

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

0-0

HP 22-002

IN THE MATTER OF THE APPLICATION :
OF NAVIGATOR HEARTLAND :
GREENWAY, LLC FOR A PERMIT UNDER :
THE SOUTH DAKOTA ENERGY :
CONVERSION AND TRANSMISSION :
FACILITIES ACT TO CONSTRUCT THE :
HEARTLAND GREENWAY PIPELINE IN :
SOUTH DAKOTA, :
:
:

**DIRECT TESTIMONY
OF VIDAL ROSA**

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1. Please state your name and address for the record.

Answer: My name is Vidal Rosa. My business address is 2626 Cole Avenue, Suite 900, Dallas, Texas 75204.

2. Please state your position with Navigator and provide a description of your responsibility with respect to the Heartland Greenway Project.

Answer: I am Senior Vice President of Operations for NES II, LLC, which is an affiliated company of Navigator Heartland Greenway LLC. My current job responsibilities are to ensure that we operate the assets we manage, including the proposed pipeline, in a safe and reliable manner that complies with 49 C.F.R. Part 195 and other applicable state and local rules and regulations. Most importantly, we work to protect the public, our employees, our assets, and the natural environment.

3. Please describe your educational and professional background.

Answer: I have a B.S. degree in Business Administration and Management from the University of Texas Permian Basin in Odessa, Texas. I started working with Enron Oil Trading

and Transportation in 1995. I joined Occidental Oil & Gas in 2004 and held various roles within Centurion Pipeline and Oxy Corp Business Development before joining the Navigator organization in 2017. A copy of my resume is attached as Exhibit A.

4. Please describe your responsibilities with Navigator.

Answer: I am in charge of operations for the Navigator Heartland Greenway Pipeline, including matters related to emergency response planning and preparedness; operations and remote monitoring; Supervisory Control and Data Acquisition (SCADA), in-line and visual pipeline inspection, and surveillance; spill frequency; the operation of valves and above-ground facilities; and public awareness.

5. Have you previously submitted or prepared testimony in this proceeding in South Dakota?

Answer: No.

6. Please state for which sections of the application that Navigator has filed with the South Dakota Public Utilities Commission you are responsible.

Answer: My testimony relates to Section 5.0 of the application on Operation and Maintenance.

7. Please describe Navigator's approach to operating the pipeline.

Answer: Navigator is committed to building and operating the Project, including the pipeline, so that it meets and exceeds regulatory and safety requirements while also minimizing the collective impact on the environment, landowners, and the public. We will comply with 49 CRF Parts 195.

8. What experience and qualifications does the Navigator organization have to operate the pipeline?

Answer: As explained in the testimony of David Giles, the Navigator organization has a team with over 200 years of combined experience in the pipeline infrastructure industries, including technical expertise in the area of safely transporting various commodities across pipelines. This experience includes safely operating approximately 1,300 miles of pipeline and associated infrastructure over the past decade. In addition to myself, our Director of Health Environmental Safety and Regulatory Compliance with almost 20 years of experience is and will be involved in developing the plans and procedures and monitoring compliance. We will be building out a full scale highly qualified operations team including a VP of Operations and regional directors and managers in addition to the subject matter experts and technicians, to perform measurement, corrosion prevention and protection, electrical, and instrumentation duties, as well as a robust safety training program.

9. What operating procedures will be established to govern the operation, monitoring, and control of the pipeline?

Answer: Operating procedures are being prepared, and will be followed, to govern the operation of the Pipeline and ensure the Pipeline is operated safely. An Operation Manual for the Pipeline is being developed and will be finalized prior to the Pipeline being placed in-service in accordance with PHMSA regulations; it will be routinely reviewed and updated as warranted throughout operation of the HGPS to ensure its continuing effectiveness. Certain components of that manual are already known, including that the Pipeline will be subject to a variety of ongoing inspections and testing to verify continued integrity and compliance with applicable regulatory and industry standards while in operation.

10. Please explain what integrity management is and describe your integrity management program.

Answer: An Integrity Management Program (“IMP”) is a program implemented, and regulated updated, to help evaluate and maintain the integrity of a pipeline and to mitigate and remediate any risks to high consequence areas (“HCAs”) presented by a pipeline. PHMSA regulations, found at 49 C.F.R. § 195.452, require pipeline operators to develop written IMPs and for an IMP to be in place before a new pipeline begins operations. Navigator will implement a robust integrity management program in compliance with PHMSA regulations to continually assess the pipeline for potential risks to the system, to identify preventative and mitigation measures to address risks, and to specify criteria for remedial actions to address integrity concerns. The purposes of integrity management include performing integrity assessments of pipelines in places where a pipeline leak or failure could have significant adverse consequences, meaning High Consequence Areas (HCAs), improving operational processes to manage pipeline integrity to prevent leaks or failures, and improving public confidence in pipeline safety. Integrity management includes regularly evaluating all information about the pipeline and its specific integrity threats, and periodically evaluating the effectiveness of the program and identifying improvements to enhance its effectiveness.

11. What is a High Consequence Area or HCA?

Answer: A high consequence area is defined in 49 C.F.R. § 195.450 of the PHMSA regulations as:

(1) A commercially navigable waterway, which means a waterway where a substantial likelihood of commercial navigation exists;

(2) A high population area, which means an urbanized area, as defined and delineated by

the Census Bureau, that contains 50,000 or more people and has a population density of at least 1,000 people per square mile;

(3) An other populated area, which means a place, as defined and delineated by the Census Bureau, that contains a concentrated population, such as an incorporated or unincorporated city, town, village, or other designated residential or commercial area; or

(4) An unusually sensitive area, as defined in § 195.6 of the PHMSA regulations.

