Pipeline Failure Investigation Report

Pipeline System: MDU Heartland **Operator:** Montana-Dakota Utilities

Operator ID: 12684 **Unit Number:** **Activity Number:**

Location: 102 S Mannston St. Gettysburg South Dakota **Date of Occurrence:** 6-17-2015

Material Released: Natural Gas **Quantity:**

PHMSA Arrival Time & Date: 4:37 PM on 6-17-2015 **Total Damages $:** Approximately $300,000

Investigation Responsibility: **_X_** State **__** PHMSA **__** NTSB **__**Other

	Company Reported Apparent Cause:	***Company Reported Sub-Cause (from PHMSA Form 7000-1/7100.2):***
	Corrosion	
	Natural Force Damage	
x	Excavation Damage	Previous Damage due to Excavation Activity
	Other Outside Force Damage	
	Material Failure (Pipe, Joint, Weld)	
	Equipment Failure	
	Incorrect Operation	
	Other	

	Accident/Incident Resulted in (check all that apply):	***Comments:***
	Rupture	
x	Leak	
x	Fire	
x	Explosion	
x	Evacuation	Number of Persons:___4_____ Area:_Single House_____

Narrative Summary

Short summary of the Incident/Accident scenario

At approximately 8:30 am on June 17, 2015 the family at 102 S Mannston St (also known as 102 310th Ave) in Gettysburg, SD experienced a house explosion and fire. The family evacuated the premise. One family member, a 4month old child, was injured with burns on their hands and face. The fire department was first to arrive, extinguished the fire and aired out the house. The operator (Montana Dakota Utilities) received the report of the explosion at 8:44 am and an operator first responder arrived on the scene at 9:29 am. Operator bar tested the area and did not find migration beyond the immediate area in the alley. No gas leak was indicated at the service line near the house. Odorant level tests were completed. The section of main where the leak was indicated was squeezed off at each end because this was a loop feed.

The main and service were PE and installed in 1993.
The area was last leak surveyed September 13, 2013.
The main was in the alley adjacent to the house.
Cable was installed in the alley in September of 2014.
The house had basement work completed in September of 2014.

Region/State: **Central / South Dakota** **Reviewed by:**

Principal Investigator: Mary Jantes **Title:**

Date: **8-31-2015** **Date:**

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Failure Location & Response		
Location (City, Township, Range, County/Parish): Gettysburg, South Dakota		(Acquire Map)
Address or M.P. on Pipeline: (1) 102 S. Mannston St./ 310th Ave.	Type of Area (Rural, City): (1) Residential Small Town	
Coordinates of failure location (Latitude):	(Longitude):	
Date: 6-17-2015	Time of Failure: Unknown	
Time Detected: Approximately 8:30 AM	Time Located: 9:45 AM	
How Located: Explosion		
NRC Report #: 1120065 (Attach Report)	Time Reported to NRC: 12:18PM	Reported by: Montana Dakota Utilities – Matt Klingenstein

Type of Pipeline:

Gas Distribution	**Gas Transmission**	**Hazardous Liquid**	**___ LNG**
__ LP	__ Interstate Gas	__ Interstate Liquid	
__ Municipal	__ Intrastate Gas	__ Intrastate Liquid	
_x_ Public Utility	__ Gas Gathering	__ Offshore Liquid	
__ Master Meter	__ Offshore Gas	__ Liquid Gathering	
	__ Offshore Gas - High H_2S	__ CO_2	
		__ Low Stress Liquid	
		__ HVL	

Pipeline Configuration (Regulator Station, Pump Station, Pipeline, etc.): Distribution main, service tee

Operator/Owner Information	
Owner: Montana Dakota Utilities Address: 400 North 4th Street Bismarck, ND 58501	Operator: same Address:
Company Official: Patrick Darras	Company Official:
Phone No.: 701-222-7900 Fax No.:	Phone No. Fax No.

