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

Q: Please state your name and business address.

A: Matthew Frazell, ERM, 7700 Windrose Ave., Plano, Texas 75024

Q: Describe your educational background.

A: I have a Bachelor of Science in Civil Engineering

Q: By whom are you now employed?

A: I have been employed by Environmental Resources Management, Inc. since May of 2012.

Q: What work experience have you had that is relevant to your involvement on this project?

A: I have had 9 years of full-time experience as a consultant, and 2 years as an intern, focusing on Regulatory Compliance, Process Safety Management including Quantitative Risk Assessment. Of the 9 years of full-time experience, I was seconded for 2 years at a company that operated carbon dioxide (CO2) pipelines. At this seconded position, I was responsible for reducing the risk of leaks from CO2 pipelines, which included modeling the effects of leaks and managing the execution of risk based internal inspections of both pipelines and facilities.

Q: What is the purpose of your testimony?

A: To provide an honest and unbiased expert opinion as to the adequacy of any modeling pertaining to risk assessment and/or consequence analysis for the Application for the SCS Midwest Carbon Express Pipeline System. As part of this testimony, I reviewed all sections of the Supplement of the Application (Application) filed on 10/13/2022, its attachments, and other supporting documentation (e.g., Applicant's responses to South Dakota Public Utilities Commission [SDPUC] data requests).

Q: Are you familiar with pipeline risk assessments?

A: Yes. I have experience in Quantitative Risk Assessment, (QRA), Risk Based inspection techniques, and U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) risk assessment and mitigation strategies.

Q: Are you familiar with dense gas dispersion modeling?

A: Yes, I have experience with dense gas dispersion modeling, which includes far-field vapor dispersion modeling of multiple types of fluids including CO2, and specifically CO2 pipelines.

Q: Are you familiar with PHMSA's risk assessment/modeling requirements and PHMSA's guidance on pipeline risk modeling?

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

Q: Why do operators subject to PHMSA's regulations complete risk modeling?

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

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

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

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

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

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

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

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

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

Application does not speak directly to the Risk and Dispersion Modeling, which is acceptable from an application readiness standpoint. However, the documents, which were received confidentially in response to Staff data requests, titled "*DRAFT – Dispersion Modeling Methodology, 2-16-23*" and "*DRAFT - Risk Assessment Overview Report, 2-16-23*" do speak directly to the Risk and Dispersion modeling conducted by SCS for the project. The document titled "*DRAFT – Dispersion Modeling Methodology, 2-16-23*" describes, in summary, [BEGIN CONFIDENTIAL] [redacted] [END CONFIDENTIAL]

Q: Does the modeling completed by SCS align with PHMSA's guidance?

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

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

A: [BEGIN CONFIDENTIAL] [redacted]

[redacted] [END 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 of 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.

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] [redacted] [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.

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

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

A: Yes [BEGIN CONFIDENTIAL] [redacted] [END CONFIDENTIAL]

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

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

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

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

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

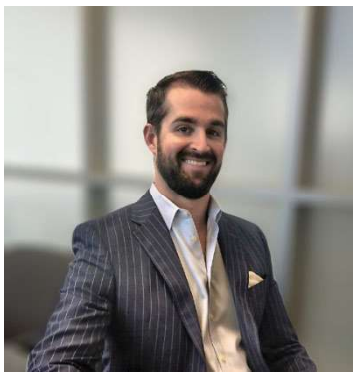
Q: Does this conclude your testimony?

A: Yes.

Matthew Frazell, EIT, ASP

Principal Consultant

Matthew is a graduate engineer, who holds a B.S. in Civil Engineering from Texas Tech University and has over ten years of Engineering, Process Safety, and Regulatory consulting experience. His work experience at ERM includes Facility and pipeline consequence analysis, PSM program development and auditing for midstream and downstream facilities, production and processing facility engineering design, equipment design, well site design/layout, flare studies and PSV sizing calculations, Greenhouse Gas reporting and SPCC plan generation. He also participated in over 150 PHAs as a Facilitator and Scribe. He is proficient with AutoCAD and ProMax. He has completed the AIChE certificate training program for HAZOP and LOPA. Matthew holds an Associate Safety Professional credential, and is an Engineer-In-Training with the Texas Board of Professional Engineers.