12. What is an emergency response plan?

Answer: An emergency response plan is a plan that includes safety response procedures if an emergency condition occurs as a result of the operation of a pipeline. It provides guidance on how personnel should respond under various circumstances including step-by-step directions for internal and external responses, notifications, documentation, reporting, etc.

13. Is an emergency response plan governed by PHMSA regulations?

Answer: Yes. PHMSA regulations require emergency response plans to include procedures for receiving, identifying and classifying emergency events; responding to emergencies; having personnel, equipment, instruments and tools necessary to respond to an emergency; taking action necessary to minimize and control any releases of carbon dioxide; minimizing public exposure to injury or accidents; notifying and coordinating with local emergency services; providing for post-accident review to determine if response procedures were effective; and providing actions to be taken by control room operators during an emergency. These requirements are set forth in PHMSA's regulations at 49 C.F.R. 195.402. Applicant is developing such plans and collaborating with respective public emergency responders in developing its plans and will be initiating training and communication in advance of operating the HGPS.

14. How will Navigator be prepared to respond if there is a release?

Answer: Navigator will be able to respond to and minimize leaks using the remote-control capabilities I have discussed above. Additionally, Navigator and its contractors will maintain emergency response equipment and personnel at strategic points along the route and train their personnel to respond to any pipeline emergencies. As I described earlier in this testimony, an emergency response plan for the Pipeline is being prepared and will be in place prior to commencing operation. Systems and procedures like the IMP, detailed operation and maintenance programs, routine inspections, regular employee training, detailed coordination with emergency management and response outfits, and comprehensive public awareness and education efforts, will also help optimize safe operation of the Pipeline and minimize the risk of a release.

15. Will Navigator train and otherwise work with local first responders in the area of the pipeline on how to respond to a leak?

Answer: Yes. As described Section 7.5 of the Application, Navigator will coordinate with and train local emergency responders and authorities in preventing and responding to any Pipeline-related problems. Navigator will coordinate with existing emergency response departments along and in proximity to the Pipeline route when developing its emergency response plan for the Pipeline and will make sure they and any mutual aid parties are informed of the operation risks and are equipped to respond in the unlikely event of a release. Navigator will also conduct and host periodic emergency response drills with its employees and local emergency responders, including planned drills, desktop events, and simulated field events, throughout the operation of the Pipeline.

16. Is there specialized equipment that is needed or useful to respond to and contain a leak?

Answer: Navigator is evaluating the necessary emergency response equipment and communicating with all emergency responders along the HGPS, including mutual aid partners. Navigator is drafting the emergency response plans and will provide drafts to the emergency responders for review and feedback before meeting with all parties in 2023 to discuss emergency situations and identify the equipment needs of each outfit. Navigator is committed to purchasing necessary equipment for emergency responders so that an emergency can be properly responded to as well as paying responders for the necessary training needed to be prepared for such an emergency.

17. Please describe the purpose, placement, and operation of mainline valves.

Answer: The Pipeline includes numerous remote-controlled mainline valves (MLVs) to allow for prompt response and isolation of line segments in the unlikely event of a release. The valves will be located at least every 7.5 miles apart in high consequence areas (HCAs) and every 20 miles apart in non-HCAs as required by 49 CFR Part 195 section 195.260. The valves will be connected to the Operations Control Center located in Omaha, Nebraska, which is staffed 24/7 by at least two persons as required by PHMSA. Redundant communication and power systems will be installed to ensure constant connectivity and information flow.

18. Please explain cathodic protection and how it will be used on this pipeline.

Answer: Cathodic protection is a method used to prevent external pipeline corrosion. A cathodic protection system is comprised of engineered anodes that are connected to the Pipeline through which a low voltage direct current is applied to the Pipeline. The result is that the anodes corrode rather than the Pipeline.

19. Please summarize Navigator’s leak detection program.

Answer: Navigator will implement a comprehensive leak detection system that includes both non-continuous and continuous monitoring. The non-continuous monitoring components are aerial patrol and in-line inspection. Inline inspections are done with smart pigs that are used to detect internal corrosion. To prevent internal corrosion, all captured carbon dioxide will be continuously tested at capture facilities and will have to meet strict specifications in order to be transferred into and transported by the pipeline. Controls and safety equipment for the pipeline will also be tested and calibrated on a routine basis. The continuous monitoring include compensated mass balance, real time transient model, negative pressure wave, fiber optic sensing cables, and strategically placed CO₂ monitoring devices.

The pipeline will also be remotely monitored and controlled 24 hours per day, 7 days per week, 365 days per year, from an operational control center (“OCC”), the location of which is still under development but is expected to be in the Midwest with a back-up OCC in a different area to be available in the event the primary OCC experiences a loss of power, damage from a natural disaster, or other events such that the HGPS will always be monitored while operating in accordance with PHMSA regulations under CFR Part 195. The OCC will be manned and monitored by at least two operators at all times. The Pipeline will be equipped with and use an advanced Supervisory Control and Data Acquisition (“SCADA”) system to continuously monitor pressure, temperature, and flow of the carbon dioxide. The information monitored by the SCADA system will be relayed to the OCC. The OCC will utilize modern pipeline monitoring and control technology to safely operate the Pipeline by maintaining the established operating parameters and will be capable of remotely isolating pipeline segments when alerted to abnormal operating conditions or if safety parameters are exceeded. As described in the testimony of

Stephen Lee, the SCADA will have a Computational Pipeline Monitoring system to analyze flow deviations in the pipeline, as well as backup power and communication sources if the primary power and communications sources fail. OCC personnel will be trained in and will follow strict procedures to direct actions during normal and abnormal operations to prevent the risk of a release. Training will be accordance with PHMSA regulations and asset-specific requirements.

