

Gas Distribution Integrity Management Program Best Practices and Considerations

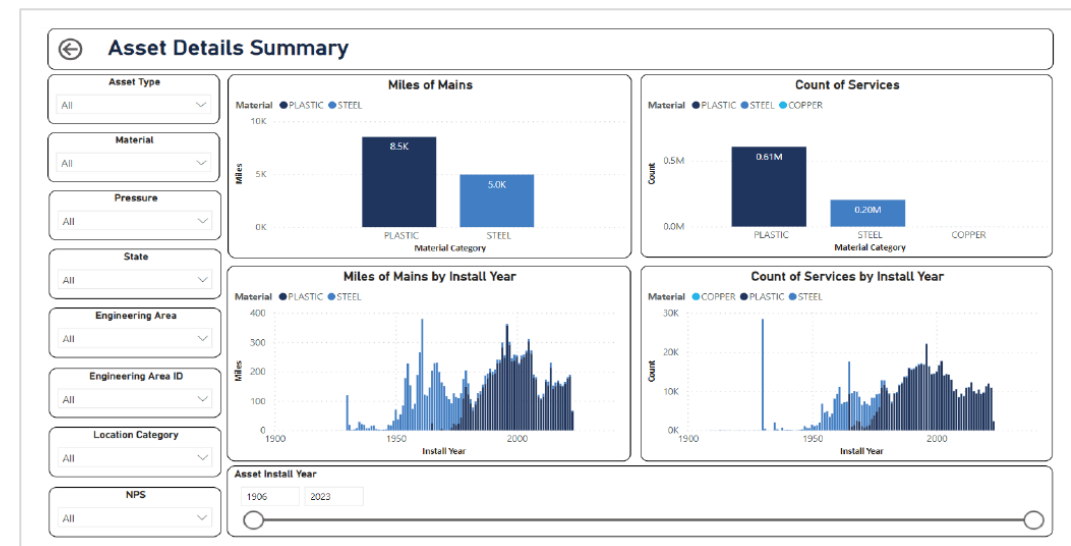
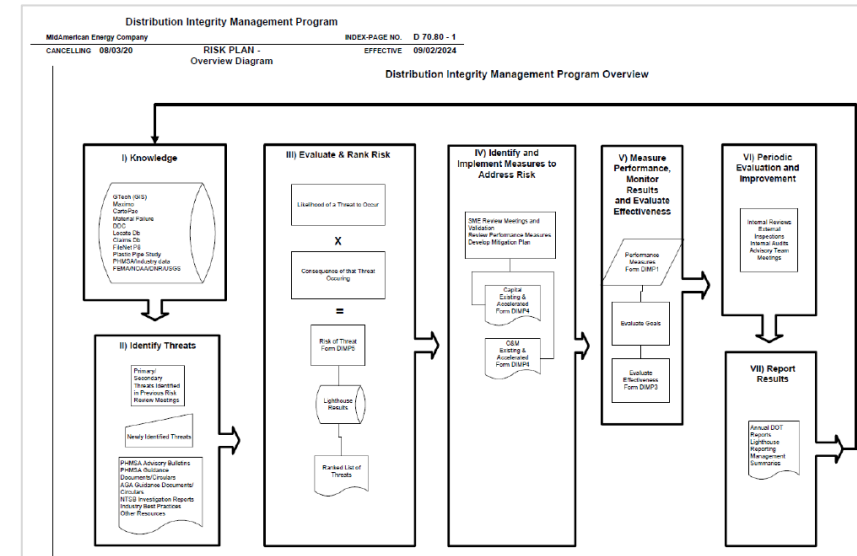
Dan Miller, Principal Engineer – Integrity Management at MidAmerican Energy

