STATE OF VERMONT
PUBLIC UTILITIES COMMISSION

Petition of Vermont Gas Systems, Inc., for a certificate of public good, pursuant to 30 V.S.A. § 248 , authorizing the construction of the "Addison Natural Gas Project" consisting of approximately 43 miles of new natural gas transmission pipeline in Chittenden and Addison Counties, approximately 5 miles of new distribution mainlines in Addison County, together with three new gate stations in Williston, New Haven and Middlebury, Vermont	)	Case No. 17-3550-INV

LEFORCE DEPOSITION EXHIBIT 22

MEMORANDUM

TO: ANGP File

FROM: Adam Gero

DATE: June 6, 2017

RE: Addison Natural Gas Project (ANGP) Pipe Laid on Trench Bottom

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This memorandum serves as justification for Vermont Gas' decision to allow the areas on ANGP where pipe was laid directly on the trench bottom to remain in place.

During the construction of the ANGP pipeline, there were a few locations where the transmission pipe was installed directly on the trench bottom or supported by sand berms or "dutchmens". At the time of occurrence it was in compliance with Technical Specification Section 312333. After the occurrences, decisions were made to adopt more stringent construction practices and no longer allow these methods.

Order of events:
August 31, 2015 – Pipe was installed between station 240+26 and station 279+75 directly on the sandy bottom of the trench. This is documented in directive 2015-005 (attached) stating that the Construction Management Team deemed that the trench bottom had adequate support and padding. This practice was allowed by the Technical Specifications:

"Pipe supports shall be installed in all locations prior to backfilling, unless otherwise directed by the Construction Management Team – refer project design drawings for further requirements. Stacked sandbags, pipe pillows, or owner approved equal are acceptable methods. Spacing shall be per manufacturers recommendations, if a commercial product, or 15' maximum intervals if sandbags." – Technical Specification for ANGP, Section 312333 part 3.5B – April 29, 2015

June, 2016 – Construction began on ANGP south of the Williston Gat Station. Technical Specification 312333 part 3.5B had been revised 05/2016 to read:

"Pipe supports may be installed in all locations prior to backfilling as an alternative to continuous pipe bedding for the entire width of the trench. However, areas around pipe shall still be padded with select backfill as shown on the contract drawings and explained in paragraph 3.3.b. above. Stacked sandbags, pipe pillows, or owner approved equal are acceptable methods. Spacing shall be per manufacturer recommendations, if a commercial product, or 15' maximum separation if sandbags." – Technical Specification for ANGP, Section 312333 part 3.5B – May, 2016

MEMORANDUM

The Construction Management Team constructed the pipeline with the knowledge that pipe installed on the trench bottom or on sand berms was in fact an “owner approved equal” for pipe support. This is solidified by the (attached) email from Brendan Kearns, CHA Engineer to John St. Hilaire on June 22, 2016 where he stated “If the material 6” below the bottom of the trench is deemed to be suitable material (per specifications) by the CM team, then the pipe can be laid in the bottom of the trench as long as it is sufficiently supported as stated in 3.3.C”. The only section that was installed directly on the trench bottom in 2016 was a 360 foot section between station 564+24 and station 567+84. VGS did a test dig in that section to inspect the pipe and to analyze the trench. The report (attached) shows that the soil at the bottom of the trench was suitable for padding material.

Further discussions on this matter ensued and on July 5th, 2016 the team decided that for consistency they would no longer allow pipe to be installed on the trench bottom or supported on sand berms. This is memorialized in RFI#: ANGP-VGS-RFI-025 (attached) and then communicated to the DPS in the (attached) email From Chris LeForce to GC Morris and Louise Porter on July 7th, 2016.

Another concern was also brought up regarding soil differences potentially causing corrosion issues. This concern was quickly handled by Jeremy Bachand, Vermont Gas Corrosion Technician, NACE CP2 certified, and Bob Allen, President and Owner of ARK Engineering, NACE CP4 certified. Their conversations clarified that the conditions present in the areas where the pipe was installed directly on the ground or on sand berms were similar to those elsewhere on the project and raised no extra corrosion concern. This was documented in an email from John St. Hilaire to GC Morris and Louise Porter on July 1st, 2016 (attached).

At the time that the pipe was installed either on the trench bottom or on sand berms it was acceptable practice. VGS and the Construction Management Team then decided to remove some of the flexibility in the construction methods. After this change was made, no additional pipe was installed on the trench bottom or on sand berms.