The Pipeline will also have local controls and manual overrides to enable personnel in the field to control and operate the Pipeline in the event remote communications fail

20. Please describe the processes for aerial inspections of the pipeline during operations.

Answer: As required by 49 CFR Part 195, the pipeline will be inspected aerially 26 times per year at intervals not to exceed three weeks, but ideally every 10 days, weather permitting. Aerial patrols will occur a minimum of two times per month. Aerial patrols are done to detect abnormal conditions and dangerous activities, like unauthorized excavation by third parties.

21. Will personnel be employed to inspect and maintain the pipeline once it is in operation?

Answer: Yes. Personnel will be assigned to conduct local inspection and maintenance along the pipeline after it is in operation. Employees and contractors will be hired and located along the pipeline route to be able to provide prompt responses for maintenance and repair issues. We estimate that 80-100 full time employees will be stationed along the entire pipeline, with approximately 10 employees located in South Dakota.

22. Please describe your public awareness program.

Answer: Extensive public education and outreach programs, including damage-prevention programs, that meet or exceed PHMSA and industry requirements will be used to increase public awareness of the pipeline and related safety matters. The pipeline location will

be visibly marked as required by federal regulation. This will include placing signs at road and highway crossings, commercially navigable waterways, and other locations to alert the public to the presence of an underground line. The signage will include owner contact and emergency information. NHG will also participate in the State and Federal 811 One-Call system for damage prevention and public awareness. In addition, to help protect against inadvertent damage by third-party excavators, warning tape will be installed approximately two feet above the pipeline and below the plow-line.

23. Does this conclude your direct testimony?

Answer: Yes.

Dated this 26th day of September, 2022.

/s/ Vidal Rosa
Vidal Rosa



Navigator CO₂

PROFILE

As SVP of Operations, Vidal is responsible for overseeing day-to-day operations of Navigator CO₂'s assets, including implementation of ancillary policies and procedures required thereto.

CONTACT

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VIDAL ROSA

Senior Vice President, Operations

WORK EXPERIENCE

Navigator, **SVP, Operations** [2017-current]

Serves as the head of the Operations department for two of the Navigator companies, Glass Mountain Pipeline companies (Oklahoma and Texas crude pipelines) 2017-current, and Navigator CO₂, 2020-current

Oxy Midstream Strategic Development, **Director Commercial Development** [2017]

Managed special projects and midstream joint ventures for Oxy Midstream Strategic Development with focus on maximizing the transportation of equity barrels from wellhead to market

Oxy, **Business Improvement Coordinator** [2016-2017]

Responsibilities included creating a new collaboration platform between internal teams, implementing best practices, and maximizing cost savings ideas/programs across the entire Oxy organization

Centurion Pipeline Co, **Director of Operations** [2004-2016]

Responsible for the day-to-day management and operations of 2,000 miles of pipeline, more than 3.0 MMBO of tank storage, and ~225 employees across Texas, New Mexico, and Oklahoma

EDUCATION

University of Texas of the Permian Basin

Bachelor of Business Administration, Management, 2016

CERTIFICATIONS & ASSOCIATIONS

- Certificate of Energy Business, UTPB, 2016
- Habitat for Humanity Board Member – Midland, TX, 2015-2018
- American Corporate Partners (ACP) Mentorship for Veterans Program, 2016-2017
- American Management Association – Executive Training, 2015

Answer: Navigator is evaluating various locations in the Midwest for the Operations Control Center and a backup OCC. Navigator is likely to use an existing building with suitable space that can be outfitted with the necessary equipment to support the OCC. The locations should be determined by the end of 2023.

5. What is the status of Navigator’s development of its Emergency Response Plan?

Answer: Under PHMSA’s regulations, the Emergency Response Plan must be submitted to PHMSA before operation, which is anticipated in the fourth quarter of 2024. As indicated in the Exceedance Table provided with the Application as Exhibit D, Navigator expects to have the plan completed and vetted 90-180 days before pipeline inservice. Ongoing work includes the training discussed below in response to question 7; drafting the preliminary Emergency Response Plan; identifying and obtaining necessary resources to execute the preliminary plan after local and regional plans are compiled in the first half of 2024; developing and training on use of the NAV911 system; hiring and training operations personnel and/or a third-party response to team to supplement regional first responders; performing drills to measure the effectiveness of the plan and make necessary adjustments before inservice; and making plans to conduct annual drills after the pipeline is operational. PHMSA requires that response drills be performed once each calendar year and no more than 15 months apart. Navigator will perform each type of drill at least once per year.

6. Has Navigator met with local emergency first responders to discuss training and equipment?

Answer: Yes. Navigator met with local emergency first responders in South Dakota in January 2023 as part of its outreach and training. The participating departments are identified in Navigator’s response to Staff’s Data Request 3-12(b), a copy of which is attached as Exhibit A.

These meetings included proctored CO2 training, which included the following information: general properties of CO2, transportation, and risks; system design and operations; release indicators and hazards; and an overview of emergency response plan development. In follow up to these meetings, Navigator recently provided a CO2 training overview document to EMS and first responders that Navigator met with in South Dakota, a copy of which is attached as Exhibit B. As part of its work with local first responders, Applicant also gathered information to start developing drafts of the emergency response plans. Additionally, Navigator is planning to deploy an online tool where EMS departments can communicate about equipment they feel they need to respond to an emergency of our system.