March 11, 2025



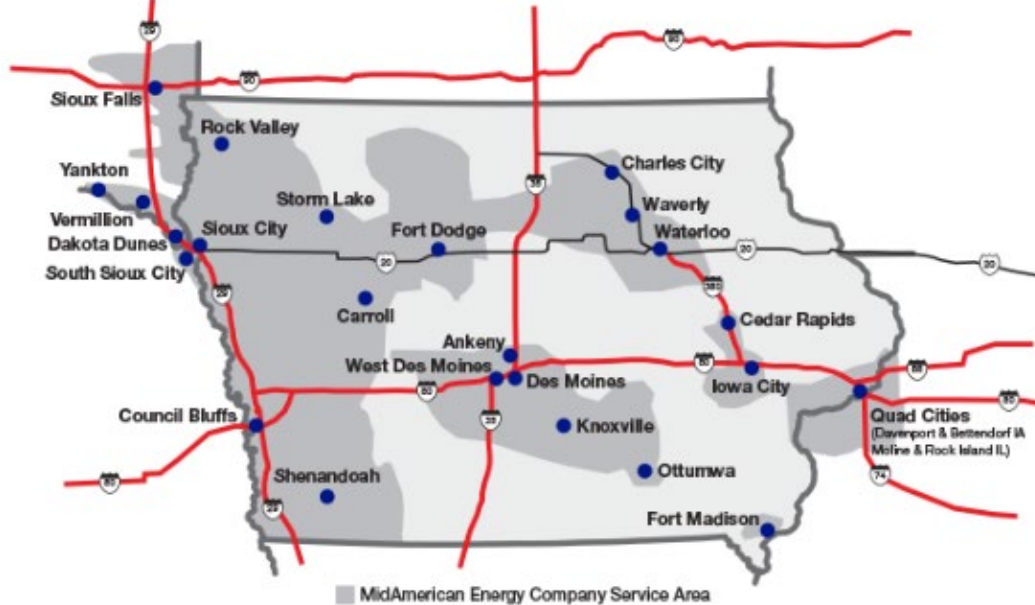
Agenda

- ▶ MidAmerican Background
- ▶ DIMP Journey
- ▶ Best Practices & Considerations
 - Metrics
 - Goals
 - Tying DIMP to SMS
 - Risk Modeling
 - Interaction with Operator Qualifications
 - Continuous improvement
- ▶ Q&A



MidAmerican Overview

SERVICE AREA



803,000
gas customers



30
towns with gas
services in SD



623
miles of transmission
gas mains



13,712
miles of distribution
gas mains

MidAmerican's Gas System

- ▶ Unique aspects of MidAmerican's gas system:
 - Distribution pressures range from low pressure to 410 PSIG
 - Pipe sizes range from 0.5 inch to 24 inch
 - Materials include steel, polyethylene and copper (SD only)
 - Steel includes bare, coated, protected and unprotected
 - Polyethylene includes first and second generation plastics (Orangeburg, Aldyl A, Continental, Performance, Phillips, JM Eagle, Extron)



DIMP Journey

- ▶ Like all operators, MidAmerican has been on a journey with its DIMP.
- ▶ Consider adding a master table of program milestones to your written plans as a future reference.

Distribution Integrity Management Program		
MidAmerican Energy Company	INDEX-PAGE NO.	D 1.10 - 2
CANCELLING 08/01/23	GENERAL -	EFFECTIVE 09/02/2024
	HISTORY OF PLAN	
Chronology of Significant Plan Developments	Proposed rule published	June 25, 2008
	Comments submitted to PHMSA	October 23, 2008
	Final rule published	December 4, 2009
	Comments on additional reporting submitted to PHMSA	February 4, 2010
	Final rule became effective	February 12, 2010
	DIMP Advisory Team Formed	March 1, 2010
	1st Draft-DIMP plan for Advisory Approval Completed	June 1, 2010
	Modifications as required by Advisory Team completed – submitted to consultant for review	August 1, 2010
	Final review report received from consultant	September 1, 2010
	Advisory review and implementation of consultant recommendations completed	October 1, 2010
	DIMP Trial Inspection by PHMSA and state inspectors	November 15 -19, 2010
	Corrections based on federal/state recommendations made and management approval obtained	December 31, 2010
	Initial DIMP written plan effective	January 3, 2011
	Completed risk identification and 1 st risk model to establish baseline	March 1, 2011
	DIMP Program fully implemented	August 2, 2011
	Initial Plan Inspection – NE/IA/IL/SD	February, 2012
	Revision 1.0 of the DIMP written plan effective	December 31, 2012
	Implementation inspection by the SDPUC	May, 2013
	Revision 2.0 of the DIMP written plan effective	December 31, 2013
	Revision 3.0 of the DIMP written plan effective	November 1, 2014
Revision 4.0 of the DIMP written plan effective	January 31, 2016	
Revision 5.0 of the DIMP written plan effective	August 2, 2016	
Received internal audit report	May, 2017	



