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September 20, 2024

VIA ELECTRONIC FILING

Mr. Adam J. Teitzman
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Re: Docket No. 20240107; Petition for Approval of Modifications to Cast Iron/Bare Steel Pipe Replacement Rider, by Peoples Gas System, Inc.

Dear Mr. Teitzman:

Attached for filing on behalf of Peoples Gas System, Inc. are the company's answers to Staff's Second Data Request (Nos. 1-7) served via email on September 6, 2024.

Thank you for your assistance in connection with this matter.

Sincerely,

Virginia Ponder

VLP/ne
Attachment

cc: Oakley Ward
Ryan Sandy

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing answers, filed on behalf of People Gas System, Inc., has been furnished by electronic mail on this 20th day of September, 2024 to the following:

Ryan Sandy
Office of General Counsel
Florida Public Service Commission
Room 390L – Gerald L. Gunter Building
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850
rsandy@psc.state.fl.us
discovery-gcl@psc.state.fl.us

ATTORNEY

PEOPLES GAS SYSTEM, INC.
DOCKET NO. 20240107-GU
STAFF'S SECOND DATA REQUEST
REQUEST NO. 1
BATES PAGE(S): 1 - 2
FILED: SEPTEMBER 17, 2024

1. Please refer to Peoples Gas System, Inc. (Peoples or Utility) petition for approval of the Safety of Facilities and Infrastructure Replacement Rider (SAFIR). Please indicate whether or not each of the capital activities proposed under Peoples' SAFIR program are the result of an official regulatory requirement (such as a requirement from the Pipeline and Hazardous Materials Safety Administration (PHMSA) or other regulatory authority). If so, please identify each requirement and the regulatory authorities that issued each requirement for each proposed capital activity. If not, please provide Peoples' perceived justification for each requested capital activity.

A. Please see the Excel file "(BS 2) No.1 – Regulatory Requirements.xlsx," containing a table listing each new activity requested with the SAFIR Rider and any corresponding regulatory requirements or other justification.

2. Please identify and provide any studies conducted supporting the need for the proposed SAFIR improvements and its benefits to the general body of ratepayers.

A. Please see the following attached report regarding a review of the company's Distribution Integrity Management Plan.

FINAL ENGINEERING REPORT

PGS DISTRIBUTION INTEGRITY MANAGEMENT PLAN REVIEW AND ANALYSIS

AUGUST 4TH, 2024

Prepared For:

TECO PEOPLES GAS
AN EMERA COMPANY

Peoples Gas System, Inc.
702 N Franklin Street
Tampa, FL 33602
(877) 832-6747

Prepared By:

RUIZ

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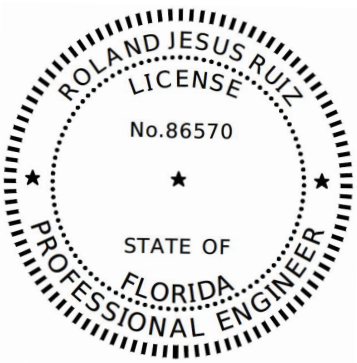

Roland J. Ruiz
Florida PE # 86570

Roland J Ruiz
Digitally signed by Roland J Ruiz
Date: 2024.08.04 21:17:52 -04'00'

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY ROLAND JESUS RUIZ ON THE DATE ADJACENT TO THE SEAL.

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

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REVISION CONTROL

REVISION #	DATE	AUTHOR	SECTION	COMMENTS
0	8/04/2024	Roland J Ruiz, P.E.	(Entire Document)	(Original version)

1.0 EXECUTIVE SUMMARY

PURPOSE

The purpose of this study was to conduct an independent review and analysis of the Peoples Gas System Inc. (PGS) Natural Gas Distribution Integrity Management Program (DIMP) for compliance with Subpart P of Part 192 of Title 49 of the Code of Federal Regulations. In addition, the analysis also involved a review of risk related conditions related to its existing pipeline system as summarized within its DIMP plan and appendices, as an effort to provide recommendations to PGS as to mitigation efforts and prioritization of each effort.

APPROACH

Generally, gas operators must develop and implement an integrity management program that includes a written integrity management plan as specified in Section 192.1007 of 49 CFR. The written integrity management plan must contain procedures for developing and implementing the following elements:

1. Knowledge and understanding of its gas distribution system.
2. Identification of threats.
3. Evaluation and ranking of risk.
4. Identification and implementation of measures to address risks.
5. Measurement of performance and monitoring of results to evaluate effectiveness.
6. Periodic DIMP Program Evaluation and Improvement.
7. Annual Reporting of results.

RUIZ performed an independent review and analysis of the PGS DIM Plan for compliance with these requirements. RUIZ also performed an analysis that encompassed a review of documented natural gas distribution system threats, a review of current PGS risk ranking methodology, and performance measures, specifically stated and shown in the provided DIMP plan. It should be noted that RUIZ did NOT conduct nor perform a detailed independent formal risk assessment which typically involves independently collecting and reviewing actual leak history, reviewing GIS data, hosting SME discussions, performing independent risk modeling and risk ranking, but rather the basis for the RUIZ review was, in its entirety, the DIMP Plan provided by PGS.

CONCLUSIONS AND RECOMMENDATIONS

RUIZ performed a thorough review and analysis of the written PGS DIM Plan provided by PGS to arrive at the following conclusions and recommendations:

- The PGS Distribution Integrity Management Program COMPLIES with, MEETS and EXCEEDS the minimum requirements for compliance with Subpart P of Part 192 of Title 49 of the Code of Federal Regulations.

- During the next DIMP review, we recommend for PGS to update the DIM Plan to include some of the SME identified threats that are not currently included in plan.

- PGS should continue to strengthen its Damage Prevention Program.
- PGS should continue to execute projects within the scope of its Cast Iron and Bare Steel (CIBS) pipeline replacement program and its Problematic Plastic Pipeline (PPP) replacement program.
- PGS should consider prioritizing replacement of known areas of plastic distribution systems that are considered undetectable / unlocatable.
- Evaluate feasibility of replacing segments with corrosion issues, including Shorted Casings.
- PGS should implement redundant Overpressure Protection mechanisms at key city gate purchase tap stations and district metering and pressure regulating stations.
- Analyze the risks associated with facilities of record that exist within the Rear lot of homes and consider long term plans to mitigate these risks.
- PGS Span and Suspended Pipe Segments that are In-Service should be evaluated thoroughly for integrity verification and threat risk reduction.
- PGS should continue to use modern polyethylene pipe per ASTM standard D-2513 for areas considered for all new construction and for replacement.
- PGS should continuously monitor system threats, adjust and re-prioritize pipe segment risk ranks as needed, and deploy short-term risk mitigation activities.

2.0 INTRODUCTION

In December of 2011, The Pipeline Hazardous Materials Safety Administration (PHMSA) released a Call to Action to all natural gas utility operators with a goal to accelerate the rehabilitation, repair, and replacement of high-risk pipeline infrastructure. This effort was driven by multiple unfortunate high profile pipeline accidents, including the 2010 San Bruno California 30" pipeline incident, and two gas pipeline explosions in Pennsylvania that occurred in January and February of 2011. All of these events resulted in tragic loss of life and property because of pipeline failures related to material integrity. This, among other PHSMA directives, was the basis for the establishment of the required "Distribution Integrity Management Program" for all natural gas operators regulated under Part 192 of Title 49 of the Code of Federal Regulations, as well as Chapter 25-12 of the State of Florida Administrative Code. Because of the general volatility of the commodity product that the natural gas distribution systems transport, the underlying goal of these regulations is to ensure the operator maintains and operates each pipeline in a way that maximizes the safety for the general public.

Peoples Gas System, Inc. is the largest natural gas operator of Florida, and just like all other natural gas local distribution companies, there is a federal and state requirement to comply with specific areas of Part 192 of Title 49 of the Code of Federal Regulations pertaining to integrity management. The goal of the Distribution Integrity Management (DIM) program as intended by PHMSA is to enhance safety by identifying and reducing gas distribution integrity risks. DIM is the driver for analysis, the determination of improvements, the prioritization of corrective actions and the development of a mechanism that will support measurement of performance. PGS's objective with their DIM plan is to create a safer distribution system by guiding processes on continually identifying and assessing risks on distribution and lines, remediating conditions that present a potential threat to pipeline integrity, and to monitor program effectiveness.

The purpose of this study was to conduct an independent review and analysis of the PGS Natural Gas Distribution Integrity Management Program (DIMP) for compliance with Subpart P of Part 192 of Title 49 of the Code of Federal Regulations. In addition, the analysis also involved a review of risk related conditions related to its existing pipeline system as summarized within its DIMP plan and appendices, as an effort to provide recommendations to PGS as to mitigation efforts and prioritization of each effort.

3.0 SCOPE OF WORK

R.J. Ruiz and Associates, Inc. dba RUIZ ("RUIZ") was retained by Peoples Gas System, Inc. (PGS) to conduct an independent review and analysis of the PGS Natural Gas Distribution Integrity Management Program (DIMP) for compliance with Subpart P of Part 192 of Title 49 of the Code of Federal Regulations. The analysis also involved a review of risk related conditions related to its existing pipeline system as summarized within its DIMP plan and appendices, as an effort to provide recommendations to PGS as to mitigation efforts and prioritization of each effort.

RUIZ performed an analysis that encompassed a review of documented natural gas distribution system threats, a review of current PGS risk ranking methodology, and performance measures, specifically stated and shown in the provided DIMP plan. It should be noted that RUIZ did NOT conduct nor perform a detailed independent formal risk assessment which typically involves independently collecting and reviewing actual leak history, reviewing GIS data, hosting SME discussions, performing independent risk modeling and risk ranking, but rather the basis for the RUIZ review was, in its entirety, the provided PGS DIMP Plan.

RUIZ was also retained to provide general consulting, guidance, and recommendations to PGS on the basis of the results of the findings produced by reviewing the PGS DIMP plan, including providing recommendation for short and long term goals for mitigation of certain system threats as to likelihood and consequence of failure, as identified in the DIMP plan.

4.0 INFORMATION PROVIDED BY PGS

On April 10th, 2024, PGS organized and provided their June 19th, 2023 version of their Distribution Integrity Management Program Plan ("PGS Gas Distribution Integrity Management Program Plan.pdf"). This document can be found within Appendix A as a reference. In addition to the DIMP plan, the PGS Director of Engineering & Technical Services had multiple verbal conversations with RUIZ staff with regard to certain areas of concern in their system, as identified by a few of the PGS Subject Matter Experts. These Client provided files and information discussed were the basis of our review and analysis summarized within this report.

5.0 REGULATORY COMPLIANCE REQUIREMENTS

Subpart P of Part 192 of Title 49 of the Code of Federal Regulations (CFR) clearly outlines the integrity management requirements for natural gas distribution operators regulated under said part of 49 CFR. In addition, specifically in Florida, Chapter 25-12 of the Florida Administrative Code has provisions in place to supplement the federal requirements at the state level, related to inactive gas service lines.

Generally, gas operators must develop and implement an integrity management program that includes a written integrity management plan as specified in Section 192.1007 of 49 CFR. The

written integrity management plan must contain procedures for developing and implementing the following elements:

1. Knowledge and understanding of its gas distribution system.
2. Identification of threats.
3. Evaluation and ranking of risk.
4. Identification and implementation of measures to address risks.
5. Measurement of performance and monitoring of results to evaluate effectiveness.
6. Periodic DIMP Program Evaluation and Improvement.
7. Annual Reporting of results.

In addition to the written plan, the operator is required to maintain and keep records of demonstrating compliance with the requirements of the subpart for at least 10 years.

At the state level, Chapter 25-12 of the Florida Administrative Code requires gas operators to take certain DIMP related actions for inactive gas service lines that have been inactive for more than one year.

With regard to inactive gas service lines, generally in Florida, natural gas operators are required to:

1. Take immediate action to protect persons and property if it determines that an inactive natural gas service line is an existing or probable hazard to persons or property and shall retire and physically abandon said line within three months of that determination.

2. Retire and physically abandon the natural gas service line within three months of determining that there is no prospect for reuse.

3. Perform annual risk assessments for all service lines that have been inactive for more than one year. These annual risk assessments shall

    a. Identify potential threats and shall rank risks using the operator's DIM Plan.

    b. Include the threats such as Presence of excess flow valves, incident and leak history, corrosion control records, continuing surveillance records, patrolling records, maintenance history, excavation damage experience, and any other data deemed relevant by the operator.

    c. be maintained by the operator for at least 10 years.

4. Inactive service lines that are identified in the annual risk assessments as potential threats with a high-risk ranking shall be retired and physically abandoned within six (6) months after completion of the annual risk assessment.

6.0 PGS DIMP COMPLIANCE WITH REGULATIONS

RUIZ performed an independent review and analysis of the PGS Natural Gas Distribution Integrity Management Program (DIMP) for compliance with Subpart P of Part 192 of Title 49 of the Code of Federal Regulations. The following summarizes how the PGS DIMP Written plan complies with Section 192.1007 of 49 CFR.

6.1 KNOWLEDGE AND UNDERSTANDING THE PGS GAS SYSTEM

Section 6.0 of the PGS DIM Plan demonstrates compliance with Section 192.1007 (a). PGS demonstrates an understanding of its gas distribution system developed from available information that it collects and maintains. PGS uses many resources to capture and retain data about its distribution pipeline system. These data sources include incident and leak history, corrosion control records, continuing surveillance records, patrolling records, maintenance history, excavation damages, Geographical Information System, and asset repository and management software(s).

Sections 6.1, 6.2 and 6.3 of the PGS DIM Plan identify the characteristics of the PGS pipeline's design, operations and the environmental factors that are necessary to assess the applicable threats and risks to its gas distribution pipeline, respectively. PGS maintains a database in SharePoint to house its pipeline system data for elements such as Number of EFVs Installed by Year, Summary of Construction Practices, Number of total and hazardous leaks either eliminated or repaired, categorized by cause (threat), and many other important metrics. This database is also considered for information gained from past design, operations, and maintenance.

Section 6.5 of the PGS DIM Plan identifies additional information needed and provides a plan for gaining that information over time through normal activities conducted on the pipeline system. They summarize this information in a data table that is clear and precise. Information is gained via new information learned (internal to PGS or external sources), changes such as acquisitions of new systems, completion of replacement programs, new threats, increases in threats, changes in the organization, code changes, etc. PGS develops action plans for attaining additional information over time through normal activities conducted on the pipeline, new data management practices or gathered through special efforts are also documented, or included by reference, as the plans are developed. PGS develops and implements a process by which the DIM program is reviewed periodically and refined and improved as needed.

PGS states in their DIM plan (section 6.6 & 6.7), how they collect and retain data on any new pipeline installed. They developed a PGS Map Record Standard to ensure the collection of attribute information such as diameter, material, and similar data must include, at a minimum, the location where the new pipeline is installed and the material of which it is constructed.

6.2 IDENTIFICATION OF THREATS

Section 7.0 and 15.0 of the PGS DIM Plan demonstrates compliance with Section 192.1007 (b). PGS Identify threats in its system and on each gas distribution pipeline, such as corrosion threats,

natural forces threats, excavation damage threats, other outside force damage threats, material or welds threats, equipment failure threats, incorrect operation threats, and other issues that could threaten the integrity of its system. The PGS DIM Plan data demonstrates that they utilize available information collected from incident and leak history, corrosion control records continuing surveillance records, patrolling records, maintenance history, and excavation damage experience in order to identify existing and potential threats.

For compliance with Florida Administrative Code Chapter 25-12.045 (c) related to inactive gas service lines, Section 16.9 of the PGS DIM Plan shows that they rely on their internal leak management system and customer relationship management interfaces to collect maintenance history and asset data for services for elements such as presence of excess flow valves, incident and leak history, corrosion control records, continuing surveillance records, patrolling records, maintenance history, and excavation damages. They feed this data into a specific risk ranking index that uses the historical data to apply a risk factor and achieve a relative risk score. PGS then schedules to perform a disconnection order on any inactive services with no prospect for reuse identified in the risk assessment, within the timeline required by the rule.

6.3 EVALUATION AND RANKING OF RISK

Section 8.0 and 16.0 of the PGS DIM Plan demonstrates compliance with Section 192.1007 (c). PGS self performs their own risk assessment process, and their methodology for evaluating and ranking risk is consistent with good practice and industry standards. Their documented process involves risk modeling as a means of evaluation and establishing rank. This detailed process can be found within Section 16.0 of the DIM Plan. A formal review of this method determined that its process is consistent with risk assessment methodology across the industry and is found to be appropriate for the utility operator's size. The data sources for spatial and tabular data are primarily the PGS system's production GIS data and the PGS leak management system.

Generally, they perform qualitative risk modeling using SME input to validate information, as well as quantitative risk modeling via relative risk and importance ranking to consider the probability and consequence of an event occurring. They utilize data sources to develop relative scores for likelihood of failure and consequence of failure which are combined to produce an overall risk score. PGS also deploys probabilistic risk models to help predict the likelihood of an event happening through determination of a probability of failure and associate it with its corresponding consequence of the event/failure, for both current and potential threats. Relative risk scores are generated by utilizing the consequence of failure and likelihood of failure values using spatial risk analyst software.

6.4 IDENTIFICATION AND IMPLEMENTATION OF MEASURES TO ADDRESS RISKS

Section 9.0 and 17.0 of the PGS DIM Plan demonstrates compliance with Section 192.1007 (d). PGS has implemented numerous programs to identify and implement measures to address risks. Some of these programs include Leak Management, Damage Prevention and Public Awareness Programs, Legacy Pipe Replacement Program, Over-Pressurization Prevention program, Cross Bore

Identification and Prevention program, the PGS Safety Management System, and so on. Section 17.0 of the DIM plan demonstrates key elements for each one of these specific programs such as Procedures that "Establishes requirements for collecting and maintaining Data & Records for Excavation Damage" and "Auditing and Quality Assurance of Leak Survey Program activities", and as such, via these specific programs, PGS determines and implements measures designed to reduce the risks from failure of its gas distribution system.

6.5 MEASUREMENT OF PERFORMANCE AND MONITORING OF RESULTS TO EVALUATE EFFECTIVENESS

Section 10.0 and Section 18.0 of the PGS DIM Plan demonstrates compliance with Section 192.1007 (e). PGS maintains a database for historical failures (leaks) that were repaired or eliminated, and they maintain five (5) year running averages worth of actuals to measure percent increases over the previous 5-year period. They organize and categorize the number of hazardous leaks either eliminated or repaired as required by section 192.703(c) of 49 CFR by leak causes such as corrosion leaks, natural forces leaks, excavation damage leaks, other outside leaks, pipe & weld leaks, equipment failure leaks, incorrect operations leaks and others. They also organize and categorize the number of hazardous leaks either eliminated or repaired by material types such as cast iron, bare steel, coated steel with CP, plastic, Aldyl-A, etc. This is an effective way to monitor performance measures from their established baseline to evaluate the effectiveness of the PGS DIM program, by utilizing the moving 5-year average method. Similarly, and included in this evaluation are additional performance measures such as the number of excavation damages and number of excavation locate tickets, organized in the same 5-year performance period.

6.6 PERIODIC DIMP PROGRAM EVALUATION AND IMPROVEMENT

Section 11.0 of the PGS DIM Plan demonstrates compliance with Section 192.1007 (f). PGS re-evaluates threats and risks on its entire pipeline system and performs its DIM program re-evaluation at least every five years (the most recent one was completed in 2020 and is maintained in its sharepoint database). They consider results of the performance monitoring in these evaluations and observe any negative increases (five percent or more) in any measures which would drive the need for re-evaluation. If identified, they reevaluate via analyzing data to determine a cause for increase and determining if additional actions need to be taken. Changes that take place on the plan as a direct result of these reevaluations are typically recorded within the Change Log on the DIM plan.

6.7 ANNUAL REPORTING OF RESULTS

Section 12.0 of the PGS DIM Plan demonstrates compliance with Section 192.1007 (g). PGS normally files their annual PHMSA F 7100.1-1 report (as required by all natural gas operators), and within the 7100 report they provide the four measures listed in paragraphs (e)(1)(i) through (e)(1)(iv) of section 192.1007 for the previous years performance as follows:

- Number of hazardous leaks either eliminated or repaired as required by Section 192.703(c) of 49 CFR (or total number of leaks if all leaks are repaired when found), categorized by cause.
- Number of excavation damages.
- Number of excavation tickets (receipt of information by the underground facility operator from the notification center).
- Total number of leaks either eliminated or repaired, categorized by cause.

6.8 RECORD KEEPING

Section 13.0 of the PGS DIM Plan demonstrates compliance with Section 192.1011. PGS states in this section that "Documentation demonstrating compliance with the requirements of 49 CFR, Part 192, and Subpart P shall be retained for at least 10 years". The plan states that it not only retains the most current version of the IMP, but also prior versions of it. PGS has a company-wide retention policy schedule for its documents of record. Section 13 goes on to elaborate on all material and documents supporting the subsections of the DIM Plan (such as Knowledge of Facilities, threat identification, risk evaluation and ranking, etc) are to be retained together with the Distribution Integrity Management Program files.

7.0 ANALYSIS OF PGS RISKS

An analysis and a review of risk-related conditions related to the Peoples Gas System (PGS) existing pipeline system was also performed. RUIZ performed said analysis that encompassed a review of documented natural gas distribution system threats, a review of current PGS risk ranking methodology, and performance measures, specifically stated and shown in the provided DIMP plan. The PGS DIMP plan and appendices were analyzed and observed, as an effort to provide recommendations to PGS as to mitigation efforts and prioritization of each effort.

7.1 DIMP IDENTIFIED SYSTEM THREATS

Section 15.0 of the PGS DIM Plan contains tables that summarize the utility's threat data. This section, including Tables 15.1, 15.2 and 15.3, shows data centric threat identification, and elaborates on how PGS reviews leak repairs, equipment failure reports, incidents by the threat categories, etc. PGS validates data results with reviews by the SMEs, in accordance with the threat Identification area of the document (Section 7.1 of the PGS DIM Plan)

The baseline threat review data contains the five-year baseline leak history from 2006 through 2010. From all leaks that occurred within that time span, the data centric leak information shows that 26% were related to Excavation Damages, 20% were Pipe/Weld/Joint Failures, 17% were Equipment Failure Leaks, and 14% were Corrosion related leaks.

The re-assessment took place recently for the latest five-year historical (2018 – 2022), and the results were as follows:

- Of the total 22,384 leaks,
  - 39% of recorded leaks are related to Excavation Damages
    - 60% of which were because the excavator did not have a locate ticket.
    - 29% was related to bad excavation practice.
    - 11% were related to mismarks.
  - 32% were Equipment Failure Leaks,
    - 95% of which are due to Service regulators.
  - 16% were Corrosion related leaks.
  - 5% were Pipe/Weld/Joint Failures.
  - The remaining DIM identified threats represent the remaining 8% of leaks.

The PGS's subject matter expert (SME)'s historical knowledge and input is utilized to verify and identify additional threats to their internal risk analysis as needed. They have provided appendix B, table 15-4 summary of SME threat identification applicable to their gas distribution system. Within this table, an SME response of Yes (Y), represents that the SME states that the threat is deemed to be a currently active threat.

From reviewing table 15-4 of the PGS DIM plan, the most notable threats are:

- Divisions 1 and 2 of the PGS system still operate and maintain cast iron pipes in the PGS system.

- Bare pipe still exists within Divisions 1,2,3,4 and 6 of the PGS System
- All Divisions show areas of stray current, internal corrosion, atmospheric corrosion, corrosion in cased crossings.
- All Divisions show excavation damages.
- All Divisions show presence of Aldyl-A plastic pipe, Delrin insert tap tees, and plexco caps.
- All Divisions show historical PE fusion failures.
- All Divisions show failures of control relief station equipment, valves, meters, and service regulators.

7.1.1 EXCAVATION DAMAGE THREATS

PGS Leak History repository shows that the number one threat in its system remains as Excavation Damages. These are leaks resulting directly from excavation damages caused by earth moving or other equipment, tools or vehicles. It includes leaks from damage by operator's personnel (oftentimes referred to as “first party”) or by the operator’s contractor (oftentimes referred to as “second party”) or by people or contractors not associated with the operator (oftentimes referred to as “third party”). This also includes a release or failure determined to have resulted from previous damage due to excavation activity. The Florida State’s Administrative Code addresses procedures and responsibilities relating to damage prevention, including Chapter 556 of the Florida Statutes, the Sunshine 811 program, and similar administrative codes and laws for Florida.

