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Re: Comments on Docket HP22-002

Dear Public Utilities Commission:

My name is Thomas Tiaht; I am an Associate Professor of Decision Sciences in the Beacom School of Business at the University of South Dakota (USD) and a scientific researcher for the United States Department of Veterans Affairs (VA). I have attached my curriculum vitae. My views are my own and reflect neither the views of USD nor those of the VA.

I write regarding the Navigator Heartland Greenway Pipeline (NHGP) application. I claim expertise in accordance with SDCL 19-19-702 ([sdlegislature.gov/Statutes/19-19-702](http://sdlegislature.gov/Statutes/19-19-702)). Specifically, my expertise is in statistics, predictive and prescriptive analytics.

I write as a supporter of South Dakota's economic development and the ethanol industry. I would support a carbon-capture pipeline were it to increase the profitability of South Dakota farming operations and ethanol producers while meeting the criteria specified in SDCL 49-41B-22 ([sdlegislature.gov/Statutes/49-41B-22](http://sdlegislature.gov/Statutes/49-41B-22)). However, the NHGP does not do so.

Many PUC staff requests were replied to using the following assertion, "*RESPONSE: Objection. This request seeks information that Navigator maintains as confidential and proprietary.*" That answer lacks the transparency required of a public process. Another example is the reply to the question,

***"Please provide a summary report on the plume modeling completed and the results of such modeling that are referenced on page 11 of Mr. Lee's direct testimony and in Section 2.2 of the Application."***

*"RESPONSE: Objection. This request seeks information that is confidential and proprietary because it has commercial value and disclosure to any competitor would cause damage to Navigator."<sup>1</sup>*

In the same document, we read, "*It also seeks information that may be outside the jurisdiction of the PUC based on federal preemption and to that extent is not relevant to the scope of this proceeding.*" These demands to impose a veil of ignorance on the public are troubling.

A surprising instance of impairing transparency is, "*Navigator's plume modeling is commercially sensitive, complex, and easily misinterpreted.*" But nothing prevents Navigator from sharing the plume information along with their interpretation. On the other hand, if your purpose is to control public opinion, the less the public knows about the pipeline, the greater the chance of acceptance.

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<sup>1</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Staff JT1.pdf](http://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Staff%20JT1.pdf) p. 48

As Koornneef mentions, “*Whether the risks (i.e., the risks of CO2 pipelines) are socially acceptable will depend on public attitude*” (Koornneef et al., 2010). If Navigator wants to claim transparency can cause damage, they need to justify that claim instead of merely asserting it.

Navigator never establishes the basis for those opacity demands. While we cannot determine the basis for those claims from an external perspective due to the occlusion, we can observe the effects. One effect is to keep the public ignorant of the pipeline’s danger.

SDCL 49-41B-22 requires that:

**(2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area.**

The economic condition of both inhabitants and expected inhabitants is threatened, and they potentially could be seriously injured by the pipeline.

One threat is pollution discharge liability. The landowner concerns regarding pollution insurance were dismissed by Jeffrey L. Pray<sup>2</sup>, apparently assuming that specialty carriers could meet their needs. But Pray does not describe the cost of such policies or whether anyone has been covered for carbon dioxide pollution resulting from a pipeline failure. Without specifics, it is impossible to know whether landowners can obtain the coverage or whether it is available but cost prohibitive.

### **Development Dead Zone**

The pipeline will create an economic dead zone for landowners unfortunate enough to have the pipeline cross their land. Not only will the easement be unavailable for development, the surrounding area will have to remain undeveloped due to the danger posed by a pipeline puncture or rupture.

The National Institute for Safety and Health (NIOSH, 2007) “*has determined that human exposure to 4% (40000 ppm) CO2 concentration poses an immediately threat to life and health*” (Wang et al., 2021). A distance that ensures safety in one rupture example is “*At 35 s, the horizontal safe distances for the terrains were 286.46 m and 291.53 m, respectively*” (Wang et al., 2021). Those distances, 940 ft to 956 ft, are well beyond the “aspirational” values Navigator proposes (321 ft. and 417 ft.)<sup>3</sup> If the UK-acceptable values were adopted, just a 20% puncture of a 12-inch pipeline would require a 249 m (817 ft.) buffer (Vianello et al., 2016). Once people understand their jeopardy, they will not want to live or work anywhere near the pipeline. All property values within the affected area will decline, and development will be thwarted. That growth constraint would be imposed on the largest and fastest-growing community in South Dakota.