Best Practices & Considerations

Metrics

- ▶ Consider a standard naming convention for performance metrics
- ▶ Example:
 - Primary Threat Category of 1 = External Corrosion for first decimal
 - Subthreat Category of 1 = Atmospheric Corrosion for second decimal
 - Metrics would use a third decimal
 - 1.1.1: No. of External Corrosion Leaks Above Grade
 - 1.1.2: No. of Conditions Reported as Grade 1 (Severe) Corrosion
- ▶ Can tie the threat ID system to events, such as material failures or reportable events for trending/analysis

Best Practices & Considerations

Metrics Examples

Example threat listing from the plan, includes categories and measures

Pri #	Sub #	Primary Threat Category	Threat Subcategory	Prior Yr Existing Program	Proposed Existing Program	Prior Yr Accelerated Action (AA)	Proposed Accelerated Action (AA)	Ref1	Measure 1	Ref2	Measure 2	Ref3	Measure 3
1	1	External Corrosion	Atmospheric	Operations G 30, Corrosion Control G 50, Post Top Regulator Inspection	Operations G 30, Corrosion Control G 50, Post Top Regulator Inspection	Reference Capital table DIMP4 for project list.	Reference Capital table DIMP4 for project list.	1.1.1	Number of leaks categorized as "External Corrosion" cause above grade	1.1.2	Number of Conditions reported grade red	1.1.3	Number of Conditions reported grade red MAOP compromised

Example listing of reportable incident and threat associated with event

Incident	Date	Description	6.1.1 Over Pressure	6.4.2 Incidents due to Failure to follow OQ	6.9.1 Improper Valve Operation/Stoppering/Squeezing.	8.1.2 Flood	8.7.2 Ice Snow	10.1.2 Relief valve malfunction	10.2.2 Regulator or valve malfunction	10.10.2 Debris	Other Reportable Event	7.1.4 Number of outage events due to excavation
	4/27/2023	Pleasant Valley, Iowa - At approximately 7:30 a.m. on April 27, 2023, MidAmerican determined that the number of customers that would need to be shut off due to Mississippi River flooding in Pleasant Valley, Iowa would exceed the reportable threshold of 50 customers.				1						

Best Practices & Considerations

Metrics Example – Material Failure Record Entry

Matl Failure ID: 54240	Sender: T40584 PAGE, TERRY PHMSA Reportable: YES	Service Area: WEST
Leak Grade: 1	Mailing Code: SFS <input type="radio"/> Yes <input type="radio"/> No	Sub Area: SIOUX FALLS
Leak Cause: EQUIPMENT	Status: CLOSED	Peer Reviewed: 01/26/2022
Leak Source: Compression Fitting	Closed On: 02/16/2023	Discovery Year: 2022
Predecessor Company: MGC		

Material Failure | Pre Analysis | Manufacturer Detail | Analysis Notes | **Post Analysis** | Photo | Attachments

MEC Analysis By: T39669 MILLER, DANIEL

Action Taken: ANALYSIS PERFORMED BY MEC QUALITY ASSURANCE ENGINEER

Material Leak Location: Leak Through Seal

Related DIMP THREAT: Equipment/Mechanical Fitting Failure (Threat 10.4.1)

Response Due Date: 00/00/0000

Reminder Letter Sent:

Response Received:

Lab/Manufacturer Analysis By:

Caused Analysis Category: EQUIPMENT

PHMSA Apparent Cause: EQUIPMENT

PHMSA Subcause:

Explanation:

Cause Analysis: SEAL FAILURES ON GASKETS

Evaluation Results: RENEWED PART OF EXISTING SERVICE TO ELIMINATE A DRESSER COUPLING THAT WE COULD NOT GET TO SEAL BY TIGHTENING.
FIELD INDICATING A 3/4" STEEL COMPRESSION COMPLING LEAKING. UPON RECEPT OF PART. SEVERE DETERIORATION WAS NOTED. CAUSE ASSUMED EQUIPMENT SEAL FAILURE.