The aforementioned PGS DIM reassessment demonstrated an increase in excavation damage failures. The document specifies that this considerable increase in excavation damages were mostly related to “Insufficient One-Call Notification Practices”. This means contractor related damages to gas pipelines due to excavating without valid locate ticket. Prior to undertaking any excavation or demolition activities, it shall be the duty of each excavator to notify the approved notification center no less than the number of days outlined in the state administrative code. It could also mean the contractor excavated before locate ticket was valid (The state issues valid locate tickets under different guidelines, typically two business days). Or possibly the contractor excavated outside locate ticket scope. When a locate request is made in accordance with the provisions of state administrative codes the excavator may conduct such activity provided the excavation information provided by the excavator in their locate ticket request details is followed. Lastly, some excavation damages have been caused by some unlocatable plastic segments within their system, where the PGS staff member is unable to trace and locate the exact location of the plastic pipe due to lack of tracer wire, or tracer tape that has disintegrated.

7.1.2 EQUIPMENT THREATS

The 2nd most common failure (and threat) in the PGS system (based on the DIMP appendices) is related to equipment leaks (representing 32% of total leaks between 2018 - 2022). These are Leaks caused by malfunctions of control and relief equipment including regulators, valves, meters, compressors, or other instrumentation or functional equipment. Failures may be from threaded components, flanges, collars, couplings and broken or cracked components, or from o-ring failures, gasket failures, seal failures, and failures in packing or similar leaks. Specifically, for PGS, service regulators appear to be a common cause of leaks due to o-ring or gasket seal type failures.

7.1.3 CORROSION THREATS

External corrosion occurs due to environmental conditions on the outside of the pipe (e.g., from the natural chemical interaction between the exterior surface of the pipeline and the soil surrounding it). Internal corrosion typically occurs due to chemical attack on the interior surface of the steel pipe from the commodities being transported within the pipeline. In some cases, the corrosive liquids may be contaminants such as water or other chemicals entrained or suspended within the commodity being transported. Atmospheric Corrosion is when the presence of a thin film of moisture on exposed steel gas mains, services, risers, and meter manifolds may subject these facilities to atmospheric corrosion. Steel pipe with inadequate coating that is exposed to marine atmospheres, high humidity, atmospheric pollutants, and agricultural chemicals may be particularly vulnerable to atmospheric corrosion.

Corrosion Leaks caused by galvanic, atmospheric, stray currents, microbiological or other corrosive actions appear to be present within the PGS system. The PGS DIM plan demonstrates that 16% of leaks that occurred from 2018 to 2022 were caused by Corrosion related failures. As of the 06/19/2023 revision to Table 15-4 of the PGS DIM Plan (under section 15.0), PGS notes that multiple divisions of its system still have the presence of Cast Iron pipe, Bare Steel pipe with no CP, Stray Current areas, Internal Corrosion Areas, areas of below and above ground piping with Atmospheric Corrosion, and Corrosion of carrier pipe in encased crossings.

7.1.4 PIPE, WELD OR JOINT THREATS

Leaks resulting from material defects within the pipe, components or joints due to faulty manufacturing procedures, design defects or in-service stresses such as vibration, fatigue and environmental cracking are categorized into the “Pipe, Weld or Joint Threat” category. Material defect means an inherent flaw in the material or weld that occurred in the manufacture or at a point prior to construction, fabrication or installation. Design defect means an aspect inherent in a component to which a subsequent failure has been attributed that is not associated with errors in installation, i.e., and is not a construction defect.

Table 15-2 of the PGS DIM plan demonstrates that approximately 5% of all leaks between 2018 to 2022 were associated with Pipe, Weld or Joint Threats. By analyzing Table 15-4, it appears that PGS maintains and operates in its system areas Aldyl-A plastic in its system. This type of Plastic pipe manufactured by several companies has the potential for brittle-like cracking dependent on the resin, pipe processing, and service conditions. PHMSA issued advisory bulletin ADB-99-02 in March of 1999 informing natural gas distribution system operators of the potential brittle-like cracking vulnerability of plastic pipe installed between the 1960s and early 1980s. Aldyl-A Plastic pipe typically installed prior to 1974 based on manufacturing resin changes has the greatest potential for brittle-like cracking. Aldyl-A Plastic pipe typically installed 1974 – 1983 based on manufacturing resin changes has a moderate potential for brittle-like cracking. Finally, late Vintage Aldyl-A Plastic pipe typically installed 1983-1990 based on manufacturing resin change has lower potential for brittle-like cracking.

PGS also notes the presence of Delrin Insert Tapping Tees. PHMSA Advisory bulletin ADB-07-01 specifies Delrin insert tap tees as being susceptible to premature brittle-like cracking. Other PGS

threats in this category include PE Fusion Failures, Stab type mechanical failures, bolted type mechanical failures, and even Pre-1940 oxy-acetylene girth welds on larger diameter steel gas lines. These joints may be more prone to leakage and failure than the electric arc welding techniques used today for steel pipe.

7.1.5 OTHER KNOWN THREATS IN THE PGS SYSTEM

The PGS Natural Gas Distribution system witnesses other known threats commonly. These include Natural Force Damage Threats, incorrect operation threats, and other outside force threats. Natural Force Damage Threats are those caused by outside forces attributable to causes NOT involving humans, such as earth movements, earthquakes, landslides, subsidence, heavy rains/floods, lightning, temperatures, thermal stresses, frozen components, high winds (Including damage caused by impact from objects blown by wind) or other similar natural causes. Lightning includes both damage and/or fire caused by a direct lighting strike and damage and/or fire as a secondary effect from a lightning strike in the area.

Incorrect operation threats typically are leaks resulting from inadequate procedures or safety practices, or failure to follow correct procedures, or other operator errors. It includes leaks that are associated with components or processes that join pipe such as threaded connections, flanges, mechanical couplings, welds, and pipe fusions that leak as a result from poor construction and unintentional ignition of the transported gas during a welding or maintenance activity. It also includes leaks due to improper valve selection or operation, inadvertent over pressurization, or improper selection or installation of equipment.

Lastly, Other Outside forces threats are Leaks resulting from outside force damages, other than excavation damages or natural forces. This includes nearby industrial, man-made or other fire/explosion, damage by car, truck or other motorized vehicle/equipment NOT engaged in excavation activities, damage by boats, barges, drilling rigs or other maritime equipment or vessels NOT engaged in excavation activities. Previous mechanical damage NOT related to excavation activities. Unintentional damage caused by other power equipment, such as mowers, tractors or other tracked vehicles, NOT related to excavation activities. Intentional damage/vandalism/terrorism, i.e. the willful or malicious destruction of the operator's pipeline facility or equipment.

The exact threats known to the PGS system are documented in section 7.3 of the PGS DIM plan, but in general, include (but are not limited to) threats such as Ground movement related settlement, landslide or subsidence, Lightning strikes, Static electric threats where pin holing through the body of plastic pipe occurs, soil washouts, flooding, vandalism, improper backfill areas, and cross bores. Refer to Section 7.3 of the PGS DIM plan for the full list of threats.

7.2 ADDITIONAL SYSTEM THREATS

PGS has noted additional threats in its system, documented under Section 7.4 of its DIM Plan. The threats included in this section are:

- Cross bores
    - Because Trenchless technologies are being utilized during the installation of mains and services, when proper foreign utility locating procedures are not followed, a gas main or service may be accidentally cross-bored through a sewer line without the installation crew realizing it. At some later point in time, sewer maintenance activities may cut the gas line which may result in leaking gas entering the sewer line and potentially someone's home.

- Overbuilds
    - Areas where enclosed (and, at times, habitable) structures are placed directly over gas mains or services. Pipelines under buildings are illegal per FAC chapter 25-12.024, but at times certain homeowners unknowingly install mobile homes or construct illegal sheds, additions, or similar structures in areas of rear easements or where existing gas pipelines are located.

- Over pressurization threats
    - PGS operated some portions of its system at pressures lower than 1 psig, and as such, these areas did not typically have service regulators and additional means of over pressure protection at the meter sets for each premise, since the pressure delivered from the system to the meter is the same that is delivered to the gas appliance within the home. The DIM plan states that by June of 2019, these systems were replaced or uprated, but a PGS failure mode and effect analysis took place in 2021 and identified a number of opportunities for threat mitigation and protective redundancies to lower risk of over-pressurization of the PGS distribution system.

- Cast Iron pipe
    - Discussed under the corrosion threats section 7.1.3 of this document. Cast iron pipe is known to be weak in nature and represents industry wide threats. The joint types are typically Bell & Spigot type joint were over time this connection tends to fail for varying reasons.

- Bare Steel pipe
    - Discussed under the corrosion threats section 7.1.3 of this document. Bare steel pipe is considered high risk due to its high potential for external corrosion and leaks, in accordance with the PHMSA 2009 regulatory requirement, "Pipeline Safety: Integrity Management Program for Gas Distribution Pipelines".

- Aldyl-A plastic pipe
    - Discussed under the pipe threats section 7.1.4 of this document. These types of plastic material are an ongoing DIMP threat within the system. It is common for natural gas utilities to witness several cases of brittle type failures related to rock impingements, Outerwall cracking, and other stress related failures. The material also poses a challenge during emergency leak response due to the inability to "squeeze" the plastic to control a cut line. This is an industry-wide concern (see PHMSA 1999 advisory bulletins ADB-99-01 and ADB-99-02).

- Xtrubed Steel Tubing
    - This type of material appears to exist in the PGS distribution system and is an area of concern. Other operators in Florida have noted that their System data and their Subject Matter Experts have reported many historical leaks in these xtrubed steel tubing areas, and repairs are challenging due to its thin wall nature and inability to weld on the material.

- Inside Meters & Regulators
    - The PGS system is known to have some meters and pressure regulators within the inside of buildings. This is generally a threat due to the possibility of an equipment leak occurring within the inside of the building, resulting in leaking gas inside were high risks of Asphyxiation and/or accidental ignition can occur.

- Cyber and Other Security Threats
    - PGS notes the threats around cyber security breaches. This can be a threat for their gas control room activities and for human machine interfacing equipment that have remote control of critical field devices such as pipeline pressure control valves and similar critical infrastructure.

Although the DIM plan does not elaborate on any of the following threats, conversations took place with the PGS Director of Engineering and Integrity, and he mentioned that the PGS SMEs have witnessed the following threats within the PGS natural gas system, and the utility has determined that these threats are present and represent a risk for operations:

- Shorted Casings
    - Shorted CP system on steel carrier pipe due to contact with its steel casing is present in certain areas of the PGS system. Pipes installed in casings may be electrically shorted to the casing wall, shielding from effective cathodic protection current. Contact between the casing and pipe may result from improperly installed end seals, settlement of the pipe relative to the casing, failed spacers, and welding or other material inside the casing. Water may also accumulate in the casing due to ineffective seals or atmospheric condensation. As a result, pipes installed in casing may experience a higher rate of corrosion and leakage.

- Spans / Crossings
    - Aboveground pipe segments crossing canals, ditches and bridge attachments have shown multiple integrity issues throughout the years. Coating defects, stress related to movement, unsupported sagged pipe areas, natural force damages, and outside force damages related to reptiles and animals are common for other operators in Florida and for PGS as well.

- Rear Easements
    - History shows that it is increasingly challenging for a utility representative to access the rear of a residential premises for purposes of performing the required maintenance and compliance activities. The lack of access to a rear lot existing natural gas main, service, and/or meter not only results on the utility operator

failing to comply with state and federal regulations but can also present operational risks and challenges for the utility operators and its customers.

- Undetectable (unlocatable) facilities
    - The Company has reports of known areas where the plastic gas pipeline's locating tracer wire or tracer tape has deteriorated and/or corroded in a way that makes the plastic gas main unlocatable or difficult to locate. Plastic pipe that is not encased must have an electrically conducting wire or other means of locating the pipe while it is underground in accordance with section 192.321 (d) of 49 CFR. Many excavation damages have occurred in the PGS system because of this.

- MAOP / Material Verification
    - Recent changes in regulations require operators to ensure the physical and operational characteristics of gas pipelines are accurately reflected in records. Material verification records must be traceable, verifiable, and complete (TVC) and be maintained for the life of the pipeline. Many natural gas operators find that TVC records for legacy systems are not available, and operators are forced to develop and implement procedures for conducting additional tests to confirm pipeline materials. PHMSA added this requirement for onshore, steel, natural gas pipelines in accordance with 49 CFR § 192.607. Material verification may be necessary if there are changes in MAOP, or where TVC records are not available.

8.0 DIMP RISK RANKING RESULTS BY THREAT AND BY PGS DIVISION

Section 16.8 of the PGS DIMP plan summarizes the results of the most recent risk assessment and relative risk ranking that the utility has performed.

Generally, the Highest Risk Ranks for PGS appear to be in Division 1 (Dade – Broward), followed by Division 3 (St. Petersburg), and third place is Division 9 (Daytona) of its service territory. PGS continues to elaborate on its rank results in this section and breaks down the top threats based on the highest leak rate for any Service Area. Top threats based on frequency of failure are best summarized in Table 16.8.2.1 of the DIM plan, but in all cases, Corrosion threats appear to be high in the risk ranks for many of PGS's service centers, specifically, Corrosion on bare steel services and main within Divisions 3, 4, and 1 of PGS service territory. The plan goes on to elaborate which specific municipalities area included in this risk.

The utility states that the Risk results by threat type and by region were found to reflect the experience and judgement of the PGS SMEs. Refer to Appendix A of this report to find the full PGS DIM Plan referenced herein, including the full table of results under Section 16.8

9.0 PGS ACCELERATED ACTION AND RISK REDUCTION ACTIVITIES

PGS has already implemented numerous programs to identify and implement measures to address risks. Some of these mitigation programs include Leak Management, Damage Prevention and Public Awareness Programs, Over-Pressurization Prevention program, the PGS Safety Management System, and so on.

PGS has also implemented a Legacy Pipe Replacement Program driven by PHMSA's call to action during the 2010s related to obsolete materials such as cast iron, wrought iron, bare steel, and specific polyethylene/plastic facilities. The Florida Public Service Commission (FPSC) approved a 10-year accelerated cast iron and bare steel (CIBS) pipeline replacement program through 2022 for PGS back in 2012. In 2017, the FPSC approved a 10-year accelerated problematic plastic pipeline (PPP) replacement program through 2028. These replacement programs are an effective way to mitigate many of the threats and risks identified in the PGS DIM plan.

PGS also rolled out its Cross Bore Identification and Prevention program, to mitigate risks of its gas main or service being accidentally cross-bored through a sewer line without the installation crew realizing it. For the legacy pipe replacement program, PGS requires pre-camera utility location and post-camera verification requirements to reduce risk of cross bores. PGS also performs inspections on gravity sewer systems within the area of its natural gas system that had a possible cross bore from older completed projects.

The gas company has also implemented numerous additional "Risk Reduction" and "Accelerated Action" activities to mitigate some of the risk it has identified through its DIM program. Section 9.9 of the PGS DIM plan have multiple tables that summarizes the types of threat mitigation activities it has deployed, organized by threat categories such as Corrosion, Natural Forces, Excavation Damage,

Other Outside Force, Pipe, Weld, or Joint Failure, Equipment Failure, Incorrect Operation, and others. Generally, some of these actions include (but is not limited to):

- Increasing Leak Survey Frequency on areas of highest risk from 3 year to 1 year for areas with Cast Iron pipe, bare steel with/without CP, stray current areas, shorted casing areas, etc.
- Implementing or increasing schedule of PGS Main Replacement Program and DIMP risk analysis and ranking is utilized to prioritize the replacement schedule based on highest risk areas/segments for cast iron, bare steel, and similar obsolete pipe areas.
- For excavation damages, Track repeat offenders (third party contractors) with no locate tickets, perform targeted education sessions.

For more efficient leak detection and leak surveying, PGS rolled out the use of new technology (MobileGuard) to quickly identify potential leaks in the system. The technology works by mounting infrared diode equipment on a vehicle designed to collect methane and ethane measurements while driving the vehicle at speeds of up to 55 mph. This can supplement conventional leak detection methods and adds value by expediting the amount of area covered per unit of time and allows to detect leaks from further away and to locate hard-to-find small leaks.

Refer to section 9.9 of the PGS DIM plan for the full table and summary of Risk Reduction Activities and Accelerated Action programs the utility has already implemented.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Natural Gas Utility operators face a considerable level of risk associated with problematic and aging infrastructure piping systems. This, and because of a few terrible accidents that have occurred to some natural gas utility operators, was primarily the reason why the Pipeline Hazardous Materials and Safety Administration (PHMSA) established the requirements for Distribution Integrity Management Programs. These DIMP programs were intended to promote for the operators to fully understand their system risk, and ensure timely rehabilitation, repair, or replacement of high-risk gas mainlines that might have helped prevent accidents.

R.J. Ruiz and Associates, Inc. dba RUIZ ("RUIZ") was retained by Peoples Gas System, Inc. (PGS) to conduct an independent review and analysis of the PGS Natural Gas Distribution Integrity Management Program (DIMP) for compliance with Subpart P of Part 192 of Title 49 of the Code of Federal Regulations. RUIZ also performed an analysis on the Peoples Gas System Inc. Distribution Integrity Management Program that encompassed a review of documented natural gas distribution system threats, a review of current PGS risk ranking methodology, and performance measures, specifically stated and shown in the provided DIMP plan.

RUIZ performed a thorough review and analysis of the written PGS DIM Plan provided by PGS to arrive at the following conclusions and recommendations:

- **The PGS Distribution Integrity Management Program COMPLIES with, MEETS and EXCEEDS the minimum requirements for compliance with Subpart P of Part 192 of Title 49 of the Code of Federal Regulations.** The PGS DIM plan reviewed demonstrates specific processes and procedures the utility has developed and implemented to effectively know and understand its gas distribution system, identify its threats, evaluate and rank its risk, identify and implement measures to address risks, measure performance and track results. The utility also periodically performs the necessary evaluations and Improvements to its DIMP Program and reports on the results every year. PGS self performs their own risk assessment process, and their methodology for evaluating and ranking risk, and implementing accelerated actions and risk reduction activities is consistent with good practice and industry standards.

- **During the next DIMP review, we recommend for PGS to update the DIM Plan to include some of the SME identified threats that are not currently included in plan.** PGS staff members have witnessed the following threats within the PGS natural gas system, and the utility has determined that these threats are present and represent a risk for operations: Shorted Casings, Spans / Crossings, Rear Easements risks, Undetectable (unlocatable) facilities and concerns with MAOP / Material Verification. These threats appear to be present in the PGS system, and the DIM plan should be updated to include metrics and assessments related to each.

- **PGS should continue to strengthen its Damage Prevention Program.** As is customary for most natural gas local distribution operators, the highest threat and risk that PGS sees in its system is Excavation Damages. PGS has already implemented risk reduction activities for excavation damage prevention such as tracking of repeat offenders (third party contractors) with no locate tickets, perform targeted education sessions, and similar accelerated actions.

We encourage PGS to continue the all-employee culture for Patrolling the PGS Gas System, Public Awareness, and Damage Prevention in accordance with RP 1162 / 49 CFR 192.616. Initiatives should have a strong emphasis on homeowner educational notifications for excavation 811 laws and safety tips, using social media, radio announcements, TV commercials, mailers, and other methods. PGS should continue to perform general contractor excavator training and educational seminars and meetings. PGS should take the lead on hosting state-wide seminars in front of builder associations, local and state fire departments, annual FDOT Utility coordination conferences, and similar type events.

- **PGS should continue to execute projects within the scope of its Cast Iron and Bare Steel (CIBS) pipeline replacement program and its Problematic Plastic Pipeline (PPP) replacement program.** The PGS DIM program shows that there is still Cast-Iron pipe, Bare Steel pipe without CP, and vintage Aldyl-A plastic pipe in-service in its system, and these piping segments represent high levels of historical failures in the PGS system. PGS should prioritize these pipe segments for replacement as soon as practical. PHMSA has issued a number of advisories as it relates to aging infrastructure such as cast iron, bare steel and vintage plastic. RUIZ understands PGS establishes a legacy pipe replacement prioritization method in accordance with Section 16.10 of its DIM plan. The method includes establishing a replacement score based on six factors, including Risk Score, Frequency of Failure, Operating Pressure, Accessibility, Proximity, Municipal roadway or Utility Projects. The formula shown in said section demonstrates that it applies most weight (multiple of 30) on Risk Score and Frequency of Failure. RUIZ finds that this method is consistent with good engineering judgment, and PGS should continue prioritizing projects for replacement using this method, especially where cast iron or bare steel systems are still present.

- **PGS should consider prioritizing for replacement known areas of plastic distribution systems that are considered undetectable / unlocatable.** The Company has reports of known areas where the plastic gas pipeline's locating tracer wire or tracer tape has deteriorated and/or corroded in a way that makes the plastic gas main unlocatable or difficult to locate. Plastic pipe that is not encased must have an electrically conducting wire or other means of locating the pipe while it is underground in accordance with section 192.321 (d) of 49 CFR. PGS has reported many excavation damages have occurred in the PGS system because of the inability to locate the exact location of its facilities because of this. Projects to replace unlocatable plastic lines with modern installation methods that include the installation of coated copper tracer wire should be deployed.

- **Evaluate feasibility of replacing segments with corrosion issues, including Shorted Casings.** PGS reports that corrosion failures remain high in the risk ranks of many of its service territory divisions. It also mentions issues with shorted casings. Shorted casings refer to shorted CP system on steel carrier pipe due to contact with its steel casing is present in certain areas of the PGS system. Pipes installed in casings may be electrically shorted to the casing wall, shielding from effective cathodic protection current. As a result, pipes installed in casing may experience a higher rate of corrosion and leakage. PGS should evaluate the possibility of replacing any shorted casings and carrier pipe segments, preferably uncased. Modern installation methods using horizontal directional drilling allow for deeper installations across areas of elevated external surface loads related to vehicle weights and rail train car weights, without needing a casing, all while mitigating risks around a casing steel-to-steel

current short. PGS would need to collaborate with the authorities having jurisdiction over the railroads and road to confirm construction specifications related to uncased crossings would adhere to the applicable requirements.

- **PGS should implement redundant Overpressure Protection mechanisms at key city gate purchase tap stations and district metering and pressure regulating stations.** The PGS DIM plan does specify that the PGS low pressure systems (lower than 1 psig) were either replaced or uprated by June of 2019, but a PGS FMEA analysis took place in 2021 and identified a number of opportunities for threat mitigation and protective redundancies to lower risk of over-pressurization of the PGS distribution system. While the written DIMP plan does not specify exactly which opportunities these may be, we recommend reviewing the primary methods for Overpressure Protection (OPP) for compliance (and confirm capacities) and consider implementing a secondary or tertiary redundant method for OPP as warranted. For example, if primary method of OPP for a city gate station that feeds into the PGS system is a worker – monitor regulator run setup, consider the installation of One (or more) full capacity relief valves sized for a failure event of the monitor regulator as secondary redundant OPP. An example of Tertiary redundancy (last resort) can be positive shut-in remote valves or slam shut valves to completely prevent a drastic overpressure event where warranted (this should be reviewed on a case-by-case as a shut-in of a large system can protect it from overpressurization, but may cause an unwanted mass outage). PGS should also implement new Rupture Mitigation Valve requirements recently established within 49 CFR 192 for new pipelines as applicable.

- **Analyze the risks associated with facilities of record that exist within the Rear lot of homes and consider long term plans to mitigate these risks.** Gas mains and services that exist within rear lot of residential premises may present operational risks and challenges for PGS and its customers, especially in those areas where high-risk gas mains have been identified. The condition presents issues with access for operating and maintaining the system, conducting compliance repairs, and responding to emergency situations. It also establishes an increased risk associated with property use and related improvements to the property by the landowner; It is very common to see overbuilds, dogs, patios, property fencing and landscaping in the rear of homes, making it difficult to access the areas where the facilities are located for purposes of conducting compliance and maintenance tasks required by state and federal regulations. If budgeting allows and if warranted, It would be ideal for PGS to develop a replacement program with a goal to Install new distribution mains and services within the street fronts of the residential neighborhoods, in order to transfer meter sets to the new “front” gas service lines and eventually retire and place-out-service all rear lot underground natural gas distribution system facilities. This will allow PGS with more direct access to its facilities of record and will enable an improvement to safety and reliability. Similar programs for other operators in Florida have been proven effective. But at a minimum, current replacement “CIBS” or “PPP” program work related to the replacement of cast iron, bare steel and vintage plastic, should be proposing new polyethylene plastic within the front lot of residential homes, and using or proposing new pipe within the rear lots should be avoided wherever possible.