### **Oversold Economic Benefits**

Moreover, the description of the pipeline’s offsetting economic benefits is general; many advantages are contingent on questionable premises. For example, the question “***Is there a commercial market for the use of carbon dioxide from which Navigator’s current and future customers may benefit?***” was asked in the rebuttal testimony of Laura McGlothlin. EVP & CCO McGlothlin replied, “*Yes. Carbon*

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<sup>2</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/JPrebuttal.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/JPrebuttal.pdf)

<sup>3</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/Navigator/N35.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/Navigator/N35.pdf)

dioxide is currently used commercially in many ways, including, use in the food and beverage industry, dry ice, welding, fire extinguishers, cleaning, and in other products like cement.<sup>4</sup>“However, those applications already exist. POET is a good example.

*Ethanol giant POET actively captures and sells ultra-high purity CO<sub>2</sub> to the beverage industry for carbonated drinks, the food processing industry for refrigeration, municipalities for water treatment, and more, under the POET Pure brand, according to Doug Berven, POET’s vice president of corporate affairs (Schroeder, 2022).*

POET’s commercial sales already occur without a pipeline. EVP McGlothlin testified that “Navigator is currently working on similar long-term agreements with other potential customers who will need a larger and more reliable supply of carbon dioxide for their commercial and industrial purposes that could not be efficiently or economically satisfied through the shipment of carbon dioxide by truck or rail.” However, there are no details about those opportunities and no way to evaluate their probability of success.

EVP McGlothlin identifies one concrete example of potential sales, “a Memorandum of Understanding and long-term relationship with Infinium to deliver 600,000 tons per annum of biogenic carbon dioxide from the pipeline to a future facility for the production of eFuels” but the future of eFuels is uncertain.

The EU has banned new CO<sub>2</sub>-emitting cars beginning in 2035 (Waldersee, 2023). The academic research notes, “E-fuels promise to replace fossil fuels with renewable electricity without the demand-side transformations required for a direct electrification. However, e-fuels’ versatility is counterbalanced by their fragile climate effectiveness, high costs and uncertain availability” (Ueckerdt et al., 2021).

In addition, the Memorandum of Understanding will not cover the carbon dioxide captured in South Dakota, much less the total capture from all the pipeline-connected ethanol plants.

**2-3) Refer to Page 3 of the Application, Table 1.2-1. The Applicant states it will capture 0.9 MMT of carbon dioxide per year from facilities in South Dakota. Please identify how much carbon dioxide per year will be captured from each facility in South Dakota.**

RESPONSE: VLO Aurora = 392,067 POET Chancellor = 308,246 POET Hudson = 194,682 <sup>5</sup>.

Arithmetically, 392,067 + 308,246 + 194,682 = 894,995 and 894,995 – 600,000 = 294,995 less than the total; the remaining pipeline-connected ethanol plans will add to the total.

Others in the carbon dioxide sequestration industry do not share McGlothlin’s view.

*Non-food grade CO<sub>2</sub> does not have any product value...the only value is the tax value provided under 45Q. This poses an extremely challenging business risk as project economics hinge solely on government subsidies. (PCS®-CO<sub>2</sub>-Sequestration-and-Infrastructure-Team, 2023)*

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<sup>4</sup> puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/LMRebuttal.pdf

<sup>5</sup> puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Staff/JT1.pdf p. 101

Also, as Carolyn Raffensberger's testimony shows<sup>6</sup>, environmental activists have shifted from advocacy of carbon capture pipelines to opposition. They have also resisted low-carbon projects (Temper et al., 2020). Without the support of environmental activists, it is unclear how low-carbon fuel standards will remain as incentives for the ethanol industry.

### **Regional Economic Impact Studies**

Jon Muller has presented a **Regional Economic Impact Study**. The work comprises "... a series of 8 simulations, covering 4 impact scenarios across 2 phases." Jared McEntaffer produced another study, **Economic Impacts of CO<sub>2</sub> Pipelines in South Dakota**, which states, "This analysis aims to model and understand the potential economic impacts of CO<sub>2</sub> pipelines in South Dakota." Both used Regional Economic Models, Inc (REMI) to generate their models, and REMI creates econometric models.

Any model is subject to the George E. P. Box adage, "All models are wrong, but some are useful" (Box, 1976). The question is, are the McEntaffer and Muller models useful to the South Dakota Public Utilities Commission for predicting the pipeline's economic impact? The answer is that there is no way to know.

The reasons we cannot know are: (1) there is no quantification of prediction uncertainty, (2) there are no evaluation metrics with which to assess the results, and (3) there is no track record of follow-up studies to demonstrate the prediction quality of previous models.

The limitations of econometric models have long been known, e.g., "I fear that many people do not realize how tenuous the conclusions drawn from econometric models really are" (Richter, 1972). Phillips provides a realistic view of limitations.

