

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA**

**IN THE MATTER OF THE APPLICATION BY SCS CARBON TRANSPORT LLC FOR
A PERMIT TO CONSTRUCT A CARBON DIOXIDE TRANSMISSION PIPELINE**

DOCKET NO. HP22-001

**Direct Testimony of Matthew Frazell
On Behalf of the Staff of the South Dakota Public Utilities Commission
June 23, 2023**

1 **Q: Please state your name and business address.**
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3 A: Matthew Frazell, ERM, 7700 Windrose Ave., Plano, Texas 75024
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5 **Q: Describe your educational background.**
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7 A: I have a Bachelor of Science in Civil Engineering
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9 **Q: By whom are you now employed?**
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11 A: I have been employed by Environmental Resources Management, Inc. since May
12 of 2012.
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14 **Q: What work experience have you had that is relevant to your involvement on
15 this project?**
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17 A: I have had 9 years of full-time experience as a consultant, and 2 years as an intern,
18 focusing on Regulatory Compliance, Process Safety Management including
19 Quantitative Risk Assessment. Of the 9 years of full-time experience, I was
20 seconded for 2 years at a company that operated carbon dioxide (CO₂) pipelines.
21 At this seconded position, I was responsible for reducing the risk of leaks from CO₂
22 pipelines, which included modeling the effects of leaks and managing the
23 execution of risk based internal inspections of both pipelines and facilities.
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25 **Q: What is the purpose of your testimony?**
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27 A: To provide an honest and unbiased expert opinion as to the adequacy of any
28 modeling pertaining to risk assessment and/or consequence analysis for the
29 Application for the SCS Midwest Carbon Express Pipeline System. As part of this
30 testimony, I reviewed all sections of the Supplement of the Application
31 (Application) filed on 10/13/2022, its attachments, and other supporting
32 documentation (e.g., Applicant's responses to South Dakota Public Utilities
33 Commission [SDPUC] data requests).
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35 **Q: Are you familiar with pipeline risk assessments?**
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37 A: Yes. I have experience in Quantitative Risk Assessment, (QRA), Risk Based
38 inspection techniques, and U.S. Pipeline and Hazardous Materials Safety
39 Administration (PHMSA) risk assessment and mitigation strategies.
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41 **Q: Are you familiar with dense gas dispersion modeling?**
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43 A: Yes, I have experience with dense gas dispersion modeling, which includes far-
44 field vapor dispersion modeling of multiple types of fluids including CO₂, and
45 specifically CO₂ pipelines.
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47 **Q: Are you familiar with PHMSA’s risk assessment/modeling requirements**
48 **and PHMSA’s guidance on pipeline risk modeling?**

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50 A: I am familiar with PHMSA Risk assessment and modeling methodologies,
51 including PHMSA Part 192 and 195 risk assessment methodologies. I am also
52 familiar with the PHMSA document titled *Pipeline Risk Modeling Overview of*
53 *Methods and Tools for Improved Implementation, 2020*, which discusses many
54 different types of Pipeline risk assessment methods and tools including
55 consequence analysis.

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57 **Q: Why do operators subject to PHMSA’s regulations complete risk modeling?**

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59 A: Operators subject to PHMSA regulations perform risk modeling to determine that
60 their chosen pipeline design and location are such that the risks associated with
61 the construction and operation of these pipelines are properly mitigated to prevent
62 harm to the public, the operator’s employees, and environment.

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64 **Q: Should risk modeling be used to inform pipeline siting decisions?**

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66 A: Performing various types of risk modeling is needed to mitigate risk associated
67 with the operation of the pipeline installation in relation to the public, operator’s
68 employees, and the environment. The applicant would develop and use sound
69 models, which denote where the pipeline has the potential to impact the health and
70 safety of the public, employees, and the environment; to be able to adjust the route
71 of the pipeline to minimize these risks.

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73 **Q: How can risk modeling be used to inform pipeline siting decisions?**

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75 A: Pipeline operators use risk modeling to identify where the pipeline has the potential
76 to impact High Consequence and Highly sensitive areas. Risk modeling can and
77 should be used to determine where potential risks to the public or environment are
78 elevated due to the population density and proximity of the proposed location to
79 environmentally sensitive areas.

