zinc ribbon prior to using an indirect line locator, probing the pipeline location, or hand digging/potholing to ensure the line is located accurately prior to any excavation near a pipe protected by zinc ribbon. These procedures, training programs, and qualification programs should be submitted for Department review within six months of [the Byrd] report.*
- *VGS should modify its pipeline integrity management plan to specifically mention the locations of the 67 Canusa sleeve repairs from the problematic batches. These locations should be called out as a potential integrity concern during all subsequent integrity assessments and evaluations (such as close-interval surveys and in-line inspections). This does not mean that every assessment must be designed specifically to look for external corrosion threats at coating repairs. Rather, that the Canusa sleeve locations be considered when evaluating the results of every assessment (even assessments not designed to look for that threat), because of the potential for interacting threats.*

100. Q. Does this conclude your testimony?

A. Yes.

DECLARATION OF ADAM GERO

I declare that the testimony and exhibits that I have sponsored are true and accurate to the best of my knowledge and belief and were prepared by me or under my direct supervision. I understand that if the above statements are false, I may be subject to sanctions by the Commission pursuant to 30 V.S.A. § 30.

01/10/25
Date

/s/ Adam Gero
Adam Gero
VGS, Director, Operations and Construction

STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Case No. 25-_____

Vermont Gas Systems, Inc.'s Petition to Amend Existing Docket No. 7970 Certificate of Public Good	

APPENDIX A - EXHIBIT LIST

PUC Orders	
Exhibit VGS-AG-001	Post-Appeal Order Outlining Next Steps (Jun. 25, 2024)
Exhibit VGS-AG-002	Final Order (Apr. 6, 2023)
Exhibit VGS-AG-003	Proposal for Decision (Oct. 3, 2022)
Exhibit VGS-AG-004	Liability Order (Jan. 29, 2021)
Transcripts	
Exhibit VGS-AG-005	2020-09-01 Evidentiary Hearing Transcript Day I
Exhibit VGS-AG-006	2020-09-02 Evidentiary Hearing Transcript Day II
Exhibit VGS-AG-007	2020-09-03 Evidentiary Hearing Transcript Day III
Exhibit VGS-AG-008	2021-12-08 Evidentiary Hearing Transcript
Byrd Report & Supporting Attachments	
Exhibit VGS-AG-009	Final Report from the Independent Investigation of the Vermont Gas Systems Addison Natural Gas Project, January 8, 2020, by William R. Byrd (the "Byrd Report")
Exhibit VGS-AG-010	Byrd Report, Attachment #1 (W R Byrd Statement of Qualifications)
Exhibit VGS-AG-011	Byrd Report, Attachment #2 (Partial Index of Files Received)
Exhibit VGS-AG-012	Byrd Report, Attachment #3 (Listing of Construction Inspection Reports Reviewed by WRB)
Exhibit VGS-AG-013	Byrd Report, Attachment #4 (Mr. Heintz' 2-28-13 PFT)
Exhibit VGS-AG-014	Byrd Report, Attachment #5 (PUC Final Order of CPG for ANGP)
Exhibit VGS-AG-015	Byrd Report, Attachment #6 (ANGP Organization Charts)
Exhibit VGS-AG-016	Byrd Report, Attachment #7 (Intervenors Motion to Broaden Scope of Investigation 3-1-18)
Exhibit VGS-AG-017	Byrd Report, Attachment #8 (Intervenors Summary of the Evidence for WRB - annotated 5-21-19)
Exhibit VGS-AG-018	Byrd Report, Attachment #9 (WRB Site Visit Summary Findings)
Exhibit VGS-AG-019	Byrd Report, Attachment #10 (Selected Images)
Exhibit VGS-AG-020	Byrd Report, Attachment #11 (Breezy Valley Dig Report 7-30-19)
Exhibit VGS-AG-021	Byrd Report, Attachment #12 (Baldwin Rd Dig Report 7-30-19)
Exhibit VGS-AG-022	Byrd Report, Attachment #13 (Chicken Farm Dig Report 7-31-19)
Exhibit VGS-AG-023	Byrd Report, Attachment #14 (Route 7 Dig Report 7-31-19)
Exhibit VGS-AG-024	Byrd Report, Attachment #15 (PHMSA Civil Penalty Guidance 02-25-2019)
Exhibit VGS-AG-025	Byrd Report, Attachment #16 (Bid Specification Index)

