

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

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

HP22-001

REBUTTAL TESTIMONY OF

KENT MUHLBAUER

ON BEHALF OF

SCS CARBON TRANSPORT LLC

SCS EXHIBIT #

July 7, 2023

1 **Q. Please state your name, present position, and business address for the record.**

2 A. My name is Kent Muhlbauer, P.E. I am employed as a Managing Partner of WKM
3 Consultancy, LLC. My business address is 704 Wickford Circle, Austin, TX 78704.

4 **Q. On whose behalf are you providing testimony in this docket?**

5 A. The Applicant.

6 **Q. What is your position with SCS Carbon Transport, LLC (“SCS”)?**

7 A. I have been engaged by Summit to provide consulting services regarding risk assessment,
8 risk management, and the Pipeline and Hazardous Materials Safety Administration (“PHMSA”)
9 regulatory requirements regarding those topics.

10 **Q. Please describe your educational and professional background.**

11 A. I earned a Bachelor of Science degree in civil/environmental engineering in 1981 from
12 the University of Missouri. I have been a licensed professional engineer in the state of Texas
13 since 1984. I have more than 40 years’ experience in the pipeline industry, in which I have
14 designed, advised on, and overseen construction, operation and maintenance of pipeline systems.
15 For ~15 years prior to becoming a consultant on pipelines, I held a variety of engineering and
16 management positions for a pipeline operating company. Since 1994, I have been a managing
17 partner of WKM Consultancy, LLC, where I specialize in pipeline risk assessment, risk
18 management, and regulatory compliance. I have published four textbooks on the subject of
19 pipeline risk assessment and risk management, I have designed and developed several software
20 applications related to pipeline risk assessment and risk management, and I am a regular
21 presenter at industry events on the subjects of risk assessment and risk management. Since 1994,
22 I have also been an instructor and trainer on risk assessment, including training PHMSA federal
23 and state auditors in pipeline risk assessment.

24 **Q. Have you previously submitted direct testimony and exhibits in this proceeding?**

25 A. I have not.

26 **Q. What is your area(s) of expertise?**

27 A. I am an expert in the areas of risk assessment, risk management, and regulatory
28 compliance. The basis for my testimony is to provide information regarding pipeline risk
29 analysis and the regulatory requirements applicable to pipeline risk analysis.

30 **Q. Have you reviewed the concerns stated by staff witness Matthew Frazell?**

31 A. Yes.

32 **Q. What comments do you have on Mr. Frazell's concerns?**

33 A. I want to provide additional background on the risk assessment process and regulatory
34 requirements.

35 **Q. Can you briefly describe what risk analysis or risk assessment is?**

36 A. Risk assessment involves evaluating risks identified for a project or asset and develop
37 quantitative estimates of the probability of an event occurring (likelihood) and the consequence
38 (possible level of harm). These estimates are combined into values of risk which can be
39 expressed in several different units of measurement. The risk assessment on the proposed
40 pipeline system (MCE) begins with an assessment of threats to the pipeline. For example,
41 accidental damage from excavating equipment working nearby, or the potential for corrosion. To
42 assess this and all other threats, Summit's risk assessment identifies, compiles, measures, and
43 estimates values for over 200 variables at all points along the pipeline system. These input
44 variables address aspects of the pipeline's surroundings such as nearby populations, soil types,
45 topography, roads, waterways, and the like, as well as characteristics of the pipeline itself, such
46 as wall thickness, material types, pressure, flowrates, and the like. The input variables are then

47 used in algorithms that estimate: (a) the potential of an incident from all threats to the pipeline
48 and (b) potential damages to the pipeline’s surroundings if a failure occurs. Decision-makers use
49 the information provided by the risk analysis to determine the optimal protections to manage
50 risks along all portions of the pipeline system.

51 **Q. Do PHMSA regulations require Summit to perform a risk assessment?**

52 A. Yes. PHMSA’s regulations at 49 C.F.R. Part 195 apply to Summit’s proposed pipeline
53 system. Among many other requirements, Part 195 requires an operator to first identify “high
54 consequence areas” or (“HCAs”) and, where present, perform formal risk analysis in those areas.
55 Portions of a pipeline that could affect HCAs are then subject to a heightened set of safety
56 measures under PHMSA’s Integrity Management Program (“IMP”) regulations. The risk
57 analysis is used to determine risk management actions including integrity assessment
58 methods/frequencies and the selection of other measures to prevent and mitigate failures.
59 PHMSA sets out the minimum risk assessment elements and factors in the information analysis
60 provision of its IMP regulations at 49 CFR Part 195.452. PHMSA recently updated the IMP
61 regulations in 2019 to provide more specific and prescriptive requirements for the risk factors
62 that operators must consider.