- **PGS Span and Suspended Pipe Segments that are In-Service should be evaluated thoroughly for integrity verification and threat risk reduction.** PGS mentioned it maintains span pipe segments that were intentionally installed above grade and that cross features such as rivers, canals, ditches, or highways. These span pipe segments may be susceptible to outside force damage as well as corrosion threats. History in Florida shows that aboveground gas pipe segments crossing canals, ditches and bridge attachments typically have multiple integrity issues throughout the years. It is not uncommon to see things like coating defects, stress related to movement, unsupported sagged pipe areas, dented pipe, and outside force damages related to vessels, reptiles and animals. PGS should thoroughly review its bridge attachment and suspended span pipe inspection records and have intimate reviews and interviews with its subject matter experts with regard to the condition of these span pipes. The best case for these conditions is obviously replacement with subaqueously installed pipelines, but certain crossings will have very challenging constructability and environmental requirements and will be very costly. One suggestion is to roll in the span pipe assessment into the next DIMP review and rank each one with its relative risk system wide.

- **PGS should continue to use modern polyethylene pipe per ASTM standard D-2513 for areas considered for all new construction and for replacement.** Unless steel pipe is required to maintain continuity of existing cathodic protection systems, or for high pressure or high stress applications, polyethylene pipe should be used in new construction whenever possible, to increase long term reliability and sustainability, and eliminate the risk of corroded pipe failures. Size all new main appropriately for the load but use minimum size of 2" piping for all new main and ensure the use of newer polyethylene PE2708 and PE4710 resins to ensure high performing materials with limited rework resin. Limit the amount of OQ span of control and ensure all construction personnel are properly operator qualified for joining covered tasks in accordance with the PGS written OQ plan and with ASTM standards F2620, D3261, and other industry standards for joining of new plastic. In addition, increase redundancy when using heavy gauge coated copper tracer wire for future locating abilities and ensure every new and replaced service line receives an excess flow valve properly sized to function at system pressure ranges.

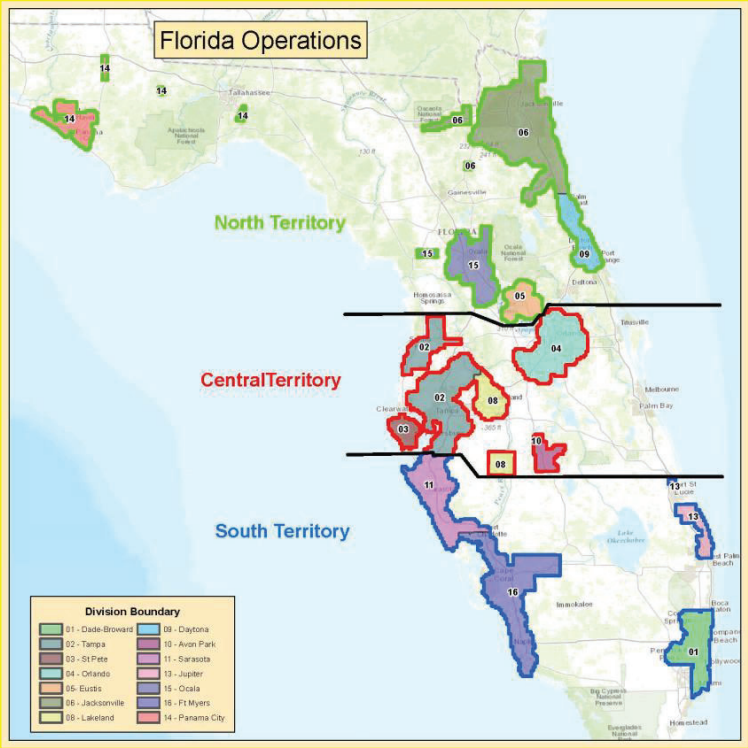
- **PGS should continuously monitor system threats, adjust and re-prioritize pipe segment risk ranks as needed, and deploy short-term risk mitigation activities.** PGS should continue advocating its Distribution Integrity Management Program and monitor system threats continuously to re-prioritize the ranks of risky mains as needed and on a periodic basis (minimum once per year). Continue to deploy robust leak survey programs using advanced new technology, deploy enhanced and remote corrosion monitoring activities, and conduct preventative maintenance to ensure short term risk of failure is mitigated in any way possible.

11.0 APPENDICES

11.1 APPENDIX A – PGS DISTRIBUTION INTEGRITY MANAGEMENT PLAN

Distribution Integrity Management Program

Program Effectiveness Evaluation Completed per §192.1007: __06/19/2023__



Company Headquarters: 702 N Franklin St, Tampa FL 33602

Operator ID: 15348

Distribution System Makeup: 14,800 miles of intrastate natural gas main; 460,000 customers in Florida

Key DIMP Personnel Contact Information

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IM Analyst
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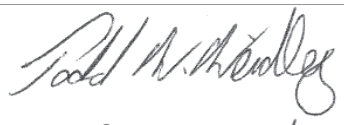
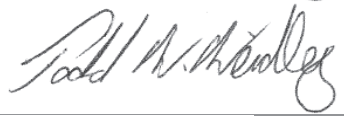
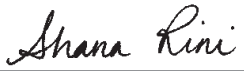
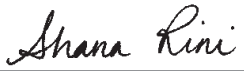
Contents

REVISION APPROVAL

Date	Name	Title	Signature
05/19/2014	Todd Weidley	Manager Compliance, Standards & Mapping	
09/15/2015	Todd Weidley	Manager Integrity Management	
05/31/2016	Todd Weidley	Manager Integrity Management	
10/01/2016	Todd Weidley	Manager Integrity Management	
05/10/2017	Todd Weidley	Manager Integrity Management	
10/19/2017	Todd Weidley	Manager Integrity Management	
01/22/2019	Shana Rini	Manager Integrity Management	
11/01/2019	Shana Rini	Manager Integrity Management	
06/23/2020	Shana Rini	Manager Integrity Management	
06/30/2021	Shana Rini	Manager Integrity Management	
06/02/2022	Shana Rini	Manager Integrity Management	
06/19/2023	Shana Rini	Manager Integrity Management	

1.0 SCOPE

This written Distribution Integrity Management (DIM) Plan applies to the gas distribution pipelines operated by Peoples Gas System in the State of Florida. Gas distribution pipelines include the associated mains, services, service regulators, customer meters, valves, and other appurtenances attached to the pipe, compressor units, metering stations, regulator stations, delivery stations, holders and fabricated assemblies. This plan does not cover *Transmission lines* as defined by PHMSA.

The DIM Plan complies with 49 CFR 192.1001, 192.1005, 192.1007, and 192.1011, 192.1013 pertaining to integrity management for gas distribution pipelines.

2.0 PURPOSE AND OBJECTIVE

The purpose of the DIM program is to enhance safety by identifying and reducing gas distribution integrity risks. DIM is the driver for analysis, the determination of improvements, the prioritization of corrective actions and the development of a mechanism that will support measurement of performance.

The objective of this DIM plan is to create a safer distribution system by guiding processes on continually identifying and assessing risks on distribution and lines, remediating conditions that present a potential threat to pipeline integrity, and to monitor program effectiveness.

The DIM Plan is comprised of these elements:

- Knowledge of PGS Facilities & Data Integrity (Section 6.0)
- Threat Identification (Section 7.0)
- Risk Evaluation and Ranking (Section 8.0)
- Identification and Implementation of Measures to Address Risk (Section 9.0)
- Performance Measurement, Monitoring Results and Evaluating Effectiveness (Section 10.0)
- DIM Program Evaluation and Improvement (Section 11.0)
- Annual Reporting & Communicating Results (Section 12.0)
- Document and Record Retention (Section 13.0)

3.0 ROLES

Key roles overseeing DIMP include:

3.1 Director of Engineering Technical Services (Director Engineering)

This role has overall responsibility to assure that the IM Plan processes are implemented by the organization in accordance with this IM Plan and associated regulatory requirements. The Director Engineering may delegate, in writing, some or all these responsibilities to others within the organization.

3.2 Manager of Integrity Management

This role has the responsibility for day-to-day program oversight and responsibility to assure that the plan is implemented effectively and is fully integrated with the Company's operating procedures.

This Plan assigns authority to the *Manager of Integrity Management* for approval of documents and plans. This role *may* delegate some or all these responsibilities.

Roles for this position include:

a. Monitors and controls costs and scheduling

b. Determines IM Program budget requirements and makes associated Capital and Maintenance budget requests

c. Assures effective implementation of the IM Program

d. Authorizes and approves changes and revisions to the IM Plan

e. Initiates communication with other departments within the Company

f. Participates in annual effectiveness reviews and complete plan re-evaluations

g. Submits reports to PHMSA and State Safety Regulators

h. Administers the IM Program Compliance Activity Management system

i. Monitors Performance Measure

j. Assures plan compliance

k. Analyzes threats

l. Performs risk ranking

m. Reviews and approves Exception Requests

3.3 Integrity Management Analyst

The primary responsibility of this role is the identification, maintenance and associated analyses of asset, maintenance and operational data used in the IM Program and developing recommendations based upon regulatory requirements and program results. The Analyst is responsible for compliance with the Company's distribution IM Plan along with mitigating and reducing the associated risk to the gas distribution facilities.

3.4 Integrity Management Engineer

This role is a technical position responsible for distribution evaluations, risk assessments and legacy distribution pipeline replacement related to integrity management of the PGS natural gas system. The IM Engineer performs leak data analysis, threat identification and risk analysis to initiate DIM plan changes based on risk data.

Table 3-1: Key Personnel Requirements

Role	Education, Training and Experience
Director Engineering	• Bachelor's degree or equivalent experience. • Experience in the operations and management of gas pipeline systems. • Working knowledge of or specific training on DOT Integrity Management regulations 49 CFR §192 Subpart P.
Manager Integrity Management	• BS degree in engineering, physical sciences, physics or equivalent experience. • Minimum of six years of related experience in project management, engineering and/or natural gas operations • Working knowledge of or specific training on DOT Integrity Management regulations 49 CFR §192 Subpart P.
Integrity Analyst	• Bachelor's degree or equivalent experience. • Business operations analysis experience and experience in using, analyzing, and assessing natural gas operating system performance and asset related data.

Role	Education, Training and Experience
	• Working knowledge of or specific training on DOT Integrity Management regulations 49 CFR §192 Subpart P.
Integrity Engineer	• Bachelor's degree or equivalent experience. • Knowledge of engineering procedures and experience specific to the natural gas industry. • Working knowledge of or specific training on DOT Integrity Management regulations 49 CFR §192 Subpart P.

4.0 MANAGEMENT OF CHANGE

Management of Change is applicable to changes to a DIM process, policy, procedure, standard or manual. New or significant changes to the PGS DIMP will follow the PGS Management of Change process through our PGS Standards Committee review.

Significant changes to the DIM Plan will be recorded in the Change Log of this DIM Plan. The Change Log will record revisions and changes that include:

- Changes in plan general information
- Additions, refinements, improvements, or elimination of measures to reduce risk
- Additions, refinements, improvements, or replacement of performance measures

Minor edits such as edits in wording, formatting, etc. that do not affect processes, requirements or performance are not required to be documented. Changes to material in the Appendices that is included by reference need not be recorded on the Change Log.

5.0 DEFINITIONS

Cross Bore: The intersection of an existing underground sewer utility or underground sewer structure by a natural gas utility installed using trenchless technology resulting in an actual or potential compromise of the integrity of either or both utility or underground structure. (PGS specific definition)

DIMP: Distribution Integrity Management Program

EFV: Excess Flow Valve. An Excess Flow Valve is a safety device that is designed to shut off flow of natural gas automatically if the service line breaks.

FOF: Frequency of Failure; synonymous with Likelihood of Failure.

Hazardous Leak: a leak that represents an existing or probable hazard to persons or property, and requires immediate repair or continuous action until the conditions are no longer hazardous (reference §192.1001)

Integrity Management Plan (IM Plan): a written explanation of the mechanisms or procedures the operator will use to implement its integrity management program and to ensure compliance with subpart P of 49 CFR Part 192(reference §192.1001)

Integrity Management Program (IM Program): an overall approach used by an operator to ensure the integrity of its gas distribution system (reference §192.1001)

Leak: an unintentional escape of gas from a distribution line (reference *Instructions for completing Form PHMSA F 7100.1-1*)

Mechanical Fitting: A mechanical device used to connect sections of pipe. The term "mechanical fitting" applies only to compression-type fittings, including stab type fittings, nut follower type fittings, bolted type fittings, and other compression-type fittings.

Region: areas within a distribution system consisting of mains, services, and other appurtenances with similar characteristics and reasonably consistent risk. As used in Section 7 of this User Guide, the term Region applies to a geographic area within the operator's system.

Risk: A relative measure of the likelihood of a failure associated with a threat and the potential consequences of such a failure.

Risk Model: the integration of facility data, operational data, SME input, and established algorithms to estimate the relative risk associated with a gas distribution system threat

Service Line: A distribution line that transports gas from a common source of supply to an individual customer, to two adjacent or adjoining residential or small commercial customer, or to multiple residential or small commercial customers served through a meter header or manifold. A service line ends at the outlet of the customer meter or at the connection to a customer's piping, whichever is further downstream, or at the connection to customer piping if there is no meter.

SME: Subject Matter Expert. An SME is an individual who is judged by the operator to have specialized knowledge based on their expertise or training.

Sunshine 811: Sunshine State One-Call of Florida. An organization required by the Underground Facility Damage Prevention and Safety Act that operators of underground facilities in Florida shall be a member of and shall use and participate in the system. Sunshine 811 provides member operators an opportunity to identify and locate their underground facilities.

Sub-Threat: a threat type within one of the primary threat categories specified in §192.1007(b)

6.0 KNOWLEDGE OF PGS FACILITIES & DATA INTEGRITY

PGS uses many resources to capture and retain data about our distribution pipeline system that are summarized in the table below. The primary data sources for tracking pipeline threats that could threaten the integrity of our pipeline including, but not limited to, incident and leak history, corrosion control records, continuing surveillance records, patrolling records, maintenance history, and excavation damages are detailed more below.

Geographical Information System (GIS): Specifically, to warehouse system knowledge and ensure DOT Compliance, PGS uses a Geographical Information System (GIS), a multiuser geodatabase and application that enables spatial relationships and pipeline attributes for day-to-day operational use. The GIS database is used to capture and store new and archived data. Data fields include type of facility (pipe, meter, EFV, regulator, valve, etc.), date of installation, location of facility, material, size, pressure, etc. The GIS system interfaces with other PGS systems listed below. In addition to new data, data that had been missing or incomplete is also updated within the GIS system as per DIM requirements.

Inspection Manager: The system used by PGS to schedule, track and report compliance activities such as patrolling, survey and inspections. This system interfaces with the PGS GIS system to activate compliance activities upon new installation of facilities.

Customer Relationship Management (CRB) System: The system used by PGS to track and maintain current customer information such as customer type, account activity such as service initiation and support calls and meter device information.

Leak Management System (LMS): The system used by PGS to track, maintain and report leak and damaged facility reports.

Table 6-1: DIMP Records Summary

Record	Record Type – Database, Electronic Record, Paper Record	Applicable Standard, Policy, or Guideline	Extent of Missing Records	Location of Records	Key Contact
Geographic Information System (GIS) database	Database	Map Record Standard	Unknown	GIS	Supervisor GIS & Mapping Services
Gas Service Records	Electronic / Paper / GPS	Map Record Standard	Unknown	GIS, OpenText	Service Area Manager; Supervisor GIS & Mapping Services
As-Built Construction Drawings / Records	Electronic / Paper / GPS	Historic & Map Record Std	Unknown	Service Area & GIS	Service Area Manager; Supervisor GIS & Mapping Services
Gas Leak Repair Records	Electronic / Paper	O&M	0	LMS, Service Area, OpenText	Service Area Manager
Gas Leak Repair Database	Electronic	O&M	0	LMS	Service Area Manager
Gas Leak Survey Records	Electronic / Paper	O&M, PGS Pipeline Compliance Guide	0	GIS, Inspection Manager, Service Area	Service Area Manager
DOT/PHMSA Incident Reports	Electronic / Paper	O&M	0	PHMSA Portal, Corporate, SharePoint	PSMS Administrator
Other Incident Reports	Electronic / Paper	O&M	0	Service Area / Corporate / SharePoint	Service Area Manager; PSMS Administrator; Safety
Cathodic Protection Maintenance Areas (Rectifier and Pipe-to- Soil inspection)	Electronic / Paper	O&M	Unknown	Inspection Manager, Service Area	Service Area Managers
CP Maintenance of Isolated Mains and Services subject to 10% annual inspection	Electronic / Paper	O&M	Unknown	Inspection Manager, Service Area	Service Area Manager
Atmospheric Corrosion Inspection Records	Electronic / Paper	O&M	Unknown	Inspection Manager, Service Area	Service Area Manager
Patrol Records	Electronic / Paper	O&M	0	Inspection Manager, Service Area	Service Area Manager
Valve Maintenance Records	Electronic / Paper	O&M	0	Inspection Manager, Service Area	Service Area Manager

Record	Record Type – Database, Electronic Record, Paper Record	Applicable Standard, Policy, or Guideline	Extent of Missing Records	Location of Records	Key Contact
Regulator Station Maintenance Records	Electronic / Paper	O&M	0	Inspection Manager, Service Area	Service Area Manager
Requests to Locate Gas Facilities	Database / Electronic	O&M, Damage Prevention SUNSHINE 811	Unknown	Sunshine 811, IRTHnet	Service Area Manager & Supervisor Damage Prevention
3rd Party Damage Claims	Database	O&M, Damage Prevention	Unknown if not reported	LMS	Supervisor Damage Prevention
Product Quality Reports	Electronic	O&M	0	LMS, Corporate, SharePoint	Service Area Manager, Integrity Mgt
Main & Service Condition Reports (Uncovered Pipe Reports)	Paper	O&M, PGS Pipeline Compliance Guide	Unknown	LMS, Service Area	Service Area Manager
Environmental Factor: Areas subject to flood	Database	FEMA	0	GIS	Supervisor GIS & Mapping Services
Environmental Factor: Population Density Records	Database	CRB, Hurricane Preparedness	n/a	GIS	Supervisor GIS & Mapping Services
Environmental Factor: Areas of Wall-to-Wall Paving	Electronic	O&M	Unknown	Identified as L01 in Inspection Manager for Annual Leak Survey	Service Area Manager
SME Interview Records	Electronic / Paper	DIM, SME form	0	Corporate, SharePoint	Manager Integrity Management

6.1 Pipeline System Design and Materials

Appendix A: Pipeline System Data provides detailed information on the Company's pipeline system design and material. PGS may obtain SME involvement for aspects of knowledge if available data is lacking. PGS may modify, delete or add new material to the information in Appendix A based on applicability and availability of the data. Currently, Appendix A contains:

- System Design by Operating Pressure by Mains and Services
- System Material Types and Years Installed (System Total & By Service Area)
- Summary of Construction Practices
- Number of EFVs Installed by Year
- District Regulators, Security Valves and Relief Valves

6.2 Pipeline System Operations

Appendix A: Pipeline System Data provides detailed information on the Company's pipeline system operations. PGS may obtain SME involvement for aspects of knowledge if available data is lacking. PGS may modify, delete or add new material to the tables presented in this section based on applicability and the availability of data. Currently, Appendix A contains:

- Number of hazardous leaks either eliminated or repaired, categorized by material
- Number of total and hazardous leaks either eliminated or repaired, categorized by cause (threat)
- Mechanical Fitting Failures by Year (individual tracking discontinued in 2021)
- Excavation Damages and Tickets by Year
- Reportable/Significant Gas Incidents Summary by Year
- Reportable/Significant Gas Incidents by Cause
- Cathodic Protection

6.3 Environmental Factors

The environmental factors that are most relevant to Florida include population density, land subsidence, external heat sources, business districts, flood, river scour, river channel migration, construction activities, wall to wall pavement areas, soil types (corrosive), saltwater exposure and valve placement.

Environmental factors deemed to have little to or no risk to PGS include frost heave (0-5" depth), earthquakes (rare and low magnitude), fault lines (none) and landslides (little elevation variation) based on historical geographical and almanac reports. PGS will continue to monitor these factors for change in risk profile. Seismicity is not currently considered a threat of concern.

Appendix A: Pipeline System Data provides detailed information on environmental factors that may affect the Company's pipeline system, specifically:

- Areas Subject to Flood Damage

FEMA flood zone designations are used to reflect severity or type of flooding in an area. PGS consolidates these designations into three (3) categories that include multiple risk zones: Moderate to Low Risk, High Risk, and Undetermined. Detailed information about zones and flood designations can be found at: https://snmapmod.snco.us/fmm/document/fema-flood-zone-definitions.pdf. GIS incorporates FEMA flood map as a risk overlay on our PGS pipeline system maps.

6.4 Threat Frequency and Trends

System data collected and reported to PHMSA for annual reporting are included in assessing threats and risks and are incorporated by reference. PGS may modify, delete or add new material to the tables presented in this section based on applicability and the availability of data. Appendix A: Pipeline System Data provides detailed information on threat frequency and trends that may affect the Company's pipeline system, specifically:

- Corrosion Threat
- Natural Forces Threat
- Excavation Damage Threat
- Other Outside Force Threat

- Pipe, Weld, or Joint Failure Threat
- Equipment Failure Threat
- Incorrect Operation Threat
- Other Threat

6.5 Additional Data Needed to Assess Threats (Potential and Existing)

PGS updates this information annually and as needed during the DIM program review to include new pipeline additions and changes from system verification activities. The use of information gained from past design, operations and maintenance is also considered. Information can be obtained through:

- New information learned (internal to PGS or external sources).

Changes such as acquisitions of new systems, completion of replacement programs, new threats, increases in threats, changes in the organization, code changes, etc.

Action plans for attaining additional information over time through normal activities conducted on the pipeline, new data management practices or gathered through special efforts are also documented, or included by reference, as the plans are developed.

Table 6-2 below identifies the additional data currently needed to support the DIM Program. Completed/archived improvements are listed in Table 6-3.

Table 6-2: Additional Data Collection Needed for DIM

Area of incomplete records or data	Acquiring over time through normal activities?	Action Plan?	Action Plan	Schedule	Target Completion	Responsibility
District Regulators, Security Valves and Relief Valves Manufacturer and Type	Y Electronic / Paper Inspection Manager	N	No plan to consolidate at this time. All district regulator records are available in Service Area offices			
Unknown installation date of assets in GIS	N	Y	Manual map record review for date information	Target completion 2025	Target completion 2025	Supervisor GIS & Mapping Services
Cross bore exposure	Y	Y	Begin inspections in 2018	Ongoing	Ongoing	Manager, Integrity Mgt
Pipe material type (formerly plastic piping type)	Y	Y	Use Uncovered Pipe Reports to identify pipe material; GPS / Barcoding	Ongoing	Until system completely traceable	Service Area Manager

Overbuilds (structures over gas mains)	N	Y	Incorporate mobile home property data into DIM Risk	2021	2021	Manager, Integrity Mgt
Addition of galvanic and impressed cathodic protection system in GIS	Y	Y	GPS / Barcoding	Ongoing	When completed	Supervisor GIS & Mapping Services, Service Area Manager
Quantification of Inside Meters & Regulators	Y	Y	Quantify remaining inside meters / regulators and verify safety conditions	2022	Baseline count completed 2022	Mgr Pipeline Safety Compliance

Table 6-3: Completed Records and/or Actions to Gaining Additional Information

Action Plan Scope Gaining Additional Information	Completion Date
Revision of Gas Leak Repair Form	March 31, 2012
Revision to Leak Information and Database Reporting database	February 28, 2013
District Regulators, Security Valves and Relief Valves Manufacturer and Type – Develop/update a Form to capture this information during PGS- specified normal activities	
Mechanical Coupling Type - Update Gas Leak and Repair Form to capture this information during PGS-specified normal activities	March 31, 2012
Plastic Piping Type - Update Gas Leak and Repair Form to capture this information during PGS-specified normal activities	December 31, 2015
Summary of Construction Practices	Completed
Mechanical Coupling Type Failures Tracking	Completed
Service Regulators Manufacturer and Type	Completed
Overbuild review, mapping and incorporation into PPP replacement risk (mobile home and trailer structures over gas mains)	August 2021
Validating and documenting location and safety of inside meters and regulators	December 31, 2022

6.6 Data Collection for New Construction and Ongoing O&M

Data is continuously collected for construction of new facilities, reconstruction of existing facilities and ongoing operations and maintenance. In particular, the standard or procedure that require data capture for the location where the new pipeline is installed and the material of which it is constructed is contained in the PGS Map Record Standard.

6.7 Data Collection from Subject Matter Experts (SME)

In addition to maps, records, and databases, valuable information may be gathered and captured from Subject Matter Experts (SMEs). SMEs are individuals who have specialized knowledge based on their experience or training. SMEs may be used to supplement existing, incomplete, or missing records and may be the only or best source of information in subjects such as historical operations, maintenance, and construction practices. SME interviews are utilized to ensure that all threats have been identified.

