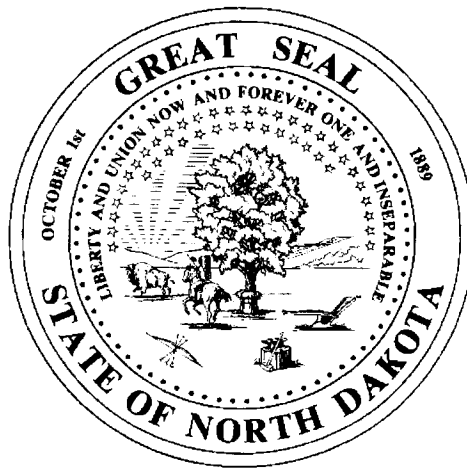


**INTRASTATE NATURAL GAS DISTRIBUTION SYSTEM
INCIDENT INVESTIGATION REPORT**

NORTH DAKOTA PUBLIC SERVICE COMMISSION





**NORTH DAKOTA PUBLIC SERVICE COMMISSION
NATURAL GAS DISTRIBUTION SYSTEM
INCIDENT INVESTIGATION
STAFF REPORT**

State Capitol 12th Floor, Dept. 408
600 East Boulevard Ave.
Bismarck, ND 58505-0480
(701) 328-2400

Case number: GS-08-765
Report Date: August 20, 2009

Executive Summary

On September 2, 2008, at 12:37 AM, an explosion occurred at a duplex dwelling located at 2215 and 2213, 15th Street South in Fargo, ND. Five people at the 2215 dwelling were injured from the explosion, two required in-patient hospitalization. Property and other damages were estimated at \$154,000.

Natural gas is distributed to the duplex through pipeline and facilities owned and operated by Northern States Power Company (NSP), doing business as Xcel Energy. NSP personnel were dispatched at 12:41 AM and arrived on site at 12:55 AM.

Excavation of the service line at the 2215 unit revealed an area of grey-colored soil located between the service line and the house foundation drain field pipe (Attachment 1, Photo #4-7). At the service line, the grey soil was adjacent to a polyethylene (PE) socket coupler that joined the buried PE distribution system service line to the service riser (Attachment 1, Photo #8-9). The grey soil was dry and smelled strongly of natural gas odorant. Soil will turn grey when exposed to natural gas for a period of time. Subsequent pressure testing revealed a leak at a PE socket coupler that joined the service line to the service riser. Laboratory testing revealed a pinhole leak in the service pipe at the fusion to the socket coupler (Attachment 1, Photo #13) and a crack on the inside of the service pipe at the pinhole (Attachment 1, Photo #14). Laboratory testing also revealed the presence of debris entrapped in the socket coupler joint fusion at the pinhole (Attachment 1, Photo #15-18).

The service pipe was marketed by Century Utility Products, Inc. (Century). On October 23, 2008, NSP initiated a program to identify and replace all Century pipe materials in North Dakota within two years.

Events and Observations

12:37 AM Tuesday, September 2, 2008

At 12:37 AM, An explosion occurred at a duplex dwelling located at 2215 and 2213, 15th Street South in Fargo, ND.

12:41 AM Tuesday, September 2, 2008

At 12:41 AM, NSP personnel were dispatched and arrived on site at 12:55 AM. (Attachment 2) NSP determined the incident was a probable natural gas incident as defined under 49 CFR

Part 191.3. NSP personnel coordinated with the fire chief and were informed that 5 occupants had been rescued from the basement of the 2215 residence and transported to the hospital.

1:41 AM Tuesday, September 2, 2008

At 1:41 AM, NSP made a telephonic report of the incident to a North Dakota Public Service Commission (PSC) gas pipeline safety representative. (Attachment 3)

3:07 AM Tuesday, September 2, 2008

At 3:07 AM, NSP determined the incident was a probable natural gas incident as defined under 49 CFR Part 191.3, and made a telephonic incident report to the National Response Center (NRC) as required under 49 CFR Part 191.5 Telephonic notice of certain incidents. The NRC generated Incident Report Number 882452.

7:13 AM Tuesday, September 2, 2008

The Pipeline and Hazardous Materials Safety Administration Central Region emailed NRC report #882452 to the PSC's Gas Pipeline Safety Program Manager. (Attachment 4)

8:30 AM Tuesday, September 2, 2008

At 8:30 AM, a PSC gas pipeline safety staff person (Staff) was dispatched to the incident site. At 11:30 AM, Staff arrived at the incident site and coordinated with NSP personnel.

NSP informed Staff of the following:

- The Fire Department and Police had left the site.
- Five occupants sustained injuries, three were treated at the local hospital in Fargo and two were airlifted to the Hennepin County Medical Center in Minneapolis, MN
- NSP Electric Department personnel had disconnected the electricity supply to the duplex.
- NSP personnel detected 80% raw gas in the ground at the service riser of the 2215 unit.
- The 2215 service line was excavated at the sidewalk near the main distribution line, squeezed shut, cut, and capped. NSP personnel continued testing to verify that gas levels in the ground at the service riser decreased to zero.
- Service risers and tapping tees at 2213, 2203, 2301, 2303 15th St. S and 1507, 1513, 1508, 23rd Ave. S had been checked and no gas leaks were found. (Attachment 1, Drawing #1)
- At 1525 23rd Ave. S., 2301 15th St. S., and 2203 15th St. S., NSP had tested, with the aid of an ordrometer, and found odorant to be readily detectable. (Attachment 1, Drawing #1)
- Each duplex dwelling unit was provided natural gas by its own service line.