Exhibit VGS-AG-026	Byrd Report, Attachment #17 (Bid Specification Package, Project Manual May 24 2014)
Exhibit VGS-AG-027	Byrd Report, Attachment #18 (CHA Summary of Material Specs and Quality Control Procedures)
Exhibit VGS-AG-028	Byrd Report, Attachment #19 (Specification for Application of Pipeline External Coatings)
Exhibit VGS-AG-029	Byrd Report, Attachment #20 (IFC Plans 5-13-16 in Modification bulletin Trans-09) (Part 1)
Exhibit VGS-AG-029	Byrd Report, Attachment #20 (IFC Plans 5-13-16 in Modification bulletin Trans-09) (Part 2)
Exhibit VGS-AG-029	Byrd Report, Attachment #20 (IFC Plans 5-13-16 in Modification bulletin Trans-09) (Part 3)
Exhibit VGS-AG-030	Byrd Report, Attachment #21 (CHA Specification 312333 TRENCHING, PIPE LAYING AND BACKFILLING dated 4-29-2015)
Exhibit VGS-AG-031	Byrd Report, Attachment #22 (CHA Specification 312333 TRENCHING, PIPE LAYING AND BACKFILLING 7-1-2016, in Modification Bulletin Trans-14)
Exhibit VGS-AG-032	Byrd Report, Attachment #23 (Design drawing sheet ANGP-T-G-015 as of 6-28-2013)
Exhibit VGS-AG-033	Byrd Report, Attachment #24 (Design drawing sheet ANGP T-G-015 as of 6-11-2015)
Exhibit VGS-AG-034	Byrd Report, Attachment #25 (Design Drawing ANGP-T-G-015 as of 5-2016 w TB tables)
Exhibit VGS-AG-035	Byrd Report, Attachment #26 (Project Directive 2015-006 Backfill Compaction 8-31-15)
Exhibit VGS-AG-036	Byrd Report, Attachment #27 (Project Directive 2015-007 General Backfill Materials 8-31-15)
Exhibit VGS-AG-037	Byrd Report, Attachment #28 (Project Directive 2015-008 Adhesion Testing 8-31-15)
Exhibit VGS-AG-038	Byrd Report, Attachment #29 (ARK CP System Design IFC 5-20-2016)
Exhibit VGS-AG-039	Byrd Report, Attachment #30 (ARK Engineering AC Mitigation Design)
Exhibit VGS-AG-040	Byrd Report, Attachment #31 (ARK CP Commissioning – first 11 miles)
Exhibit VGS-AG-041	Byrd Report, Attachment #32 (ARK CP Commissioning - 30 miles)
Exhibit VGS-AG-042	Byrd Report, Attachment #33 (ARK DCVG & CIS Analysis)
Exhibit VGS-AG-043	Byrd Report, Attachment #34 (E-mail of 9/4/2019 concerning zinc ribbon in Clay Plains Swamp)
Exhibit VGS-AG-044	Byrd Report, Attachment #35 (ANGP Inspection Manual from 2014)
Exhibit VGS-AG-045	Byrd Report, Attachment #36 (Eric Curtis Field Notes May 30 - July 26 2014)
Exhibit VGS-AG-046	Byrd Report, Attachment #37 (James Haney Field Notes July 27 - Nov. 4, 2015)

