

Rick Brown, PE

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Career Overview

Deep technical and leadership experience in distribution, local transmission, backbone, and underground storage gas system planning, Gas Control operations, and pipeline simulation technology. Leadership of Gas System Planning for over 25 years including complex hydraulic analysis for unprecedented system outages to perform safety work on the gas system. Developed ideation and directed technical development of visionary planning technology including optimization software, parametric software to run thousands of simulations for operational and design optimization and operational intelligence, regulator station failure parametric analysis, advanced metering demand forecasting software, sensitivity analysis, and numerous transmission model loading improvements. International pipeline simulation industry recognition for both pipeline simulation technical expertise and leadership of the gas planning function, including Pipeline Simulation Interest Group Board of Directors and Author Coordinator for over 20 years. Authored and presented seven papers at PSIG and AGA. Significant experience in Rate Cases and other regulatory activities.

Experience

Consultant – Gas Decarbonization, Hydraulic Analysis 11/2021-present

Independent consultant providing gas decarbonization and hydraulic analysis expertise. Develop strategies and approaches to analyze gas system decarbonization including hydraulic analysis approaches to retire gas assets, and critical factors for decarbonizing gas systems. Expert witness in multiple proceedings involving gas system investments, NPAs, and gas decarbonization.

Principal Gas System Planning Engineer – Gas System Planning 3/2020-11/2021

New role to provide focus as the Gas System Planning lead for the complex decarbonization of PG&E gas systems. Developed process to prioritize portions of the gas system to potentially convert customers from gas to electric to reduce carbon emissions. Developed an overall strategy to address declining gas demand, methods to understand costs and revenues of individual gas systems and hydraulic analysis methodologies to retire portions of the gas system to reduce costs. Unique knowledge in an area of increased activity due to carbon reduction goals.

Senior Manager and Interim Director– Gas System Planning 9/2014-3/2020

Led 70 +/- planning engineers in the local transmission and distribution planning function. Develop ideas and lead revolutionary planning process and technology improvements to improve hydraulic analysis accuracy/thoroughness, and engineer time efficiency to meet the needs of extensive system safety work. Led improvements on parametric studies for operational optimization of constrained gas systems, parametric studies for in-line inspection, system investments, and regulator station failure. Developed ideation and implemented a Gas System Operations organization wide program to repurpose gas systems with excess capacity to reduce costs and system risks yielding hundreds of millions of dollars of savings opportunities and significant risk reductions. Set direction for extensive improvements in gas planning processes and technology including automated advanced metering utilization, improved demand accuracy, and model loading improvements.

As Interim Director for two years led group of 100 +/- planning engineers. Continued technical and process vision from Senior Manager role, advocated the role of the planning function and educated other directors of the role. Led underground storage strategy and efforts to improve system outage planning.

Manager – Gas System Planning 1999-9/2013

Multiple gas planning manager roles with increasing levels of leadership and responsibility. Local Transmission and Distribution Planning (6/12-9/13, 32 engineers), Transmission System Planning & Gas

Planning Support (2006-2012, 16 direct report engineers), and Transmission System Planning (1999-2006, 12 direct report engineers).

Developed a team culture to provide high quality accurate hydraulic analysis, long-term cost-efficient system investments, and extensive system expertise to support reliable, optimum operations. Drove team to develop of state-of-the-art gas planning technology and process improvements. Promote environment of trust, honesty, openness, and employee recognition. Influenced and implemented the combining of transmission and distribution planning engineers into one focused planning organization. Led planning analyses to support unprecedented levels of pipeline safety work and pressure reductions. Led optimization of system investments resulting in over \$200 million in capital savings. Four-time Rate Case expert witness.

Principal Gas Engineer, Senior Gas Engineer – Gas Control 1993-1999

- Increasing levels of technical expertise and leadership from Senior Engineer (1993-1997) to Principal Engineer (1997-1999)
- PG&E and industry recognized expert for hydraulic and operational analysis for backbone and underground storage gas transmission systems.
- Visionary development of custom VBA/Excel operations optimization modeling applications for use by Gas Control Operators. Robust, user friendly tools minimized energy use and flow capacity while running hundreds of simulation scenarios. Applications used for over a decade for majority of backbone simulations.