PHMSA Record ID: 2022-54240 Date: 02/16/2023

*Applicable only to Mechanical Fitting Failures reported to PHMSA. Auto-generated by PHMSA for each submitted mechanical fitting failure report.





Best Practices & Considerations

Goals

- ▶ PHMSA Advisory ADB-2012-10 suggests that operators should use goals as part of DIMP and that metrics should be meaningful and categorized into leading, deteriorating and lagging.
 - Shouldn't use all lagging metrics!
 - Consider adding categories to your forms/documents that collect metrics.
- ▶ Consider having a list of company goals for your program, including accelerated actions and other initiatives (like data closure projects) that might not be recorded.
 - This is a great place for documenting data gap closures, for example.

Best Practices & Considerations

Goal Examples

Goal	Established	Goal Description	Goal Type	Goal Measurement	Modifications to Goal	Met for 2017	Met for 2017	Met for 2018	Met for 2019	Met for 2020	Met for 2021	Met for 2022	Met for 2023	Met for 2024
3	8/2015	Complete zone verification analysis of 500 zones annually – assumes completion by 2027	Leading	Number of zones analyzed	Goal Updated to 660,000 feet for 2024	Yes, analyzed 621 zones	Yes, analyzed 739 zones	Yes, completed analysis of 704 zones	Yes, analyzed 1320	Yes, analyzed 510 zones	Yes, analyzed 522 zones	Complete - verified 1.56M feet	Yes - verified 1,064,406	Yes - verified 655,594 feet
6	8/2016	Verify and collect FIDS for GTech data population for DIMP, 5000 for 2017, 6000 beyond (KPI)	Leading	Number of remaining gaps specified in plan	No longer a KPI but is continually monitored	n/a	Yes, completed 7952 gaps	Yes, completed 9,383 gaps	Yes, completed 12,822 gaps	Yes, completed 11070 gaps	Yes, completed 10235 gaps	Yes, completed 12959 gaps	Yes, completed 10,194 as of 12/5/23	Yes, completed 10,338 as of 12/11/2024
10	1/1/20	Replace 30 miles of low pressure systems	Leading	Completion of replacements	Continue replacement of low pressure pipeline systems	N/A, 2020 Goal	N/A, 2020 Goal	N/A, 2020 Goal	N/A, 2020 Goal	Yes, completed 54.2 miles of main	Yes, completed 42 miles of main	N/A 2021 KPI	Yes, completed 24.9 miles of main plus service footage	In progress
11	1/1/20	Replace 5 miles of leaking and aging distribution to reduce gas emissions	Leading	Completion of replacements	Continue replacement of legacy pipeline systems	N/A, 2020 Goal	N/A, 2020 Goal	N/A, 2020 Goal	N/A, 2020 Goal	Yes, completed 10.9 miles including mains and services	Yes, completed 7.79 miles including mains and services	Yes, completed 6.3 miles including mains and services	Yes, completed 1.99 miles of main plus service footage	Yes, completed 1.05 miles of mains and services
12	1/1/20	Develop plan for probabilistic risk modelling for transmission and distribution assets	Leading	Completion of plan	Updated to go live by Aug. 2024.	N/A, 2020 Goal	N/A, 2020 Goal	N/A, 2020 Goal	N/A, 2020 Goal	Yes, write up completed and provided to Ralph Martens	N/A, 2020 Goal	N/A, 2020 Goal	N/A 2024 Goal	Completed with go live on 8/28/24
16	3/7/23	Develop a process for discovering, tracking and replacing potential Century pipe sections from service. This includes a technical solution for tracking beyond simple email requests. Discoveries may be field or office-based.	Leading			N/A, 2023 Goal	N/A, 2023 Goal	N/A, 2023 Goal	N/A, 2023 Goal	N/A, 2023 Goal	N/A, 2023 Goal	N/A, 2023 Goal	Complete	N/A 2023 Goal