Exhibit VGS-AG-047	Byrd Report, Attachment #38 (JR Kelch ML Inspection Reports 9-5 and 9-10-14)
Exhibit VGS-AG-048	Byrd Report, Attachment #39 (DPS Inspection Report - 2014)
Exhibit VGS-AG-049	Byrd Report, Attachment #40 (DPS Inspection Report - 2015)
Exhibit VGS-AG-050	Byrd Report, Attachment #41 (DPS Inspection Report - 2016)
Exhibit VGS-AG-051	Byrd Report, Attachment #42 (DPS Inspection Report - 2017)
Exhibit VGS-AG-052	Byrd Report, Attachment #43 (PHMSA review of VT DPS Inspectors)
Exhibit VGS-AG-053	Byrd Report, Attachment #44 (VGS - VELCO MOU of 6-2013)
Exhibit VGS-AG-054	Byrd Report, Attachment #45 (VGS - ANR MOU of 9-2013)
Exhibit VGS-AG-055	Byrd Report, Attachment #46 (VTrans Permit of 5-27-2014)
Exhibit VGS-AG-056	Byrd Report, Attachment #47 (CHA Loading Calculations 11-7-2014)
Exhibit VGS-AG-057	Byrd Report, Attachment #48 (Mott MacDonald Loading Calculations 5-25-16)
Exhibit VGS-AG-058	Byrd Report, Attachment #49 (CEPA Report 10-16-2009 re Surface Loading)
Exhibit VGS-AG-059	Byrd Report, Attachment #50 (Compaction Testing Results and email of 5-24-2016)
Exhibit VGS-AG-060	Byrd Report, Attachment #51 (WCE report of 9-27-16 - stripping topsoil)
Exhibit VGS-AG-061	Byrd Report, Attachment #52 (WCE Report of 6-23-15 crushing rock for general backfill)
Exhibit VGS-AG-062	Byrd Report, Attachment #53 (WCE Report of 9-27-16 - using shaker bucket to sift backfill)
Exhibit VGS-AG-063	Byrd Report, Attachment #54 (CPAR of 12-11-15 re TB locations in 2014)
Exhibit VGS-AG-064	Byrd Report, Attachment #55 (VELCO email of 9-21-2016 re Clay Plains Swamp)
Exhibit VGS-AG-065	Byrd Report, Attachment #56 (VELCO letter of 4-25-2017 re Clay Plains Swamp)
Exhibit VGS-AG-066	Byrd Report, Attachment #57 (Wetlands Permit Supporting Narrative)
Exhibit VGS-AG-067	Byrd Report, Attachment #58 (Clay Plains Inspection Report Summaries - WRB)
Exhibit VGS-AG-068	Byrd Report, Attachment #59 (Summary Memo re Laying Pipe on Trench Bottom 6-6-17)
Exhibit VGS-AG-069	Byrd Report, Attachment #60 (VGS 8-4-17 Comments re DOC commitments)
Exhibit VGS-AG-070	Byrd Report, Attachment #61 (JAN Affidavit 8-4-17 re Stream Crossings)
Exhibit VGS-AG-071	Byrd Report, Attachment #62 (JSH Affidavit 8-11-17 re DOC)
Exhibit VGS-AG-072	Byrd Report, Attachment #63 (JSH Affidavit 8-11-17 Exhibit 1 - DOC Table)

Exhibit VGS-AG-073	Byrd Report, Attachment #64 (ANR Comments 10-12-17 re DOC for Non-Jurisdictional Streams)
Exhibit VGS-AG-074	Byrd Report, Attachment #65 (Bedding / TB NOPV of 2-13-2018)
Exhibit VGS-AG-075	Byrd Report, Attachment #66 (VGS Response to DPS Bedding / TB NOPV 2-28-18)
Exhibit VGS-AG-076	Byrd Report, Attachment #67 (Stipulated Remedial Action Compliance Plan - DRAFT - to Bedding TB NOPV)
Exhibit VGS-AG-077	Byrd Report, Attachment #68 (ANR Comments 3-22-18 re Trench Breakers)
Exhibit VGS-AG-078	Byrd Report, Attachment #69 (ANR Comments 5-4-18 re Scope of Investigation)
Exhibit VGS-AG-079	Byrd Report, Attachment #70 (VGS email re ANR TB Follow Up Activities 11-12-19)
VGS Prefiled Testimony	
Exhibit VGS-AG-080	2020-07-10 Direct Testimony of Donald J. Rendall
Exhibit VGS-AG-081	2020-07-10 Direct Testimony of John St. Hilaire
Exhibit VGS-AG-082	2020-07-31 Rebuttal Testimony of John St. Hilaire
Exhibit VGS-AG-083	2021-09-10 Direct Testimony of John St. Hilaire
Exhibit VGS-AG-084	Exhibit VGS-JSH-1
Exhibit VGS-AG-085	Exhibit VGS-JSH-2
Exhibit VGS-AG-086	Exhibit VGS-JSH-3
Exhibit VGS-AG-087	Exhibit VGS-JSH-4
Exhibit VGS-AG-088	Exhibit VGS-JSH-5
Exhibit VGS-AG-089	Exhibit VGS-JSH-6
Exhibit VGS-AG-090	Exhibit VGS-JSH-7
Exhibit VGS-AG-091	Exhibit VGS-JSH-8
Exhibit VGS-AG-092	Exhibit VGS-JSH-9
Exhibit VGS-AG-093	Exhibit VGS-JSH-10
Exhibit VGS-AG-094	2020-07-10 Direct Testimony of Jeffrey A. Nelson
Exhibit VGS-AG-095	Exhibit VGS-JAN-1
Exhibit VGS-AG-096	Exhibit VGS-JAN-2
Exhibit VGS-AG-097	Exhibit VGS-JAN-3
Exhibit VGS-AG-098	2020-07-31 Rebuttal Testimony of John F. Godfrey
Exhibit VGS-AG-099	Exhibit VGS-JFG-1
Exhibit VGS-AG-100	2021-09-10 Direct Testimony of Carlos J. Chaves
Exhibit VGS-AG-101	Exhibit VGS-CC-1
Exhibit VGS-AG-102	Exhibit VGS-CC-2
Exhibit VGS-AG-103	2021-11-01 Rebuttal Testimony of Carlos J. Chaves
Exhibit VGS-AG-104	Exhibit VGS-CC-3
Exhibit VGS-AG-105	Exhibit VGS-CC-4
Exhibit VGS-AG-106	Exhibit VGS-CC-5
Exhibit VGS-AG-107	Exhibit VGS-CC-6
Exhibit VGS-AG-108	Exhibit VGS-CC-7
VELCO Prefiled Testimony	
Exhibit VGS-AG-109	2021-07-23 Prefiled Direct Testimony of Kevin Bodenhamer