Gas Engineer – Gas Control and Golden Gate Region 1986-1993

- Provided direct hydraulic engineering support to Gas Control leadership and operators.
- Provided expert hydraulic operations support PG&E backbone systems. Performed complex modeling of compressor stations, transient backbone operations, and underground storage operations..

Professional Memberships

Registered Professional Mechanical Engineer – State of California

Board Member and Conference Author Coordinator - Pipeline Simulation Interest Group (PSIG), 1997 to present

Presented 7 papers at PSIG and one at AGA:

- 2022 - Gas decarbonization in California and impacts on hydraulic analysis methodologies
- 2022 – Parametric studies and practical business benefits
- Custom energy minimization software used by gas control operators (voted best paper)
- Compressor/turbine performance monitoring software (3rd best paper)
- Software to run hundreds of hydraulic simulations (parametric study) automatically (runner up best paper)
- Demand uncertainty and the need for sensitivity analysis (runner up best paper)
- Pipeline safety impacts on gas system planning (voted best paper)

Education

California Polytechnic State University
B.S., Mechanical Engineering

San Luis Obispo, CA

References

Available on request.

Interests

Home improvement, camping, hiking, travel, youth sport coaching

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.10ei

Respondent: K. M. Fedele

Page: 1 of 1

- Question:** Please provide information regarding the existing 8" Petoskey Pipeline requiring a second, redundant pipeline to address customer service reliability during the ILI.
- e. Please describe all actions the Company has taken to address any potential obstructions that could cause the ILI tool to become stuck, including the following:
- i. Has the Company reviewed its records to identify diameter changes, fittings, tees, elbows, and any other physical characteristics that could potentially cause an ILI tool to become stuck and made physical modifications to the pipeline to minimize the chance of a stuck ILI tool?

Answer: Yes, pipeline modifications have been made to reduce the likelihood of a stuck tool but pipeline characteristics are not the only thing that could cause a tool to get stuck. For example, excessive debris built up in the line over the many years of being in service could potentially cause a tool to get stuck.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.8c

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding actions the Company takes to help minimize the impacts on customer service in the rare event there is damage to the existing 8" Petoskey Pipeline.

c. Does the Company have an emergency response plan for the 8" Petoskey Pipeline to quickly isolate any damage to the pipeline and make emergency repairs?

Answer: Yes.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.11a

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please refer to the Direct Testimony of K. M. Fedele, p. 39, lines 12-13 stating that LNG is costly, complex, and impractical if an ILI tool were to become stuck.

a. Please provide the estimated cost to provide LNG during the ILI operation.

Answer: Estimated cost to provide LNG in the event of a stuck ILI tool is \$5.5 million. This assumes the LNG vendor would be on set up and on stand by for 7 days while the ILI occurs. If there were a stuck tool, we assume that injection would be on for 14 days to feed the system

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.9a

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding the existing 8" Petoskey Pipeline requiring a second, redundant pipeline to address customer service reliability in the event of a pipeline failure.

a. How many incidents have occurred during the pipeline's life that created a risk of a pipeline failure?

Answer: To the best of my knowledge, there have been no incidents to date that could have led to a failure.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.6g

Respondent: K. M. Fedele

Page: 1 of 1

Question: For the following requests regarding the East Petoskey Pipeline Reinforcement project, please provide the following information regarding the existing 8" Petoskey Pipeline:

g. Please provide leak data for the past 5 years including count of leaks by leak grade.

Answer: There have been no leaks in the past 5 years.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.6h

Respondent: K. M. Fedele

Page: 1 of 1

Question: For the following requests regarding the East Petoskey Pipeline Reinforcement project, please provide the following information regarding the existing 8" Petoskey Pipeline:

h. Please provide any data regarding corrosion issues.

Answer: No additional data is available.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.9b

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding the existing 8" Petoskey Pipeline requiring a second, redundant pipeline to address customer service reliability in the event of a pipeline failure.

b. Has the pipeline ever had to be isolated due to damage? Did customers lose service and if so, how many customers? If customers did not lose service, please explain why customers did not lose service.

Answer: No.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.7b

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding the risk of third party or natural forces that could cause a failure in the existing 8" Petoskey Pipeline.

b. How often is the pipeline patrolled? How often is the pipeline aerial patrolled?