Best Practices & Considerations

Tying DIMP to PSMS

- ▶ Pipeline Safety Management Systems (PSMS) is an overarching program that should cover several elements.
- ▶ DIMP does not have to be contained within PSMS, but there should be ties as one of the PSMS elements is Safety Risk Management.
- ▶ For process or procedural items that don't necessarily fit well in a written DIMP plan, PSMS may be the perfect home.

Best Practices & Considerations

Tying DIMP to SMS

- ▶ Century Pipe Elimination Project is now tracked via SMS as a corrective and preventative action (CAPA) item.

The screenshot displays a SharePoint site for a 'CAPA Development Project'. The main content area shows a 'CAPA Issue Manager' list. The selected item is 'CENTURY DIMP MAPPING REVIEW', which is categorized as a 'Gas Integrity Management Threat'. The issue description details the objective of performing records reviews to identify and replace Century pipes, notes the discovery of 12 occurrences between 2019 and 2022, and provides a recommendation to conduct records reviews and perform replacements per MidAmerican standard G 25.30-3. Mitigation steps include records review, field investigations, mapping corrections, and replacing identified facilities.

Issue	Issue Cat...	Issue description	Impact	Likelihood	Priority	Action Ty...	Status
CENTURY DIMP MAPPING REVIEW	Gas Integrity Management Threat	<p>Objective Perform records review to identify and replace possible Century pipe. Century pipe continues to be discovered in the former Iowa Public Service (IPS) towns since the wholesale replacement project completion in the 1990s. 166 occurrences of Century pipe have been identified and replaced in 38 towns between 2000-2022. A total of 59 discoveries have occurred since 2017. Recent DIMP mapping records review of 'multi-segment' services have identified 12 occurrences of Century between 2019 and 2022.</p> <p>Recommendation: Conduct a records review to mitigate risk of Century pipe remaining in service. Identify facilities possibly candidates to be Century and perform replacement per MidAmerican operating standard G 25.30-3. Mitigation steps include:</p> <ul style="list-style-type: none">Records review to identify facilities suspect of Century pipe, focusing on jurisdictions where Century has been discovered since the replacement projectPerform field investigations to identify material type, color, size, print line if availablePerform mapping corrections based on records review and/or field investigationReplace facilities identified as Century	5	5	5.0	Department Action Plan	Monitoring

Best Practices & Considerations

Tying DIMP to SMS Example

- ▶ Material failure procedures are held in SMS plan rather than DIMP.

Title	Document Type	Effective Date	Revision	Description	Change Record	Modified
Attachments						June 9, 2022
Document Change Reports						May 26, 2021
Historic Versions						July 26, 2021
Material Failure Engineering Analysis	Work Instruction	11/26/2024	3.0		https://brkenegy.shar...	November 26, 2024
Material Failure ODBC Connection Instructi...	Reference	2/8/2023	1.0			February 8, 2023
Material Failure Part Long-Term Storage	Work Instruction	6/5/2023	1.0		https://brkenegy.shar...	June 5, 2023
Material Failure Peer Review	Work Instruction	6/5/2023	1.0		https://brkenegy.shar...	June 5, 2023
Material Failure PHMSA Report Process	Work Instruction	5/31/2023	1.0		https://brkenegy.shar...	May 31, 2023
Material Failure Post Failure Analysis	Work Instruction	6/6/2023	1.0		https://brkenegy.shar...	June 6, 2023
Material Failure Report Initiation	Work Instruction	6/5/2023	1.0		https://brkenegy.shar...	June 5, 2023
Material Failure Report Receiving and Proce...	Work Instruction	11/26/2024	3.0	The Integrity Management Engineer or designee performs this work instruction to receive and process Material Failure Reports upon receipt.	https://brkenegy.shar...	November 26, 2024