Exhibit VGS-AG-110	2021-11-01 Prefiled Direct Rebuttal Testimony of Kevin Bodenhamer
Exhibit VGS-AG-111	Exhibit VELCO-KB-1
Exhibit VGS-AG-112	2021-07-23 Prefiled Direct Testimony of Brian Connaughton
Exhibit VGS-AG-113	2021-11-01 Prefiled Direct Rebuttal Testimony of Brian Connaughton
Exhibit VGS-AG-114	Exhibit VELCO-BC-1
Exhibit VGS-AG-115	Exhibit VELCO-BC-2
Exhibit VGS-AG-116	Exhibit VELCO-BC-3
Exhibit VGS-AG-117	Exhibit VELCO-BC-4
All other evidence cited by the Commission	
Exhibit VGS-AG-118	2017-06-19 Letter from Donald J. Einhorn, Esq. to PUC Clerk
Exhibit VGS-AG-119	2021-09-10 Prefiled Testimony of Gregory R. Liebert
Exhibit VGS-AG-120	Liebert Exh. 2 - Liebert Report September 12, 2019
Exhibit VGS-AG-121	2021-10-04 Rebuttal Testimony of Gregory R. Liebert
Exhibit VGS-AG-122	Exhibit Pet. JH-13 (Docket 7970)
Exhibit VGS-AG-123	2012-12-20 Prefiled Testimony of John Heintz (Docket 7970)
Exhibit VGS-AG-124	2017-12-19 Transcript from 30(b)(6) Deposition of Carl Bubolz
Exhibit VGS-AG-125	2013-06-11 Prefiled Testimony of Eric Sorenson (Docket 7970)
Exhibit VGS-AG-126	2013-02-28 Prefiled Testimony of John Heintz (Docket 7970)
Exhibit VGS-AG-127	Exhibit Pet. JH-3 (Docket 7970)
Exhibit VGS-AG-128	Exhibit Intervenors Cross 33A
Exhibit VGS-AG-129	2020-09-03 (Corrected) Prefiled Testimony of Lawrence Shelton
Exhibit VGS-AG-130	Exhibit Int. LS-2 (video)
Exhibit VGS-AG-131	Exhibit Int. LS-3 (photographs)
Exhibit VGS-AG-132	2014 Construction Manual
Exhibit VGS-AG-133	Int. Cross Exhibit 1 (Part 1)
Exhibit VGS-AG-133	Int. Cross Exhibit 1 (Part 2)
Exhibit VGS-AG-133	Int. Cross Exhibit 1 (Part 3)
Exhibit VGS-AG-134	Jane Palmer Exh. 1 (Summary of 2014 Inspection Reports)
Exhibit VGS-AG-135	2020-03-27 Transcript from Deposition of Chris LeForce
Exhibit VGS-AG-136	Docket 7970 Hearing Transcript 9/17/13
Other Referenced Documents	
Exhibit VGS-AG-137	Case Nos. 17-3550-INV & 18-0395-PET, PSD Comments on Compliance Filing (May 24, 2023)
Exhibit VGS-AG-138	David Berger Letter to the Department of Public Service (Jun. 21, 2017)
Exhibit VGS-AG-139	VGS Compliance Filing Regarding Proposed Amendments to the Docket 7970 Certificate of Public Good (Apr. 27, 2023)