7. What is the status of Navigator’s development of the NAV911 system discussed in the Application?

Answer: Navigator is still developing the NAV911 system to provide notice through an automatic, almost instantaneous, telephone call to local government authorities and first responders in the event of an emergency. Navigator is evaluating ways this system could include alerts to the public or area landowners. Navigator intends to implement it in some form and will provide updated information at the hearing.

8. Does this conclude your supplemental testimony?

Answer: Yes.

Dated this 25th day of May, 2023.

/s/Vidal Rosa
Vidal Rosa

- 3-12) Refer to Page 60 of the Application. The Applicant states in the development of the emergency response plan, the Applicant will be coordinating with “existing emergency response department along, and in proximity to, the route to ensure they and any mutual aid parties are informed of the operation risks and equipped to respond in the unlikely event of a release.”
- a) Please describe in detail what that coordination will entail.
 - b) Has the Applicant begun coordinating with existing county emergency response departments? If yes, please identify all departments the Applicant has coordinated with. If no, when does the Applicant intend to begin coordinating with those departments?
 - c) Does the Applicant intend to purchase the necessary emergency response equipment for each county? If yes, please provide a list of equipment that the Applicant intends to purchase for each county.

RESPONSE: See below for response.

- a) The Applicant's Emergency Response Engagement Plan includes the following:
 - Conduct stakeholder and emergency/first responder proctored CO2 training Q1 2023
 - Draft preliminary Emergency Response Plan between NHG and external stakeholders in development Q3 2023
 - Identify and obtain necessary resources to execute the preliminary plan after local/regional plans are compiled Q1 to Q2 2024.
 - The Applicant will set up a process for first responders to submit equipment requests.
 - NAV911 outcall system training
 - Operations personnel and/or 3rd party response team to supplement regional first responders
 - Perform drills to measure the effectiveness of the plan and adjust accordingly prior to placing in service and assets are established (49 CFR 195.402.15)
 - Conduct annual drills upon in-service
- b) Yes, the Applicant has been engaging local county officials and emergency response personnel since Summer of 2022. Most recently, during Q1 2023, NHG conducted emergency/first responder CO2 training. The following is a list of emergency response departments NHG has coordinated with and attended the CO2 training:
 - Brookings County - Director of County Development and Emergency Management
 - City of White and Brookings County Ambulance
 - Brookings County Ambulance

- Lincoln County, Director of EMS
 - Lincoln County Sheriff's Office
 - Lincoln County 911 dispatch center
 - Lincoln County Emergency Management Office
 - City of Hudson Fire Department
 - Worthing Fire Department
 - Tea Fire Department
 - Lennox Area Ambulance
 - Lennox Fire Department
 - Minnehaha County Director of EMS
 - Minnehaha County Sheriff's Office
 - Valley Springs Fire Department
 - Moody County Director of Emergency Management
 - Moody County Sheriff's Office
 - Colman Fire and Rescue Department
 - South Dakota Emergency Management
 - Flandreau Santee Sioux Tribe
- c) Developing the list of necessary emergency equipment is a collaborative process between Applicant and the emergency responders. The first step was providing initial CO2 training in January-February 2023 so that all departments had the same awareness of what could happen in the event of a CO2 release. Applicant gathered information to start developing drafts of the emergency response plans. In Summer 2023 NHG will deploy an online tool where EMS departments can communicate equipment they have or feel they need to respond to an emergency of our system. Applicant will assess the responses, continue collaboration, and procure necessary equipment and/or reimburse departments to procure as warranted such that all necessary equipment needs are fulfilled prior to operating the system.

Carbon Dioxide (CO₂) Training Overview

For EMS and First Responders



HEARTLAND
GREENWAY

Carbon Capture, Utilization, and Storage (CCUS) technology safely removes carbon dioxide before it enters the atmosphere. CCUS involves a pipeline network, which is the safest, most efficient method for transporting CO₂ and energy fuel required for daily life.

Heartland Greenway is a CCUS system that will provide biofuel and other industrial customers in five Midwest states with a long-term and cost-effective means to reduce their carbon footprint. Heartland Greenway will reach industrial customers in Illinois, Iowa, Minnesota, Nebraska and South Dakota. Operations are expected to be phased in early 2025.

Omaha-based Navigator CO₂, will construct, operate, and maintain Heartland Greenway, having safely constructed and operated more than 1,300 miles of new pipeline infrastructure since 2012. The company designs and constructs its projects to meet or exceed minimum safety, design, construction and operating standards, while also minimizing the collective impact to landowners and the communities where it operates.

Train

Plan

Equip

Test

Informing and Listening to Communities

Safe planning for a pipeline project requires advance information and training for all involved communities. As part of its commitment to fostering open and regular dialogue, in early 2023 Navigator completed an initial series of special training sessions for police, fire, and emergency teams in local communities in the counties where the new CO₂ pipeline is planned. Critical content from these sessions – which will continue as the project develops – is summarized in this publication.

Content summary

Transportation

How CO₂ moves within a pipeline; pipeline specifications; indications of what is heard, seen and smelled during an unplanned CO₂ release; NAV 911 emergency notification system

Safety Principles

Guidelines followed prior to, during, and after construction has been completed; 24/7/365 monitoring; maintenance and response protocols

Emergency Response Development

Engagement and planning prior to putting a pipeline in service; toxicity levels of CO₂; process followed in the event of emergencies

Comparative Plume Modeling

How CO₂ travels in the air and dissipates in the event of an unplanned release

Additional Resources

Online references for emergency personnel

An established track record

CO₂ pipelines have been in service since the late 1970's. Currently, there are approximately 5,500 miles of pipeline in the US carrying liquefied CO₂. Since the 1990's, they have been regulated by the US Dept. of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) under 49 CFR Part 195.