Best Practices & Considerations

Risk Modeling

- ▶ 49 CFR Part 192.1007(c) requires that risks to the distribution system are evaluated and ranked
- ▶ While PHMSA does not require any mathematical method for ranking risks, the use of a consistent calculation tool is recommended, especially for operators of medium to large size.
- ▶ When choosing a model for risk evaluation, consider the questions:
 - Is your model based on actual performance history of the system?
 - Does your model provide a way to evaluate/predict risk reduction over time?
 - For those with both distribution and transmission assets, do your integrity models provide a basis for comparison of risks between assets?
- ▶ MidAmerican implemented a probabilistic risk model for transmission in December 2023 and for distribution in August 2024.

Best Practices & Considerations

Risk Modeling Examples*

Risk Model Types and Applicability to Decisions				
Decision Type	Model Category			
	A. Qualitative Model	B. Relative Assessment/ Index Model	C. Quantitative System Model	D. Probabilistic Model
Risk Priorities for Baseline Integrity Assessment	A	A	A	BP
Preventive and Mitigative Measure Identification	A	A	A	BP
Preventive and Mitigative Measure Evaluation and Comparison	AI	AI	A	BP
Benefit-Cost Analysis for Risk Reduction Options	AI	AI	A	BP
Integrity Assessment Interval Determination	AI	AI	A	BP
General Risk Management Decision Making	AI	AI	A	BP

Key:

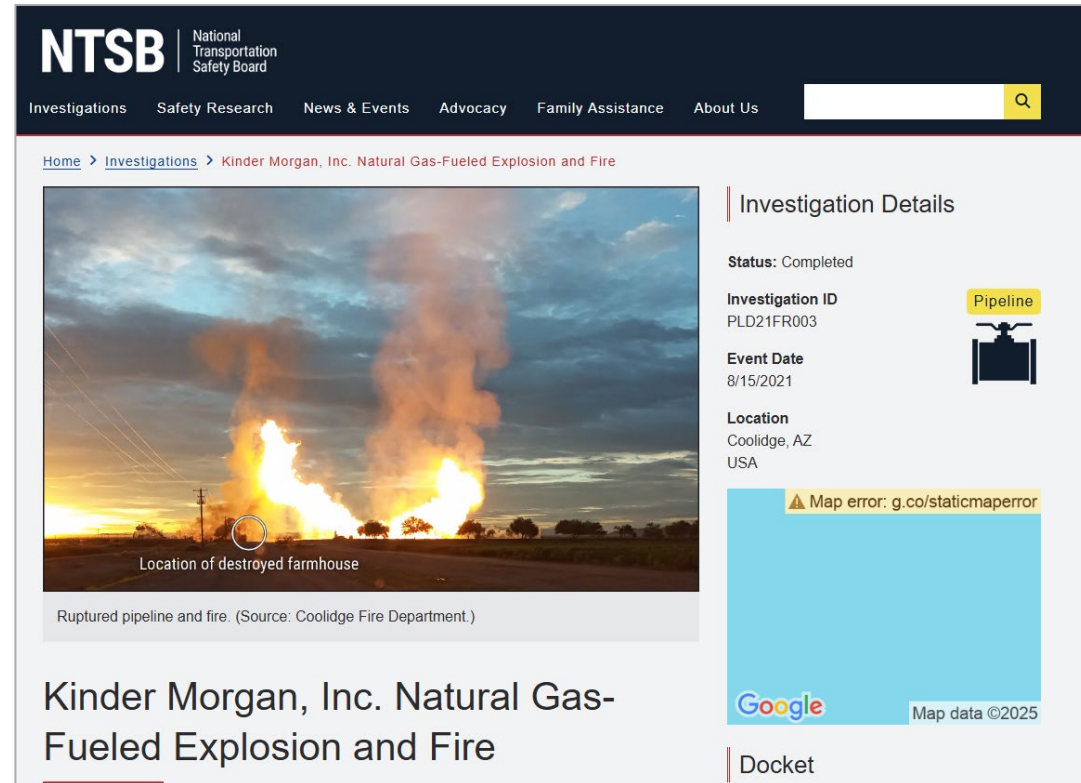
Can be Applicable with Additional Inputs to Risk Assessment Process	AI
Can be Applicable	A
Best Practice	BP