Staff initially observed the following:

- The 2215 unit along with the single stall attached garage was completely destroyed (Attachment 1, Photo #1, 2 and 3).
- A vehicle in the driveway of the 2215 unit sustained damage.
- The 2213 unit sustained damaged to the adjoining wall and roof area.
- A vehicle in the garage of the 2213 unit sustained damage when the adjoining wall and roof fell.
- No fire damage was readily apparent.

An initial pressure test to 60 psig was conducted to check the segment of pipe between the initial cut and capped area and the riser shutoff valve for leaks. The pipe segment failed the pressure test, and the rapid pressure drop indicated a significant leak.

Excavation continued as needed and as further testing required.

Further pressure testing of service line segments to 60 psig by NSP (60 psig is the service line maximum allowable operating pressure) found one leak located at a socket coupler joint that connected the service riser and the service piping.

The service riser was then excavated and Staff observed an area of grey-colored soil between the service line and the house foundation. (Attachment 1, Photos #4-7). At the service line, the grey soil was adjacent to a polyethylene (PE) socket coupler that joined the buried PE distribution system service line to the service riser (Attachment 1, Photos #8-9). The grey soil was dry and smelled strongly of natural gas odorant.

Afternoon Tuesday, September 2, 2008

At this point the investigation was postponed until all the interested parties could participate.

Monday, September 15, 2008

The investigation continued, with all the interested parties represented. The pressure tests performed on September 2nd were repeated. In addition, a flow test was performed using a Dwyer rotor meter device, measuring cubic feet per hour, to quantify the leak.

Tuesday, September 16, 2008

Excavation continued. NSP personnel preserved the segment of pipe including the socket coupler for the possibility of further testing (Attachment 1, Photo #10). Staff visual inspection of the coupler fusion joint from the failed pipe at 2215 dwelling revealed that the joint was not straight (Attachment 1, Photo #11) and that the fusion bead on the riser side of the socket coupler was irregular (Attachment 1, Photo #12). The segment was sent to an NSP secure storage facility. The grey soil area was further excavated. The path of grey soil continued from the socket area to the foundation footing and drain field, approximately eight feet underground. (Attachment 1, Photo #7)

The meter, regulator, inside gas piping, and house gas appliances were stored at a secure storage facility for possible future testing.

Friday, September 26, 2008

On September 26, 2008, NSP prepared its Incident Report – Gas Distribution System for the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Form PHMSA F7100.1 (03-04). (Attachment 5)

Thursday, October 23, 2008

On October 23, 2008, NSP initiated a program to identify and replace all Century pipe materials in North Dakota within two years.

Monday, February 2, 2009

CRT Laboratories, Inc. (CRT) received the piping sample at its facility in Orange, California via Excel Energy courier. Under CRT supervision, the forensic work was carried out by Forensic Engineering Consultants, LLC.

Wednesday, March 25, 2009

CRT testing begins.

Staff Analysis

Emergency Response

Emergency response actions taken by NSP personnel were consistent with the company's manual for responding to a level 1 emergency (Attachment 6).

Service line at 2215

The service line at dwelling unit 2215 was constructed in 1975. See Attachment 7 for distribution system specifications at the 2215 dwelling unit.

Fusion

The service line at dwelling unit 2215 was constructed in 1975 and consisted of a PE service line, a steel service riser and a socket coupler used to join the service line to the riser. Risers are manufactured with a short piece of PE pipe at the end that is to be joined to the PE service line. The method used for joining the PE service pipe, service riser and coupler at dwelling unit 2215 was fusion welding. For fusion welding of a coupler fitting, the inner surface of the coupler and the outer surface of the pipe are cleaned and then heated with special equipment to a temperature of 500°F. While still heated, the service pipe and riser pipe ends are inserted into opposite ends of the coupler. The melted PE surfaces fuse together to form a bond.

In 1975, when the service was constructed, NSP's operations manual included a procedure for socket fusion (Attachment 9). Staff visual inspection of the coupler fusion joint from the failed pipe at 2215 dwelling revealed that the joint was not straight (Attachment 1, Photo #11) and that the fusion bead on the riser side of the socket coupler was irregular (Attachment 1, Photo #12). Forensic Engineering Consultants, LLC concluded that the PE socket coupler fusion joint appeared strong but laboratory inspection of a cross section of the weld joint displayed a lack of fusion for a length of approximately 0.03 inches at the end of the fitting as well as the presence of entrapped debris. One cavity formed at the time of welding contained approximately eight particles of apparent sand. This cavity served as a stress concentrator that contributed to a fracture in the service line at the welded joint of the socket coupler.

CRT's report (Attachment 10) makes no conclusions concerning the cause of the pinhole leak.

Century pipe

The distribution system pipe providing natural gas to the 2215 unit was marketed by Century Utility Products, Inc. (Century). PE pipe marketed by Century has been the subject of prior federal advisory bulletins concerning brittle-like cracking when exposed to prolonged external forces. (Attachment 11) Neither Forensic nor CRT, after laboratory testing of the Century service pipe sample, including the socket coupler and associated fusion joint, indicated that the Century pipe or the fusion joint was not sound.

Grey soil

Soil will turn grey when exposed to natural gas for a period of time due to the exclusion of oxygen.