Areas Pipe Lays on Ground or Pipe Using Dirt Berms

Date	Station From	Station To	Sand Berms	Pipe on the Ground
8/31/2015	240+26	279+75		X
6/17/2016	564+24	567+84		X
6/18/2016	889+74	892+11	X	
6/21/2016	888+38	889+74	X	
6/28/2016	863+62	864+55	X	
7/5/2016	663+00	664+50	X	

Vermont Gas

ARNGP PROJECT DIRECTIVE

Date: 9/1/2015

Subject: Construction in Sand Area

Directive Number: 2015 - 005

In 3.5(B) – Bedding and Backfilling of Section 312333 – Trenching, Pipe Laying, and Backfilling of the Technical Specifications: pipe supports shall be installed in all locations prior to backfilling, unless otherwise directed by the Construction Management Team.

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.

Issued by (print): John Stamatov

Signature: _____

This directive expires on 12/31/2015 unless superseded or cancelled prior to that date.

Adam Gero

From: John St.Hilaire
Sent: Wednesday, June 22, 2016 9:53 AM
To: Adam Gero; Chris LeForce
Subject: FW: 312333 Trenching and Backfilling Clarification

FYI

From: Kearns, Brendan [mailto:BKearns@chacompanies.com]
Sent: Wednesday, June 22, 2016 9:37 AM
To: John St.Hilaire
Cc: 'john.r.stamatov@pwc.com'
Subject: 312333 Trenching and Backfilling Clarification

Hi John St. Hilaire,

The intent of the trenching and backfilling specification is to have suitable native material (described in the specification) around the pipe as shown in the trench details on ANGP-T-G-015. If the material 6" below the bottom of the trench is deemed to be suitable material (per specifications) by the CM team, then the pipe can be laid in the bottom of the trench as long as it is sufficiently supported as stated in 3.3.C:

"The bottom of the trench shall be accurately graded to provide a uniform layer of padding/bedding material, as required, for each section of pipe. Trim and shape trench bottoms and leave free of irregularities, lumps, and projections."

If the material in the trench is determined not suitable by the CM team, then borrow material as described in section 2.1.A.2 shall be used as select backfill and placed around the pipe according to the dimensions shown in the trench detail on sheet ANGP-T-G-015. Alternatively, the contractor may use a shaker bucket with the native material to screen out the oversized material to meet the specification. However, Part 2.1.A.1 states:

"A shaker bucket or screen may be used if native material is too large, given that the characteristics of the material are suitable for successful shaker bucket or screen use."

This clause was placed in there to clarify that if the material cannot work in a shaker bucket (e.g. clay) and that material is in large "clumps" and the CM team cannot assure that the material meets the specification, then borrow material must be brought in to bed the pipe.

As far as the Cathodic Protection issue goes, clay is not as dielectric (dielectric meaning a poor electrical conductor) as sand. However, there is nothing in the code that says you can't use clay around the pipe. Ark Engineering can speak better to this, but they studied the soils along the route in preparation for the design of the CP system.

Thanks,

Brendan

Brendan C. Kearns, P.E.*
Engineer II

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Responsibly Improving the World We Live In

ANGP Pipeline Anomaly Dig, @ station 565+85

Personnel On-Site: Darrel Crandall (Mott MacDonald), Steve Miner (VGS), Kate Marcotte (VGS), and the Michels Pipeline Construction crew

Date: 09/27/2016

The Enduro Pipeline Services caliper inspection detected a 1.7% deformation in the pipe at the 4:00/4:30 location on the pipe at station 565+85, indicating a possible dent in the pipe. Pictures below show no rocks were detected around the pipe or anywhere in the excavation. Pictures also show no indication of a dent found due to construction while inspecting the pipe.

Excavation dirt pile with clumps of clay and no rocks.

Exposed pipe section at station 565+85. Moved stake into area to show location of possible dent.

ANGP Pipeline Anomaly Dig, @ station 565+85

No dent or coating damage spotted at station 565+85 after cleaning the pipe and thoroughly inspecting the pipe by hand. Checked the pipe several feet upstream and downstream of station number.

Excavation dirt pile with clumps of clay and no rocks. Expanded excavation to locate weld 0193.

ANGP Pipeline Anomaly Dig, @ station 565+85

Exposing more pipe to weld 0193. No rocks detected just clumps of clay and clay topsoil mix.

Measurement of 17’ from weld 0193 to possible dent to confirm location.

ANGP Pipeline Anomaly Dig, @ station 565+85

Confirmation measurement came to the same location from the first location observed based point set by survey. No dent detected due to a construction condition on any part of the pipe upstream or downstream of station 565+85. Re-inspected the pipe by hand several feet upstream and down stream of station 565+85 to feel for any damage. Also inspected pipe for damage in the entire section exposed. No coating damage detected or indication of a dent due to construction in the section of pipe exposed.