Drug and Alcohol Testing Program Contacts _x_ N/A

Drug Program Contact & Phone:

Alcohol Program Contact & Phone:

1 Photo documentation

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Damages	
Product/Gas Loss or Spill[(2)] Amount Recovered Estimated Amount $	Estimated Property Damage $ $300,000 Associated Damages[(3)] $?
Description of Property Damage: Single family home had walls blown out and fire damage.	
Customers out of Service: _1_ Yes __ No Number: 102 - house under investigation Suppliers out of Service: __ Yes _x_ No Number:	

Fatalities and Injuries					***___ N/A***
Fatalities:	__ Yes	_x_ No	Company:	Contractor:	Public: x
Injuries - Hospitalization:	_x_ Yes	__ No	Company: 0	Contractor: 0	Public: 1
Injuries - Non-Hospitalization:	__ Yes	_x_ No	Company:	Contractor:	Public:
Total Injuries (including Non-Hospitalization):			Company: 0	Contractor: 0	Public: 1

Name	Job Function	Yrs. w/ Comp.	Yrs. Exp.	Type of Injury
4-Month old Female	Public			Burns to head and arms

Drug/Alcohol Testing					***_x__ N/A***
Were all employees that could have contributed to the incident, post-accident tested within the 2 hour time frame for alcohol or the 32 hour time frame for all other drugs? ___Yes ___No					
Job Function	Test Date & Time	Location	Results		Type of Drug
			Pos	Neg	

System Description

2 Initial volume lost or spilled
3 Including cleanup cost

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System Description
Describe the Operator's System: Plastic distribution system that has an MAOP of 60psig but is operates at 40psig according to the operator. The main is 2" PE and the service is ¾" PE.

Pipe Failure Description	***___ N/A***
Length of Failure (inches, feet, miles): (1) Approximately 1/8"	
Position (Top, Bottom, include position on pipe, 6 O'clock): (1) Top	Description of Failure (Corrosion Gouge, Seam Split): (1) Damage from third party installation of threaded rod for basement wall securement.
Laboratory Analysis: ___ Yes __x_ No Performed by:	
Preservation of Failed Section or Component: __x_Yes ___No If Yes - Method:	
In Custody of: Advanced Engineering Investigations / MDU	
Develop a sketch of the area including distances from roads, houses, stress inducing factors, pipe configurations, direction of flow, etc. Bar Hole Test Survey Plot, if included, should be outlined with concentrations at test points.	

Component Failure Description	***_x_ N/A***
Component Failed: (1)	
Manufacturer:	Model:
Pressure Rating:	Size:
Other (Breakout Tank, Underground Storage):	

Pipe Data	***___ N/A***
Material: PE 2406	Wall Thickness/SDR: SDR11
Diameter (O.D.): 2"	Installation Date: 1993
SMYS: NA	Manufacturer: Driscopipe
Longitudinal Seam: NA	Type of Coating: NA
Pipe Specifications (API 5L, ASTM A53, etc.): ASTM 2513	

Joining	***_x__N/A***
Type:	Procedure:
NDT Method:	Inspected: ___ Yes ___No

Pressure @ Time of Failure @ Failure Site	***_x__ N/A***
Pressure @ Failure Site: 40psig	Elevation @ Failure Site: NA

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Pressure @ Time of Failure @ Failure Site				***_x__ N/A***
Pressure Readings @ Various Locations:			Direction from Failure Site	
Location/M.P./Station #	Pressure (psig)	Elevation (ft msl)	Upstream	Downstream

Upstream Pump Station Data	***_x__ N/A***
Type of Product:	API Gravity:
Specific Gravity:	Flow Rate:
Pressure @ Time of Failure [4]	Distance to Failure Site:
High Pressure Set Point:	Low Pressure Set Point:

Upstream Compressor Station Data	***_x__ N/A***
Specific Gravity:	Flow Rate:
Pressure @ Time of Failure [4]	Distance to Failure Site:
High Pressure Set Point:	Low Pressure Set Point:

Operating Pressure	***___ N/A***
Max. Allowable Operating Pressure: 60psig	Determination of MAOP: Pressure test after installation
Actual Operating Pressure: 40psig	
Method of Over Pressure Protection: relief valve	
Relief Valve Set Point: 50 psig	Capacity Adequate? _x__ Yes ___ No

Integrity Test After Failure	***___ N/A***
Pressure test conducted in place? (Conducted on Failed Components or Associated Piping): __x_ Yes ___ No	
If No, tested after removal? ___ Yes ___ No	
Method: air pressure	
Describe any failures during the test. Put air pressure of 40 psig on suspected leak segment and it showed approximately 200 cfh of flow.	