ATTACHMENTS

Attachment 1: Drawing and Photographs

Attachment 2: Xcel Energy OMS Gas Primary Completion Ticket

Attachment 3: Memorandum of Telephonic Report of Incident to the Commission

Attachment 4: PHMSA email forwarding National Response Center Incident Report Number 882452

Attachment 5: NSP Incident Report *PHMSA Form F7100.1 (03-04)*

Attachment 6: NSP Level 1 Emergency Response Procedure and Flow Chart

Attachment 7: Distribution System Specifications

Attachment 8: Public Service Commission Incident Investigators

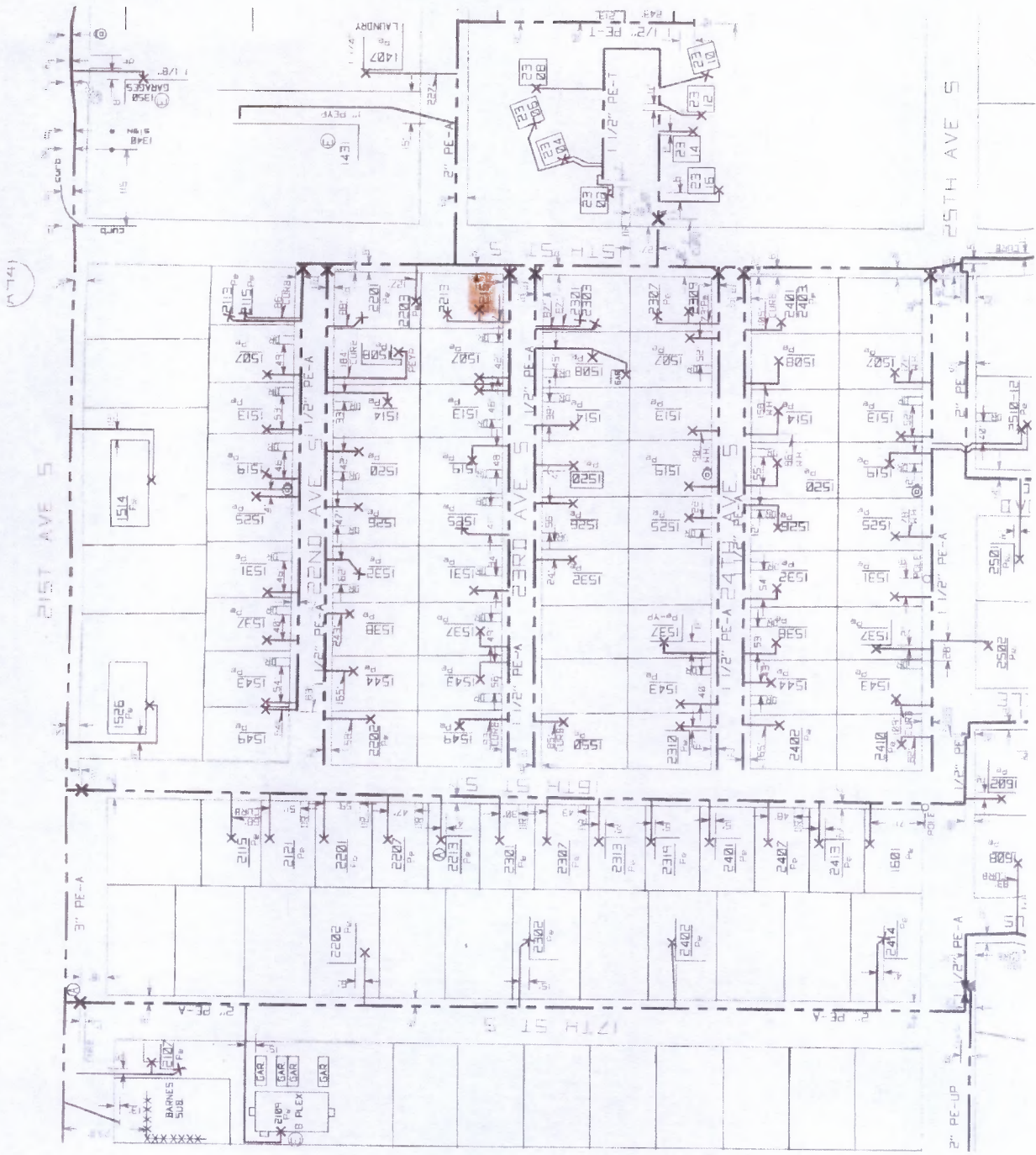
Attachment 9: NSP Socket Fusion Procedure