Other liquid CO₂ pipelines in the Midwest:

- Dakota Gas, 205 mi ND to Canada, in-service 2000, 12–14" pipe, 2700 psi MOP for 14-inch and 2965 psi for the 12"
- Gary Climate Solutions, 14 mi near Garden City, KS, in-service 2012, 4" pipe, 2200 psig MOP with normal operating pressure of 1750 psig

CO₂ general properties

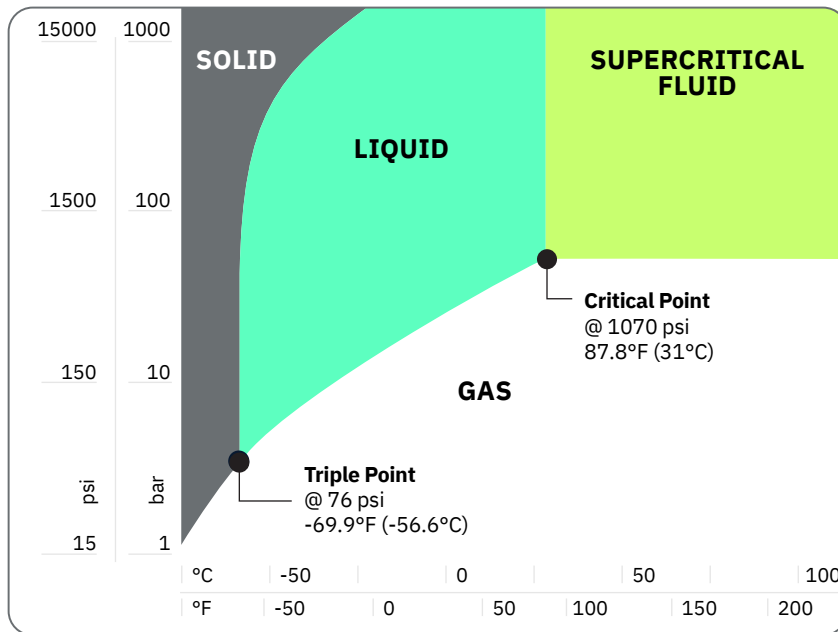
CO₂ is an inert gas that's non-flammable, non-corrosive, and is both colorless and odorless. Based on atmospheric conditions, it may accumulate in low-lying and confined areas if ventilation is insufficient, as it is heavier than air. It is a naturally occurring compound that can displace oxygen where CO₂ concentration is higher than normal atmospheric conditions.

General CO₂ Transportation

Considerations when designing and developing CO₂ transportation:

- The quality of metal is critically important to reduce the susceptibility of ductile fractures while in supercritical phase.
- Removal of water (dehydration step) prevents water from forming carbonic acid- which can affect the integrity of the carbon steel.
- Equipment installed at each capture site to continuously monitor CO₂ quality and isolate if any contaminants enter the stream beyond our high quality specification standards.
- In the event of loss of containment, immediate phase change back to gas with dispersion subject to atmospheric conditions.

The following graph represents the phases of CO₂. Phase change is dependent on temperature and pressure.



HEARTLAND GREENWAY PIPELINE SYSTEM SPECIFICATIONS

- Minimum 98% pure CO₂ compressed to a supercritical fluid at receipt points
- Line Pipe: steel pipe designed expressly for CO₂ with added toughness parameters (above API-5L PSL2)
- Federal Regulation: design, construct, operate to meet or exceed 49 CFR Part 195
- Include best practices and recommended practices from DNV-RP-F104 as well as some components from Part 192
- Normal Operating Pressure: 1,300-2,100 psig (MOP by design 2,200 psig or ANSI 900)
- Pipe Depth: nominal 5', 12"-24" separation below existing pipelines and utilities
- Pipe Diameter: 6"-20" outside diameter
- Operating Temperature: 40-110°F
- Mainline Valves: strategically located (max interval of 20 mi in non-HCAs and 7.5 mi within Populated HCAs) for control and isolation of the system
- Routing to minimize the collective impact to HCAs, vulnerable places of gathering, and other stakeholder inputs (ongoing from engagement)

Indications of a CO₂ Release



You may HEAR:

- A hissing or whistling noise
- OR a loud jet engine roar



You may SEE:

- White vapor cloud
- Dirt blowing from a hole in the ground
- An area of frozen ground in the summer
- An area of dead vegetation
- An unusual area of melted snow in the winter
- Bubbling in pools of water



You may SMELL:

- A strong garlic odor (*specific to HGS pipelines)