Soil/water Conditions @ Failure Site	***_x__ N/A***
Condition of and Type of Soil around Failure Site (Color, Wet, Dry, Frost Depth):	
Type of Backfill (Size and Description):	

4 Obtain event logs and pressure recording charts

Pipeline Failure Investigation Report

Soil/water Conditions @ Failure Site	***_x__ N/A***
Type of Water (Salt, Brackish): rain water/fire hose water	Water Analysis [5] ___ Yes ___ No

External Pipe or Component Examination	***_x__ N/A***
External Corrosion? ___Yes ___ No [1]	Coating Condition (Disbonded, Non-existent): [1]
Description of Corrosion:	
Description of Failure Surface (Gouges, Arc Burns, Wrinkle Bends, Cracks, Stress Cracks, Chevrons, Fracture Mode, Point of Origin):	
Above Ground: ___ Yes ___ No [1]	Buried: ___ Yes ___ No [1]
Stress Inducing Factors: [1]	Depth of Cover: [1]

Cathodic Protection	***_x__ N/A***
P/S (Surface):	P/S (Interface):
Soil Resistivity: pH:	Date of Installation:
Method of Protection:	
Did the Operator have knowledge of Corrosion before the Incident? ____ Yes ____ No	
How Discovered? (Close Interval Survey, Instrumented Pig, Annual Survey, Rectifier Readings, ECDA, etc):	

Internal Pipe or Component Examination	***_x__ N/A***
Internal Corrosion: ___ Yes ___No [1]	Injected Inhibitors: ___ Yes ___ No
Type of Inhibitors:	Testing: ___ Yes ___ No
Results (Coupon Test, Corrosion Resistance Probe):	
Description of Failure Surface (MIC, Pitting, Wall Thinning, Chevrons, Fracture Mode, Point of Origin):	
Cleaning Pig Program: ___ Yes ___ No	Gas and/or Liquid Analysis: ___ Yes ___ No

5 Attach copy of water analysis report

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Internal Pipe or Component Examination	***_x__ N/A***
Results of Gas and/or Liquid Analysis [6]	
Internal Inspection Survey: ___ Yes ___ No	Results [7]
Did the Operator have knowledge of Corrosion before the Incident? ___ Yes ___ No	
How Discovered? (Instrumented Pig, Coupon Testing, ICDA, etc.):	

Outside Force Damage	***___ N/A***
Responsible Party: Blackburn Basement Systems	Telephone No.: 800-392-3389
Address: PO Box 367, Miller, SD 57362	
Work Being Performed: foundation repair / anchoring	
Equipment Involved: all-thread rod approximately 1" in diameter [1]	Called One Call System? _x__ Yes ___ No
One Call Name: SD 811	One Call Report # [8] 1423888976
Notice Date: 8/26/14	Time: 1:16 pm
Response Date: 8/27/14	Time: 07:54
Details of Response: Request stated: Please mark 10' perimeter along entire foundation. Full excavation of S, E and W walls. Placing Geo Lock Earth Anchors to stabilize bowing/shearing foundation walls. Work to be done 9/2-9/5 Locator marked overhead power and gas.	
Was Location Marked According to Procedures? _x__ Yes ___ No	
Pipeline Marking Type: Paint [1]	Location: Locator marked overhead power and gas. [1]
State Law Damage Prevention Program Followed? ___ Yes __x_ No ___ No State Law	
Notice Required: ___Yes _x__No	Response Required: _x__ Yes ___ No
Was Operator Member of State One Call? __x_ Yes ___ No	Was Operator on Site? ___ Yes _x__ No
Did a deficiency in the Public Awareness Program contribute to the accident? ___Yes _x__ No	
Is OSHA Notification Required? ___ Yes __x_ No	

Natural Forces	***_x_ N/A***

6 Attach copy of gas and/or liquid analysis report
7 Attach copy of internal inspection survey report
8 Attach copy of one-call report

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Natural Forces	***_x_ N/A***
Description (Earthquake, Tornado, Flooding, Erosion):	

Failure Isolation	***__ N/A***
Squeeze Off/Stopple Location and Method: squeeze off section main at leak area (1)	
Valve Closed - Upstream: NA Time:	I.D.: M.P.:
Valve Closed - Downstream: NA Time:	I.D.: M.P.:
Pipeline Shutdown Method: _x_ Manual __ Automatic __ SCADA __ Controller __ ESD	
Failed Section Bypassed or Isolated: Isolated	
Performed By: Montana Dakota Utilities	Valve Spacing: NA