Attachment 10: CRT Laboratories, Inc. Final Lab Report

Attachment 11: Federal Advisory Bulletins Concerning Century Pipe

Attachment 1
Drawing and Photographs

Drawing #1



845



Photo #1



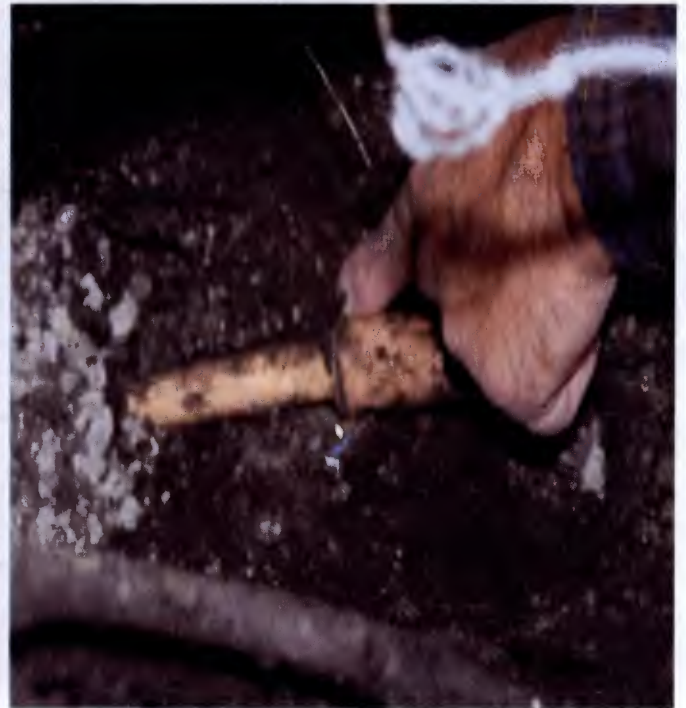
Photo #2



Photo #3



area of grey soil by socket coupler
Photo #4

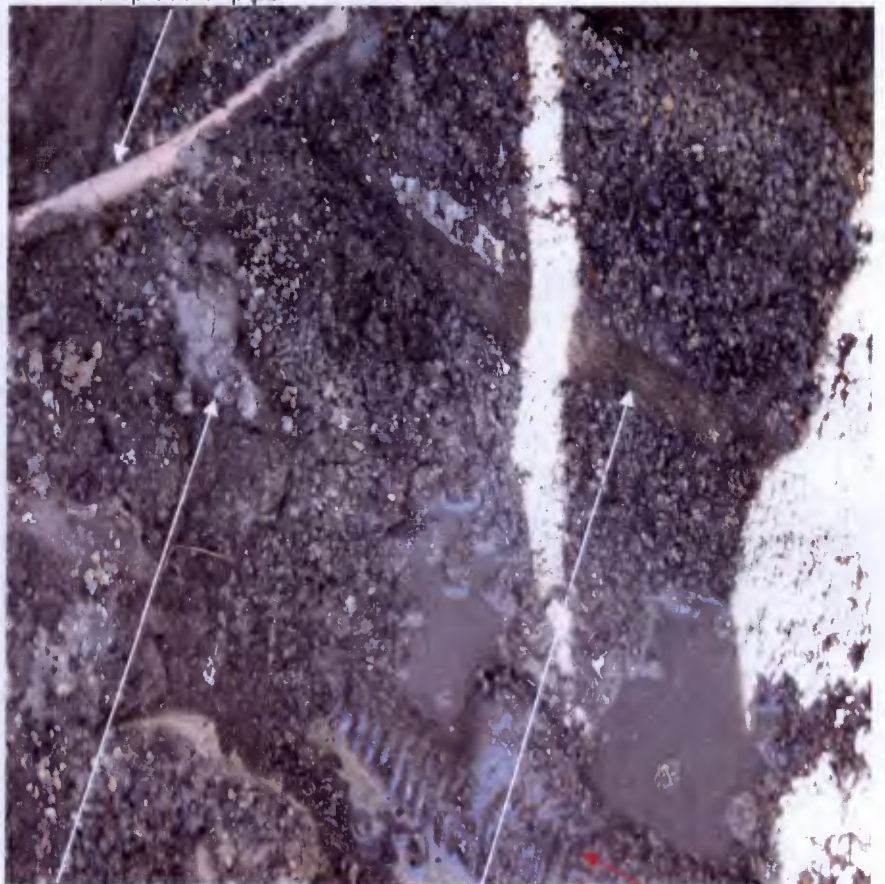


area of grey soil by socket coupler
Photo #5

Discarded piece of pipe



area of grey soil 3 feet below surface
Photo #6



area of grey soil at drain field
house foundation
drain tile
Photo #7



Photo #8

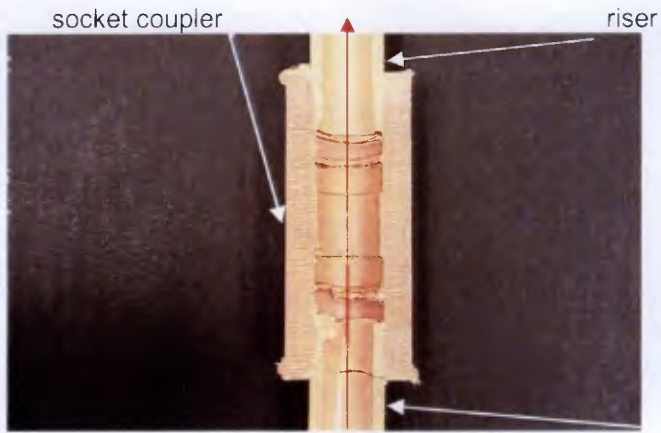


Photo #9

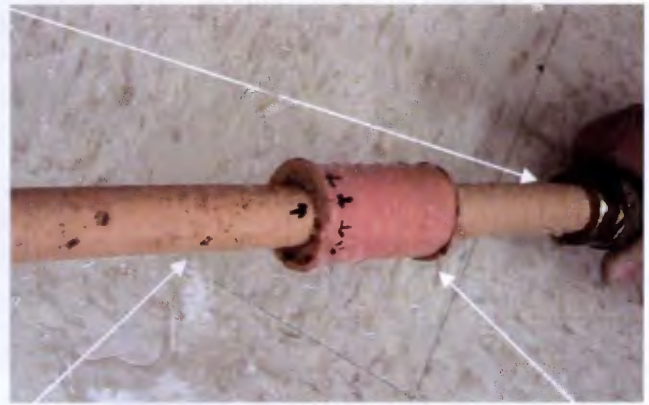


Riser socket coupler service line
pipe section sent to CRT Laboratories, Inc.