All SME interviews shall be documented and stored in the DIMP files. A sample SME Interview Form is shown below and may be used for documenting SME interviews.

SME records used in system knowledge gathering and in threat determination are included as support documents to be retained per Document and Record Retention requirements of this IM Plan.

Sample SME Interview Form

SME Name	Current Job Title Role	Yrs. Experience	Comment(s) re: Qualification & Experience
Written Record			
Describe nature of information (First Hand witness or direct experience vs. Second Hand)			
Date:			
Interviewer Name:			
Interviewer Title:			
Signature of Interviewer (Required):			
Signature of SME's (Required):			

7.0 THREAT IDENTIFICATION

The Company identifies existing and potential threats to its gas distribution pipeline system. Threats are defined by PHMSA to ensure consistency of reporting, improve data integrity and permit improved risk analysis and risk comparison.

A review of information gathered from data collection activities in Section 6.0 is conducted to identify existing and potential threats.

The process used to identify threats is fully described and documented in Section 15.0 Appendix B. Threats identified as applicable to the gas distribution pipeline are documented in Section 15.0 Appendix B.

Prior versions of the threat identification process and results that are no longer current are retained and stored in the Distribution Integrity Management Program files.

7.1 Data Centric Threat Identification

PGS uses available leak repair and incident data to identify threats to the gas system. Appendix B, Tables 15-1 - 3 documents how the Company reviews leak repairs, equipment failure reports, and incidents by the threat categories for the current year's previous five-year period and documents this evaluation of the applicable threats.

PGS validates data results with reviews by SME(s) to make a final conclusion on applicable threats to the system. The SME(s) will also seek to identify any additional threats not covered by the threat categories.

The application of this data centric SME review existing threat identification process is documented in Appendix B of this Plan. The results are documented in Appendix B.

If it is found that the level of detail available from leak repair and incidents does not fully support this approach, the Company may consider SME threat identification.

7.2 SME Threat Identification

PGS may use SME historical knowledge and input to verify or identify additional threats to our risk analysis as needed. Documentation of SME reviews are similar to data collection reviews. Appendix B, Table 15-4: SME Threat Identification Summary Applicable to the Gas Distribution System lists the current analysis for system leaks using SME reviews and evaluation of applicable threats.

The Company may combine the data centric and SME centric approaches to have as complete an evaluation as possible.

7.3 Known Threats Causing Leaks

Threat (Leak Cause) Sub-Threat
Corrosion Failure
Internal corrosion
External corrosion
Atmospheric corrosion
Natural Force Damage
Ground movement - settlement, landslide or subsidence
Lightning - direct strike
Static electric – pin holing through the body of plastic pipe
Washouts - soil moved by water, including river scour and channel migration causing undermining of supporting soils
Flooding – damage by water or debris/material carried by flood water
Tree related - pipe is in the root system of a felled tree
High temperature - degradation due to prolonged exposure to high temperatures
High winds - object blowing over and damaging above ground assets from high winds, tornados or hurricanes
Excavation Damage
One Call: • Wrong Information Provided • No Notification made to the one-call center • Incorrect facility records/maps • Notification to the one-call center made, but not sufficient
Locating Practice: • Facility could not be located • Facility marking or location not sufficient • Facility was not located or marked
Excavation Practice: • Excavation Processes not sufficient
Other: • Deteriorated Facility

Threat (Leak Cause) Sub-Threat
• Abandoned Facility • Previous Damage
Other Outside Force
Vandalism/Terrorism/Theft – purposeful harm
Fire/Explosion – not ignited/caused by natural gas
Previous Mechanical Damage (Non-excavation related)
Animal/Insect
Vehicle/Maritime Vessels – mower, boat, etc., striking a facility
Pipe, Weld or Joint Failure
Threaded connection
Wrinkle bend
Defective factory weld (Field welds should be categorized as Incorrect Operations)
Defective compression coupling
Defective pipe seam
Defective body of pipe
Fusion failure
Mechanical fitting failure
Repair device failure
Equipment Failure
Equipment Malfunction (Control/Relief Equipment)
Gasket/O-Ring/Doping/Grease/Thread Sealant - failure of the sealing mechanism
Valve Failure/Packing - failure of the sealing mechanism
Incorrect Operation
Failure to follow procedures – company or manufacturer's
Defective/failed field weld / fusion
Loose connection - not adequately tightening a fitting
Stripped threads - overtightening or cross threading of a threaded fitting
Improper backfill – damaging coating or facility
Cross bore
Improper selection/Installation of equipment
Other

7.4 Other Additional Threats to Pipeline System

In addition to threats that are known as directly causing leaks on natural gas systems, PGS has identified additional threats and factors that are considered and evaluated.

7.4.1 Cross Bores

Cross bores resulting from trenchless pipe installation during directional-drilling activities pose a potential threat to the PGS distribution system. Cross bores can cause blockage of gravity sewer lines and may impact the integrity of the gas utility if or when the gravity sewer line is later cleared with an auger. It is essential to prevent cross bores during trenchless natural gas line installation. Proactive programs to prevent and discover cross bores are a way to identify potential damages in our system before they occur and compromise safety.

Cross bore prevention and mitigation is discussed in the Company's Construction Standards Manual. PGS uses Company Claims data to review possible cross bore claims monthly. This information along with historical review of leak data was used to identify a number of possible cross bore locations within the PGS system. PGS actively conducted investigations of potential cross bores in the natural gas distribution system via camera

inspections of sanitary sewer lines and continues to monitor and evaluate data results for further risk management of cross bores as needed. Through these investigations, PGS has learned that an additional risk for cross bores is the occurrence of multiple sewer laterals y-ing off of a single service line in the state of Florida.

7.4.2 Overbuilds

A pipeline overbuild occurs when an existing pipeline facility is enclosed within or a building is built on top of the pipeline. Pipeline overbuilds are an environmental factor to be considered in evaluating the degree of risk to a pipeline. PGS uses SME input may help identify risk of overbuilds on its system by visual confirmation of structure relocations such as when mobile homes are moved within a community. Overbuilds would be evaluated within the "other concerns" threat category.

7.4.3 Over-Pressurization

Over-pressurization can occur within the pipeline system if varying pressures are existent within a single system, particularly in utilization pressure systems. Utilization pressure (UP) systems, otherwise known as low pressure, operates at less than 1 psig. UP systems do not require a service regulator to reduce pressure since the pressure is already delivered at a pressure appropriate for use by appliances. However, with changing system and customer demand needs, higher pressure systems are now more common. A risk of UP systems is the potential for over-pressurization as there are not the standard pressure reliefs and safeguards installed on higher pressure systems. PGS has replaced its UP system within its territories and has implemented additional measure to reduce risk of over-pressurization.

7.4.4 Legacy Pipe Materials

PHMSA has identified a number of pipe materials that are prone to failure, cracking, etc. at an accelerated rate. These materials include:

- Cast iron
- Bare steel
- Aldyl A – particularly pre-1973

PGS has identified these additional pipe materials that may require risk consideration:

- Pre-1984 Aldyl A pipe
- X-tru steel pipe
- Hand-wrapped pipe, to be classified as bare steel

7.4.5 Inside Meters & Regulators

PGS has evaluated its system for inside meters and regulators to verify appropriate venting of regulators and reliefs and correcting those as needed. As able and by preference, inside meters and regulators are being relocated to well-vented, outside locations. For those meters and regulators that will remain inside, PGS will perform leak and atmospheric corrosion surveys per CFR 192 requirements. PGS job procedures cover inspection requirements to ensure safe working conditions following service or maintenance work.

7.4.6 Cyber and Other Security Threats

In addition to physical security, PGS realizes the risk of cyber and information security threats to its system. These risks can negatively affect the public and critical energy infrastructure. See Section 9.7 for more information on risk mitigation.

7.5 Potential Threat Identification

PGS must consider reasonably available information to identify potential threats per §192.1007(b) though the process on how to identify threats is not specified. Potential Threats are those that are not currently evident based on failures, leak, or incident data.

7.5.1 Process for Potential Threat Identification & Evaluation

PGS identifies and evaluates new potential threats to its distribution system and documents the results of the evaluations as follows:

- Review internal records for indications of applicable potential threats as listed in Table 7-2. Perform the reviews at the individual Service Area level relative to each Service Area's distribution subsystem.
- Review external sources for information on potential threats.
- Determine the threat root cause relative to the affected distribution subsystem and/or relative to the entire PGS distribution system, as applicable.
- If the identified threat is not currently included in the DIM Program, determine the date for inclusion into the DIM Risk Evaluation and Ranking process step.

7.5.2 Identification through Regular Operations and Maintenance (O&M) Activities

PGS actively assesses for integrity threats during regular O&M activities as identified in Table 7-1. Results from these activities are recorded per Table 6-1 and reviewed for trends as part of the performance monitoring activities.

Table 7-1: Threat Assessment by O&M Activity

O&M Activity	Potential Threat Categories
Cathodic Protection Maintenance Areas (Rectifier and Pipe-to-Soil inspection)	Corrosion
CP Maintenance of Isolated Mains and Services subject to 10% annual inspection	Corrosion
Atmospheric Corrosion Inspection Records	Corrosion
Patrol Records	All Categories
Valve Maintenance Records	Natural Forces, Other Outside Force, Equipment Failure
Regulator Station Maintenance Records	Pipe, Weld or Joint Failure; Equipment Failure, Incorrect Operation, Other
Requests to Locate Gas Facilities	Excavation Damage, Other
3rd Party Damage Claims	Excavation Damage
Product Quality Reports	Pipe, Weld or Joint Failure; Equipment Failure
Main & Service Condition Reports	All Categories, except Incorrect Operation
Liquid Removal Records	Corrosion, Natural Forces
Assessment of areas subject to flood	Natural Forces
SME Interview Records	All Categories

7.5.3 Identification through Monitoring of External Sources

The Company may become aware of potential threats during routine monitoring of information from external sources including:

- National Transportation and Safety Board (NTSB) Reports: https://www.ntsb.gov/investigations/AccidentReports/Pages/AccidentReports.aspx
- National Transportation and Safety Board (NTSB) Recommendations applicable to Pipeline Accidents: https://www.ntsb.gov/safety/safety-recs/_layouts/ntsb.recsearch/RecTabs.aspx
- PHMSA Advisory Bulletins: https://www.phmsa.dot.gov/standards-rulemaking/notices-and-advisory-bulletins
- Membership in local, regional, or national gas association (e.g. American Gas Association, Northeast Gas Association, Southern Gas Association, etc.) and involvement in Association workshops and forums that share knowledge regarding distribution pipeline threats
- Review of trade journals and magazines that publish material regarding gas distribution
- Resources for determining extent of landslide and sinkhole hazards are Landslide Hazards - Maps | U.S. Geological Survey (usgs.gov) and Subsidence Incident Reports | Florida Department of Environmental Protection.

The Manager Integrity Management will conduct or coordinate the potential threat identification and evaluation process and will be the recipient of this information from various company sources. Table 7-2 details when new threats were reviewed and/or incorporated into the DIM program.

Table 7-2: Log of Threat Reviewed and Incorporation in DIMP

Date of Review	Source 0 – Internal Record Review 1 - PHMSA Bulletin 2 – NTSB Report 3 – NTSB Recommendations 4 – Gas Association 5 – Trade Journal 6 – FL Admin Code	Threat Root Cause	Is threat already evaluated for in DIMP? Y/N	Date threat added to DIMP and incorporated into Risk Evaluation and Ranking
11/2013	1 - 78 FR 53190 8-28-13 TDW Leak Repair Clamp	Equipment Failure	Y	N/A
04/2014 - 05/2014	6 - FAC 25-12.045 Inactive Service Lines	Equipment Failure	Y	5/19/2014
01/2014 - 04/2014	0 and 1 - SME interviews Aldyl-A pipe; 4 - Report	Material, Weld or Joint Failure	Y	5/19/2014
01/2014 - 04/2014	0 and 1 - SME interviews black cap tees	Material, Weld or Joint Failure	Y	5/19/2014
04/2016 – 05/2016	0 –SME Interview Cast Iron & Bare Steel	Corrosion/Equipment Failure	Y	08/2/2011
2014	4, 4 – Cross bores	Incorrect Operations	Y	06/2018
04/2019	3 - PermaLock Mechanical Tapping Tees	Material, Weld or Joint Failure, Incorrect Operation	Y	10/2019
12/2018	2 - Over-pressurization	Equipment Failure,	Y	10/2019
2019	1 - Overbuilds	Other Threat	Y	09/2021
2022	1 – ADB-2020-01- Inside Meters & Regulators	Equipment Failure, Incorrect Operation	N	01/2022

8.0 RISK EVALUATION AND RANKING

Risk analysis is an ongoing process of understanding what factors affect the risk posed by threats to the gas distribution pipeline and where they are relatively more important than others.

The primary objectives of the evaluation and ranking of gas distribution pipeline risk are:

- Consider each applicable current and potential threat.
- Consider the likelihood of failure associated with each threat.
- Consider the potential consequences of such a failure.
- Estimate and rank the risks (i.e. determine the relative importance) posed to the pipeline.
- Consider the relevance of threats in one location to other areas.

8.1 Risk Assessment Process

PGS may use a variety of risk modeling approaches for DIM. Assessing improvements to risk modeling are performed periodically as additional data is gathered and the PGS DIM program matures.

Qualitative risk modeling uses subjective reasoning, often relying on SME input to validate information. PGS minimizes the use of qualitative risk modeling.

Quantitative risk modeling includes relative risk ranking. Relative risk ranking considers the probability and consequence of an event occurring. Data sources are used to develop relative scores for likelihood of failure and consequence of failure which are combined to produce an overall risk score. Relative risk ranking is used to prioritize legacy pipe replacement projects and is the method utilized currently for most other DIM risk analysis by PGS.

Probabilistic risk models use a quantitative approach the both likelihood of an event happening through determination of the probability of failure (POF), the quantification of the consequence of the event/failure (COF) yielding a result in financial terms. The probabilistic approach provides quantitative metrics like POF, failure projections and failure rates that allow a more proactive approach to IM.

PGS will use SME approximation based on historical knowledge, industry data, statistical evaluation, assumptions of the most conservative value and/or assumptions of the most likely value when performing a risk model that has data gaps.

PGS considers factors other than past observed abnormal operating conditions and avoids zero as a risk ranking unless supported by engineering or operational knowledge when performing a risk assessment.

8.2 DIMP Risk Assessment

The current DIMP risk assessment (the evaluation of likelihood, consequence, and resultant risk ranking) is described in length in Section 16, Appendix C. Assessment results may be included by reference. Prior risk assessment results shall be retained and stored in the DIMP files.

8.3 Inactive Service Line Risk Assessment

The 2013 revisions to Florida Administrative Code Chapter 25-12.045 Inactive Service Lines requires annual risk assessments be made for all service lines that have been inactive for more than one year. Inactive service lines identified in the annual risk assessment as potential threats with a high-risk ranking shall be retired and physically abandoned within 6 months after completion of the annual risk assessment.

The current risk assessment for inactive service lines shall be documented, or included by reference, in Section 16, Appendix C. Assessment results may be included by reference. Prior risk assessments for inactive service lines shall be maintain for at least 10 years and retained and stored in the DIMP files.

8.4 Legacy Pipe Replacement Risk Assessment

PGS has taken actions to remove and/or replace legacy bare steel and cast iron pipelines for the past several decades and currently has a program in place to remove and/or replace bare steel and cast iron by the end of 2022. Prioritizing areas for the removal/replacement of these legacy pipelines involves six factors with risk rank and frequency of failure being the most significant. Problematic plastic piping (pre-1984 Aldyl A) is currently prioritized secondary to cast iron and bare steel replacement.

8.5 Leak Prone Pipe

PGS is implementing new technology (MobileGuard) to help identify operating areas where natural gas emissions may be occurring on the system. This technology can identify emissions at levels much lower than standard compliance and leak reporting thresholds. This technology may be used to help identify emissions occurring in areas of legacy pipe replacement projects, post-storm or other damages, suspected leak prone pipe, or otherwise identified as needed by PGS. As emissions data continues to be collected, it will be analyzed with leak data to determine if further investigation is required or if a recommendation for remediation or replacement should be made.

9.0 IDENTIFICATION AND IMPLEMENTATION OF MEASURES TO ADDRESS RISKS

PGS has identified and implemented the following measures to address our pipeline risks that have been evaluated and prioritized in Section 8 and Section 16, Appendix C. Documentation of measures that are no longer actively implemented are retained and stored in the DIMP files.

9.1 Leak Management Program

The Leak Management Program is established in the Company's Operations and Maintenance (O&M) Manual Section 2 – Patrols and Leak Survey, Section 14 - Emergency Operating Plan, Job Procedures JP 11-001 – Investigate Outside Leak, JP 11-002 – Investigate Inside Leak, and the Public Awareness Plan. A summary of the key elements, key performance metrics and analysis of effectiveness of the Leak Management Program are documented, or included by reference, in Section 17, Appendix D. Information gathered from this program are maintained in the Leak Management System and Inspection Manager.

9.2 Damage Prevention and Public Awareness Programs

Excavation damages are the top threat for PGS. PGS has developed programs that address preventing damages and increasing public awareness. See Guide to Preventing Pipeline Damages and Public Awareness Plan for detailed information.

9.3 Legacy Pipe Replacement Program

The Pipeline Safety and Hazardous Materials Administration (PHMSA) has determined certain pipeline materials as obsolete that presents a potential safety threat to operations and the general public. This material includes cast iron, wrought iron, bare steel, and specific polyethylene/plastic facilities.

In 2012, the Florida PSC approved a 10-year accelerated cast iron and bare steel (CIBS) pipeline replacement program through 2022. In 2017, the Florida PSC approved a 10-year accelerated problematic plastic pipeline (PPP) replacement program through 2028. These replacement programs include mains and services as well as

regulators and other pipeline system components required to be installed as a consequence of the replacement of the aforesaid facilities.

Timeline of replacement projects consider system needs, leaks per mile, miles of legacy pipe in concentrated areas, other construction projects commencing in an area and other risk considerations.

9.4 Over-Pressurization Prevention

Utilization pressure (UP) systems, otherwise known as low pressure, operate at less than 1 psig. UP systems do not require a service regulator to reduce pressure since the pressure is already delivered at a pressure appropriate for use by appliances. However, with changing system and customer demand needs, higher pressure systems are now more common. A risk of UP systems is the potential for over-pressurization as there are not the standard pressure reliefs and safeguards installed on higher pressure systems.

As of December 2018, only 6 low pressure systems totaling 11.6 miles of mains existed in the PGS pipeline system and were replaced or uprated by June 2019. Comprehensive retirement plans were reviewed and approved prior to UP system retirement to ensure prevention of over-pressurization. An additional measure implemented, regardless of pressure, includes incorporation of tie-in plans for any tie-in made to facilities with varying pressure, have other complexities such as networking systems or are large in scale that have multiple tie-in locations.

Additionally, as opportunities for system replacement occur such as with legacy pipe replacement, PGS evaluates whether multiple operating pressure systems exist in a single area and if this variance can be reduced.

In 2021, PGS performed a failure mode and effect analysis (FMEA) to review, at a high level, to identify further opportunities to reduce risk of over-pressurization. The FMEA confirmed a number of protective redundancies to lower risk of over-pressurization of the PGS distribution system. Opportunities for system improvement have been identified as action items of the FMEA.

9.5 Cross Bore Identification and Prevention

In 2014 Peoples Gas incorporated procedures into its Construction Standards to minimize the risk of cross-bores during construction of new facilities. PGS also requires pre-camera utility location and post-camera verification requirements for large legacy pipe replacement work to reduce risk of cross bores. By March 2021, post-camera verification was expanded and is now required for all legacy pipe replacement work.

In 2018, PGS began inspecting gravity sewer systems within the area of our natural gas system that had a possible cross bore report. This investigation aimed to confirm if a cross bore was repaired or if it was still existing. Additionally, the camera investigation was extended beyond the initial cross bore site 500 ft in either direction of the sewer system to determine if there were additional cross bores in the area. PGS will continue to investigate cross bore risk in its system. Additional camera investigation work will take place for newly identified sites and full investigation of areas with confirmed previous cross bore occurrences.

9.6 PGS Safety Management System

PGS will utilize its Safety Management System to enhance the effectiveness of its IM program and enable continuous improvement of safety practices and performance. Within the SMS are guidelines for leadership commitment; operational controls; emergency preparedness; incident investigation, management of change; reporting; training, safety assurance; risk management; and management review among others.

9.6.1 Engineering Assessments and Management of Change

Engineering Assessments may be initiated by proposed system changes and used to support decisions such as changing operating conditions or when PGS becomes aware of conditions that can lead to failures in its

pipeline system. The engineering assessment, to be performed by PGS Corporate Engineering or an approved engineering designee, will establish further actions, including repairs when required. PGS will follow the PGS SMS Management of Change process for communication, documentation, etc.

9.6.2 Deviation Requests

Part 192 requires tests and inspections periodically such as leak surveys conducted annually in business districts and atmospheric corrosion surveys must be conducted every three years on exposed pipe. These activities are intended to address a potential threat to distribution pipeline integrity. The relative value of these required periodic activities could be shown to decrease in specific areas which could allow PGS to shift resources from generically-required periodic risk control activities to activities more specifically focused on the issues of pipeline risk that provide an equal or greater overall level of safety.

PGS may submit proposed adjustments to the FPSC to the frequency of periodic actions based on the results of risk assessments in the DIMP and engineering analysis. Proposed changes could be approved if the FPSC agrees that the proposed changes provide an equal or improved overall level of safety. Any deviation requests must follow the PGS SMS Management of Change process for communication, documentation, etc.

9.7 Cyber Security Framework

As cyber and other security risks exist and continue to increase, PGS utilizes the guidance and oversight from its corporate Cyber Security Framework (CYB series of standards) which covers cyber security, asset management; access control; physical and environmental security; incident management; human resource security, among others, to mitigate this risk at an enterprise level. Additionally, the TECO Information Technology & Telecommunications Standard 3.05 Ensure Systems Security details the objectives to ensure observance with CYB requirements.

9.8 Proposed Other Additional or Accelerated Actions

The following Sections outline risk reduction activities and additional or accelerated actions that have been taken or are being planned in order to reduce the risks from failure of the gas distribution pipeline.

Preventive and mitigative actions included in this DIM Program are existing O&M actions required by 49 CFR Part 192, and additional or accelerated actions beyond these requirements.

These measures associated with each threat category are determined and recommended by SME(s) knowledgeable of the potential effects of the threat category on the PGS distribution system.

Some of these actions are now ongoing, while other actions may be initiated depending upon the results of periodic risk reviews relative to these categories, to be conducted under the direction of the responsible PGS Officer(s) or Manager(s) listed in the action plan tables in Section 9.7.

9.9 Threat Mitigation (Leak Cause)

PGS manages each leak threat with numerous accelerated risk reduction and mitigation activities or, are ongoing and planned, dependent on risk reviews. Each activity is assigned an owner for oversight. Prior documentation is retained and stored in the DIM files.