80
81 **Q: Did you review the risk and dispersion modeling completed by SCS?**

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83 A: Yes, I reviewed the Application, several supporting documents, and Applicant’s
84 responses to data requests. Two documents titled “*DRAFT – Dispersion Modeling*
85 *Methodology, 2-16-23*” and “*DRAFT - Risk Assessment Overview Report, 2-16-*
86 *23*” provided as a supplement to Applicant’s responses to the SDPUC’s second
87 set of data requests were directly related to risk analysis and dispersion modeling.

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89 **Q: Please summarize the risk and dispersion modeling completed by SCS?**

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91 A: Section 5.4 – Aquatic Ecosystems of the Application speaks at a high level the risk
92 associated with the release of CO₂ from the pipeline on the environment. The

93 Application does not speak directly to the Risk and Dispersion Modeling, which is
94 acceptable from an application readiness standpoint. However, the documents,
95 which were received confidentially in response to Staff data requests, titled
96 “DRAFT – Dispersion Modeling Methodology, 2-16-23” and “DRAFT - Risk
97 Assessment Overview Report, 2-16-23” do speak directly to the Risk and
98 Dispersion modeling conducted by SCS for the project. The document titled
99 “DRAFT – Dispersion Modeling Methodology, 2-16-23” describes, in summary,

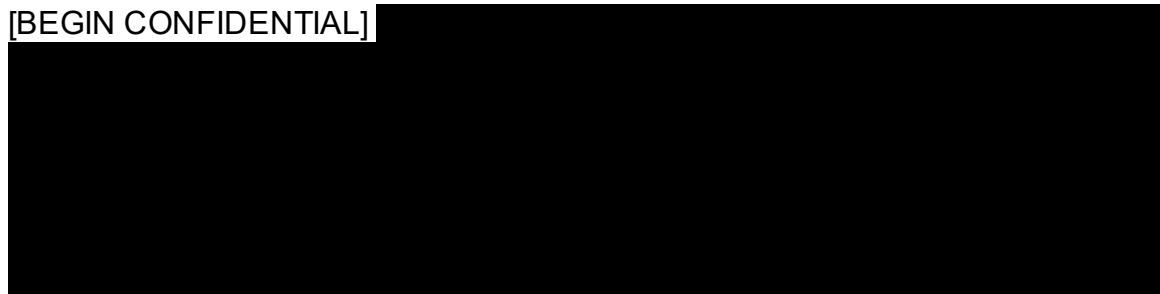
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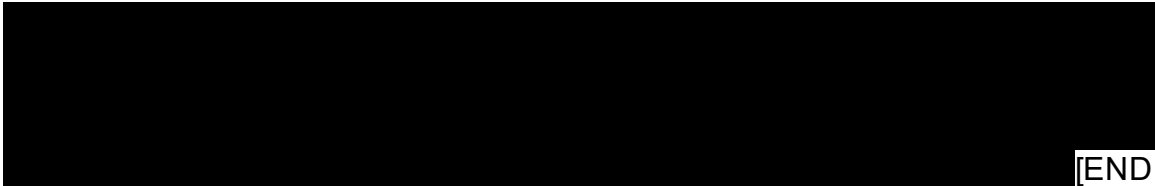
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121 **Q: Does the modeling completed by SCS align with PHMSA’s guidance?**

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123 A: The documents titled “DRAFT – Dispersion Modeling Methodology, 2-16-23” and
124 “DRAFT - Risk Assessment Overview Report, 2-16-23” do speak to specific
125 PHMSA regulatory citations (PHMSA 49 CFR Part 195) and appear to align with
126 the PHMSA Risk Assessment Methodology.

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128 **Q: Please summarize the findings of the risk and dispersion modeling**
129 **completed by SCS?**

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131 A: [BEGIN CONFIDENTIAL] 
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CONFIDENTIAL]

Q: There has been discussion in the industry regarding the use of Computational Fluid Dynamic (CFD) modeling for carbon dioxide pipelines. Do you have an opinion on the use CFD modeling at this stage in the project planning and design?