Photo #10



Service pipe out-of-alignment with socket coupler
Photo #11



Service line
 irregular socket fusion bead
Photo #12

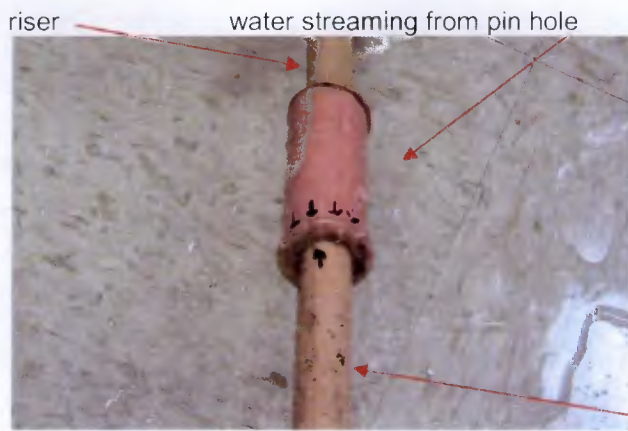


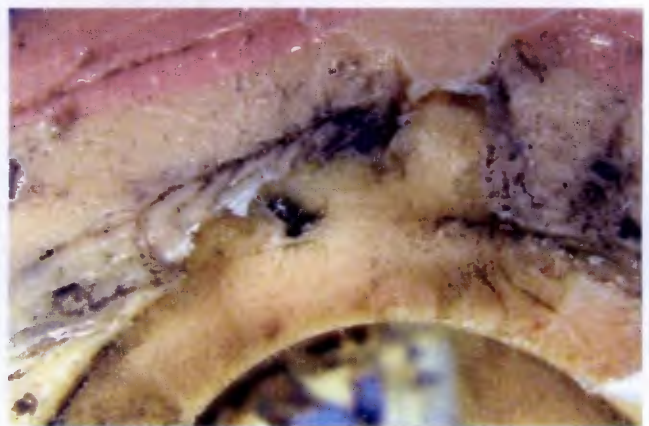
Photo #13



Service line
 interior stress fracture
Photo #14



sand grain inclusion
Photo #15



sand grain inclusion
Photo #16

magnified images of sand inclusion

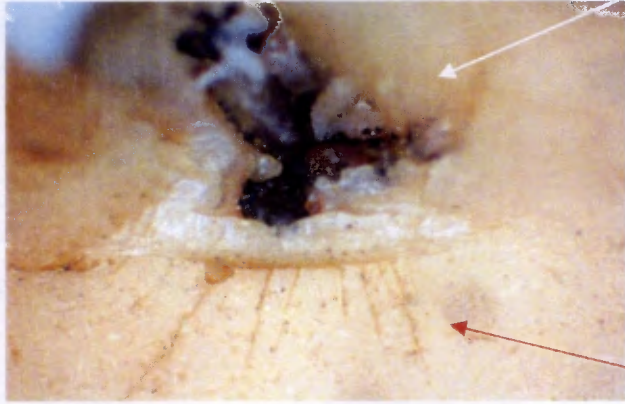
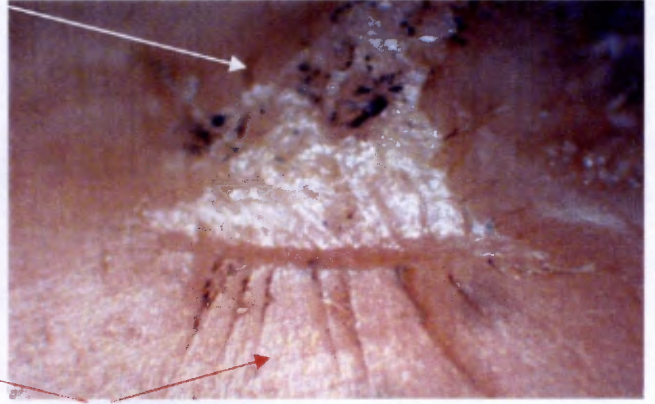


Photo #17



Radiating pattern

Photo #18

Attachment 2

Xcel Energy OMS Gas Primary Completion Ticket

1

Incident response
Dispatch

Xcel Energy OMS Gas Primary Completion Ticket (Form 17-8499 revised 03-07)