9.9.1 Threat Mitigation - Corrosion

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
Cast Iron Pipe	Increase Leak Survey Frequency on areas of highest risk from 3 year to 1 year	Determined	Territory/ Service Area Manager

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
		by risk review	
	Implement or increase schedule of a replacement program that prioritizes the replacement schedule based on highest risk areas/segments	Determined by risk review	Director Engineering; Director Gas Operations
	Provide training for crews to identify and determine extent of graphitization. Inspect all CI exposed for other work. Replace any segment with evidence of graphitization.	Ongoing	Service Area Manager
Bare Steel (No CP)	Increase Leak Survey Frequency on areas of highest risk from 3 year to 1 year	Determined by risk review	Territory/ Service Area Manager
	Implement or increase schedule of a replacement program that prioritizes the replacement schedule based on highest risk areas/segments	Determined by risk review	Director Engineering; Director Gas Operations
	Assess whether CP would be effective and Install	Ongoing	Territory/ Service Area Manager
Bare Steel (with CP)	Increase Leak Survey Frequency on areas of highest risk from 3 year to 1 year	Determined by risk review	Territory/ Service Area Manager
	Implement or increase schedule of a replacement program that prioritizes the replacement schedule based on highest risk areas/segments	Determined by risk review	Director of Engineering; Director Gas Operations
	Assess effectiveness of existing CP	Ongoing	Territory/ Service Area Manager
Coated Steel (with CP)	Review adequacy of CP design and whether existing test locations are truly indicative of minimum protection level in the system	Ongoing	Territory/ Service Area Manager
	Evaluate whether timely corrective action is taken when CP levels fall below standard	Ongoing	Territory/ Service Area Manager
	Establish and monitor key performance measures for the maintenance of CP areas	Ongoing	Territory/ Service Area Manager
Coated Steel (without CP)	Evaluate ability to install effective CP and install	Ongoing	Territory/ Service Area Manager
	Ensure that inspection data is being taken when lines are exposed to record level of corrosion. Organize data such that it can be used to target and prioritize replacement	Ongoing	Territory/ Service Area Manager
	Establish replacement program	Determined by risk review	Territory/ Service Area Manager
	Increase Leak Survey Frequency on areas of highest risk	Ongoing	Territory/ Service Area Manager

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
	Implement review of all new projects to ensure that they do not result in isolation of steel services or sections of steel main from effective CP current	Ongoing	Territory/ Service Area Manager
Stray Current	Increase Leak Survey Frequency on areas of highest risk	Determined by risk review	Territory/ Service Area Manager
	Test for and resolve DC interference in areas located near DC transit systems, foreign utilities under CP, etc.	Ongoing	Territory/ Service Area Manager
	Replace sections of poorly coated pipe subject to stray current	Determined by risk review	Territory/ Service Area Manager
	Install insulation joints, magnesium anodes, and/or drainage bonds	Ongoing	Territory/ Service Area Manager
Atmospheric Corrosion	Increase inspection frequency on areas of highest risk	Determined by risk review	Territory/ Service Area Manager
	Implement a replacement program	Determined by risk review	Territory/ Service Area Manager
	Review coating materials to ensure they are appropriate for areas susceptible to atmospheric corrosion	Ongoing	Territory/ Service Area Manager

Corrosion Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Cast Iron Pipe	PGS Main Replacement Program and DIMP risk analysis and ranking is utilized to prioritize cast iron segments for replacement. PGS acquired a rider to accelerate the replacement of all cast iron mains.
Bare Steel Pipe	PGS Main Replacement Program and DIMP risk analysis and ranking is utilized to prioritize bare steel segments for replacement. PGS acquired a rider to accelerate the replacement all bare steel main.
Coated Steel with CP	No active replacement program. Coated steel mains and services with CP are tested as per O&M - Section 4-B. Leaks on protected steel services are handled in accordance with Job Procedure 10-001.
Coated Steel w/o CP	Coated steel mains without CP may be included in PGS Main Replacement Program as bare steel and prioritized accordingly.
Stray Current	Instances of Stray Current are a rarity and are handled on a case-by-case basis in accordance with O&M -Section 4.
Internal Corrosion	Mains are inspected for internal corrosion during main cut-outs as per O&M - Section 4-C.
Atmospheric Corrosion on aboveground facilities	Above ground facilities are inspected as per O&M - Section 4-C.
Atmospheric Corrosion of underground facilities (e.g, vaults)	Per Inspection Manager, scheduled maintenance includes inspection of atmospheric corrosion.

Corrosion Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Corrosion of carrier pipe in Cased Crossing	Gas mains in cased crossings are leak surveyed more frequently when unacceptable readings are indicated.
Electrically isolated metal alloy fittings	Electrically isolated metal alloy fittings installed after January 22, 2019; except those in plastic pipelines and that PGS has shown per 192.455(f) that adequate corrosion control is provided by the alloy composition, and the fitting is designed to prevent leakage caused by localized corrosion pitting; must be externally coated or cathodically protected per O&M -Section 4-C.
Corrosive Soil Conditions	Corrosive Soil Conditions are handled in O&M - Section 4-C.

9.9.2 Threat Mitigation - Natural Forces

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
Flooding	Monitor flood threats and shut off gas service to impacted areas in advance of flooding	Ongoing	Territory/ Service Area Manager
	Patrol and leak survey after flooding	As necessary	Territory/ Service Area Manager
	Identify Emergency Isolation Zones and utilize zone shut off valves for areas known to have high risk of flooding	Ongoing	Territory/ Service Area Manager
Tree Related	Increase leakage survey in areas with history of problems	As necessary	Territory/ Service Area Manager
	Replace / relocate sections of main or service subject to abnormal stress due to known root impact	As necessary	Territory/ Service Area Manager

Natural Forces Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Earth Movement / Landslide, Washout (Unstable Soil)	O&M - Section 14
Flooding (including Coastal) / High Winds	O&M - Emergency Preparedness Plan addresses response planning in the event of a Coastal Storm that may impact gas facilities.
Tree Related	Gas mains and services are leak surveyed as per gas specification O&M - Section 14.
Other Natural Forces (Lightning)	Not significant enough to require pro-active mitigation.

9.9.3 Threat Mitigation - Excavation Damage

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
Improper Excavation Practice	Track dig-ins and identify problem Excavators, including repeating offenders. Implement additional contact with repeat offender that may include a formal letter of	In-place / Ongoing	Manager Pipeline Operations Compliance

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
	warning to excavator, targeted education, and targeted locator contact.		
	Work with jurisdictional authorities to implement the right to increase fines for damages in cases of gross negligence.	Continued opportunities evaluated	Manager Pipeline Operations Compliance
	Work with jurisdictional authorities to implement the right for additional fines to be added to damage claim bill(s) for repeat offenders.	Not legally permitted by TECO; under evaluation by state enforcement	Manager Pipeline Operations Compliance
	Conduct pre-construction meeting or site-visits for excavation near critical or high-risk facilities.	Ongoing	Manager Pipeline Operations Compliance, Service Area Manager
	Special patrols or job site visits for high-risk excavators or high-risk excavation practices.	Ongoing	Manager Pipeline Operations Compliance, Service Area Manager
Facility Not Located or Marked	Analyze root cause and implement corrective action. Adopt formal procedure that requires written investigation and signed review/approval.	Ongoing review; Formal procedure to be evaluated	Service Area Manager
	Require all 1st party excavation to require one-call notification and marking.	Ongoing	Manager Pipeline Operations Compliance
One-call Notification Center Error	Follow-up by Damage Prevention Coordinators with notification center and ask for documentation of corrective action.	Ongoing	Manager Pipeline Operations Compliance
Mismarked Facilities	Monitor and track for dig-ins resulting from mismarked facilities. Analyze root cause and implement corrective action. Adopt formal procedure that requires written investigation and signed review/approval.	Ongoing review; Formal procedure to be evaluated	Manager Pipeline Operations Compliance
	Conduct sample audits of locates to monitor performance.	Ongoing	Manager Pipeline Operations Compliance; Service Area Manager
	Conduct analysis of capability/accuracy of existing locating equipment and deploy improved tools as necessary.	Ongoing	Manager Pipeline Operations Compliance; Service Area Manager
Incorrect Facility Records	Monitor and track for dig-ins resulting from incorrect facility records. Analyze root cause and implement corrective action. GIS SharePoint request for corrections.	Ongoing	Manager Pipeline Operations Compliance;

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
	Monitor timeliness of As-Built mapping for new and/or reconstructed facilities. Implement process for indicating existence of plans for new construction or reconstruction on facility maps/records.	Ongoing	Service Area Manager Director Engineering
Undetectable Facilities	Locate tickets with this response are currently e-mailed to a Service Area supervisor/manager. There should be a procedure at the Service Area level to identify undetectable gas lines and make sure they are in the Company GIS.	On-Going (Map Record Standards)	Service Area Manager/ Supervisor
Construction over gas mains and services	Participation in Sunshine 811 to identify, track, prioritize locate tickets. Evaluate construction near high priority lines for construction watch as required.	Participation in SUNSHINE 811	Manager Pipeline Operations Compliance
	Distribution of education through annual mailings, bill inserts, and supplemental education as identified as part of the Public Awareness program	Current Public Awareness Plan	Manager Pipeline Operations Compliance

Excavation Damage Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Improper Excavation Practice	Utility Technician's Guide to Preventing Pipeline Damages
Facility not located or marked	Utility Technician's Guide to Preventing Pipeline Damages
One-call notification center error	Utility Technician's Guide to Preventing Pipeline Damages
Mismarked Facilities	Utility Technician's Guide to Preventing Pipeline Damages
Incorrect Facility Records	Utility Technician's Guide to Preventing Pipeline Damages; Map Records Standards
Other Excavation Damage	Utility Technician's Guide to Preventing Pipeline Damages
Construction over gas mains and services	Construction watch is conducted in accordance with the Utility Technician's Guide to Preventing Pipeline Damages.

9.9.4 Threat Mitigation - Other Outside Force

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible

Vehicle Damage to Riser/Meter	Train personnel to identify meters/risers at high risk. Implement or expand program to install protection or relocate facilities.	Ongoing	Service Area Manager/ Supervisor
	Relocate or protect any meter/riser that is hit or damaged by a vehicle.	Ongoing	Service Area Manager/ Supervisor
Vehicle Damage to above ground equipment or stations	Train personnel to identify facilities at high risk. Implement or expand program to install protection or relocate facilities.	Ongoing	Service Area Manager/ Supervisor
	Relocate or protect any facility that is hit or damaged by a vehicle.	Ongoing	Service Area Manager/ Supervisor
Vandalism / Terrorism	Ensure locks are installed on critical valves and existing gates.	Ongoing	Service Area Manager/ Supervisor
	Install fences or other enclosures for high-risk stations or other facilities.	Ongoing	Service Area Manager/ Supervisor
	Increase visibility/lighting or other actions at critical facilities.	As necessary	Service Area Manager/ Supervisor
Structure Fire	Ensure that a shut off valve (riser or curb valve) exists outside the structure and is operable. Monitor and expedite repairs of these service shutoff valves.	Ongoing	Service Area Manager
	Verify that PGS first responder training is adequate and frequent.	Ongoing	Service Area Manager

Other Outside Force Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Vehicle Damage to Riser/Meter	Customer meter sets are protected from damage according to the Construction Standards Manual – Section 15.
Vehicle Damage to above-ground equip/station	Customer meter sets are protected from damage according to the Construction Standards Manual – Section 15.
Vandalism / Terrorism	24x7 response to emergencies that may impact the gas system.
Structure Fire	24x7 response to emergencies that may impact the gas system.
Other Outside Force Damage	24x7 response to emergencies that may impact the gas system.

9.9.5 Threat Mitigation - Pipe, Weld, or Joint Failure

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
MDPE 2306 **Aldyl A HDPE 3306** **PVC** **ABS CAB PB**	Provide training and process to identify these plastics by type whenever facilities are exposed and maintain database to identify where these facilities exist.	Ongoing	Territory/ Service Area Manager

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
	Increase Leak Survey Frequency on areas of highest risk	Determined by risk review	Territory/ Service Area Manager
	Implement or increase schedule of a replacement program that prioritizes the replacement schedule based on highest risk areas/segments.	Determined by risk review	Territory/ Service Area Manager
Delrin Insert Tap Tees	Provide training and process to identify these Tees whenever facilities are exposed and maintain database to identify where these facilities exist.	Ongoing	Territory/ Service Area Manager
	Increase Leak Survey Frequency on areas of highest risk.	Determined by risk review	Territory/ Service Area Manager
	Implement or increase schedule of a replacement program that prioritizes the replacement schedule based on highest risk areas/segments.	Determined by risk review	Territory/ Service Area Manager
Plexco Service Tee Celcon Caps	Provide training and process to identify these Tees whenever facilities are exposed and maintain database to identify where these facilities exist.	Ongoing	Territory/ Service Area Manager
	Increase Leak Survey Frequency on areas of highest risk.	Determined by risk review	Territory/ Service Area Manager
PE Fusion Failure	Track Fusion failures by material type, diameter and fusion type to identify any trends.	Ongoing	Territory/ Service Area Manager
	Increase Leak Survey Frequency on areas of highest risk.	Determined by risk review	Territory/ Service Area Manager
	Perform QA/QC review of fusion procedures; modify as necessary	Ongoing	Territory/ Service Area Manager
Mechanical Coupling Pullout or Seal Leak	Track coupling leaks/failures by coupling type, material type, diameter and manufacturer to identify any trends.	Ongoing	Territory/ Service Area Manager
	Increase Leak Survey Frequency on identified areas of highest risk.	Determined by risk review	Territory/ Service Area Manager
	Establish criteria for replacement in lieu of repair for any mechanical couplings that are excavated for leak repair.	Determined by risk review	Territory/ Service Area Manager
Pre-1940 Oxy-Acetylene girth welds	Track weld leaks/failures by age and diameter to identify any trends.	Ongoing	Territory/ Service Area Manager
	Increase Leak Survey Frequency on pre-1940 steel mains greater than 4” in diameter.	Determined by risk review	Territory/ Service Area Manager

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
	Replace pre-1940 OA girth welds subject to high axial or bending stresses.	Determined by risk review	Territory/ Service Area Manager
	Establish criteria for replacement in lieu of repair for any mechanical couplings that are excavated for leak repair.	Determined by risk review	Territory/ Service Area Manager

Pipe, Weld, Joint Failure Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Aldyl A (Tan MDPE 2306)	Gas leak surveys are performed annually on mains and services in business district, and on a five-year cycle in non-business districts.
Aldyl 4A (Green MDPE 2406)	Gas leak surveys are performed annually on mains and services in business district, and on a five-year cycle in non-business districts.
PE other than Century Products and Aldyl A & 4A	Gas leak surveys are performed annually on mains and services in business district, and on a five-year cycle in non-business districts.
PP – Delrin Insert Tap Tees	Gas leak surveys are performed annually on mains and services in business district, and on a five-year cycle in non-business districts.
PE Fusion failure	Gas leak surveys are performed annually on mains and services in business district, and on a five-year cycle in non-business districts.
Pre-1940 Oxy-Acetylene Girth Weld	Gas leak surveys are performed annually on mains and services in business district, on a three-year cycle on bare steel and galvanized mains and services in non-business districts and on a five-year cycle in non-business districts.
CAB – Cellulose Acetate Butyrate	No CAB in PGS's distribution system.
Stab Type Mechanical	Gas leak surveys are performed annually on mains and services in business district, and on a five-year cycle in non-business districts.
Nut Follower Type Mechanical Fittings	Gas leak surveys are performed annually on mains and services in business district, on a three-year cycle on bare steel and galvanized mains and services in non-business districts and on a five-year cycle in non-business districts.
Bolted Type Mechanical Fittings (e.g., PermaLock)	Gas leak surveys are performed annually on mains and services in business district, on a three-year cycle on bare steel and galvanized mains and services in non-business districts and on a five-year cycle in non-business districts.
	PermaLock mechanical tapping tee assemblies are being phased out of use starting 2019. Ensuring training per manufacturer requirements.
Other Type Mechanical Fittings (including Hydraulic)	Gas leak surveys are performed annually on mains and services in business district, on a three-year cycle on bare steel and galvanized mains and services in non-business districts and on a five-year cycle in non-business districts.

9.9.6 Threat Mitigation - Equipment Failure

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
Valves	Track valve leaks/failures by age and diameter in order to identify any trends	Ongoing	Territory/ Service Area Manager

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
	Establish criteria for replacement in lieu of repair for any mechanical couplings that are excavated for leak repair	Ongoing	Territory/ Service Area Manager
Service Regulators	Track Service Regulator failures by age, size, style and manufacturer to identify any trends, as possible	Ongoing	Territory/ Service Area Manager
	Establish or advance existing replacement program if failure history warrants	Determined by risk review	Territory/ Service Area Manager
Control / Relief Station Equipment	Increase inspection and/or maintenance frequency	Determined by risk review	Territory/ Service Area Manager; Mgr M&R
	Track failures by age, size, style, and manufacturer, to identify and trends, as possible	Ongoing	Territory/ Service Area Manager
	Establish replacement program if failure history warrants	Determined by risk review	Territory/ Service Area Manager
Inside Meters & Regulators	Ensure safe venting of regulator reliefs and/or relocating meters and regulators to well-vented, outside locations	Determined by risk review	Territory/ Service Area Manager

Equipment Failure Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Valves	Inspections are performed as per O&M - Section 5.
Service Regulators	Inspections are performed as per O&M - Section 4-C.
Meters (including Tin Meters)	Inspections are performed as per O&M - Section 4-C.
Control/Relief Station Equipment	Inspections are performed as per O&M - Section 13-B. This includes any “Farm Taps” as defined by PHMSA as an individual service line directly connected to transmission, gathering or production pipelines. As of 05/2022, PGS has identified fourteen assets that meets this definition.
Inside Meters & Regulators	Perform leak and atmospheric corrosion surveys per CFR 192 requirements.

9.9.7 Threat Mitigation - Incorrect Operation

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
Operating Error	Track failures/leaks that results from operating errors to identify any trends.	Ongoing	Territory/ Service Area Manager
	Perform root cause analysis of operating errors and take corrective action.	Ongoing	Territory/ Service Area Manager
	Review training and qualification programs and procedures for adequacy and take correct action.	Ongoing	Territory/ Service Area Manager

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
	Implement QA/QC program for key maintenance and operations tasks	Ongoing	Territory/ Service Area Manager
Gas Lines Bored thru Sewers	Identify possible locations and prioritize investigation of highest risk sites.	Determined by risk review	Territory/ Service Area Manager

Incorrect Operation Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Incorrect Operations	PGS employees are requalified as required by the Personnel Qualification Plan.
Gas lines bored through Sewers	Directional bores are performed in accordance with the Construction Standards Manual. Legacy replacement projects require post-camera inspection.

9.9.8 Threat Mitigation – Other

Risk	Risk Reduction Activities	Status	Officer / Manager Responsible
Bell Joint Leakage	Increase Survey Leak Frequency on areas of highest risk	Determined by risk review	Territory/ Service Area Manager
	Implement or increase schedule of a replacement program that prioritizes the replacement schedule based on highest risk areas/segments	Determined by risk review	Territory/ Service Area Manager
	Review process for ensuring adequate support or work-around during adjacent 3rd party construction.	Ongoing	Territory/ Service Area Manager
Overbuilds	Identification of possible areas of overbuild of mobile homes near areas of gas distribution system. Legacy pipe replacement risk factor.	Ongoing	Territory/ Service Area Manager / Integrity Management

Other Sub-Threat	Existing Mitigation or Additional/Accelerated Actions
Bell Joint Leakage	Gas leak surveys are performed annually on mains and services in business district, and on a five-year cycle in non-business districts.

10.0 PERFORMANCE MEASUREMENT, MONITORING RESULTS, AND EVALUATING EFFECTIVENESS

PHMSA requires specific performance measures that are completed and reported by PGS annually through the submission of Annual Reports. These reports are completed at a Company system level and at the Service Area operating level. The information in the annual reports is reviewed and analyzed.

10.1 Key Performance Metrics and Monitoring

APPENDIX E: MEASUREMENT OF PERFORMANCE, MONITORING RESULTS, AND EFFECTIVENESS EVALUATION provides detailed information on the Company's performance of threat measurement, reduction and effectiveness of methods. PHMSA required performance measures (49 CFR 192.1007) include:

- Number of hazardous leaks either eliminated or repaired (or total number of leaks if all leaks are repaired when found), categorized by cause.
    - This evaluation compares a 5-year average of hazardous leaks by leak cause per mile per year from the previous year to the next 5-year average leaks per mile per year. The criteria for re-evaluation of threats and risks is a moving 5-Year average with an increase of 5% or more from an established baseline.
- Total number of leaks either eliminated or repaired, categorized by cause.
    - This evaluation compares a 5-year average of leaks per mile per year from the previous year to the next 5-year average leaks per mile per year. The criteria for re-evaluation of threats and risks is a moving 5-Year average with an increase of 5% or more from an established baseline.
- Number of hazardous leaks either eliminated or repaired (or total number of leaks if all leaks are repaired when found), categorized by material.
    - This evaluation compares a 5-year average of hazardous leaks by material type per mile per year from the previous year to the next 5-year average leaks per mile per year. The criteria for re-evaluation of threats and risks is a moving 5-Year average with an increase of 5% or more from an established baseline.
- Number of excavation damages.
    - This evaluation compares a 5-year average of excavation damages resulting in a need to repair or replace a gas facility per year. An increase in 5% or more from an established baseline requires re-evaluation of the threat and risk.
- Number of location tickets for excavations received from Sunshine State One Call of Florida (811).
    - This evaluation compares a 5-year average of excavation tickets received by the 811 per year. An increase in 5% or more from an established baseline requires re-evaluation of the threat and risk.
- Threat specific performance measures by material type for mains and services
    - This evaluation compares a 5-year average of leaks by material type per mile per year from the previous year to the next 5-year average leaks per mile per year. An evaluation is performed for mains and services separately. The criteria for re-evaluation of threats and risks is a moving 5-Year average with an increase of 5% or more from an established baseline.
    - Threat types include Corrosion, Natural Forces, Excavation Damage, Other Outside Force, Material, Weld or Joint Failure, Equipment Failure, Incorrect Operation and Other.

A baseline measurement and ongoing measurement of the performance measures are monitored by PGS to assist in the ongoing evaluation of threats. Each measure is analyzed and documented at a system level and is included by reference or in Appendix E. A rolling 5-year comparison is performed and reviewed annually after completion of PHMSA reporting of performance measures.

Any additional performance measures determined necessary to evaluate the effectiveness of the IM Program in controlling an identified threat, shall be documented, or included by reference, in Appendix E.

10.2 Performance Effectiveness and Reevaluation

In cases where the reevaluation criteria specified is met or exceeded, a reevaluation of the associated threats and risks shall be completed as indicated in Appendix E. An emerging threat or risk in one or more location shall be evaluated/re-evaluated for relevance in one location to other areas. The reevaluation of threats and risks shall be documented, and the results of the reevaluation shall be summarized in a Performance Evaluation report in Appendix F. The review shall also establish whether a complete program reevaluation shall be completed in a shorter timeframe than five years; this decision shall also be documented.

Past effectiveness reviews that are no longer current shall be retained and stored in the DIM Program files.

11.0 DIM PROGRAM EVALUATION AND IMPROVEMENTS

The DIM written plan shall be reviewed annually and updated for improvements as required to reflect changes and improvements that have occurred in process, procedures and analysis for each element of the program to determine overall effectiveness of our program.

A complete program reevaluation shall be completed every 5 years but PGS may perform this evaluation more frequently. This evaluation is performed to meet the requirements of §192.1007.

All changes to the written plan, inclusive of material from the appendices, shall be recorded on the Change Log.

The PGS Safety Management System Safety Assurance element will also perform internal audits to assure effectiveness of the IM program.

12.0 ANNUAL REPORTING & COMMUNICATING RESULTS

PGS will report required performance measures annually through the submission of Annual Reports. These reports are completed at a Company system level and at the Service Area operating level.

PGS will send a copy of the PHMSA annual report information to the Florida Public Service Commission annually. A copy of the reports shall be maintained in the DIM Program files.

13.0 DOCUMENT AND RECORD RETENTION

The following records shall be retained in the Distribution Integrity Management Program files.

- The most current as well as prior versions of this written IM Plan.
- Documents supporting Knowledge of Facilities (material supporting Appendix A of the IM Plan).
- Documents supporting threat identification (material supporting Appendix B of the IM Plan).
- Documents supporting risk evaluation and ranking (material supporting Appendix C of the IM Plan).
- Documents supporting the identification and implementation of measures to address risks (material supporting Appendix D of the IM Plan).
- Documents supporting measurement of performance, monitoring results and evaluating effectiveness (material supporting Appendix E of the IM Plan).
- Effectiveness Reviews (Performance Reevaluations reports).
- Annual Reports to PHMSA (as required by §191.11) and State pipeline safety authorities.

- Mechanical Fitting Failure Reports (reporting discontinued beginning 2021)
- Documentation demonstrating compliance with the requirements of 49 CFR, Part 192, and Subpart P shall be retained for at least 10 years.

PGS will follow the Company's retention schedule as applicable.

14.0 APPENDIX A: PIPELINE SYSTEM DATA

Information in Appendix A: Pipeline System Data is now maintained as a separate, consolidated data file and can be accessed on the PGS SharePoint, Integrity Management Site: https://source.tec.net/sites/gasops/eng/im/Integrity%20Management%20Library/Appendix%20A%20-%20Pipeline%20System%20Data.xlsx?d=wb6b6d4fc397a44859d926ecc49df1181 Data is separated into tables according to the list below.