Answer: Pipeline is patrolled annually for Pipeline Density Survey with leak survey of road/railroad crossings semi-annually. It is aerial patrolled bi-weekly, twenty-four times per year.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.7aiv

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding the risk of third party or natural forces that could cause a failure in the existing 8" Petoskey Pipeline.

- a. Please provide a description of the route of the pipeline from Boyne City Gate Station including:
- iv. A fair amount of the pipeline route is on open land. Is the land used for farming or livestock grazing? Does the Company have a program to educate and provide farmers or ranchers or other landowners about the presence of the pipeline on their land and the need to contact 811 before they dig on their land?

Answer: There is approximately five miles of the pipeline that is used for farming and/or livestock grazing. DTE Gas sends annual informational safety mailers to all landowners within 660' either side of the pipeline. Also, DTE Gas also sends an annual mailing specifically to farmers along the pipeline right-of-way. Both cover 811 requirements.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.7aiii

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding the risk of third party or natural forces that could cause a failure in the existing 8" Petoskey Pipeline.

a. Please provide a description of the route of the pipeline from Boyne City Gate Station including:

iii. Are pipeline markers present along the entire pipeline's route?

Answer: Yes, aside from within the farmland. At farmland, markers are at the boundary points to designate the pipeline location at each edge. If farmers allow for markers, they are maintained within the farmed area.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.8ei

Respondent: K. M. Fedele

Page: 1 of 1

- Question:** Please provide information regarding actions the Company takes to help minimize the impacts on customer service in the rare event there is damage to the existing 8" Petoskey Pipeline.
- e. Has the Company hydraulically modeled the survival time of the pipeline to provide service to customers in the event of a pipeline failure under the following conditions?
- i. A range of temperature conditions across the year in addition to extreme cold conditions.

Answer: No.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.8eii

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding actions the Company takes to help minimize the impacts on customer service in the rare event there is damage to the existing 8" Petoskey Pipeline.

e. Has the Company hydraulically modeled the survival time of the pipeline to provide service to customers in the event of a pipeline failure under the following conditions?

ii. Isolation of the damaged section to limit the loss of gas as described in 8a above.

Answer: No.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.8eiii

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding actions the Company takes to help minimize the impacts on customer service in the rare event there is damage to the existing 8" Petoskey Pipeline.

e. Has the Company hydraulically modeled the survival time of the pipeline to provide service to customers in the event of a pipeline failure under the following conditions?

iii. The increase in survival time if additional mainline valves were installed on the pipeline.

Answer: No.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.8eiv

Respondent: K. M. Fedele

Page: 1 of 1

- Question:** Please provide information regarding actions the Company takes to help minimize the impacts on customer service in the rare event there is damage to the existing 8" Petoskey Pipeline.
- e. Has the Company hydraulically modeled the survival time of the pipeline to provide service to customers in the event of a pipeline failure under the following conditions?
- iv. The increase in survival time if mainline valves had remote control capability.

Answer: No.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.8ev

Respondent: K. M. Fedele

Page: 1 of 1

Question: Please provide information regarding actions the Company takes to help minimize the impacts on customer service in the rare event there is damage to the existing 8" Petoskey Pipeline.

e. Has the Company hydraulically modeled the survival time of the pipeline to provide service to customers in the event of a pipeline failure under the following conditions?

v. The increase in survival time if portable CNG or LNG was connected to the pipeline.

Answer: No.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-3.8evi

Respondent: K. M. Fedele

Page: 1 of 1

- Question:** Please provide information regarding actions the Company takes to help minimize the impacts on customer service in the rare event there is damage to the existing 8" Petoskey Pipeline.
- e. Has the Company hydraulically modeled the survival time of the pipeline to provide service to customers in the event of a pipeline failure under the following conditions?
- vi. The reduction in repair time if emergency response plans were developed and implemented including all resources both crews and material are planned for.

Answer: No.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-2.3a

Respondent: K. M. Fedele

Page: 1 of 1

Question: For the following requests, please refer to the Fort Street Main Replacement project summary in Exhibit A-12, Schedule B5.5, p. 4-5.

a. The Scope of Work section provides data that shows in 2025 the Company will replace 14,925 feet (2.83 miles) of pipe at a project cost with contingency of \$27,000,000. Since a portion of the cost is for 4 regulators and miscellaneous main, valves, and fittings, please provide the cost only for the 2.83 miles of new pipe. Does the Company find this project to have a higher than typical cost per mile of pipe replaced? Please explain why or why not.