Employee Name		Employee #	
Job Code		Order Mis-coded E-1	<input type="checkbox"/> Yes <input type="checkbox"/> No
Address		City, State, Zip Code	
Customer Name		Customer Phone	
Create Date/Time	Dispatch Date/Time	Enroute Date/Time	
Arrive Date/Time	Complete Date/Time	Paper Ticket	<input type="checkbox"/> Yes <input type="checkbox"/> No
Comments:			
<p>at the service I and more along the main, 280's, 221's, 221's, 2301, 2302, 15th St S and 1507, 1513, 1508 23rd Ave S, also checked the two valves at the corner of 23rd Ave and 15th St and provided info on the East side of 15th St S, following the street that parallels Oak Manor Ave.</p> <p>When I arrived at 0055 I called dispatch to inform them of my original plan and told them the house was located and that they better call from I was going to need some help. Dispatch asked through the call and only 1 hour later in the meter shop responded, I called dispatch back and asked if there was anyone else to call on the list, they told me to call 281 8119 / 128 6003 / Police: Nick Kinross 130-8085 / 281-8531</p>			
Gas Off Date	Gas Off Time	Gas On Date	Gas On Time
Customer Contacted		Dwelling Type	
<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Home <input type="checkbox"/> Not Home Left Card		<input type="checkbox"/> Business <input type="checkbox"/> Single Family <input type="checkbox"/> Multi-Family	
Customer Response		Customer Response	
<input type="checkbox"/> Customer agreed to inspection and inspection completed	<input type="checkbox"/> Did Not Ask	<input type="checkbox"/> Set appointment for a later date	
<input type="checkbox"/> Customer cancelled	<input type="checkbox"/> Did not Enter		
<input type="checkbox"/> Customer declined inspection	<input type="checkbox"/> Referred to dealer		
Customer Response	Leak Found	Above Ground	DOT Reportable
<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Leak Found On <input type="checkbox"/> Both Xcel Energy and Customer Facilities <input type="checkbox"/> Xcel Energy Facility <input type="checkbox"/> Customer Facility <input type="checkbox"/> Other			
Major Failure			
<input type="checkbox"/> Atmospheric Corrosion	03AC	<input type="checkbox"/> Damage by Non-Company	03NP
<input type="checkbox"/> Corrosion	03CR	<input type="checkbox"/> Outside Force Damage	03OF
<input type="checkbox"/> Equipment	03EQ	<input type="checkbox"/> Operations	03OP
<input type="checkbox"/> Material Defect	03MD	<input type="checkbox"/> Damage by Company	03PS
<input type="checkbox"/> No Defect	03ND	<input type="checkbox"/> Rodent Damage	03RD
<input type="checkbox"/> Damage by Natural Forces	03NF	<input type="checkbox"/> Weld Defect	03WD
Number Of Customers Affected		Flex Connector Inspection	
Total Connectors		Billable <input type="checkbox"/> Yes <input type="checkbox"/> No	
		Customer Charge	
		Hours	
		Trip Charge	
Bill to Information			
<input type="checkbox"/> Customer <input type="checkbox"/> Other			
Name			
Address			
City			
State		Zip	

Xcel Energy OMS Gas Primary Completion Ticket (Form 17-8499 revised 03-07)

Employee Name	Employee #	Original OMS Order #
Job Code	Order Mis-coded E-1 <input type="checkbox"/> Yes <input type="checkbox"/> No	Duplicated Original OMS #
Address	City, State, Zip Code	Passport W/O #
Customer Name	Customer Phone	
Create Date/Time	Dispatch Date/Time	
Arrive Date/Time	Complete Date/Time	
	Enroute Date/Time	
	Paper Ticket <input type="checkbox"/> Yes <input type="checkbox"/> No	

Comments: The customer reported there was a problem with the meter and I had them to call their provider. Doug Hill responded to the call after a period of time and I had him to call back. I took another reading and the gas was going down - took several readings of the meter. However, after the gas was turned down until there was almost 0 readings. Checked with the One check periodically and he told me that there was nothing else that was an emergency, so I stayed and continued for the next couple of hours checking over houses and meters for any other readings. Doug Hill and Tim Sullivan checked the same area as I did and in addition to those areas continued on to other houses and a larger area.

Gas Off Date	Gas Off Time	Gas On Date	Gas On Time
Customer Contacted		Dwelling Type	
<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Home <input type="checkbox"/> Not Home Left Card	<input type="checkbox"/> Business <input type="checkbox"/> Single Family <input type="checkbox"/> Multi-Family		
Customer Response		Customer Response	
<input type="checkbox"/> Customer agreed to inspection and inspection completed	<input type="checkbox"/> Did Not Ask <input type="checkbox"/> Set appointment for a later date	<input type="checkbox"/> Above Ground <input type="checkbox"/> DOT Reportable	
<input type="checkbox"/> Customer cancelled	<input type="checkbox"/> Did not Enter	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> Customer declined inspection	<input type="checkbox"/> Referred to dealer	<input type="checkbox"/> Leak Found <input type="checkbox"/> No	
Leak Found On <input type="checkbox"/> Both Xcel Energy and Customer Facilities		<input type="checkbox"/> Xcel Energy Facility <input type="checkbox"/> Customer Facility <input type="checkbox"/> Other	
Major Failure			
<input type="checkbox"/> Atmospheric Corrosion	<input type="checkbox"/> Corrosion	<input type="checkbox"/> Damage by Non-Company	<input type="checkbox"/> Customer
<input type="checkbox"/> Equipment	<input type="checkbox"/> Material Defect	<input type="checkbox"/> Outside Force Damage	<input type="checkbox"/> Other
<input type="checkbox"/> No Defect	<input type="checkbox"/> Damage by Natural Forces	<input type="checkbox"/> Operations	
		<input type="checkbox"/> Damage by Company	
		<input type="checkbox"/> Rodent Damage	
		<input type="checkbox"/> Weld Defect	
Bill to Information			
Total Connectors _____			
Flex Connector Inspection _____			
Number Of Customers Affected _____			
Billable <input type="checkbox"/> Yes <input type="checkbox"/> No			
Customer Charge _____ Hours _____			
Trip Charge _____			
City _____ State _____ Zip _____			

Xcel Energy OMS Gas Primary Completion Ticket (Form 17-8499 revised 03-01)