14.1 System Design by Operating Pressure by Main and Services

14.2 System Material Types Installed (System Total & By Service Area)

14.3 System Material Types and Years Installed (System Total & By Service Area)

14.4 Summary of Construction Practices

14.5 Number of EFV's Installed by Year

14.6 District Regulators, Security Valves and Relief Valves

14.7 Hazardous Leaks Eliminated or Repaired by Material

14.8 Hazardous Leaks Eliminated or Repaired by Cause (Threat)

14.9 Total Leaks Eliminated or Repaired by Cause (Threat)

14.10 Mechanical Fitting Failures by Year

14.11 Excavation Damages and Tickets by Year

14.12 Areas Subject to Flood Damage

14.13 Corrosion Threat – Frequency and Trend

14.14 Natural Forces Threat – Frequency and Trend

14.15 Excavation Damage Threat – Frequency and Trend

14.16 Outside Force Threat – Frequency and Trend

14.17 Material, Weld or Joint Failure Threat – Frequency and Trend

14.18 Equipment Failure Threat – Frequency and Trend

14.19 Incorrect Operation Threat – Frequency and Trend

14.20 Other Threat – Frequency and Trend

15.0 APPENDIX B: SYSTEM THREAT REVIEW

15.1 Baseline Threat Review

PGS used a data centric approach (see Section 7.1 for a description of this approach) for the baseline identification of threats to its distribution system. The Company maintained leak repair history documented on company Gas Leak and Repair Report Form PGS 24 and the Leak Information and Damage Reporting System database as noted in the DIM Program Records Summary in Section 5.1 of the 2010 Plan. A five-year leak history of these records (2006 through 2010) was used to initially identify the threats to the natural gas distribution system, as summarized below.

Table 15-1: Baseline Threat Review (Data) (2006 – 2010)

Threat	Percent Serious Incidents	Percent Recorded Leaks	Threat Rank
Corrosion	0%	14.55%	4th
Natural Forces	0%	7.6%	6th
Excavation Damage	100%	26.55%	1st
Other Outside Force	0%	2.00%	8th
Pipe, Weld, Joint Failure	0%	20.02%	2nd
Equipment Failure	0%	17.75%	3rd
Incorrect Operations	0%	2.18%	7th
Other Threats	0%	9.35%	5th

15.2 Threat Reassessment Review (Data)

The Table below documents the latest five-year history (2018-2022) reassessment using PHMSA reportable leak data history for both mains and services and PHMSA reportable incident review.

Table 15-2: Threat Reassessment Review (2018 – 2022)

Threat	2018	2019	2020	2021	2022	Leak Total by Cause	Percent Serious Incident	Percent Recorded Leaks	Threat Rank
Corrosion Mains Total	410	512	531	561	56	2070	0%	7%	
Corrosion Services Total	488	619	643	633	639	3022	0%	10%	
Corrosion Total	**898**	**1131**	**1174**	**1194**	**695**	**5092**	**0%**	**16%**	**3rd**
Natural Force Damage Mains Total	168	70	55	52	16	361	0%	1%	
Natural Force Damage Services Total	195	88	71	72	44	470	0%	1%	
Natural Forces Total	**363**	**158**	**126**	**124**	**60**	**831**	**0%**	**3%**	**5th**
Excavation Damage Mains Total	1011	1113	1082	1273	430	4909	0%	16%	
Excavation Damage Services Total	1324	1532	1476	1693	1375	7400	0%	23%	
Excavation Damage Total[1]	**2335**	**2645**	**2558**	**2966**	**1805**	**12309**	**0%**	**39%**	**1st**
Other Outside Force Mains Total	77	52	55	66	13	263	0%	1%	
Other Outside Force Services Total	89	64	60	74	81	368	0%	1%	
Other Outside Force Total	**166**	**116**	**115**	**140**	**94**	**631**	**0%**	**2%**	**6th**

[1] For Excavation leaks during the 5-year period of 2018 to 2022, Insufficient One-Call Notification Practices were the most significant of the root causes, with an average of 60%, followed by Insufficient Excavation Practices, representing 29% then Locating Practices Not Sufficient (11%) and Other root causes at <.01%.

Threat	2018	2019	2020	2021	2022	Leak Total by Cause	Percent Serious Incident	Percent Recorded Leaks	Threat Rank
Pipe Weld Joint Failure Mains Total	122	114	95	78	63	472	0%	1%	
Pipe Weld Joint Failure Services Total	202	340	203	192	242	1179	0%	4%	
Pipe Weld Joint Failure Total	**324**	**454**	**298**	**270**	**305**	**1651**	**0%**	**5%**	**4th**
Equipment Failure Mains Total	162	147	106	92	80	587	0%	2%	
Equipment Failure Services Total	1416	2386	1763	2047	1912	9524	0%	30%	
Equipment Failure Total[2]	**1578**	**2533**	**1869**	**2139**	**1992**	**10111**	**0%**	**32%**	**2nd**
Incorrect Operation Mains Total	21	25	15	19	15	95	0%	0%	
Incorrect Operation Services Total	30	87	63	70	84	334	0%	1%	
Incorrect Operation Total	**51**	**112**	**78**	**89**	**99**	**429**	**0%**	**1%**	**8th**
Other Mains Total	34	43	50	34	24	185	0%	1%	
Other Services Total	19	115	89	112	95	430	0%	1%	
Other Cause Total	**53**	**158**	**139**	**146**	**119**	**615**	**0%**	**2%**	**7th**

The Table below documents the latest five-year history (2018-2022) of system leaks using PHMSA reportable leak data history for both mains and services that were classified by the leak cause "Other".

Table 15-3: Other Cause Leaks by System Part (2018-2022)

System Part	2018	2019	2020	2021	2022	5 Year Total	Total Other Leaks	% of Other Leaks
Meter Set & Riser	3	51	50	59	42	205	615	33.33%
Service Line & Stub	16	50	37	44	31	178	615	28.94%
Main	22	41	49	32	22	166	615	26.99%
Regulator Station	12	2	1	2	2	19	615	3.09%
Other	0	14	2	9	22	47	615	7.64%

15.3 Threats Applicable to the Gas Distribution System (SME Knowledge)

PGS Subject Matter Experts (SMEs) reviewed threats in one or more of the regions in the PGS Service Territory. Each of the SMEs have knowledge of the pipeline system, design, operation, maintenance, and environmental

[2] Equipment Failure continues to be affected by an increase in leaks reported from 2018 – 2022 on service regulators (95%). In 2022, most leaks were from gasket or o-ring failures, making up 55% of leaks. A specific model or manufacturer of regulator issue was not identified. This threat will continue to be monitored.

factors. A summary of the threats identified for each Service Area is presented in the table below. A response of Yes (Y) means that the threat is deemed to be a currently active threat, a response of No (N) means that the threat is not considered to be applicable to the service territory in that Service Area, and a response of Potential (P) means that the threat is not known to have ever occurred but should continue to be monitored as a potential threat.

Table 15-4: SME Threat Identification Summary Applicable to the Gas Distribution System

Primary Threat Category	Sub-Threat	01	02	03	04	05	06	08	09	10	11	13	14	15	16
Corrosion	Cast Iron Pipe	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
	Bare Steel Pipe (with no CP other than Localized hot spotting with anodes)	Y	Y	Y	Y	N*	Y	N	N	N*	N	N	N	N	N
	Bare Pipe (with CP other than just localized hot spotting with anodes)	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N
	Coated Steel with CP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Coated Steel w/o CP	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Copper Services	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Stray Current	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Internal Corrosion	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Atmospheric Corrosion on above ground facilities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Atmospheric Corrosion of facilities in Vaulted areas underground	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Corrosion of carrier pipe in Cased Crossing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Other Corrosion	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Natural Forces	Seismic Activity	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Earth Movement / Landslide (Unstable Soil)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Flooding	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Over-pressure due to snow/ ice blockage	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Tree Roots	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Other Natural Forces	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Excavation Damage	Improper Excavation Practice	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Facility not located or marked	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	One-call notification center error	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Mismarked Facilities	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Incorrect Facility Records	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Other Excavation Damage (including plastic without tracer wire that cannot be accurately located)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Construction over gas mains & services	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Other Outside Force Damage	Vehicle Damage to Riser/ Meter	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Vehicle Damage to above-ground equip/station	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Primary Threat Category	Sub-Threat	01	02	03	04	05	06	08	09	10	11	13	14	15	16
	Vandalism	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Terrorism	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Structure Fire	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Other Outside Force Damage (including electric burn- out in joint trench)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Gas lines bored through Sewers	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pipe, Weld or Joint Failure	Century Products (MDPE 2306)	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Aldyl A (MDPE 2306)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
	Aldyl 4A (MDPE 2406) Green Aldyl	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
	PVC – Polyvinyl Chloride	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	ABS – Acrylonitrile Butadiene Styrene	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	CAB – Cellulose Acetate Butyrate	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	PB – Polybutylene	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	PP – Polypropylene	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	PA - Polyamide	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	PP – Delrin Insert Tap Tees	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Plexco Service Tee Celcon Caps	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	PE Fusion failure	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Pre-1940 Oxy-Acetylene Girth Weld	Y	N	Y	Y	N	Y	Y	Y	N	Y	N	N	Y	N
	Other	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Stab Type Mechanical	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Nut Follower Type Mechanical Fittings	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Bolted Type Mechanical Fittings	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Other Type Mechanical Fittings	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Equipment Failure	Valves	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Service Regulators	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Meters	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	P	Y	Y	P
	Control/Relief Station Equipment	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Other Equipment Failure	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Inside Meters & Regulators	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	N	N	Y
	Mercury Regulators	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Incorrect Operations	Incorrect Operations	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Other	Bell Joint Leakage	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
	Inserted Copper Puncture	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Copper Sulfide	N	N	N	N	N	N	N	N	N	N	N	N	N	N

* All known bare steel replaced in Sarasota and Eustis (2019). Threat table updated in 2022.

16.0 APPENDIX C: RISK ASSESSMENT AND RANKING

16.1 DIMP Risk Assessment and Ranking Process

PGS must evaluate the risks associated with its distribution pipeline system to determine the relative importance of each threat and estimate and rank the risks posed to our pipeline. This evaluation must consider each applicable current and potential threat, the likelihood of failure associated with each threat, and the potential consequences of such a failure.

The methodology used to evaluate and rank risk must:

- Consider each applicable current and potential threat
- Consider the likelihood of failure associated with each threat
- Consider the potential consequences of such a failure
- Estimate and rank the risks (i.e. determine the relative importance) posed to the pipeline
- Consider the relevance of threats in one location to other areas

PGS has subdivided its pipeline into regions with similar characteristics (e.g., contiguous areas within a distribution pipeline consisting of mains, services and other appurtenances; areas with common materials or environmental factors), and for which similar actions likely would be effective in reducing risk.

PGS must re-evaluate threats and risks on its entire pipeline and consider the relevance of threats in one location to other areas.

The PGS risk assessment and ranking model is a tool that is used to assist in the assessment of gas distribution pipeline risks. The model uses reasonably available data on leak repairs, mains and services, as well as population density, excess flow valves (EFVs), business districts, and areas of wall-to-wall paving. This data is utilized to develop risk scores for both the frequency of failure and the consequence of failure for the distribution facilities, which are subsequently combined to produce an overall risk score. Risk scores have been developed by leak cause, facility type (main vs. service) and geographic region (division and subdivision). PGS uses the results of the model as well as SME judgment to assess and rank distribution pipeline risks as well as to understand where in its system these risks may be greatest. The PGS system risk model is not used to identify, plan or schedule specific mitigation. PGS uses a variety of tools, processes and other risk models for managing mitigation that are specific to the risk.

16.2 Data Sources

16.2.1 **Mains and Services** - Information on PGS's mains and services are exported from the GIS and service records to a personal geodatabase. This export represents a snapshot in time of PGS's facilities. The distribution mains are maintained in the GIS, while the services are located in the GIS based on active meter locations.

16.2.2 **Leak Repairs** - Leak repairs for the prior five-year period are imported into the DIMP database for use in the analysis. Data imported included the leak repair date, leak cause, facility type (main vs. service), leak grade, pipe type (material), and location. Leak repair data is used instead of leak survey data because leak repair data provides a determination of the facility from which the leak/failure has occurred as well as an identification of the root cause.

16.2.3 **Leaks per Mile** - The facility and leak data are then used to calculate average leaks per mile.

16.2.4 **Miles of Services** - Service mileage is determined using the length of each service when available

and are supplemented using the average foot per service as recorded in the most recent Gas Distribution Annual Report.

Table 16-1: **Data sources used in the DIMP System Risk Analysis**

Data Type	Source	Source Type	Data	Description
Distribution Mains	GIS	Spatial	Material Diameter Location Flow rates	Polyline distribution mains with attributes, delivered by Service Area and aggregated to a single GIS layer
Services	GIS	Spatial and Tabular	Material Length Location	Point locations created using active meters, converted to polylines for processing
Regions	GIS	Spatial	Division and Sub-Division	Polygons representing analysis regions
Leak Repairs	Leak Management System	Tabular	Leak cause Leak class Material Clear date	Point data for leaks from pre-ceding five-year period.
Population Density	GIS	Spatial	Population density (pop/sq. mile)	US Census data
Business Districts	GIS	Spatial	Business district polygons	Polygons created from annual leak survey points to represent business districts
Wall to wall paving	GIS	Spatial	Wall to wall paving polygons	Polygons created from annual leak survey points to represent wall to wall paving areas
Excess Flow Valve	GIS	Spatial and Tabular	Facilities	Record of each EFV coded with Sub-Division (from spatial join)

16.3 Geographic Regions

For purposes of risk evaluation, ranking, and risk reduction planning, the PGS system is subdivided into geographic regions (Division and District) in order to consider the relevance of threats from one location to another. Divisions are selected as the geographic region since most PGS data is organized at this level. Within each region, the relative lengths of pipe within business districts, areas of wall-to-wall paving, population density, and excess flow valves were determined to feed the risk algorithm. The results are aggregated to provide risk scores at the state level.

16.4 Relative Likelihood of Each Threat

The relative likelihood of each threat is determined by first calculating the unscaled Frequency of Failure (FOF). Unscaled FOF is simply the count of the leaks divided by the facility mileage during the analysis period. Leak Repair data from the previous five years are used in the analysis.

16.5 Consequences of Failure

The relative consequence of a failure (leak) that may result from each threat is estimated by forecasting the Consequence of Failure (COF). Consequence factors utilized in the risk assessment and ranking effort include:

16.5.1 **Population Density Factor** – Population density indicates the relative likelihood that people may

be harmed. The data supporting this was taken from the most recent population data available for the service area.

16.5.2 **Leak Severity Factor –** Leak repair data for the previous five years is used to consider the probability that leaks may be more likely to be hazardous and require immediate repair or continuous action. Leak Severity Factors were developed for each region and are broken down by root cause and facility type. A summary for the PGS service area is shown below to illustrate this breakdown.

FACILITY TYPE	TOTAL LEAK REPAIRS	HAZARDOUS LEAKS	PERCENT HAZARDOUS
ALL PIPE	22384	13080	58%
MAIN	4129	2340	57%
SERVICE	18255	10740	59%

16.5.3 **Excess Flow Valves –** Excess Flow Valves (EFVs) reduce the COF and is based on the number of EFVs compared to the number of services per region.

16.5.4 **Leak Migration Factor –** The potential for leak migration is evaluated by intersecting the mains and service data against a spatial layer representing areas of likely wall to wall paving. The percentage of the total mileage of pipe within each region that is also within wall-to-wall paving areas is used to scale a COF factor to identify regions with a greater likelihood of leak migration issues.

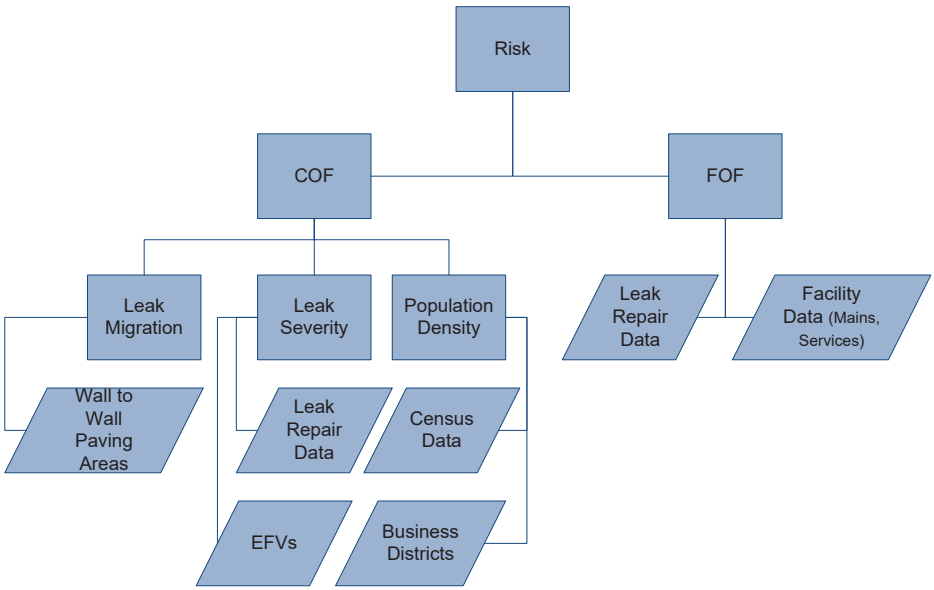
16.6 Risk Algorithms – Risk Model

Facility and GIS data are integrated into a DIMP database to be used to generate relative risk scores. Relative risk scores are determined for each threat type, broken down by facility type (main vs. service) and geographic region. Risk scores are calculated as illustrated in the figure below. Relative risk scores were developed by multiplying an unscaled Frequency of Failure (FOF) and a weighted Consequence of Failure score (COF).

The Frequency of Failure scores are directly calculated by counting the number of leaks in a given threat category within a region and dividing that by the mileage of pipe subject to the threat category within a region.

The COF score is produced from the mean of COF scores for population density, leak severity, and leak migration. The COF leak severity score represents the ratio of hazardous leaks repaired to all leaks repaired. The COF population density score uses a combination of population density and business districts to provide a measure of the potentially affected population. The COF leak migration score is produced by information on the number of miles of pipe in wall-to-wall paving areas in a region.

Figure 16-1: Overview of Risk Algorithm



16.7 Risk Data Analysis Process

The risk data analysis process is outlined in Figure 16-2. Figure 16-3 provides a more detailed representation of the architecture of the New Century Software DIMP solution. Data from the GIS on distribution mains and services are incorporated into a standardized DIMP data model using Spatial Risk Analyst. The distribution data is intersected against various spatial data layers to provide information on threats and consequences relevant to the risk analysis. The output of this step is written to a single database table that stores a record for each unique segment of distribution and service pipe. This table is the Pipe_Detail table shown in Figure C1-3. Each row in the table represents a single segment of distribution pipe that was analyzed. Data from the Pipe_Detail table is pivoted to provide a summary of the number of miles of pipe in each region by material and other factors related to consequence and failure probability. Each row in this table represents a region, and the fields of data represent the summarized mileage by each threat, consequence or pipe attribute.

Leak repair data is standardized through a database script and loaded to a table that contains all leak repairs that will be used as a part of the risk analysis (Leak_Detail table). The leak data is also pivoted to a region-specific summary, providing a count of leaks by threat type and leak class for each region. Spatial Risk Analyst is then used to return raw unscaled frequency of failure (FOF), consequence of failure (COF), and risk scores for each region by threat and sub threat considered in the analysis.

Figure 16-2: Generalized DIMP Risk Analysis Process

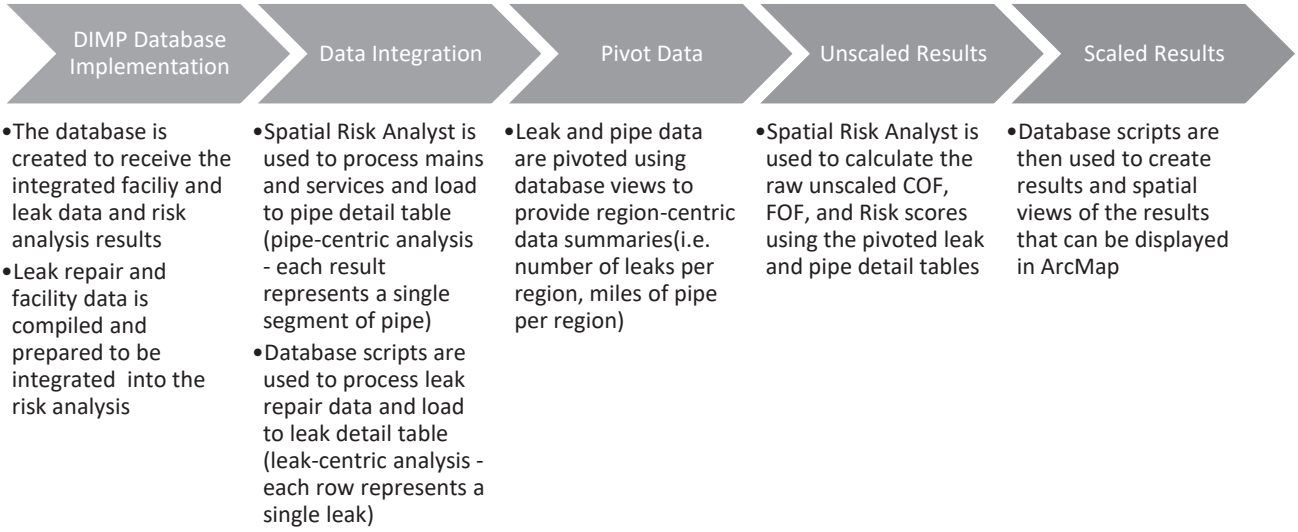
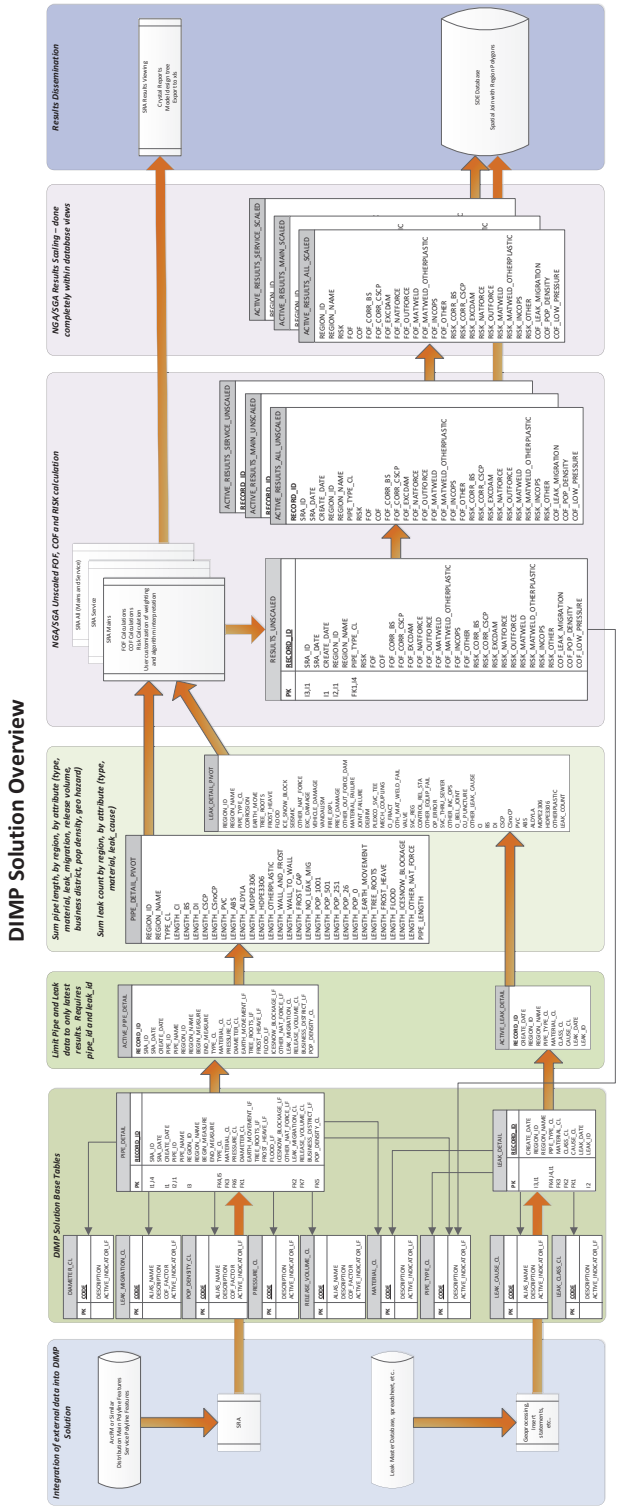


Figure 16-3: DIMP Solution Architecture



16.8 DIMP Risk Assessment and Ranking Results

16.8.1 Initial Results – Relative Risk Ranking

A summary of the results of the risk assessment and relative risk ranking is provided below. The final risk results are saved in the following folder: I:\Engineering\DIMP\RISK_DATA\Risk_Results_2018. Refer to the TECO_2019_DIMP_RESULTS.accdb

Risk Ranking Results:

		RISK			FOF			COF	
DIVISION	ALL	MAIN	SERVICE	ALL	MAIN	SERVICE	ALL	MAIN	SERVICE
1	1.7607	0.3106	4.5325	2.5121	0.6312	6.7468	0.7009	0.4921	0.6718
2	0.4068	0.1174	0.8646	0.5942	0.2504	1.3568	0.6846	0.4689	0.6372
3	1.1564	0.1845	2.7989	1.7178	0.4091	4.5937	0.6732	0.4511	0.6093
4	0.4228	0.0835	1.3038	0.6292	0.1795	2.0101	0.672	0.4653	0.6486
5	0.4266	0.1138	0.8273	0.6647	0.2591	1.3246	0.6418	0.4393	0.6246
6	0.5095	0.1098	1.4246	0.7749	0.2373	2.4863	0.6575	0.4625	0.573
8	0.5278	0.1789	1.366	0.7852	0.383	2.0833	0.6722	0.4672	0.6557
9	0.7963	0.1148	2.027	1.1811	0.2508	3.1598	0.6742	0.4577	0.6415
10	0.1232	0.0415	0.2998	0.1998	0.1015	0.4591	0.6164	0.4091	0.653
11	0.3524	0.0497	1.3154	0.5701	0.119	2.3102	0.6181	0.4179	0.5694
13	0.3798	0.0264	1.0064	0.5531	0.0557	1.4744	0.6867	0.4746	0.6826
14	0.523	0.0683	1.6386	0.7339	0.1411	2.5159	0.7126	0.4837	0.6513
15	0.2767	0.0665	0.7891	0.4358	0.1291	1.2961	0.635	0.5148	0.6088
16	0.2341	0.054	0.803	0.361	0.1148	1.3332	0.6484	0.4707	0.6023

16.8.2 System Risk Assessment and Ranking Validation

Risk Assessment and relative ranking results shall be documented and retained in the Distribution Integrity Management Program files.