Experience: Ten years' experience in oil and gas, Energy, and Petrochem sectors

Email: Matt.Frazell@erm.com

LinkedIn: https://www.linkedin.com/in/matthew-frazell-eit-asp-9447621a/

Education

- BS, Civil Engineering, Texas Tech University

Professional Affiliations and Registrations

- Engineer-in-Training (EIT) in the State of Texas
- Associate Safety Professional (ASP), Board of Certified Safety Professionals
- Eagle Scout, Boy Scouts of America (BSA)
- Society of Petroleum Engineers
- Independent Petroleum Association of America

Languages

- English, native speaker
- Spanish, limited working proficiency

Fields of Competence

- DOT / PHMSA Compliance
- Consequence Analysis
- Mechanical Integrity
- Facility Design
- Relief Valve Design & Sizing

Key Industry Sectors

- E&P Upstream
- Alternative Energy
- Gas Processing Midstream
- Petrochem Downstream

Publications

- Safety in the Red Zone: Hydraulic Fracturing – Theory to Practice

Key Projects

New Fortress Energy – FLNG EIS
Assisted United States Coast Guard (USCG) in developing an Environmental Impact Statement (EIS). Project tasks included analyzing the consequences of a Loss of Containment of Liquefied Natural Gas (LNG) and Diesel Fuel in the Gulf of Mexico including fire thermal radiation isopleth development and vapor dispersion analysis.

Energy Transfer – Blue Marlin EIS
Assisted United States Coast Guard (USCG) in developing an Environmental Impact Statement (EIS). Project tasks included analyzing the consequences of a Loss of Containment of Crude Oil in the Gulf of Mexico including fire thermal radiation isopleth development and vapor dispersion analysis.

Enterprise – SPOT EIS
Assisted United States Coast Guard (USCG) in developing an Environmental Impact Statement (EIS). Project tasks included analyzing the consequences of a Loss of Containment of Crude Oil in the Gulf of Mexico including fire thermal radiation isopleth development and vapor dispersion analysis.

Energy Transfer – DAPL EIS
Assisted United States Army Corps of Engineers (USCG) in developing an Environmental Impact Statement (EIS). Project tasks included analyzing the consequences of a Loss of Containment of Crude Oil pipeline in North Dakota including fire thermal radiation isopleth development and vapor dispersion analysis.

ExxonMobil – Gas to Energy Guyana EIS
Assisted ExxonMobil and Guyana Environmental Protection Agency (EPA) in developing an Environmental Impact Statement (EIS). Project tasks included analyzing the consequences of a Loss of Containment of Crude Oil and Natural Gas in waters off the coast of Guyana including fire thermal radiation isopleth development and vapor dispersion analysis.

Calumet Pipeline Holdings – PHMSA Support
Assisted current owner of Alligator Alley Pipeline with ensuring pipeline was abandoned properly according to DOT/PHMSA regulations. Tasks included developing an abandonment strategy, engaging with stakeholders and PHMSA regulators, and developing the Annual Report.

MarkWest – Pipeline Integrity
Worked with MarkWest Operations and Engineering to alleviate material stress issues due to subsidence from long wall coal mining directly beneath the pipeline.

Conoco Phillips – PHMSA Support
Managed PHMSA compliance requirements including the annual records review of Control Room Management Procedures, Integrity Management System, Public Awareness Program, Line Classification and operational requirements interpretations, FERC Filings, and Operator Qualification program.

Devon – Facility Siting Study
Conducted a Facility Siting Study using the Consequence Analysis (API 752/753) method to address the Facility Siting portion of OSHA PSM.

Lucid - PSM Support
Lead 18+ person team that produced redlined drawings, conducted a facility siting study, RMP updates, developed operating and maintenance procedures, and developed heat and material balance for multiple Cryogenic Gas Processing Facilities.

Denbury – Mechanical Integrity Program
Developed corporate management system for Mechanical/Asset integrity, and implemented inspection program field wide to address DOT/PHMSA requirements.

SM Energy – PHMSA Support
Aided upstream producer in understanding Line classification of newly laid pipeline, and developed Control Room Management Procedures.

Pardus – Produced Water System Management
Optimized Produced Water management system, and replaced 150 miles of produced water pipeline network over varying terrain.

Newell – Wood Wick – Containment & Piping Design
Designed new secondary containment and piping for candle making facility.

Entergy – Electrical Area Classification Drawings Development
Developed Electrical Area Classification drawings for Natural Gas powered steam turbine electric generation facility.

Conoco Phillips – Production Facility Process Simulation
Developed process simulation of new facility for use in optimizing air permit for central production facility.

Performance food Group – PSM Program Audit
Managed onsite effort in trouble shooting issues with Lithium Grease manufacturing process. Aided Onsite team in replacing faulty components.

Indorama - PSM Support
Facilitated PHA and helped team develop/refine process safety information

BP - North American Gas Facility Design
Developed production facility design for locations in Wyoming equipped with associated cold weather design conditions.

Pardus - Water Flood Design & Implementation
Aided upstream producer in developing water flood strategy, designed injection facility, and managed construction of said facility.

Atlas – Salt Water Disposal Design
Designed Produced Water injection facility with pipeline and truck loading options

Enlink – Flare System Design
Sized 90+ Pressure relief valves, and modeled flare header piping network.