Employee Name <i>Jan Sather</i>	Employee # <i>574703</i>	Original OMS Order # <i>ADV 100000000</i>
Job Code <i>E1 EGR</i>	Order Mis-coded E-1 <input type="checkbox"/> Yes <input type="checkbox"/> No	Duplicated Original OMS # <i>170095</i>
Address <i>1507 4th Ave. S.</i>	City, State, Zip Code <i>Fgo</i>	Passport W/O #
Customer Name	Customer Phone	
Create Date/Time <i>9-2-08</i>	Dispatch Date/Time <i>01:38</i>	
Arrive Date/Time <i>02:30</i>	Complete Date/Time <i>09:30</i>	
Enroute Date/Time	Paper Ticket <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Comments: *I signed on MOT. order didn't come through - address is wrong should be 2215 15 st. S. - comments are made out on another sheet - Matt Fowler was first responder - All other info. on other sheet. I didn't put bottom completely those comments are on matt's time sheet!*

did this 9-3-08 - at 09:00

Gas Off Date	Gas Off Time	Gas On Date	Gas On Time
Customer Contacted <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not Home <input type="checkbox"/> Not Home Left Card		Dwelling Type <input type="checkbox"/> Business <input type="checkbox"/> Single Family <input checked="" type="checkbox"/> Multi-Family	
Customer Response <input type="checkbox"/> Customer agreed to inspection and inspection completed <input type="checkbox"/> Customer cancelled <input type="checkbox"/> Customer declined inspection		Customer Response <input type="checkbox"/> Did Not Ask <input type="checkbox"/> Set appointment for a later date <input type="checkbox"/> Did not Enter <input type="checkbox"/> Referred to dealer	
Leak Found On <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Leak Found <input type="checkbox"/> Yes <input type="checkbox"/> No	Above Ground <input type="checkbox"/> Yes <input type="checkbox"/> No	DOT Reportable <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Leak Found On <input type="checkbox"/> Both Xcel Energy and Customer Facilities <input type="checkbox"/> Xcel Energy Facility <input type="checkbox"/> Customer Facility <input type="checkbox"/> Other			
Major Failure			
<input type="checkbox"/> Atmospheric Corrosion	<input type="checkbox"/> 03AC	<input type="checkbox"/> Damage by Non-Company	<input type="checkbox"/> 03NP
<input type="checkbox"/> Corrosion	<input type="checkbox"/> 03CR	<input type="checkbox"/> Outside Force Damage	<input type="checkbox"/> 03OF
<input type="checkbox"/> Equipment	<input type="checkbox"/> 03EO	<input type="checkbox"/> Operations	<input type="checkbox"/> 03OP
<input type="checkbox"/> Material Defect	<input type="checkbox"/> 03MD	<input type="checkbox"/> Damage by Company	<input type="checkbox"/> 03PS
<input type="checkbox"/> No Defect	<input type="checkbox"/> 03ND	<input type="checkbox"/> Rodent Damage	<input type="checkbox"/> 03RD
<input type="checkbox"/> Damage by Natural Forces	<input type="checkbox"/> 03NF	<input type="checkbox"/> Weld Defect	<input type="checkbox"/> 03WD
Number Of Customers Affected		Flex Connector Inspection	
Total Connectors		Billable <input type="checkbox"/> Yes <input type="checkbox"/> No	
Customer Charge		Hours	
Trip Charge			
Bill to Information			
Customer <input type="checkbox"/> Other <input type="checkbox"/>			
Name			
Address			
City			
State			
Zip			

Xcel Crew that responded to incident

Fargo Crew Data
Updated 6/16/08

Employee	ID	Radio	Cell #	Home #	Position	Seniority	OT Seniority	Fleet #	Crew
Terry McLeod	MCLT02	2134	371-5253	701-237-0799	Elec. Foreman	2/4/30/79	3/31/08	104905	TERRY, Carey G.
Keith Weisser	WSSK02	2141	371-5249	701-237-4347	Elec. Foreman	3/4/6/81		104105	KEITH, Paul A.
Richard (Rusty) Trosen	TRSR02	2139	371-5252	701-469-2245	Elec. Foreman	4/6/1/81		104205	RUSTY, Al N.
Jeff Anderson	ANDJ34	2140	371-5250	701-288-8483	Elec. Foreman	8/12/15/89		95405	JEFF, Steve B.
Ken Simonson	SMNK02	2142	371-5248	H-Cell 701-371-5864	Elec. Foreman	6/6/19/85		104505	
Al Nelson	NLSA08	2150	371-1176	701-293-3199	Lineman	5/4/5/83			
Carey Gleason	GLSC01	2144	212-9709	701-281-2597	Relief Foreman	7/6/24/85		95605	Street Light Truck
Scott Ladwig	LDWS01	2135	212-9356	218-498-2226	Lineman	11/4/18/94			
Steve Biegler	BGLS02	2146	541-3807	701-541-3807 Cell	Lineman	9/8/9/92			
Paul Anstrup	AMSP02	2147	412-8408	701-306-6272 H Cell	Lineman	10/1/4/93			
Luke Kringen	KRNL04		219-3420	701-200-0910	Groundmen	11/4/7/08			
Dave Kertes	KRTD01	2191	371-5216	701-282-4517	Master Tech	1/10/29/79		100305	
Paul Morehead	MRHP01	2198	371-5221	218-233-5521	Mechanic, Gas Sup	2/10/5/81		99205	
Tom Sather	STHT03	2199	371-5223	218-236-5708	Mechanic, Gas Sup	3/4/15/91		96705	
John (Haybale) Larsen	LRSJ10	2192	371-5218	701-232-1987	Mechanic, Gas Sup	4/1/4/91			
Mike McManus	MCMM03	2184	371-5222	218-233-3601	Mechanic, Gas Sup	7/4/25/94		103905	
Bryan Erickson	ERCB03	2193	371-5213	701-428-3495	Mechanic, Gas Sup	6/1/26/94		100805	
Mike Kominski	KMINM01		218-234-5126	218-346-5335	Utility Helper, there after				Meat shop
Doug Dahl	DHLJ02	2194	371-5215	701-282-3053	Gas Foreman	1/10/28/80		101105	
Tony Coronato	CRNA03	2186	371-5220	701-280-2255	Gas Foreman	2/5/20/92		101005	
Mark Olson	OLSM04	2182	371-5211	701-428-3838	Welder-Fitter	3/3/15/99		101305	
Matthew (Babba) Fowler	FWLM01	2190	429-3918	701-729-2241 cell	Fitter, Lead	5/8/14/00		101305	
Cole Weizel	WTZC01	2185	429-8893	701-412-1794 cell	Welder-Fitter	6/4/24/01			
Corey Benwick	BRWC12	2196	429-8735	701-799-9997	Fitter	7/3/2/05			
Jason Swarjoui	SWRJ02	2183	429-8738	701-730-2420 cell	Fitter	8/4/1/05			
Steve Kustermann	KSTS02		429-8733	320-249-1796	Apprentice Fitter	9/4/9/07			
Mike Hartsch	HRTM10			701-730-4882	Temp Laborer	5/16/2008			
Justin Boen	BNNJ09			701-552-1544	Temp Laborer	6/2/2008			
Alex Trosen	TRSA01				Temp Laborer	6/2/2008			
Daryle Teske	TSKD02		371-5201						
Tom Ihle	IHL101		371-5203						
Larry Roller	RLLL01		371-5246	218-236-5289	Supervisor 1				
Eyde Voglewede			371-5260	701-282-8090	Warehouse				
Tom Gehrig			371-5259	701-282-5576	Warehouse				
Bill Weitz			371-5205		Garage				
Dale Wavra			371-5205						