16.8.2.1 Risk Assessment Validation

Description of the outcomes of the Risk Assessment Validation:

The frequency of failure (FOF) was established by determining historical leak repair rates per mile of pipe (for both mains and services) per year. Analysis was performed by leak cause and by geographic area (both Service Area and Region). When threats are ranked by relative Frequency of Failure (FOF) scores, the results were found to reflect the experience and judgment of the PGS SMEs, both by cause and by Region. The SME's did find that the some of the leak frequencies are higher than expected since the region has such a small amount of mileage. As a result, the frequency of failure (FOF) and risk scores associated with a Service Area or Region that has less than one mile of main or one mile of services is clearly identified in the summary of risk scores (**bold**) to make it clear that this is the case.

Leak Rates were established using the mileage of applicable facilities. Leak rates like Corrosion-Bare Steel are applicable to just some facilities (e.g. – just bare steel), while other leak rates are applicable to all facilities (e.g. – excavation damage).

The top 10 threats based on the highest leak rate (FOF) for any Service Area are:

SERVICE AREAS: By Maximum FOF for any combination of Cause, Main or Service	5 Year Leak History (2014-2018)	Miles of Pipe	FOF

Corrosion-Bare Steel, Service, Service Area 3[3]	10	0.44	22.73
Corrosion-Bare Steel, Service, Service Area 4	15	1.27	11.81
Corrosion-Coated Steel, Service, Service Area 3	284	34.48	8.24
Corrosion-Bare Steel, Main, Service Area 1	65	14.47	4.49
Corrosion-Bare Steel, Service, Service Area 2	14	4.45	3.15
Corrosion-Coated Steel, Main, Service Area 13	65	21.71	2.99
Corrosion-Coated Steel, Service, Service Area 15	25	9.34	2.68
Corrosion-Coated Steel, Service, Service Area 9	59	26.8	2.20
Excavation Damage, Service, Service Area 3	470	395.11	1.19
Corrosion-Coated Steel, Main, Service Area 3	284	275.66	1.03

Each Service Area is further segmented into smaller geographic areas (Regions). The top 10 threats based on the highest leak rate (FOF) for any Service Area are:

REGIONS: By Maximum FOF for any combination of Cause/Main or Service	5 Year Leak History (2014-2018)	Miles of Pipe	FOF
Corrosion-Coated Steel, Service, 11-Manatee Co-08	7	0.01	700
Corrosion-Bare Steel, Service, 01-Ft Lauderdale	8	0.02	400
Corrosion-Coated Steel, Service, 01-Coral Springs	8	0.03	267
Corrosion-Bare Steel, Service, 03-NE St Petersburg[4]	8	0.03	267
Corrosion-Coated Steel, Service, 01-Coral Springs	8	0.03	267
Corrosion-Coated Steel, Main, 01-Coral Springs	8	0.03	267
Corrosion-Coated Steel, Service, 06-Port Charlotte	10	0.04	250
Corrosion-Bare Steel, Main, 01-High Beach	6	0.03	200
Corrosion-Bare Steel, Service, 04-SE Orlando-30	2	0.01	200
Corrosion-Bare Steel, Service, 03-NW St Petersburg[4]	3	0.02	150

Consequence factors were developed from reasonably available information that included population density, leak severity (the historical occurrence of hazardous leaks), leak migration, release volume, and the presence of Excess Flow Valves (EFVs). Consequence Factors were then combined with Frequency of Failure (FOF) to calculate a risk score. Analysis was performed by leak cause, facility type (main vs. service) and by Region/Service Area. The relative contribution of each consequence factor has been reviewed by the SMEs and is deemed appropriate.

The top 5 threats based on the highest Risk Score for all Service Areas are:

Service Areas: By Maximum Risk Score for any combination of Cause, Main or Service:	Risk Score
Corrosion – Bare Steel, Service, Service Area 11[4]	124.775
Corrosion – Coated Steel, Service, Service Area 11	39.473
Corrosion – Bare Steel, Service, Service Area 03[4]	13.530
Corrosion – Bare Steel, Main, Service Area 11[5]	13.263

[3] All known remaining Bare Steel pipeline in Division 3 (St Petersburg) was replaced and/or retired in 2018.
[4] All known remaining Bare Steel pipeline in Division 11 (Sarasota) was replaced and/or retired in 2019.

Corrosion – Bare Steel, Service, Service Area 04	7.802

With the exception of the results for corrosion on coated steel services with cathodic protection (CP), the overall Risk Score Ranking by cause has been reviewed and found to reflect the experience and judgment of the SMEs. See process improvement recommendations below for comments regarding corrosion of coated steel mains and services.

List desired data or risk evaluation process improvements:

- Most of the data used for the risk assessment is from GIS, however, some data points were lost during the original transition to GIS from our customer service program. Finding and correcting these data gaps will improve the risk analysis.
- Incorporation of cross bore data points (post camera work and identified sites).
- Ultimately, the business processes for gathering and organizing data for Risk Assessment should be matched up with the process for generating the Annual Gas Distribution System Report; thus ensuring as much consistency in data interpretation as possible.

SME documentation validating the current risk assessment is available upon request.

16.9 Inactive Service Line Risk Analysis

In order to meet the Florida Public Service Commission (FPSC) Rule 25-12.045(1)(c) "Inactive Gas Service Lines", PGS has developed a risk ranking approach that applies to all gas utility service lines which have been inactive for 1 year or more.

The ranking is data driven with inputs from both operational and engineering divisions. The index is designed to provide guidance on identifying inactive services which are of a higher risk than similar assets.

The risk ranking is primarily driven by data from PGS's Customer Relationship Management (CRB) as well as their Leak Management System (LMS). Each are the primary systems of record used for managing customer's gas utility service line data and the associated maintenance history around leak management of those assets.

PGS has identified these potential threats and uses the following required elements in the risk analysis process: Presence of excess flow valves, incident and leak history, corrosion control records, continuing surveillance records, patrolling records, maintenance history, excavation damage experience, and any other data deemed relevant by the operator.

PGS has incorporated the following data-driven risk ranking index which includes information pertaining to each category identified in the rule. The greater the risk score, the greater the potential risk of failure for that service.

- **Premise Status**: Only service lines with a customer status of *Inactive* with a total monthly count greater than or equal to 12 months of either status are to be included in the ranking.

- **Material Type:** Due to its greater likelihood of failure due to corrosion, Bare Steel services are given a score of 2. All other materials receive a score of 1.
- **EFV Present:** All service lines with an Excess Flow Valve (EFV) are to be identified. Those with an EFV present receive a score of -1 to reflect the risk reduction of this mitigative feature. All services without an EFV receive a score of 1.
- **Below Ground Leaks:** The history of below ground leaks for a service line is scored by its count value multiplied by a factor of 1.5. For example, a service line that has had two below ground leaks historically will receive a score of 3. 3-years of leak history is used in this analysis.
- **Above Ground Leaks:** The history of above ground leaks for a service line is scored by its count value divided by two, to account for above ground leaks being typically less hazardous than below ground leaks. For example, a service line that has had two above ground leaks historically will receive a score of 1. 3-years of leak history is used in this analysis.
- **Leak Survey Date:** The last time the service line was surveyed for leaks. Services involved in a leak survey less than 1-year-old are scored a 0. Services involved in a leak survey between 1-3 years are scored a .25. Services not involved in a leak survey within 3 years are scored a .5.
- **CP Survey Date**: The last time the service line was involved in a cathodic protection corrosion survey. Services involved in a CP survey less than 2 years old are scored a 0. Services involved in a CP survey between 2-10 years are scored a .25. Services involved in a CP survey between 10-20 years are scored a 0.5. Services involved in a CP survey between 20-30 years are scored a .75. Services not involved in a CP survey within 30 years are scored a 1. If the material of a service is coded as Plastic the service is automatically scored a 0 due to corrosion and CP not applying to plastic service lines.
- **Atmospheric Survey Date:** The last time the above ground features of a service line were surveyed for corrosion and leaks. Services involved in an atmospheric survey less than 1-year-old are scored a 0. Services involved in an atmospheric survey between 1-3 years are scored a .25. Services not involved in a leak survey within 3 years are scored a .5. If the material of a service is coded as Plastic the service is automatically scored a 0 due to corrosion not being a threat to plastic service lines.
- **Risk Factor**: The annual risk assessment for all PGS assets incorporates mileage of services, leak frequency, and a variety of threat types into a Service Area and Region (areas within a Service Area) based score. Threats included in this regionalized risk factor include Corrosion, Excavation Damage, Other Outside Forces, Natural Forces, Equipment Failure, Material/Weld Failure, Incorrect Operations, and Other unclassified leak causes. The scores are also weighted by their relative Consequence of Failure – which includes the percentage of services with EFVs, the potential for leak migration, the population density in the region, and ratio of leaks that are hazardous. The overall Risk score per region as well as the overall Risk by Excavation Damage score are utilized to factor in the regional differences, adding the regional score to each service record. This further weights service lines so that areas with historically higher risks for leaks on services are given a higher risk score than would be achieved by looking at just the data on the individual services. For example, given two inactive services with the same characteristics, the one located within a Region where scores are higher for overall Risk as well as for overall Risk by Excavation Damage as determined by the DIMP Risk Model will receive the higher index ranking.

16.9.1 Results

By combining data sources in this method, a relative risk score for all inactive service lines emerges from the results. The score works as an index where the higher the value, the higher the relative risk of the inactive

service line. Inactive service line scores and the values used in the ranking methodology are provided to individual PGS Service Areas for their review and input.

If values used in the ranking are determined to be out-of-date, new input values will be provided by the Service Area and used to re-rank the services. Otherwise, a Service Area will approve the results and begin the abandonment program of all high-risk services.

High risk values are determined annually by PGS after a thorough examination of the risk rankings are complete and data inputs are determined accurate.

The process will also flag all inactive services that meet the definitions of 25-12.045 (1)(d), (e) and (f), so that action can be taken in accordance with the inactive gas service line rules.

FPSC Rule	Inactivity	Material	Action to be taken within six months of identification
25-12.045 (1)(d)	2 years	Any	If no prospect for reuse – retire and physically abandon If there is a prospect for reuse, do one of the following: • Disconnect the service line from all sources of gas and physically abandon or remove; • A valve on the service line shall be locked in the closed position and the service line plugged to prevent the flow of gas; or • Remove the meter and plug the end of the service line to prevent the flow of gas.
25-12.045 (1)(e)	5 years	Bare Steel, Cast Iron, or other not meeting 49 CFR 192 standards	Retire and physically abandon the service
25-12.045 (1)(f)	10 years	Any	Retire and physically abandon the service

16.9.2 Determination of High-Risk Inactive Service Lines

The determination of a high-risk inactive service line shall be made based on the following criteria. The average risk score, rounded to the nearest whole number, of all inactive service lines that had a combined leak score of 2 or greater is used to establish the baseline for a high-risk inactive service line.

If an inactive service line has a combined leak score of 2 or greater, regardless of its risk score, it is also deemed high risk.

Table 16-4: Average Risk Score of all Inactive Service Lines with Leak Score >=2

Leak Score	Average Risk Score	Number of Services
2	5.32	1
3	5.33	9
3.5	6.71	1
Total	5.45	11

2021 Analysis Data

Table 16-5: Service Lines with Inactivity >= 12 Months with a Risk Score >= 5 by Material Type

Risk Score	Number of Services	Material Type
5-6	17	Plastic
	9	Coated Steel
	2	Bare Steel
6-7	3	Plastic

2021 Analysis Data

The complete list of Inactive Service lines can be found on the PGS Integrity Management SharePoint site under Risk Analysis.

16.10 Legacy Pipe Replacement Risk Ranking

Prioritizing areas for the removal/replacement of legacy pipelines involves six factors with risk rank and frequency of failure being the most significant.

The Risk Score (RS) and Frequency of Failure (FOF), for the geographic region(s) where bare steel and cast iron must be replaced, will be obtained from the PGS DIMP risk analysis. Engineering Services and Service Area personnel will identify the applicable, operating pressure (OP), accessibility for leak and close interval survey (A), proximity of existing and future projects (P) and municipal roadway or utility projects and determine the appropriate factor for each project. A score will then be calculated, for each project, using the following equation:

(RS)*30 + (FOF)*30 + (OP factor) + (A factor) + (P factor) + (M factor) = Score

- **Risk** – a weight of 30 will be applied to the Risk Score.
- **Frequency of Failure** – a weight of 30 will be applied to the FOF (leaks per mile of main)
- **Operating Pressure** (OP) – the value used is chosen based on operating pressure range as follows: Utilization Pressure = 10; Greater than U.P. up to 5 psig = 5; Greater than 5 psig = 0
- **Accessibility** (A) – Chosen based on access for leak survey and close interval survey. Access is not limited or restricted = 0; Access is limited or restricted = 10
- **Proximity** to existing or planned gas main projects (P). No existing or planned adjacent activity = 0; Adjacent activity = 10
- **Municipal roadway or utility projects** (M). No existing or planned activity = 0; Existing or planned activity = 10

These Scores, along with subject matter expert (SME) input from Engineering Services and Service Area personnel, will be utilized to prioritize projects for replacement. Assessment results may be included by reference.

17.0 APPENDIX D: IDENTIFICATION AND IMPLEMENTATION OF MEASURES TO ADDRESS RISKS

17.1 Key Elements of the Leak Management Program

Program Element	Reference to Requirement Established in the Standard or Procedure

Qualification/Training requirements for personnel conducting leak survey	PGS Pipeline Compliance Guide PGS Personnel Qualification Plan Covered Task Guidance Job Procedures
Inspection, Maintenance and Calibration of Leak Survey Equipment	PGS Pipeline Compliance Guide Covered Task 0221, Inspect, Test, and Maintain Sensing Devices
Auditing and Quality Assurance of Leak Survey Program activities	PGS Pipeline Compliance Guide
Established Frequency of Leak Survey in Business Districts, at intervals not exceeding 15 months, but at least once each calendar year.	O&M Manual - Section 2-B Leak Survey
Established Frequency of Leak Survey for Cathodically Unprotected Lines subject to §192.465(e) on which electrical surveys for corrosion are impractical, at least once every 3 calendar years at intervals not exceeding 39 months.	O&M Manual - Section 2-B Leak Survey
Established Frequency of Leak Survey of Remaining Lines at least once every 5 calendar years at intervals not exceeding 63 months.	O&M Manual - Section 2-B Leak Survey
Establish Leak Survey for Emergencies, including extreme weather conditions	O&M Manual - Section 14-B Emergency Operating Plan
Criteria for Initial Response and Hazard Mitigation	O&M Manual - Section 14-B Emergency Operating Plan
Establish requirements for building evacuation and periodic monitoring.	O&M Manual - Section 14-B Emergency Operating Plan
Request assistance from the Fire Department or other Agencies	O&M Manual - Section 14-B Emergency Operating Plan
Criteria for leak severity classification and Reclassification	O&M Manual - Section 14-B Emergency Operating Plan
Hazardous Leaks Requiring Immediate Repair – Ongoing action required	O&M Manual - Section 2-D Leak Classification
Non-hazardous Leaks Requiring Scheduled Repair – Time limit is established to Eliminate Leak (Grade 2 leaks)	O&M Manual - Section 2-D Leak Classification
Non-Hazardous Leak NOT requiring scheduled repair– Monitoring Requirements established (Grade 3 leaks)	O&M Manual - Section 2-D Leak Classification
Follow-up inspection of repaired leaks to ensure no leak remains	O&M Manual - Section 2-D Leak Classification PGS Pipeline Compliance Guide
Leak Records and Data Management procedures defined	PGS Pipeline Compliance Guide PGS Personnel Qualification Plan Covered Task Guidance Job Procedures
Leak Performance Metrics established	Annual DOT Report` Damages / 1000 Reporting Guide to Preventing Pipeline Damages

17.2 Key Elements of the Damage Prevention Program

Program Element	Reference to Requirement Established in the Standard
Participate in a qualified One-Call System	Public Awareness Plan

(Qualified as per 49 CFR, Part 192.614)	O&M Manual-Section 3-A Damage Prevention Program
Provides a means of receiving and recording notification of planned excavation activities	Public Awareness Plan O&M Manual-Section 3-A Damage Prevention Program
Provide for actual notification of persons who give notice of their intent to excavate of the type of temporary markings to be provided and how to identify the markings	Public Awareness Plan O&M Manual-Section 3-A Damage Prevention Program
Provide for temporary marking of buried pipelines in the area of excavation activity before, as far as practicable, the activity begins.	Public Awareness Plan O&M Manual-Section 3-A Damage Prevention Program
Provide for inspection of pipelines that the operator has reason to believe could be damaged by excavation activities	Public Awareness Plan O&M Manual-Section 3-A Damage Prevention Program
Conduct inspections as frequently as necessary during and after the activities to verify the integrity of the pipeline	Public Awareness Plan O&M Manual-Section 3-A Damage Prevention Program
Locate Facilities in a timely manner after receipt of notification ticket.	Public Awareness Plan O&M Manual-Section 3-A Damage Prevention Program Guide to Preventing Pipeline Damages
In the case of blasting, include leakage surveys as part of the inspection	O&M Manual-Section 3-A Damage Prevention Program
Establishes requirements for Locator Training and Qualification	Utility Guide to Preventing Pipeline Damages
Established requirements for Mapping Accuracy	Map Records Standard
Establishes special requirements for Trenchless Excavation	Construction Standards-Section 9 Directional Drilling & Boring Uncased Pipe
Establishes requirements for collecting and maintaining Data & Records for Excavation Damage	O&M Manual-Sections 3-A Damage Prevention Program; 3-F Continuing Surveillance; 14-B Emergency Operating Plan Job Procedures (10-001 and 10-032) Leak Management System
Establishes requirements for Damage Recovery	Included in damage billing process in coordination with Leak Management System
Establishes procedures for Enforcement	FS §556
Field education before/during construction activities	

17.3 Key Elements of the Public Awareness Program

Program Element	Reference to Requirement Established in the Standard or Procedure
The Public Awareness program is contained in a written program document and follows the general program recommendations of API RP 1162: • Identifies pipeline assets covered by the program. • Names an administrator(s) • Means of contact or address list for each audience type • Determines message type and content for each audience • Establishes Baseline Delivery Frequency for each message	Public Awareness Plan

• Establishes delivery methods for each message • Documents supplemental program elements • Process for program implementation and tracking progress • Establishes a program evaluation process • Establishes process for continuous improvement	
Specifically includes provisions to educate the public, appropriate government organizations, and persons engaged in excavation related activities on use of the one-call notification system, possible hazards, physical indications of a gas release, steps that should be taken to protect public safety in the event of a release (including emergency response plans for emergency officials), procedures for reporting such an event, how to follow safe excavation practices and report unauthorized digging or suspicious activity, how community decisions about land may impact community safety, encroachments, and how to contact the operator with questions or comments.	Public Awareness Plan
Includes activities to advise affected municipalities, school districts, businesses, and residents of pipeline facility locations.	Public Awareness Plan
The program and media are comprehensive as necessary to reach all areas	Public Awareness Plan
Conducted in English and other languages commonly understood by a significant number of non-English speaking population	Public Awareness Plan

18.0 APPENDIX E: MEASUREMENT OF PERFORMANCE, MONITORING RESULTS, AND EFFECTIVENESS EVALUATION

Information in Appendix E: Measurement of Performance, Monitoring Results and Effectiveness Evaluation is now maintained as a separate, consolidated data file and can be accessed on the PGS SharePoint, Integrity Management Site: https://source.tec.net/sites/gasops/eng/im/Integrity%20Management%20Library/Appendix%20E%20-%20Performance%20Measures.xlsx?web=1. A snapshot of the 2022 evaluation is provided here.