A: The use of Computational Fluid Dynamics (CFD) is coming up more and more as an option for use in consequence modeling. CFD modeling is relatively new to the consequence and risk modeling industry, and its uses are becoming more apparent as the technology is more widely used. CFD modeling is generally considered to be more accurate in terms of plume shape and movement as compared to conventional consequence modeling programs such as CANARY, since CFD modeling takes into account the three-dimensional (3D) effects of terrain, whereas CANARY assumes flat ground. However, there are some drawbacks to using CFD software in consequence modeling. Most CFD modeling takes exponentially more time and cost to perform the modeling yet yields little more information than what Canary would provide. Most conventional modeling software packages have conservative assumptions built in and end up generally being a bit more conservative than CFD would be. CFD modeling excels at modeling small project models such as a fluid pump or airplane wing, and though it can be used to model far field dispersion (large open spaces) it is not its originally intended purpose, which is what drives the higher cost and longer timeline. Due to the higher cost, extended modeling time requirements, and relatively minimal increase in accuracy for the purposes of dispersion modeling; the use of CANARY is suitable for use in consequence modeling for this project.

Q: In your opinion, should the dispersion modeling completed by SCS be used by the Commission to establish setback requirements? Please explain why or why not.

A: Yes, dispersion modeling should be used, in part, to help establish setback requirements. Most setback distances are regulatory code and standard driven, which were generally developed prior to the industry adoption of dispersion modeling use. Though the use of dispersion modeling will likely produce the largest setback distance, there may yet be some special circumstance where the existing regulatory setback distance is larger than what the dispersion modeling would yield. Dispersion modeling should be one of the many factors used to determine the appropriate setback distance. By including dispersion modeling, as a component, in the required setback distance determination, the commission would be able to add an additional layer of protection against a potential release.

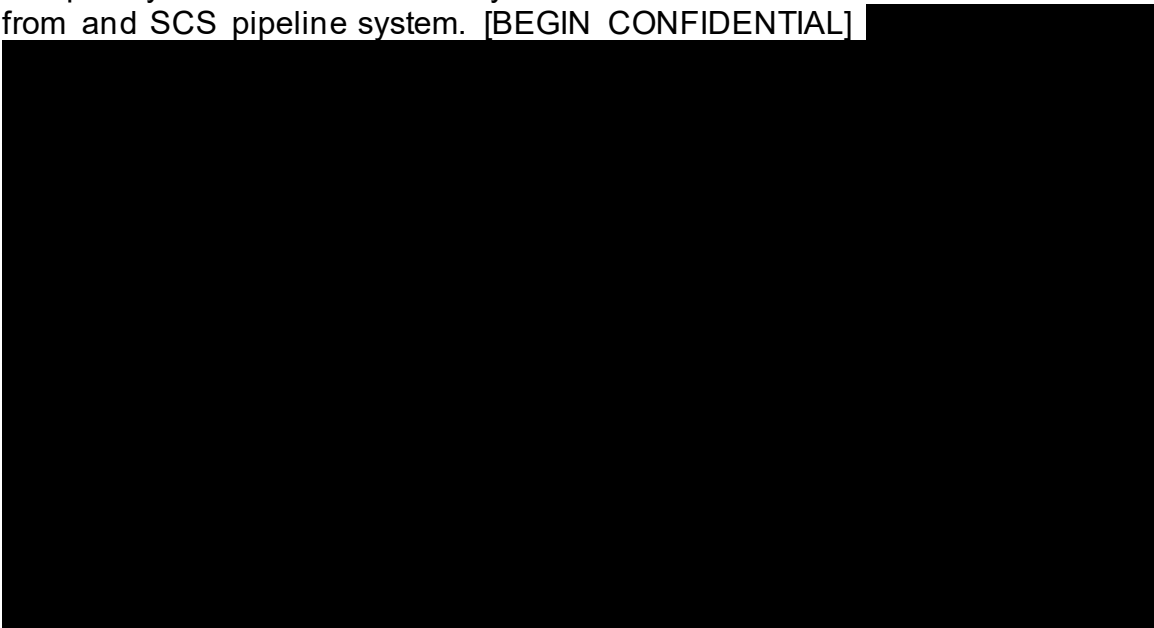
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Q: If you recommend the Commission establish setback requirements based on dispersion modeling, what are the appropriate setback distances the Commission should consider requiring?