Odorization	***__ N/A***	
Gas Odorized: _x_ Yes __ No	Concentration of Odorant (Post Incident at Failure Site):	
Method of Determination: _x_ Yes __ No Heath Odorator	% LEL: __ Yes __ No	% Gas In Air: __ Yes __ No
	Time Taken: __ Yes __ No	
Was Odorizer Working Prior to the Incident? _x_ Yes __ No	Type of Odorizer (Wick, By-Pass):	
Odorant Manufacturer: Model:	Type of Odorant:	
Amount Injected:	Monitoring Interval (Weekly):	
Odorization History (Leaks Complaints, Low Odorant Levels, Monitoring Locations, Distances from Failure Site): No history of complaints. Odorant level tests show adequate odorant levels. South Dakota Intrastate Pipeline provides odorized gas to Montana Dakota Utilities (MDU). MDU does not purchase or maintain the odorizer. MDU conducts regular odorization test with an odorator. Odor tests are conducted in Pierre which is 58 miles away (by road). Pierre is the end of the system and furthest point for gas distribution gas provided by South Dakota Intrastate Pipeline.		

Weather Conditions	***__ N/A***
Temperature: 59Degrees Fahrenheit	Wind (Direction & Speed): North 8-mph
Climate (Snow, Rain): NA	Humidity:
Was Incident preceded by a rapid weather change? __ Yes _X_ No	

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Weather Conditions	***__ N/A***
Weather Conditions Prior to Incident (Cloud Cover, Ceiling Heights, Snow, Rain, Fog): Overcast	

Gas Migration Survey	***__ N/A***
Bar Hole Test of Area: _x_ Yes __ No	Equipment Used: Sensit Gold CGI Serial No 21003
Method of Survey (Foundations, Curbs, Manholes, Driveways, Mains, Services) [9] [1] Over main in alley and along service line. See bar hole data.	

Environment Sensitivity Impact	***_x_ N/A***
Location (Nearest Rivers, Body of Water, Marshlands, Wildlife Refuge, City Water Supplies that could be or were affected by the medium loss): [1]	
OPA Contingency Plan Available? __ Yes __ No	Followed? __ Yes __ No

Class Location/High Consequence Area	_x_ N/A
Class Location: 1 __ 2__ 3 __ 4 __ Determination:	HCA Area? __ Yes __ No __ N/A Determination:
Odorization Required? __ Yes __ No __ N/A	

Pressure Test History **__ N/A**
(Expand List as Necessary)

	Req'd [10] Assessment Deadline Date	Test Date	Test Medium	Pressure (psig)	Duration (hrs)	% SMYS
Installation	N/A	5/21/93	air	100	4 days	na
Next						
Next						
Most Recent						

Describe any problems experienced during the pressure tests.

Internal Line Inspection/Other Assessment History **_x_ N/A**
(Expand List as Necessary)

	Req'd [10] Assessment Deadline Date	Assessment Date	Type of ILI Tool [11]	Other Assessment Method [12]	Indicated Anomaly If yes, describe below

9 Plot on site description page
10 As required of Pipeline Integrity Management regulations in 49CFR Parts 192 and 195
11 MFL, TFI, UT, Combination, Geometry, etc.
12 ECDA, ICDA, SCCDA, "other technology," etc.

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Internal Line Inspection/Other Assessment History *(Expand List as Necessary)*					**_x_ N/A**
Initial					__ Yes __ No
Next					__ Yes __ No
Next					__ Yes __ No
Most Recent					__ Yes __ No
Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions.					

Pre-Failure Conditions and Actions	**_x_ N/A**
Was there a known pre-failure condition requiring [10] the operator to schedule evaluation and remediation? __ Yes (describe below or on attachment) _x_ No	
If there was such a known pre-failure condition, had the operator established and adhered to a required [10] evaluation and remediation schedule? Describe below or on attachment. __ Yes __ No __ N/A	
Prior to the failure, had the operator performed the required [10] actions to address the threats that are now known to be related to the cause of this failure? __ Yes __ No __ N/A List below or on an attachment such operator-identified threats, and operator actions taken prior to the accident.	
Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions.	

Maps & Records	***___ N/A***
Are Maps and Records Current? [13] _x_ Yes __ No Comments:	

Leak Survey History	***___ N/A***
Leak Survey History (Trend Analysis, Leak Plots): Prior leak survey completed 9/13/13. No leaks found. (attached leak survey map)	

Pipeline Operation History	***_x__ N/A***
Description (Repair or Leak Reports, Exposed Pipe Reports):	

13 Obtain copies of maps and records

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Pipeline Operation History	***_x__ N/A***
Did a Safety Related Condition Exist Prior to Failure? ___ Yes ___ No Reported? ___ Yes ___ No	
Unaccounted For Gas:	
Over & Short/Line Balance (24 hr., Weekly, Monthly/Trend):	