18.1 Number of hazardous leaks either eliminated or repaired, per §192.703(c), categorized by cause

Year	Performance Measure - Hazardous Leaks Eliminated or Repaired (Main & Service)	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Corrosion	273	2018-2022	270.6	0.0181	0.0182	0.43%	No	14,870.89	
2022	Natural Forces	36	2018-2022	60.6	0.0044	0.0041	-7.80%	No	14,870.89	
2022	Excavation Damage	1757	2018-2022	1525	0.0971	0.1025	5.64%	Yes	14,870.89	
2022	Other Outside	76	2018-2022	64.8	0.0040	0.0044	8.72%	Yes	14,870.89	
2022	Pipe, Welds & Joints	100	2018-2022	94.2	0.0063	0.0063	0.54%	No	14,870.89	
2022	Equipment Failure	733	2018-2022	784	0.0516	0.0527	2.23%	No	14,870.89	
2022	Incorrect Ops	52	2018-2022	39	0.0024	0.0026	8.56%	Yes	14,870.89	
2022	Other	57	2018-2022	57	0.0042	0.0038	-8.74%	No	14,870.89	

18.2 Number of leaks either eliminated or repaired, categorized by cause

Year	Performance Measure - Leaks Eliminated or Repaired (Main & Service)	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Corrosion	695	2018-2022	615.6	0.0404	0.0414	2.41%	No	14,870.89	
2022	Natural Forces	60	2018-2022	97	0.0069	0.0065	-5.15%	No	14,870.89	
2022	Excavation Damage	1805	2018-2022	1548.6	0.0983	0.1041	5.93%	Yes	14,870.89	
2022	Other Outside	94	2018-2022	76.2	0.0047	0.0051	9.48%	Yes	14,870.89	
2022	Pipe, Welds & Joints	305	2018-2022	330.2	0.0230	0.0222	-3.36%	No	14,870.89	
2022	Equipment Failure	1992	2018-2022	2003	0.1313	0.1347	2.55%	No	14,870.89	
2022	Incorrect Ops	99	2018-2022	86.2	0.0054	0.0058	7.46%	Yes	14,870.89	
2022	Other	119	2018-2022	123	0.0096	0.0083	-14.28%	No	14,870.89	

18.3 Number of hazardous leaks either eliminated or repaired, per §192.703(c), categorized by material

Year	Performance Measure - Hazardous Leaks Eliminated or Repaired	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Cast Iron	0	2018-2022	3.5	94.0000	4.02	-95.72%	No	0.87	
2022	Bare Steel	93	2018-2022	525.2	12.7766	36.05	182.13%	Yes	14.57	
2022	Coated Steel with CP	1217	2018-2022	1311.0	0.2791	0.28	1.90%	No	4,609.10	
2022	Plastic	1576	2018-2022	1187.8	0.1544	0.12	-24.93%	No	10,246.35	
2022	Plastic Aldyl-A (MDPE 2306) or 4A (MDPE 2406)	191	2018-2022	418.8	0.7186	0.69	-3.60%	No	604.56	

18.4 Number of Excavation Damages

Year	Performance Measure	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Damages resulting in need to repair or replace)	Current Baseline (Damages resulting in need to repair or replace)	% Increase	Re-Evaluation Required?	Notes
2022	Number of Excavation Damages	1,805	2018-2022	1,548.6	1,693	1,805	6.62%	Yes	

18.5 Number of Excavation Tickets

Year	Performance Measure - Number of Excavation Tickets Received from Sunshine One Call	Tickets in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous year's number of excavation tickets)	Current Baseline (Number of excavation tickets)	% Increase	Re-Evaluation Required?	Notes
2022	Number of Excavation Tickets Received from Sunshine One Call	621,893	2018-2022	556,983	591,272	621,893	5.18%	Yes	

18.6 Corrosion Performance Measures Mains and Services

Year	Performance Measure - Corrosion Leaks Repaired/Eliminated by Material	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Number of Services	Notes
2022	Cast Iron Leaks - Mains	0	2018-2022	3.6	1.6296	1.3333	-18.18%	No	2.70		
2022	Bare Steel Leaks - Mains	8	2018-2022	12.2	0.6027	0.5252	-12.86%	No	23.23		
2022	Coated Steel (with CP) Leaks - Mains	48	2018-2022	71.2	0.0157	0.0154	-1.66%	No	4,608.69		
2022	Coated Steel (No CP) Leaks - Mains	0	2018-2022	0	0.0000			No	0.00		
2022	Bare Steel Leaks - Services	54	2018-2022	44.4	0.0678	0.0888	31.05%	Yes		500.00	
2022	Coated Steel (with CP) Leaks - Services	582	2018-2022	486.4	0.0106	0.0113	6.36%	Yes		42,959.00	
2022	Coated Steel (No CP) Leaks - Services	0	2018-2022						0.00		

18.7 Natural Forces Performance Measures

Year	Performance Measure - Natural Forces Leaks Eliminated/Repaired by Type	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Earth Movement / Landslide Leaks (mains & services)	1	2018-2022	2.0	0.0002	0.0001	-28.74%	No	14,870.89	
2022	Tree Related Leaks (mains & services)	21	2018-2022	68.0	0.0051	0.0046	-10.92%	No	14,870.89	
2022	Flood Leaks (mains & services)	3	2018-2022	3.4	0.0042	0.0002	-94.50%	No	14,870.89	
2022	Lightning (mains & services	0	2018-2022	14.7	0.0015	0.0010	-34.68%	No	14,870.89	
2022	Other Leaks (mains & services)	19	2018-2022	13.0	0.0008	0.0009	7.95%	Yes	14,870.89	

18.8 Excavation Damage Performance Measures

Year	Performance Measure - Excavation Damage Leaks per System Mile	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Excavation Damage Leaks per System Mile	1,805	2018-2022	1,548.60	0.10	0.10	5.93%	Yes	14,870.89	

18.9 Other Outside Force Performance Measures

Year	Performance Measure - Other Outside Force Leaks Eliminated/Repaired by Type	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Vehicle Damage (services including riser and meter)	39	2018-2022	35.4	0.00214	0.00238	11.17%	Yes	14,870.89	
2022	Vandalism (mains & services)	3	2018-2022	7.6	0.00055	0.00051	-6.92%	No	14,870.89	
2022	Fire / Explosion (mains & services)	6	2018-2022	2.6	0.00012	0.00017	41.53%	Yes	14,870.89	
2022	Previous Damage (mains & services)	11	2018-2022	5.2	0.00026	0.00035	34.08%	Yes	14,870.89	
2022	Other (mains & services)	29	2018-2022	19.4	0.00128	0.00130	2.20%	No	14,870.89	

18.10 Pipe, Weld, or Joint Failure Performances Measures

Year	Performance Measure - Pipe, Weld or Joint Failure Leaks Eliminated/Repaired by Type	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Aldyl A (MDPE 2306) or 4A (MDPE 2406) (mains & services)	31	2018-2022	46.8	0.0835	0.0773	-7.35%	No	604.56	
2022	HDPE 3306 (mains & services)		2018-2022		0.0000			No		
2022	Other Plastic Pipe (mains & services)	1	2018-2022	71.5	0.0111	0.0070	-37.18%	No	10,246.35	
2022	Delrin Insert Tap Tees		2018-2022		0.0000			No		
2022	Plexco Service Tee Celcon Caps		2018-2022		0.0000			No		
2022	Mechanical Coupling (mains & services)	0	2018-2022	77.8	0.0015	0.0052	254.56%	Yes	14,870.89	
2022	Pre 1940 OA girth welds (mains & services)		2018-2022		0.0000			No		
2022	Other Material or Weld Failure (mains & services)	273	2018-2022	185.0	0.0401	0.0401	0.19%	No	4,609.10	

18.11 Equipment Failure Performance Measures

Year	Performance Measure - Equipment Failure Leaks Eliminated/Repaired by Type	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Number of Services	Notes
2022	Service Regulators	1027	2018-2022	911.8	0.00191	0.00198	3.58%	No	459,971	
2022	Control/Relief Station	211	2018-2022	71.6	0.02463	0.04952	101.00%	Yes	1,446	
2022	Other	674	2018-2022	673.6	0.00158	0.00146	-7.41%	No	461,417	

18.12 Incorrect Operation Performance Measures

Year	Performance Measure - Incorrect Operation Leaks Eliminated/Repaired by Type	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Operating Error (mains & services)	38	2018-2022	33.4	0.0022	0.0022	1.01%	No	14,870.89	
2022	Service Line bored thru Sewer (mains & services)	0	2018-2022	0.0	0.0000	0.0000	0.00%	No	14,870.89	
2022	Other Incorrect Operation (mains & services)	61	2018-2022	52.2	0.0031	0.0035	12.16%	Yes	14,870.89	

18.13 Other Failure Performance Measures

Year	Performance Measure - Other Failure Leaks Eliminated/Repaired by Type	Leaks in Year	5 Year Average Range	5-Year Average from Current Year	Established Baseline (Previous 5-Yr Average Leaks/Mile/Yr)	Current Baseline (5-Yr Average Leaks/Mile/Yr)	% Increase	Re-Evaluation Required?	Miles of Main	Notes
2022	Bell Joint Leaks	0	2018-2022	1.4	0.7407	1.6092	117.24%	Yes	0.87	
2022	Other (mains & services)	119	2018-2022	295.4	0.0209	0.0199	-4.98%	No	14,870.89	

19.0 APPENDIX F: PERIODIC PERFORMANCE EVALUATION AND IMPROVEMENT

In accordance with 49 CFR, §192, Subpart P, an operator must re-evaluate its entire DIM Program at least every five years. PGS performed a reevaluation of distribution system in 2020 and can be accessed on the PGS SharePoint, Integrity Management Site:
https://source.tec.net/sites/gasops/eng/im/Integrity%20Management%20Library/2015-2019%205-yr%20reevaluation.pdf

PGS monitors the performance measures in Appendix E annually for repeated indications of a need to perform re-evaluation of our performance measures. An increase of five percent or more in any measure requires a re-evaluation. Re-evaluation involves analyzing data to determine a cause for increase and determining if additional actions need to be taken. The results of performance reevaluations, as identified in Appendix E, are summarized in Appendix F.

20.0 CHANGE LOG

The Change Log will record revisions and changes to this DIM Plan that include:

- Changes in plan general information
- Additions, refinements, improvements, or elimination of measures to reduce risk
- Additions, refinements, improvements, or replacement of performance measures

Minor edits such as edits in wording, formatting, etc. that do not affect processes, requirements or performance are not required to be documented. Changes to material in the Appendices that is included by reference need not be recorded on the Change Log.

20.1 05/19/2014

- Section 7.4 - Added 25-12.045 Inactive Service Line Risk Assessment requirements
- Appendix C- Section 4 - Inactive Service Line Risk Assessment methodology and results.
- Entire Document; EN Engineering DIMP review – revisions and recommendations.

20.2 09/15/2015

- Sections: 1, 3, 5, 9, & Appendix A, B, C, & D - Annual update of Risk Assessment, Knowledge of System Table, and Threats of Concern.

20.3 6/29/2016

- Sections 1 – 12, Appendix A & B - Annual update of Plan.

20.4 9/29/2016

- Section 3.14 and 3.15 - Added Personnel Contac Table and Communication of Plan Changes
- Section 5.4 - Populated Table 5-38
- Section 5 - Revised Table 5-17 in Section 5 to depict mechanical fitting failures reported annually to PHMSA.
- Section 5.4 - Revised wording.
- Table 5-16: Service regulators - Table removed in 2016

20.5 05/23/2017

- Appendix A Tables updated for 2016, Appendix B updated Threat Identification Table.

20.6 10/19/2017

- Section 6, Appendix C - Risk Analysis, Inactive Gas Lines/ Risk

20.7 11/06/2017

- Table 5-5: Miles of Mains and Number of Services by Material Type - Table eliminated; data now included in Table 5-3
- Table 5-7: Miles of Mains and Number of Services by material and decade - Table eliminated; data now included in Table 5-3
- Table 5-10: Number of Excavation Tickets - Table eliminated; data now included in Table 5-9
- Table 5-11: Number of leaks either eliminated or repaired, categorized by cause - Table eliminated; data now included in Table 5-8
- Table 5-18: Plastic piping - Table eliminated; data now included in Table 5-3
- Table 5-19: MAOP of Systems - Table eliminated; data now included in Table 5-2

20.8 05/15/2018

- Update Appendices; Program Key Contact Information; Revised wording. Updated Appendices

20.9 10/30/2019

- Updated Key Program Contacts and moved to title page
- Updated all outdated references for manuals and systems (e.g., O&M, CRB, etc.)
- Section 0Scope and 2.0 Purpose – revised wording for streamlining intent and recommendations from AGA DIMP scoping document.
    - Modified titles of program sections for clarity (Sections 6.0 - 12.0)
- Section 3.0 Roles – revised the role of DIM Analyst and added DIM Engineer role
- Created Section 4.0 Management of Change section. Revision Control Sheet changed to “Change Log” and contents moved to Section 20.0 Change Log.
- Section 5.0 Definitions – deleted definition of NTSB and Ticket as determined unnecessary

- Section 6.0 Knowledge of PGS Facilities and Data Integrity –
    - Added more description and detail of the systems used by PGS for integrity management (e.g., GIS, GL Essentials, LMS, CRB).
    - Updated IM program records summary for types of records and sources (e.g., CIS to CRB, LIaRDs to LMS)
    - Restructured descriptions of referenced tables in Appendix A (e.g., separated system design from operational factors, separated environmental factors from Operational factors, etc.) in 6.1 and 6.2 .
    - Updated environmental factors to known current threats in 6.3
    - Separated threat table references in 6.4
    - Retitled subsection 6.5 and added more information to clarify intent of gathering additional data.
    - Updated and combined tables for Additional Data Needed for DIMP and Action Plan Scope Gaining Additional Information and Action Plans to Enhance Data.
        - Added “unknown installation date” to Data Needed to Table 6.2
        - Created Table 6.3 to show completed items.
- Section 7.0 Threat Identification – expanded definition of threat
    - Added cross bore to list of DIM threats in table 7.2
    - Expanded list of threat types to include subthreats in 7.3 .
    - Added and expanded list of other threats in 7.4 – cross bores, over-builds, over-pressurization and legacy pipe materials.
    - Revised Table 7-1 to list only O&M activity and threat. Added O&M activity with corresponding record to Table 6.1.
- Section 8.0 Risk Evaluation and Risk Ranking
    - Added section 8.1 expanding on Risk Assessment methods to permit growth in type of assessments performed (probabilistic vs ranked, etc.)
    - Added section 8.4 Legacy Pipe Replacement Risk Ranking process
- Section 9.0 Identification and Implementation of Measures to Address Risks -
    - Retitled and streamlined wording
    - Added Electrically isolated metal alloy fittings to table 9.7.1 for Corrosion Threat
    - Added PermaLock to table 9.7.6 for Equipment Failure Threat
    - Added section 9.3 Legacy Pipe Replacement Program
    - Added section 9.4 Over-Pressurization Prevention.
    - Expanded section 9.5 Cross Bore Identification and Prevention to include current practices.

  - Moved tables with Risk Reduction Activities and Accelerated Actions taken to Reduce Risk together in Section 9.8 versus having some listed in an appendix.

- Section 10.0 – Added clearer summary of evaluation expectations and requirements.
  - A baseline measurement and ongoing measurement of the performance measures are monitored by PGS to assist in the ongoing evaluation of threats. Each measure is analyzed and documented at a system level and is included by reference or in Appendix E. A rolling 5-year comparison is performed and reviewed annually after completion of PHMSA reporting of performance measures (per EN Engineering program review recommendation.
  - Moved Annual Reporting information to Performance Measurements
  - 10.2 Modified references to Appendices B and C to Appendix F.
- Section 14.0 , Appendix A: Section 5 tables to consolidated external source and summarized for 2018 with all divisions and system total per table.
- Section 15.0 , Appendix B System Threat Review (section title revised)
  - Section 15.2 updated for current data, revised leak table to add historical data for clarity.
  - Updated Table 15-4: SME Threat Identification Summary Applicable to the Gas Distribution System at Division level to make Cast Iron and Bell Joint Leakage to No for Divisions 03 and 04. All known cast iron, including cast iron bell joints, replaced in St Pete (2018) and Orlando (2016).
- Section 16.0 , Appendix C – Risk Assessment and Ranking
  - 16.2 removed reference of CIS being used for risk analysis data.
  - 16.8 Updated Risk Assessment information based on 2014-2018 risk analysis results from New Century/Integrity Plus. Updated list desired data or risk evaluation process improvements referenced.
  - 16.10 Created new section to recognize methods for calculating legacy risk ranking.
- Section 17.0 , Appendix D consolidated information with similar information listed in section 10.
  - Appendix D, Section 7 – replaced statement stating PGS does not have 4A in its system to maintenance similar to other PE types
  - Appendix D, Section 5 – added new PHMSA Plastic Pipe rule for 192.455 stating electrically isolated metal alloy fittings must be cathodically protected and maintained per the PGS O&M.
- Section 18.0 , Appendix E: Performance Measures
  - Tables consolidated to external source. 2018 summaries shown.
  - As noted, removing specific performance measurements as identified in Notes section for threats identified as not applicable to PGS (e.g., copper piping).
- Section 19.0 , Appendix F – Periodic Evaluation and Improvement revised to reference last official reevaluation of system performed in 2016 by reference.
- Removed Appendix G – Cross reference of IM Plan to 49 CFR 192, Subpart P

- Removed Appendix H – Copy of 49 CFR 192, Subpart P

20.10 06/15/2020

- Cover page – updated miles of main, titles and personnel
- Table 7.2 - Added overbuilds, over-pressurization and cross bores to list
- 7.4 Removed inaccurate reference to q-flex pvc
- Table 9.7.1 – (Sub-threat) Updated Atmospheric Corrosion of Facilities in Underground Vaults from a 5 year inspection to state that vault inspections occur with atmospheric corrosion inspections. Revised threat wording to expand beyond vaults. Removed "Review process for ensuring adequate support or work-around during adjacent 3rd party construction." from Cast Iron.
- Section 9.9.7 – (Sub-threat) Updated Incorrect Operations to remove "every year" from requalification as PQP plan dictates 1, 3 or 5 year requalification for specific tasks.
- Section 9.9.3 and Section 15.4 – Appendix B – moved "Construction over gas mains and services" from "Other" threat to "Excavation" and "Gas lines bored through sewers" from "Incorrect Operations" to "Other Outside Force."
    - Updated Table 15-4: SME Threat Identification Summary Applicable to the Gas Distribution System at Division level to make Bare Steel to N for Division 05, 11, 09, 08 and 15. All known bare steel replaced in Eustis (2019), Sarasota (2019), Daytona (2017), Lakeland (2015) and Ocala (2013). Made Bare Steel to Y for Division 06 as confirmed bare steel services with CP exist in 2019. Made pre-1940's OA Girth Welds to N for Division 02 and 05 per SME feedback.
- Section 14.0 , Appendix A – incorporated by reference only Appendix A tables. Removed annual snapshot.
- Section 15.2 – Updated Tables 15.2 and 15.3 for 2014-2019 data, including individual values for Services and Mains and individual year data.
- Section 17.0 , Appendix D – updated reference manuals
- Section 18.0 , Appendix E: Performance Measures – updated to 2019 summaries.

20.11 05/05/2021

- Updated key DIMP personnel references and Program Effectiveness date on cover page.
- Division changed to "Service Area"
- Section 6.2 . Discontinuation of individual tracking of Mechanical Fitting Failures per the Gas Pipeline Regulatory Reform rule (PHMSA 2018-0046-0063), in which PHMSA ended the MFF information collection to ease regulatory burdens on the construction, maintenance, and operation of gas distribution systems without adversely affecting safety. The effective date of the rule was March 21, 2021.
- Section 9.4 . Added PGS completion of a failure mode and effect analysis (FMEA) in 2021 to assess risk of over-pressurization of the PGS distribution system. Per the 2020 PIPES Act, PHMSA requires DIM plans to include an evaluation of risks that could lead to over-pressurization. Link to FMEA: https://source.tec.net/sites/gasops/eng/im/_layouts/15/WopiFrame.aspx?sourcedoc={522490A8-

B171-4020-B10F-E0E18460791E}&file=Design%20FMEA-PGS%20Overpressurization%20Risk%2002%202021.xlsx&action=default

  - Added note of "opportunities for system replacement occur such as with legacy pipe replacement, PGS evaluates whether multiple operating pressure systems exist in a single area and if this variance can be reduced."

- Section 9.9.5 - Updated "Material, Weld and Joint Failure" threat to "Pipe, Weld and Joint Failure" to reflect update in DOT Annual Report. Updated all other references. Moved references to Mechanical Fitting Failures from Equipment Failure to Pipe, Weld and Joint Failure.
  - Added Theft as sub-threat to Other Outside Force
  - Moved Cross Bore sub-threat to Incorrect Operations. Added incorrect equipment selection to threat category.
- Section 14.0 – Appendix A - removing DIMP tracking of District Regulators, Security Valves and Relief Valves item from Pipeline System Data. Information is tracked in Inspection Manager and reports can be generated upon request.
- Section 15.0 , table 15.14. Mechanical Fitting Failure types moved to Pipe, Weld, Joint Failure.
  - Tables 15.2 and 15.3 for 2016-2020 years
- Section 16.0 – Updated tables 16.5.2 for 2016-2020 data, tables 16.4 and 16.5 were updated for 2019 data (2020 data was in processing)
- Section 18.0 – Updated Performance Measures tables to 2020 data.

20.12 06/02/2022

- Section 6.4 - Updated Tables 6.2, 6.3 to monitor Inside Meters and Regulators per PHMSA advisory bulletin (ADB-2020-01)
- Section 7.4.5 – Added Inside Meters & Regulators to the Other Threats Increasing Risk to Pipeline System
- Section 7.5.3 - Updated Table 7.2 to include Meters and Regulators in the "Threat Reviewed and Incorporation in DIMP"
- Section 9.9.6 - Updated Table "Threat Mitigation - Equipment Failure" with the threat of inside meters and regulators
- Section 15.3 - Updated Table 15.4 to include Inside Meters & Regulators under Equipment Failure and Service Areas with known inside equipment
- Section 0 - Removed reference to 192.1009 on mechanical fitting failures
- Tables 6.1 and 7.1 – Renamed Material Failure Reports to Product Quality Reports to reflect PGS reporting name. Updated threats in 7.1 to appropriately reflect Equipment or Pipe, Weld or Equipment Failures from "All Categories" of threats.
- Section 6.5 – Added sentence that the use of information gained from past design, operations and maintenance is also considered in accordance with 192.1007(a)(2)
- Section 7.3 – Number of farm taps / stubs directly off transmission lines updated.

- Section 7.4 – Retitled section to clarify risk aren't necessarily "increasing" risk but are noted as additional risk for PGS. Added SME visual confirmation as an example of input.
- Section 8.5 – Added section on Leak Prone Pipe and utilization of natural gas emissions technology (MobileGuard).
- Tables 9.9.4 – Consolidated threat of Terrorism with Vandalism as shown in Table 7.3.
- Table 9.9.8 – Added Overbuilds to Other Threat.
- Table 9.9.1 – Moved Corrosive soil conditions from Table 9.9.2
- Corrected internal document references as needed within plan.

20.13 06/19/2023

- Updated Director title in Section 3.1
- Added Table 3-1: Key Personnel Requirements per recommendation of internal best practice review.
- Updated Table 6-2: Additional Data Collection Needed for DIM that Quantification of Inside Meters & Regulators was completed in 2022. Updated responsible party to Manager of Compliance from Supervisor of Territory Compliance.
- Added Sections 7.4.6 for Cyber and Other Security Threats to address cyber security threats per recommendation of Florida Public Service Commission.
- Section 7.5.3 – Added Resources for determining extent of landslide and sinkhole hazards are Landslide Hazards - Maps | U.S. Geological Survey (usgs.gov) and Subsidence Incident Reports | Florida Department of Environmental Protection.
- Section 8.1 - Added "PGS considers factors other than past observed abnormal operating conditions and avoids zero as a risk ranking unless supported by engineering or operational knowledge when performing a risk assessment."
- Section 9.6 - Added PGS will utilize its Safety Management System to enhance the effectiveness of its IM program and enable continuous improvement of safety practices and performance.
- Added Section 9.6.1 to include specific language noting performance of Engineering Assessments under requirements of the PGS SMS Management of Change
- Added Section 9.6.2 for deviation requests from normally required inspections.
- Added Section 9.7 Cyber Security Framework to address cyber security threats per recommendation of Florida Public Service Commission.
- Added note to Section 11.0 to state the PGS Safety Management System Safety Assurance element will also perform internal audits to assure effectiveness of the IM program.
- Section 13.0 - Added PGS will follow the Company's retention schedule as applicable.
- Tables 15-2 and 15-3 updated with 2022 leak data
- Tables 16-4 and 16-5 updated with 2021 inactive risk summary results

- Section 16.9, added that Inactive Risk Model will use 3 years of leak history for analysis. Number of years used was not specified previously.
- Section 18.0 Appendix E updated with 2022 visuals of performance measurements

3. Please refer to Peoples' petition, paragraph 3, page 2, for the following question. Please explain how the 10-year term was determined for the SAFIR program. For each alternative term considered, please explain why it was not selected.

A. The company considered the 10-year term as it is consistent with the original Rider CI/BS for the replacement of cast iron and bare steel pipe and the term added for replacement of problematic plastic pipe approved by the Commission through Order No. PSC-17-0066-AS-GU. The company believes this term to be manageable based on availability of resources and the time necessary for construction. Accordingly, no alternative term was considered.

4. Please provide a general description of the locations of proposed SAFIR projects to be completed from September 2024 to December 2025.

A. Please see the Excel file "(BS 100) No. 4 – 2025 Project Locations.xlsx," attached containing a table listing each new activity requested with the SAFIR Rider and any corresponding regulatory requirements or other justification.

5. Please provide Exhibits 2, 3, and 4 in Excel format.

A. Please see the Excel files "(BS 102) No. 5 – Exhibit 2 – SAFIR Capital Investment by Activity.xlsx" and (BS 103) No. 5 – Exhibits 3 and 4 – Revenue Requirement and Surcharge Calc.xlsx." The Excel files for the exhibits have been revised as follows:

- The investment in 2024 for replacement of CI/BS and PPP is revised to align with investment amounts filed with the Rider CI/BS Petition under Docket No. 20240133-GU.
- The investment in 2025 for retirement of inactive services has been removed to align with the activity's removal in Rider CI/BS Petition under Docket No. 20240133-GU and as described in the company's response to Staff's First Data Request No. 4 under Docket No. 20240107-GU.
- The investment in 2025 through 2027 for MAOP activity has been revised as described in the company's response to Staff's First Data Request No. 2 under Docket No. 20240107-GU.

6. Assuming Peoples does not petition the Commission for a rate case (which would move rider investment into rate base) in the next 10 years, what is Peoples' estimated average annual customer rate impact of the proposed SAFIR for each customer class for 2025 through 2035?

A. Please find the Excel file "(BS 105) No. 6 – SAFIR 10 year plan 2025 – 2034.xlsx," attached calculating the projected revenue requirement, annual surcharge factors, and monthly bill impacts for the SAFIR modification activities for each of the ten years within the proposed period for the rider. This calculation considers the revisions for inactive services and MAOP activities noted in the company's response to Staff's Second Data Request No. 5 under Docket No.20240107-GU.

PEOPLES GAS SYSTEM, INC.
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REQUEST NO. 7
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7. Referring to Exhibit 2 of the petition, please list for each new activity requested the amount that was approved to be included in base rates in PGS's most recent rate case, Docket No. 20230023-GU. In your response, identify all relevant testimony and MFR schedules that include any costs related to each new activity requested.

A. For the new activity requested through the SAFIR Petition, all dollar amounts are projected for future years, and none of the projected investments were included in the rate base approved by the Commission in Docket No. 20230023-GU.