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Close up picture of station 565+85 at the 4:00/4:30 location. No coating damage or dent detected

PROJECT:
Addison Natural Gas Pipeline
Phase I

REQUEST FOR INFORMATION TRANSMITTAL

Date:	7/1/2016	RFI #: ANGP-VGS-RFI-025
RFI Title:	Trenching, Pipe Laying, And Backfilling Specification Clarification	
RFI Origin:	Name: Christopher LeForce	Contractor: Vermont Gas Systems, Inc.
RFI Submitted To:	Name: Brendan Kearns	Contractor: CHA

Discipline:

Engineering	[X]
Environmental	[ ]
Construction	[ ]
Other (specify)	[ ]

Information Requested:

VGS is requesting clarification with respect to the methods the pipeline can be placed in the trench and backfilled under *Section 312333 Trenching, Pipe Laying, And Backfilling Specification*. Please provide intent and clarification on the various methods the trench bottom can be prepared under the specification.

Information Response:

PER SPECIFICATION 31233, THE TRENCH BOTTOM MAY BE PREPARED UTILIZING TWO METHODS NOTED BELOW. WITH EITHER METHOD, THE PIPE SHALL HAVE A MINIMUM OF SIX (6) INCHES OF SELECT BACKFILL/PADDING PLACED BENEATH (BETWEEN IN-SITU NATIVE MATERIAL AND BOTTOM OF PIPE) AND ALL ON SIDES OF THE PIPE (SECTION 3.3.B).
1) THE PIPE MAY BE PLACED ON STACKED SANDBAGS, OR OTHER APPROVED SUPPORT METHOD (SECTION 3.5.B.) AND BACKFILLED AS SPECIFIED IN SECTION 312333.
2) THE PIPE MAY BE "CONTINUOUSLY SUPPORTED" WITH SELECT BACKFILL/PIPE PADDING (MINIMUM 6 INCHES) AS DESCRIBED IN SECTION 312333, PART 3.3.B, AND SHOWN ON DETAILS 3 AND 6 ON SHEET ANGP-T-G-015. THE CONTRACTOR AND CONSTRUCTION MANAGEMENT TEAM SHALL VERIFY THAT THE 6" OF PADDING MATERIAL BELOW THE PIPE MEETS SPECIFICATION 312333 PART 2.1.A.
PER THE SPECIFICATIONS AND DETAILS 3 AND 6 ON SHEET ANGP-T-G-015, LAYING THE PIPE DIRECTLY ON *IN-SITU* NATIVE MATERIAL ON BOTTOM OF TRENCH IS NOT ACCEPTABLE.

Authorized Signature: BCK

Printed Name and Title: BRENDAN KEARNS, CHA ENGINEER

Date: 7/5/16

Copies to: VGS-Office VGS - Field CHA VHB

Adam Gero

From: Chris LeForce
Sent: Thursday, July 07, 2016 6:16 PM
To: Morris, GC
Cc: John St.Hilaire; Adam Gero; Porter, Louise
Subject: VGS weekly meeting follow-up
Attachments: Adhesion Test - Field Coating Rev.2.pdf; ANGP-VGS-RFI-025-R0 RESP.pdf; Denso 35 Tape Peel test procedure 2016 0707 Rev 1.pdf; VGS Project Org Chart_06142016 v1.pdf

GC,

I have attached multiple documents that you have requested copies of or have asked for additional clarification during our weekly meetings. They are listed below with an explanation.

VGS Project Org Chart_06142016 v1.pdf – This was provided in hard copy form at our meeting on 7/5/2016. John St. Hilaire said we would send along an electronic version.

Denso 35 Tape Peel test procedure 2016 0707 Rev 1.pdf & Adhesion Test - Field Coating Rev.2.pdf – It was requested that we properly title the adhesion test procedure for the Denso 35 Tape. The final version is attached. I have also included the updated QA/QC Adhesion Test Plan, which incorporates this test for the tape. These documents will be added to the Inspector Manual on Monday morning.

ANGP-VGS-RFI-025-R0 RESP.pdf – This is the Request for Information (RFI) related to the pipe trench preparation under Section 312333 Trenching, Pipe Laying, and Backfilling Specification. VGS had asked CHA to clarify the methods that were acceptable under the specification, as it is written under its current revision.

It was our intent to allow the pipe to be installed on the trench bottom if the soil conditions were shown to be rock free, which would be completed by inspecting the trench bottom and sidewalls and also the spoil from the trench. If a determination could not be made or the soil contained rocks, then the pipe would be properly supported and padded during the installation. This is a commonly accepted construction technique used in the industry by other companies when favorable soil conditions exist. This is a similar situation to the use of the sand berms or “dutchmen” for pipe support in the trench in lieu of sandbags or pipe pillows. It is a commonly used method of installation in the industry. Both are difficult to inspect and by a pure interpretation reading of the specification, neither is allowed unless the specification was edited and updated, as shown in CHA’s response to the RFI.