PIPELINE RESOURCES

1-833-NAV-3CO2

In case of emergency on the pipeline
For use by the general public



CHEMTREC 1-800-424-9300

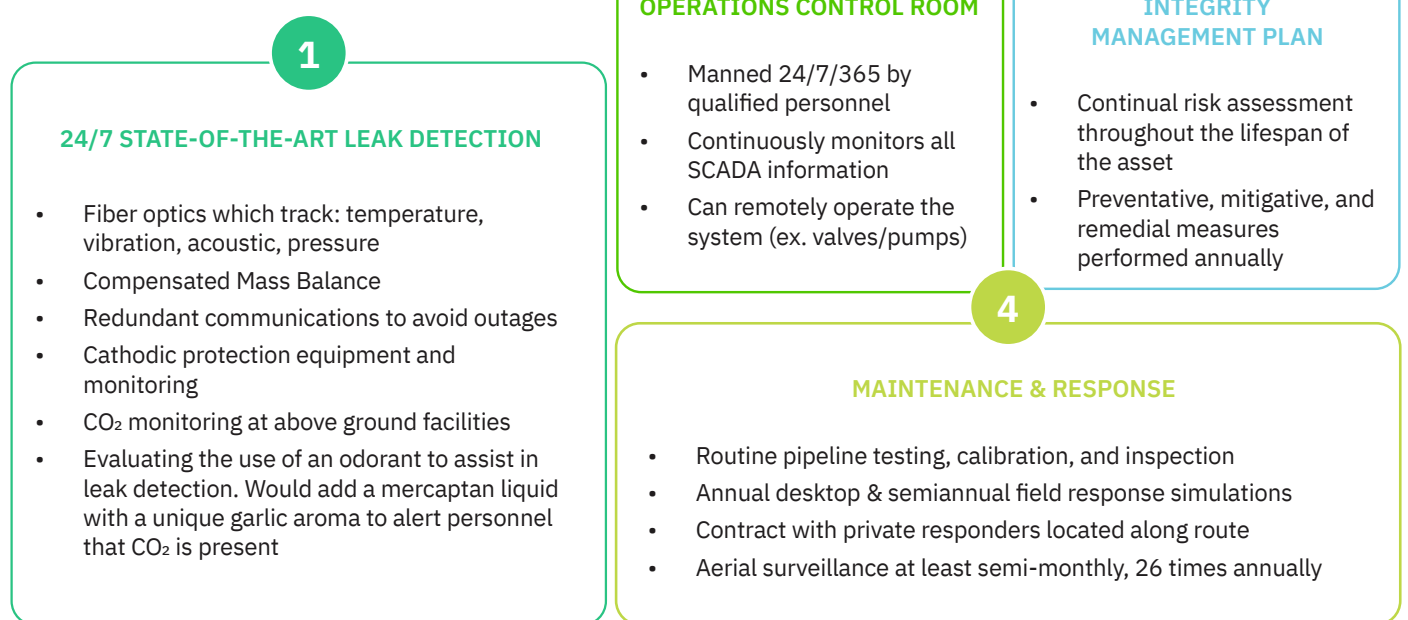
Free resource for emergency responders
Provides healthy and safety guidance to emergency responders and general public

Safety Principles

Pre-Construction Design Safety Elements

MINIMIZE COLLECTIVE IMPACT	<ul style="list-style-type: none"> Avoid and/or minimize High Consequence Areas (HCAs are defined by PHMSA) Multiple plume dispersion models under various scenarios (ALOHA/PHAST) Strategically located mainline valves, remotely monitored 24/7/365, and utilizing valves that require no actuation (immediate closure – check valves)
MEET AND EXCEED REGULATORY STANDARDS	<ul style="list-style-type: none"> Utilize guidance from 49 CFR Part 192 (natural gas) and international recommended practices (DNV-RP-F104) in design & construction to meet and exceed Part 195 (hazardous liquid pipelines) State, county and local applicable permits and statutes
MITIGATE RISK	<ul style="list-style-type: none"> Increased depth of cover to ≥5' to reduce risk of 3rd party damage and stay beneath existing drain tile and utilities Follow other existing utilities when practical (increased public awareness and damage prevention plans) Warning tape installed 2' above pipeline as a proactive warning measure for 3rd party damage Increased factor of safety/enhanced line pipe specs to protect from external forces and fracture propagation 24/7 monitoring of CO₂ composition before entering pipeline Geological hazard analysis and assessment to safeguard the system from external forces/stress
PRE-COMMISSIONING	<ul style="list-style-type: none"> Hydrostatic testing above max operating pressure, (~1.25 x 2,200 psig = 2,750 psig) Coordination with local first responders and public awareness System-wide pre-startup and safety review

Post-Construction Operational Safety Measures



Emergency Response Development

Engagement and development plan prior to putting a pipeline in service:

- Train** Conduct stakeholder and emergency/first responder proctored CO₂ training – Q1 2023
- Plan** Develop a preliminary Emergency Response Plan between NCO2V and external stakeholders approx. 3-6 months after initial training
 - NAV911 outcall system training
- Equip** Identify and obtain necessary resources to execute the preliminary plan approx. 2-3 months after local/regional plans are compiled
 - Equipment
 - HGS Ops personnel and/or 3rd party response team to supplement regional first responders
- Test**
 - Perform drills to measure the effectiveness of the plan and adjust accordingly prior to placing in-service and assets are established (Covers 49 CFR 195.402.15)
 - Annual drills will also be performed upon being placed in-service

CO₂ TOXICITY

CO₂ can be mildly toxic and potentially an asphyxiant, but is influenced by two factors:

- The concentration of CO₂ in the atmosphere (normal is 300 - 1000 ppm)
- The time duration of exposure to elevated levels of CO₂

CO ₂ Concentration (ppm)	Time	Effects
170,000 - 300,000 ppm	Within 1 minute	Loss of controlled and purposeful activity, unconsciousness, convulsions, coma, death
> 170,000 ppm	< 1 minute	Convulsions, coma, death
> 10,000 - 150,000 ppm	1 minute to several minutes	Dizziness, drowsiness, severe muscle twitching, unconsciousness
70,000 - 100,000 ppm	1.5 minutes to 1 hour	Headache, increased heart rate, shortness of breath, dizziness, sweating, rapid breathing
60,000 ppm	1-2 minutes	Hearing and visual disturbances
	≤16 minutes	Headache, dyspnea ¹
	Several hours	Tremors
40,000 - 50,000 ppm	Within a few minutes	Headache, dizziness, increased blood pressure, uncomfortable dyspnea
30,000 ppm	1 hour	Mild headache, sweating, and dyspnea at rest
20,000 ppm	Several hours	Headache, dyspnea upon mild exertion

Sources: (USEPA 2000), (Langford 2005)

¹ The clinical definition of dyspnea is an uncomfortable awareness of one's breathing effort. It is a normal symptom of heavy exertion but becomes pathological if it occurs in unexpected situations (Shiber and Santana 2006).