A: Yes, I recommend that requirements for setback distances include the use of dispersion modeling, and the thresholds for the dispersion modeling setbacks should be based on the distances to a threshold concentration based on the United States Department of Agriculture (USDA) and the National Institute for Occupational Health and Safety (NIOSH) immediately dangerous to life and health (IDLH) concentration of 40,000 parts per million (ppm). The 40,000-ppm concentration threshold provides a balance between the impacts to health and safety and the flexibility needed to route a pipeline.

Q: Does the risk and dispersion modeling completed by SCS provide an adequate analysis of the potential risks and impacts of the proposed carbon dioxide pipeline? Please explain.

A: Based on the information currently provided, the Applicant has been able to adequately provide the information associated with the way in which they assessed the consequences of a CO2 release from a pipeline but have not provided the detailed inputs to the consequence modeling that was performed. SCS has not provided sufficient detailed information pertaining to the risk modeling to adequately determine the accuracy of the stated risk associated with the release from and SCS pipeline system. [BEGIN CONFIDENTIAL]



[END CONFIDENTIAL]

Q: Based on your review of the risk and dispersion modeling completed by SCS, is there adequate information in the record for the Commission to make findings in accordance with SDCL 49-41B-22? Please explain.

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232 A: No, based on the information currently provided, the Applicant has not adequately
233 provided sufficient information to accurately articulate the consequences and risk
234 to employees, public, and environment. The applicant has provided a summary of
235 the consequence modeling, but the summary has no quantitative value that would
236 aide in determining the adequacy of the inputs. The Applicant has yet to provide
237 information pertaining to how the calculated risk of operating the pipeline is [BEGIN
238 CONFIDENTIAL] [REDACTED]
239 [REDACTED]
240 [REDACTED]
241 [END CONFIDENTIAL]

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243 **Q: Did SCS identify any high consequence areas (HCAs) that could be**
244 **impacted by the project? If yes, please identify the HCAs.**

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246 A: Yes [BEGIN CONFIDENTIAL] [REDACTED]
247 [REDACTED]
248 [REDACTED]
249 [REDACTED]
250 [REDACTED]
251 [REDACTED]
252 [REDACTED]
253 [REDACTED] [END
254 CONFIDENTIAL]

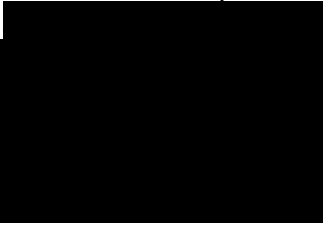
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256 **Q: If the project crosses any HCAs or USAs, do you believe SCS has the**
257 **proper mitigation measures in place? Please explain.**

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259 A: No, I do not believe the project has the potential mitigation measures in place
260 based on the information I have reviewed. I believe that the pipeline has the
261 potential to impact HCAs based on the document titled "*DRAFT – Dispersion*
262 *Modeling Methodology, 2-16-23*". [BEGIN CONFIDENTIAL] [REDACTED]
263 [REDACTED]
264 [REDACTED]
265 [REDACTED]
266 [REDACTED]
267 [REDACTED] [END CONFIDENTIAL]

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269 **Q: Based on your review of SCS's Application and responses to interrogatories**
270 **specific to the consequence analysis and quantitative risk assessment, is it**
271 **your opinion that the pipeline will not pose a threat of serious injury to the**
272 **health, safety or welfare of the inhabitants, employees, or the environment?**
273 **Please explain.**

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275 A: Based on the information provided at this time, it appears that the SCS project
276 could impact HCAs. However, the degree at which the HCAs are impacted remains

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unknown. The applicant states in the document titled "*DRAFT – Dispersion Modeling Methodology, 2-16-23*" [BEGIN CONFIDENTIAL] 

[END CONFIDENTIAL] Without this detailed information, I cannot determine that the project will not pose a threat of serious injury to the inhabitants, employees, or the environment.

Q: Does this conclude your testimony?

A: Yes.