Answer: The Company cannot provide total costs for only the 2.83 miles of new pipe on the Fort Street Main Replacement project in 2025 because costs associated with design, materials, and other project overheads are tracked by phase and year. However, the Company does find that the Fort Street Main Replacement project does have a higher than typical cost per mile of pipe replaced due to many factors including: large diameter steel pipeline construction, multiple large horizontal directional drills and auger bores, unmarked facility reroutes, historic trolley track removal, increased traffic control costs, cost for flowable filling large diameter abandoned pipelines, and additional costs for coordinating with large customers, the GHIB project, other MDOT projects, and local events.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-2.3b

Respondent: K. M. Fedele

Page: 1 of 1

Question: For the following requests, please refer to the Fort Street Main Replacement project summary in Exhibit A-12, Schedule B5.5, p. 4-5.

b. The Scope of Work section provides data that shows in 2026 and 2027 the Company will replace 12,234 feet (2.32 miles) of pipe at a project cost with contingency of \$55,000,000. Since a portion of the cost is for 1 regulator and miscellaneous main, valves, and fittings, please provide the cost only for the 2.32 miles of new pipe. . Does the Company find this project to have a higher than typical cost per mile of pipe replaced? Please explain why or why not.

Answer: Please refer to question AADG-2.3a

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-5.1d

Respondent: K. M. Fedele

Page: 1 of 1

Question: For the following request regarding the proposed Carlton Main Replacement project please refer to AADG-2.1ai-xi and AADG-2.1bi-x which requested a map or gas system schematic with information that was needed to understand the operation and hydraulics of the existing Carlton Main and the proposed 12" replacement main, and both mains' integrated operation with upstream and downstream pipelines, pipeline flow directions, operating pressures and other requested information. Since the information requested was not provided, please provide the following:

d. Please provide justification for the replacement main being 12" rather than the same diameter as the existing 8" main. Please justify why a flow area and capacity increase of approximately 120% is needed.

Answer: As discussed on pages 59 and 60 of my direct testimony, the proposed 12-inch replacement main integration will provide supply redundancy to the 274 psig system from both Willow Gate Station and Sumpter Gate Station. Per page 61 in my direct testimony, it explains why replacement of the Carlton line with 12" main at 274 psig represents the optimal solution.

Attachment: None

MPSC Case No: U-21973

Requester: Ann Arbor

Question No.: AADG-2.1h

Respondent: K. M. Fedele

Page: 1 of 1

Question: For the following requests, please refer to the Carlton Main Replacement project summary in Exhibit A-12, Schedule B5.5, pages 13-14, and the Direct Testimony of K. M. Fedele, p. 58-62.

h. To address the risk of a portion of the Carlton Main requiring lengthy repairs due to the need for long lead time mechanical fittings, has the Company considered stocking spare mechanical fittings? If yes, please explain why this option was not pursued.

Answer: Following field verification (during a planned project) of the thin-wall pipe using non-destructive testing, the company has included long-lead mechanical fittings in inventory for the 6-inch section identified for replacement on the Carlton Main project. Although these fittings are stocked for emergency use, there are concerns installing and operating heavy mechanical fittings on thin-walled steel pipe. Welding is the preferred connection method for long-term pipeline serviceability.

Attachment: None

MPSC Case No: U-21973

Requester: AG

Question No.: AGDG-3.113

Respondent: K. M. Fedele

Page: 1 of 1

Question: Refer to page 59 of Ms. Fedele's direct testimony on the Carlton Main Replacement project. Please identify what problems have occurred on this main in each of the past five years. Provide the number of gas leaks and repairs performed in those years.

Answer: The section of the Carlton Main to be replaced has not had any known gas leaks or repairs performed on it in the last 5 years.

In 2022 on the southern section of the Carlton, the Sherwood and Willow System Reliability district replacement project design required a field change resulting in construction delays due to NDT X-Rays indicating the 6" pipe thickness as low as 0.172". Given these readings, the project was redesigned at additional cost to avoid welding to the 6" Carlton pipeline.

Future projects on the Carlton main will be designed without the use of welded connections which results in more complex and costly repairs and compromises long term reliability as described on page 59 of Witness Fedele's testimony.

Attachment: None