OCCUPATIONAL EXPOSURE LIMITS

	STEL	TWA
ACGIH TLV (United States, 3/2017) Oxygen Depletion [Asphyxiant]	54000 mg/m ³ 15 minutes 30000 ppm 15 minutes	9000 mg/m ³ 8 hours 5000 ppm 8 hours
NIOSH REL (United States, 10/2016)	54000 mg/m ³ 15 minutes 30000 ppm 15 minutes	9000 mg/m ³ 10 hours 5000 ppm 10 hours
OSHA PEL (United States, 6/2016)		9000 mg/m ³ 8 hours 5000 ppm 8 hours
OSHA PEL 1989 (United States, 3/1989)	54000 mg/m ³ 15 minutes 30000 ppm 15 minutes	18000 mg/m ³ 8 hours 10000 ppm 8 hours

STEL= a short-term exposure limit is a 15-minute TWA exposure that should not be exceeded at any time during a workday

TWA= a time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek.

Emergency Response Checklist

This is an overview of the responsive process that is followed in the event of an emergency or unplanned release of CO₂ from the pipeline system. This process will form the basis of a formal written plan.



CONCERN IDENTIFIED
Incident identified by control center, field employee, or member of the public



SHUT DOWN LINE
Pipeline is safely shut down by Navigator personnel



CONTACT FIRST RESPONDERS
Includes emergency personnel and employees who are trained to manage response efforts, including the notification of affected parties



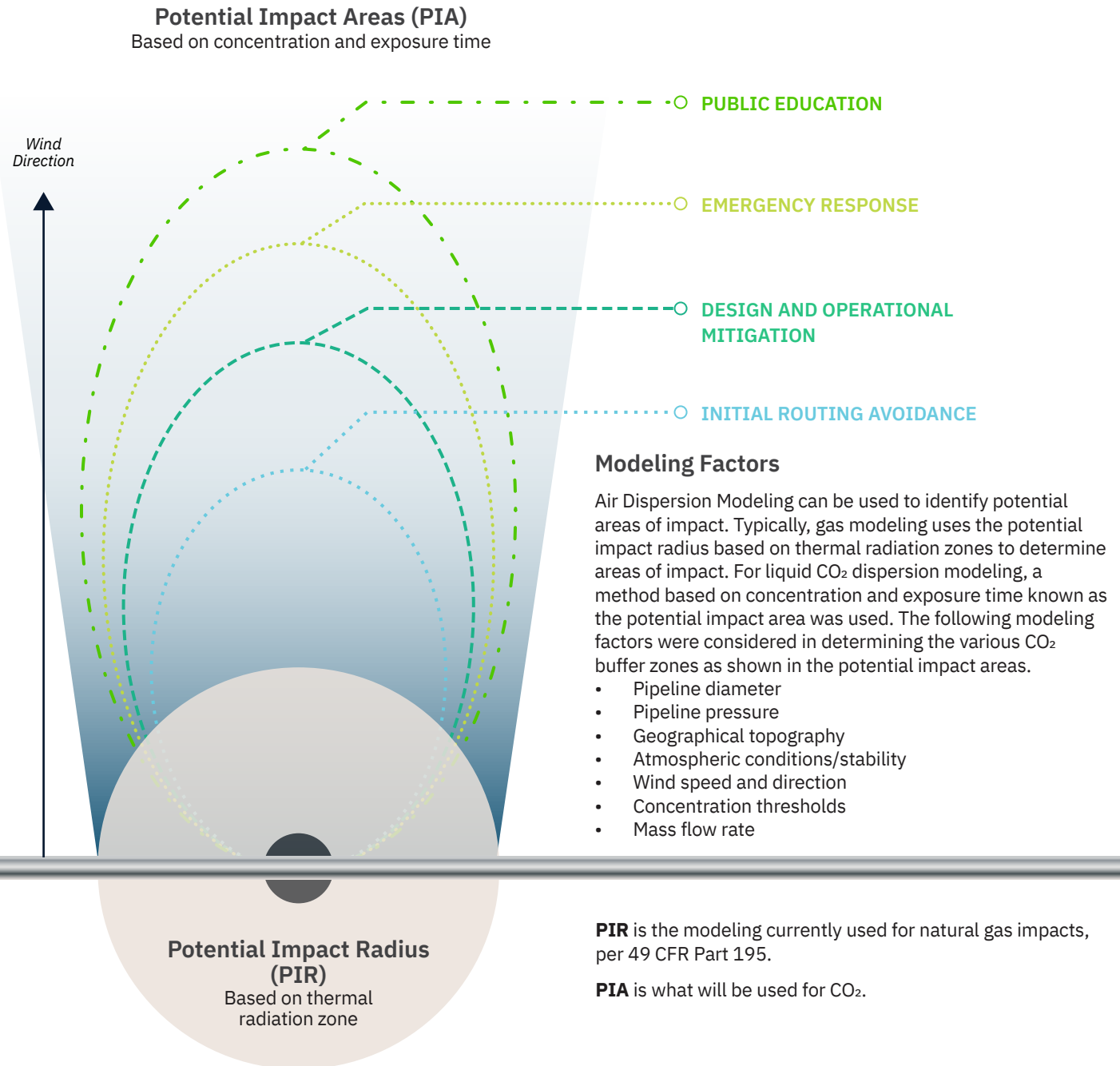
IDENTIFY & DEPLOY EMERGENCY RESPONSE EQUIPMENT & MEASURES
Begin coordination to assess the situation, evacuate area if necessary, and implement safety protocols