*Forty years of empirical research in macroeconomic forecasting suggests there are limits to our capacity to make predictions about economic activity. In fact, the performance of aggregate predictions has improved little over this time in spite of much early optimism, enormous bodies of research in macroeconomic theory and modeling, improvements in econometric methods, and larger data sets of better quality. (Phillips, 2003).*

Moosa's assessment is, "... I wrote this book to expose the limitations and abuses of econometrics and demonstrate that it is a con art that can be used to prove almost anything" (Moosa, 2017).

Consequently, the proposed upside of the pipeline is dubious, at best. When the proposed costs and benefits are combined, they show that the applicant has not met criteria (2).

### **(3) The facility will not substantially impair the health, safety or welfare of the inhabitants**

More importantly than the economic concerns, the safety considerations of the proposed CO<sub>2</sub> pipeline have not been met by the applicant. In the above section, the Navigator-proposed buffer sizes are shown to be inadequate. The testimony<sup>7</sup> and surrebuttal<sup>8</sup> of Dr. John Abraham, as well as

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<sup>6</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/Landowners/LO99.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/Landowners/LO99.pdf)

<sup>7</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/Landowners/LO90.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/Landowners/LO90.pdf)

<sup>8</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/Landowners/LO91.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/Landowners/LO91.pdf)

that of Matthew Frazell,<sup>9</sup> show the defects in the applicant's due diligence responsibilities regarding pipeline puncture and rupture.

### **Satartia**

One troubling aspect of Navigator's application is the use of the same software (PHAST) as Denbury, the pipeline company responsible for the Satartia, MS incident. When coupled with the observation made by Mark Hereth, "*According to PHMSA, 45 people sought medication attention at local hospitals after the Denbury incident in Satartia, though none required inpatient hospitalization as a result of the failure. No fatalities resulted.*"<sup>10</sup> we have to wonder whether the applicant wants to rely on luck to avoid pipeline-failure-related deaths. After all, we know that "*Incident reports suggested the possibility of casualties if the incident had occurred at night rather than during the day (with people asleep in their homes) or if the wind direction had been less favorable*" (Siregar et al., 2023).

Moreover, proceeding with the pipeline process before the PHMSA completes its updates means that changes from the lessons learned in Satartia will not be reflected in pipeline construction.

*PHMSA currently applies safety requirements to CO2 pipelines similar to those of other hazardous materials, such as Class 2.2 non-flammable gas. However, after the accident in Mississippi, the agency announced new safety measures to prevent such incidents and ensure readiness in the event of a pipeline failure. Among the new regulations is an integrity management measure requiring operators to take additional preventative and mitigative steps to address potential damage caused by earth movement. The revision also included improvement to standards pertaining to emergency preparedness and response plans.* (Siregar et al., 2023)

In addition, the rebuttal testimony of Stephen Lee states, "*The carbon dioxide stream entering the system at the ethanol and fertilizer facilities who will be Navigator's customers will meet the CO2 quality specifications required in the shipper agreements and be of a very high purity level, above 98% carbon dioxide.*"<sup>11</sup> We see the same 98 percent in the rebuttal testimonies of John Godfrey<sup>12</sup> and Mark Hereth.<sup>13</sup> We also know that "*Fermentation in ethanol production yields 99.9 percent pure CO<sub>2</sub>*" (Fry et al., 2017). Why does the applicant use a lower threshold than production quality carbon dioxide? And what impurity comprises the difference between 98 percent and 99.9 percent? If it is water, it poses a problem because "*Dehydration is of the CO<sub>2</sub> is essential as any water vapor left in the gas will corrode the pipeline over time*" (Stukel, 2023). That corrosion could lead to a pipeline failure.

Criteria (3) has not been met.

*(4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.*

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<sup>9</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/S13.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/hearing/S13.pdf)

<sup>10</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/MHR rebuttal.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/MHR rebuttal.pdf)

<sup>11</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/SL.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/SL.pdf)

<sup>12</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/JGRebuttal.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/JGRebuttal.pdf)

<sup>13</sup> [puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/MHRRebuttal.pdf](https://puc.sd.gov/commission/dockets/HydrocarbonPipeline/2022/HP22-002/testimony/Navigator/MHRRebuttal.pdf)

Navigator's response to the affected county commissions in the face of the conditions described in the Development Dead Zone section above demonstrates that they have not complied with criteria (4).

I reserve the right to amend or modify the information contained in this document upon presentation of any additional information that may justify such a change.

Thank you for your attention to my letter.

Best regards,  
Thomas Tiaht

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