*Taken from PHMA's whitepaper *Pipeline Risk Modelling Overview of Methods and Tools for Improved Implementation*, February 2020

Best Practices & Considerations

Interaction with OQ

- ▶ The QA/QC processes of field personnel have a direct impact on risk within a gas distribution system.
- ▶ Consider the following interactions with your Operator Qualification group/department:
 - Share performance metrics, especially construction-caused failures
 - Share industry lessons learned, event reviews
 - Have someone from integrity management participate in OQ committees or boards



The screenshot displays the NTSB (National Transportation Safety Board) website for an investigation titled "Kinder Morgan, Inc. Natural Gas-Fueled Explosion and Fire". The page features a dark blue header with the NTSB logo and navigation links for Investigations, Safety Research, News & Events, Advocacy, Family Assistance, and About Us. A search bar is located in the top right corner. Below the header, the breadcrumb trail reads "Home > Investigations > Kinder Morgan, Inc. Natural Gas-Fueled Explosion and Fire". The main content area is divided into two columns. The left column contains a large photograph of a massive fire and explosion at dusk, with a red circle highlighting the "Location of destroyed farmhouse". Below the photo is a caption: "Ruptured pipeline and fire. (Source: Coolidge Fire Department.)". The right column, titled "Investigation Details", lists the following information: Status: Completed; Investigation ID: PLD21FR003; Event Date: 8/15/2021; Location: Coolidge, AZ, USA. A yellow "Pipeline" tag is visible next to the Investigation ID. Below the details is a map placeholder with a "Map error: g.co/staticmaperror" message and the Google logo. At the bottom of the page, a "Docket" link is visible.

Best Practices & Considerations

Example of Hypothetical Material Failure Record

58559.pdf

Miller, Daniel (MidAmerican)

To: [Redacted]
Cc: [Redacted]

PDF 648 KB

Tese,
I processed a material failure today (see attached). The Elster Perfection Riser was broken by Q3 - [Redacted] Supposedly had the meter set in a bind and it snapped the threads of the riser. Please process as appropriate. Thanks!

Service Delivery Point - 217961

Attribute Name	Attribute Value
Install Date	[Redacted]
With Number	[Redacted]
Abandon Date	[Redacted]
Installed/Abandoned By	[Redacted]
Work Inspected By	[Redacted]
General Location	[Redacted]
Specific Location	[Redacted]
Jurisdiction	[Redacted]
Service Sub Area/WMS Crew Hq	[Redacted]
State	[Redacted]

Best Practices & Considerations

Continual Improvement

- ▶ 49 CFR Part 192.1007(f) requires that operators periodically evaluate and improve their DIMP plans.
- ▶ Since DIMP is a mature program subject to tunnel vision, consider the following:
 - Have internal corporate audits of the plan
 - Procure a third-party audit through a third-party contractor
 - If you are part of a larger organization with affiliates, have affiliate participation in DIMP meetings
 - Develop an advisory team or “board” for the DIMP program, ideally composed of employees from operations, engineering, compliance/standards, gas control and measurement/regulation.
 - This group can be an asset for not only reviewing/approving program changes, but also for championing the DIMP program companywide.

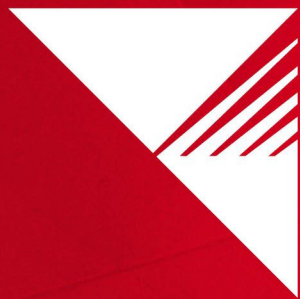
Finally, because this is a joint state event...



GO BISON!



Questions?



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ENERGY COMPANY

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