CLOSE OUT RESOLUTION
Report to proper authorities. When deemed safe, pipeline and facility operations resume

CO₂ Air Dispersion and Comparative Plume Modeling

In the event of an unplanned release, a “plume” or cloud of gas will form, then dissipate over time based on weather effects, including wind direction and speed. The modeling shown in this graphic was developed using ALOHA and DNV Phast Software models.¹



¹ **Area Location of Hazardous Atmosphere’s (ALOHA) Software:**

ALOHA was developed and is supported by the Emergency Response Division (ERD), a division within the National Oceanic and Atmospheric Administration (NOAA) in collaboration with the Office of Emergency Management of the U. S. Environmental Protection Agency (EPA). Its primary purpose is to provide emergency response personnel estimates of the spatial extent of some common hazards associated with chemical spills. The ALOHA development team also recognizes that the software can be an appropriate tool for training and contingency planning, but users should remain aware of its primary purpose in spill response.

DNV Phast Software Model:

Phast is a globally adopted solution for modeling atmospheric discharge, dispersion, fires, explosions and toxic effects of a wide range of loss of containment scenarios. Process safety professionals benefit from 40 years of development and validation by industry experts and its continued use by more than 10,000 users across 1,000 organizations.

Effective, More Expansive Safety Controls

INITIAL ROUTING

Evaluation for Direct High-Consequence Area (HCA) impact to:

- High Populous Areas (HPAs)
 - Other Populous Areas (OPAs)
 - Unusually Sensitive Areas (USAs)
 - Drinking Water (DW)
 - Commercial Navigable Waters (CNW)
 - Structures of high population density
- Utilized for initial routing where possible to maximize spacing between HGS and inhabitable structures.

ADDITIONAL DESIGN AND OPERATIONAL MITIGATION

Where pipeline falls within “Design and Operational” tolerance, the following additional mitigation measures may be utilized in any combination:

- Design Enhancements
- Increased design factor and wall thickness of pipeline
- Increased interval of Emergency Flow Restriction Device (EFRD) analysis for valve placement
- Increased third party damage mitigation
- Enhanced leak detection and air monitors
- Operational Enhancements
- Increased system surveillance interval
- Redundant control, power, and communication capabilities
- Increased integrity validations and assessments through Integrity Management Plan
- Strategically located HGS personnel or third-party resources

EMERGENCY RESPONSE

Where pipeline falls within “Emergency Response” tolerance, the following additional mitigation measures utilized:

- Indirect HCA impact to HPAs/OPAs/CNWs
- CO2 training and drills for HGS and First Responders
- First Responder resources (equipment and personnel) verifications and supplements by Navigator
- Current plan is to expand the actual buffer once all Emergency Responder meetings are complete (Currently incorporating county plus any mutual aid partners)

PUBLIC EDUCATION

Where pipeline falls within “Public Education” tolerance, the following additional mitigation measures utilized:

- NAV911 System will be designed to provide roll out calls based on emergency events. Yearly communications made to ensure accuracy of contact numbers.
- Annual public awareness and training
- Current plan is to expand the actual buffer once all Emergency Responder meetings are complete (~1-10 miles)

Unplanned CO₂ Releases Are Rare

Pipeline systems transport a variety of products quickly, efficiently, and with far fewer emergency incidents than truck or rail transport of hazardous materials.

Pipelines are the safest way to transport liquid energy with 99.999% of barrels delivered by pipeline arriving at their destinations safely.

<https://liquidenergypipelines.org/page/safety-record>

CO₂ pipelines have a lower incident rate than both crude oil and refined products pipelines.

Over the last 5 years, a CO₂ pipeline is 55% less likely to have an incident than a crude oil pipeline and 37% less likely compared to a pipeline delivering gasoline, diesel or jet fuel.

<https://liquidenergypipelines.org/Documents/en-us/9ace32cb-7b6e-4dc9-84de-7a0505269a40/1>

Access these resources for the latest information



EMERGENCY RESPONSE GUIDEBOOK (ERG)

Primarily a guide to aid first responders in quickly identifying the specific or generic hazards of the material(s) involved in the incident and protecting themselves and the general public during the initial response phase of the incident.

This guidebook will assist responders in making initial decisions upon arriving at the scene of a dangerous goods incident.

The ERG is updated every three to four years to accommodate new products and technology.

The guidebook is available from the U.S. Department of Transportation PHMSA website (phmsa.dot.gov)

HAZARD COMMUNICATION STANDARD (HCS) DATA SHEETS

- Safety Data Sheets have been standardized to provide information on a specific chemical by a manufacturer.
- Regardless of the chemical or its manufacturer, each chemical's SDS will contain the same 16 sections of data.
- Sections 1-10 provide much of the critical information necessary to provide emergency response in the event of a release.

Safety Data Sheets can be accessed at the Occupational Safety and Health Administration website (osha.gov).

HEARTLAND GREENWAY COMPLIANCE SUMMARY

Visit the Heartland Greenway website to view and download detailed summaries showing how Heartland Greenway will meet and exceed standards for 49 CFR Part 195.



WANT TO LEARN MORE?

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