Operator/Contractor Error	***_x__ N/A***
Name:	Job Function:
Title:	Years of Experience:
Training (Type of Training, Background):	
Was the person "Operator Qualified" as applicable to a precursor abnormal operating condition? ___Yes ___ No ___ N/A	
Was qualified individual suspended from performing covered task ___ Yes ___ No ___ N/A	
Type of Error (Inadvertent Operation of a Valve):	
Procedures that are required:	
Actions that were taken:	
Pre-Job Meeting (Construction, Maintenance, Blow Down, Purging, Isolation):	
Prevention of Accidental Ignition (Tag & Lock Out, Hot Weld Permit):	
Procedures conducted for Accidental Ignition:	
Was a Company Inspector on the Job? ___ Yes ___ No	
Was an Inspection conducted on this portion of the job? ___ Yes ___ No	
Additional Actions (Contributing factors may include number of hours at work prior to failure or time of day work being conducted):	
Training Procedures:	
Operation Procedures:	
Controller Activities:	

Name	Title	Years Experience	Hours on Duty Prior to Failure	Shift

Alarm Parameters:
High/Low Pressure Shutdown:
Flow Rate:

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Operator/Contractor Error	***_x__ N/A***
Procedures for Clearing Alarms:	
Type of Alarm:	
Company Response Procedures for Abnormal Operations:	
Over/Short Line Balance Procedures:	
Frequency of Over/Short Line Balance:	
Additional Actions:	

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Additional Actions Taken by the Operator	***_x__N/A***
Make notes regarding the emergency and Failure Investigation Procedures (Pressure reduction, Reinforced Squeeze Off, Clean Up, Use of Evacuators, Line Purging, closing Additional Valves, Double Block and Bleed, Continue Operating downstream Pumps):	

Photo Documentation [(1)]			
Overall Area from best possible view. Pictures from the four points of the compass. Failed Component, Operator Action, Damages in Area, Address Markings, etc.			
Photo No.	Description	Photo No.	Description
1	Pictures are labeled	16	
2		17	
3		18	
4		19	
5		20	
6		21	
7		22	
8		23	
9		24	
10		25	
11		26	
12		27	
13		28	
14		29	
15		30	
Camera Type:			

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Additional Information Sources			
Agency	Name	Title	Phone Number
Police:			
Fire Dept.:	**Gettysburg Fire Department**		
State Fire Marshall:	**Mike Erickson**		
State Agency:			
NTSB:			
EPA:			
USCG:			
FBI:			
ATF:			
OSHA:			
Insurance Co.:	**Farmers / Brown Insurance / Corey Brown**		**605-765-9550**
FRA:			
MMS:			
Television:			
Newspaper:			
Other:	**See attached investigation log-in sheet.**		

Persons Interviewed		
Name	Title	Phone Number
Mike Schoepp	**Region Gas Supt.**	**701-224-5814**
Kip Bialas	**Combination District Rep.**	**701-848-1610**
Ricky Schatz	**Region Gas Engineer**	**701-224-5857**

Event Log	
Sequence of events prior, during, and after the incident by time. (Consider the events of all parties involved in the incident, Fire Department and Police reports, Operator Logs and other government agencies.)	
Time / Date	Event
6/17/2015 8:30 am	Explosion occurred
	Fire department arrived
	EMTs arrived
	Child air lifted to burn unit
8:44	Montana Dakota Utilities (MDU) receive report of explosion
9:29	MDU first responder arrived on site – Kip Bialas
9:45	MDU began bar testing – Kip Bialas
12:45 pm	MDU completed gas squeeze off
1:00 pm	MDU bar tested again
	Leak survey
3:40 pm	MDU bar tested again
4:40 pm	SD PUC inspectors arrived on site
6/18/15 6:10 pm	MDU bar tested again
6/19/15 11:40 am	MDU bar tested again
6/20/15 6:00 pm	MDU bar tested again
6/22/15 2:00 pm	MDU bar tested again
6/23/15 9:00 am	Investigation began

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Investigation Contact Log			
Time	Date	Name	Description
		See attached sheet	

Failure Investigation Documentation Log					
Operator:		Unit #:	CPF #:		Date:
Appendix Number	Documentation Description			Date Received	FOIA Yes	FOIA No

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Site Description
Provide a sketch of the area including distances from roads, houses, stress inducing factors, pipe configurations, etc. Bar Hole Test Survey Plot should be outlined with concentrations at test points. Photos should be taken from all angles with each photo documented. Additional areas may be needed in any area of this guideline.