VGS at this time will not be using either technique and has instructed the Construction Management (CM) Team to completely pad the trench bottom or use sand bags as pipe supports unless they submit an alternative for approval. We will also circulate a copy of the RFI to the CM Team to present the interpretation. The CM Team has stated these have been the primary techniques used on the installed pipe, except for a few hundred-foot section installed south of the Williston Gate Station. We will incorporate this section into the QA/QC Program.

Regards, Chris

Adam Gero

From: John St.Hilaire
Sent: Thursday, June 08, 2017 3:57 PM
To: Chris LeForce; Adam Gero
Subject: FW: VGS weekly meeting follow-up

From: John St.Hilaire
Sent: Friday, July 01, 2016 4:55 PM
To: Morris, GC (GC.Morris@vermont.gov)
Cc: Chris LeForce; Adam Gero; Porter, Louise (Louise.Porter@vermont.gov)
Subject: VGS weekly meeting follow-up

Hi GC.

We had two items to follow up with from our Tuesday meeting including pipe placement in the trench and induced voltage.

Pipe placement in the trench – On 6/21 we discussed this item and we understood the issue to be around the placement of the pipe at the bottom of a trench and if our spec allowed for this or were we required to add padding. We engaged our engineering firm of record to provide input on whether the spec allowed for a pipe to be placed at the bottom of the trench when suitable backfill material is present. We provided an e-mail from the engineering firm describing his wording and intent to allow pipe to be placed on the bottom of the trench when suitable material is present without bedding. This is the same interpretation our inspection and our pipeline contractors have taken in regard to the spec. During our 6/28 meeting, we learned the issue was not the mechanical aspects of placing the pipe at the bottom of a trench, it is the corrosion potential due to oxygen differentials in the soil layers. We again reached out to others to determine if this was an acceptable practice. We engaged Mott McDonald and two New England LDC's who all reported that when suitable backfill material is present in the bottom of the trench, it is acceptable and common to put the pipe on the bottom of the trench. Today (7/1) at 2pm, we discussed this with ARK engineering to understand the corrosion aspect of oxygen concentration. We reviewed the report (Bushman & Associates, Inc.) provided by Mr. McCauley and find it does walk through various corrosion mechanisms including Galvonic Corrosion, Oxygen concentration corrosion, and Corrosion caused by dissimilar soils. Further it states "corrosion can be caused due to differences in the electrolyte. These differences may be in the soil resistivity, oxygen concentration, moisture content, and various ion concentrations". The next section of the report details corrosion control mechanisms including coating pipe and cathotic protection.

Corrosion is a factor that we work to minimize on a pipeline. Corrosion can occur from oxygen concentrations at the change of soil from one geologic area to another, from an HDD to open trenching, and from moving through wetlands not only due to soil changes but due to the added moisture content of the soil. We cannot eliminate every risk of corrosion, which is why we utilize the corrosion control mechanisms listed in the Bushman report including pipe coating, cathotic protection, and compacting backfill with native soil in minimizing oxygen concentration corrosion.

Our research shows that placement of cathotically protected coated steel pipe on the bottom of a trench with suitable backfill material (no sharps, etc) is an accepted practice in the natural gas industry from a mechanical and corrosion perspective. The Bushman concludes with "When a system is designed, installed, and maintained properly, cathotic protection is one of the most effective and economical methods of preventing corrosion". With the evaluation complete, we have submitted an RFI to our engineer to officially clarify the spec and its allowance for the placement of the pipe at the bottom of a trench when suitable backfill material is present.

Induced voltage – On 6/21 we again discussed managing induced voltage. We both had been trying to get a Velco procedure to manage induced voltage. In the meantime, Michels implemented their standard management approach to induced voltage including daily measuring and installing grounding rods. We were also asked about the qualifications of the Michels safety individual who was managing the induced voltage program. During the week of 6/21 we developed a formal Michels procedure, provided a summary of the readings for the project, and the resume of the Michels regional safety manager. All readings from the start of the project were substantially below the recommended level of 15 volts. On 6/28, we provided the written procedure and asked for comments. We also agreed to provide additional information regarding the Michels safety person for Induced voltage. We reached out to Ark Engineering, two New England LDC's, and our own NACE 2 CP tech to learn about managing induced voltage on a shared ROW. We learned a procedure should be in place, testing and training should be required, and grounding installed to manage induced voltage. We learned that there is no industry certification for induced voltage and the NACE CP certifications only briefly covers induced voltage. Our research indicated that an individual with actual experience managing induced voltage on a pipeline project should be used to manage the induced voltage program. During our conversation with ARK engineering, we asked them to audit our procedure and give feedback on how we can improve the procedure. We provided the procedure to ARK on 7/1. Ark Engineering is the entity that designed the cathotic protection system for the pipeline and did an induced voltage survey of the Velco line when designing the system. We continue to be open to suggestions and ways to improve the management of induced voltage.

I am still working on the information on the Michels regional safety manager and hope to have that for you on Tuesday.

Please let me know if you have any questions.
John