63 **Q. Is the risk analysis being performed by Summit intended to meet and/or exceed
64 applicable PHMSA requirements?**

65 A. Yes, the risk analysis being performed by Summit meets the PHMSA regulatory
66 requirements, and in fact exceeds them in several respects. Summit is utilizing a quantitative
67 risk assessment (“QRA”) methodology that identifies all potential threats to a pipeline’s integrity,
68 evaluates their potential severity, and estimates possible consequences associated with a release.
69 While PHMSA regulations only require that an IMP and the associated risk assessment be

70 performed for segments of the pipeline within HCAs, Summit has committed to apply its IMP to
71 the entire route of the pipeline system. Utilizing a technique called ‘dynamic segmentation’, the
72 pipeline is divided into thousands of small sections for risk analysis. Each segment is
73 independently assessed for risk, considering its specific operating conditions and surroundings.
74 In addition, while PHMSA regulations mandate approximately 20 input factors that must be
75 included in a risk assessment, Summit’s risk assessment goes beyond what is required, including
76 and quantifying over 200 inputs to fully assess every threat and consequence aspect. The
77 Summit risk assessment addresses all known threats to pipeline system integrity, including both
78 time dependent threats such as corrosion and cracking, and time independent threats such as
79 third-party damage, geohazards, weather events, human error, and others.

80 **Q. Will Summit update its risk analysis both prior to construction and once in**
81 **operation?**

82 A. Yes. Risk analysis is an iterative and on-going process. As minor route adjustments and
83 design and construction features are finalized, the risk analysis continues to be updated. Once in
84 operation, reviews and updates to all aspects of a regulatory IMP are required on a regular and on
85 an ‘as needed’ basis, as conditions change along the pipeline. In addition, Operators must
86 review, usually on at least an annual basis, the risk factors for evaluating whether a pipeline
87 could affect an HCA and the factors’ potential impact on risk levels. Because Summit has
88 committed to apply its IMP to the entire route of the pipeline, Summit plans to update its risk
89 assessment whenever conditions along the pipeline route create a meaningful change in risk or
90 whenever operational changes could create a change in the risk profile anywhere on the system.

91 **Q. Can you discuss briefly any preliminary results of Summit’s risk assessment?**

92 A. A preliminary risk assessment has been completed. For context, based on recent
93 historical data, any section of a US CO₂ pipeline has a statistical failure rate of about 0.0007
94 failures per mile-year which translates to a leak less than once every 1,400 years along any mile
95 of the pipeline. While this is a very low incident rate, the new Summit pipeline system has been
96 assessed to have a significantly lower rate. The failure rate at every location along the Summit
97 pipeline is assessed to be lower than 0.0003 per mile-year—a failure less than once every 3,300
98 years. Based on historical data, most pipeline failures involve minor leaks rather than large
99 ruptures. This is overwhelmingly the case for existing CO₂ pipelines where impacts rarely go
100 beyond the operator’s property. This is also the expectation for possible failures on the Summit
101 CO₂ system. Comparing the Summit CO₂ system to US hydrocarbon pipeline risk levels—from
102 0.0005 to 0.001 reportable failures per mile-year, historically—shows that the Summit system
103 will have even lower risk levels, as much as 3X lower.

104 **Q. Have the risk assessment inputs been subjectively determined and not biased to**
105 **generate favorable or skewed results?**

106 A. Yes. In his testimony, Mr. Frazell mentions that: “The use of favorable assumptions
107 could be what is driving the three times less risk statement.” In my professional opinion, the
108 inputs for the SCS risk assessment were not biased or favorable and the lower level of risk
109 associated with the MCE is attributable to conservative design decisions, conservative and/or
110 lower risk construction techniques, a conservative Integrity Management Plan, and the
111 commodity being transported (CO₂ is lower risk than other commodities that are flammable and
112 combustible). As discussed with staff, SCS would welcome the opportunity to review the risk
113 assessment including detailed inputs and outputs in a confidential setting.

114

115 **Q. Does this conclude your testimony?**

116 A. Yes.

117

118 Dated this 7th day of July, 2023.

119

120

121 /s/ Kent Muhlbauer

122 Kent Muhlbauer