Test for Odorant Smell (Faint and Distinct)

Odorator
Heath Tech

Location	Odorator Readings				Serial Odorator Number	NSP Meter Number	Man Number	Date	
	Faint Odorator Reading	Odorator Chart* Reading	Distinct Odorator Reading	Odorator Chart* Reading					
1525 2340 S0	Fargo	.10	.08	.15	.13	406	881632	2191	9/2/08
2301 15st 50	Fargo	.10	.08	.17	.14	406	947097	2134	9/2/08
2303 15st 50	Fargo	.13	.08	.19	.17	406	698253	2188	9/2/08
									1 1
									1 1
									1 1
									1 1
									1 1
									1 1
									1 1
									1 1

Comments: 2oz Natural gas

Office Routing: Foreman D. Heath Date 9/2/08

* Chart reading on side of odorator

Attachment 3

Memorandum of Telephonic Report of Incident to the Commission

Moch, Alan G.

From: Moch, Alan G.
Sent: Tuesday, September 02, 2008 7:52 AM
To: -Grp-PSC Commissioners
Cc: -Grp-PSC Legal; Fahn, Patrick J.; Hanson, Kevin J.
Subject: Gas Explosion in Fargo

Importance: High

Please be advised: We have received a report from both Xcel Gas Dispatch and PHMSA Central Region that an explosion occurred at a duplex located at 1507 23rd Avenue South, Fargo ND. Thirteen people were evacuated from the building. Two people were sent to the Ramsey County Burn Unit. The structure is a total loss.

The incident occurred at approximately 0100 hours today.

The gas service line feeding the building has been cut and capped on both ends. The Fargo Fire Department is on scene as well as Xcel crews. Xcel and the Fire Department are proceeding with their investigation as to the cause of the explosion.

Kevin Hanson is leaving for Fargo shortly to begin our investigation. We are not sure whether or not the gas that caused this explosion came from piping jurisdictional to the Commission, but we will continue to investigate until such time as it is shown otherwise.

We will keep you updated throughout the day.

Alan Moch, Director
Testing & Safety Division
ND Public Service Commission
701-328-2413
amoch@nd.gov

Attachment 4

**PHMSA Email Forwarding the National Response Center Incident
Report Number 882452**

371-5219

Moch, Alan G.

From: Leonard.Steiner@dot.gov
Sent: Tuesday, September 02, 2008 7:13 AM
To: Moch, Alan G.
Cc: OPSCentralRegion@dot.gov
Subject: FW: NRC#882452

Al,
Looks like this is your baby.

Would you check on this? Talk to you later.

Leonard

----- Original Message -----

From: PHMSA PHP NRC Report
To: PHMSA PHP NRC Report FWD
Sent: Tue Sep 02 03:12:59 2008
Subject: FW: NRC#882452

From: fldr-NRC@comdt.uscg.mil[SMTP:FLDR-NRC@COMDT.USCG.MIL]
Sent: Tuesday, September 02, 2008 3:15:18 AM
To: PHP Accident/Incident Cadre <PHMSA>; CMC-01 <OST>; PHMSA PHP NRC Report
Subject: NRC#882452
Auto forwarded by a Rule

NATIONAL RESPONSE CENTER 1-800-424-8802

GOVERNMENT USE ONLYGOVERNMENT USE ONLY***

Information released to a third party shall comply with any applicable federal and/or state Freedom of Information and Privacy Laws

Incident Report # 882452

INCIDENT DESCRIPTION

**** THIS IS A POTENTIAL RELEASE ****

*Report taken by: MST3 ZLATAN MRZLJAK at 03:07 on 02-SEP-08
Incident Type: FIXED
Incident Cause: UNKNOWN
Affected Area:
Incident occurred on 02-SEP-08 at 00:37 local incident time.

Affected Medium: UNKNOWN

REPORTING PARTY

Name: KAREN MIDDENDORF
Organization: EXCEL ENERGY
Address: 825 RICE ST
ST. PAUL, MN 55117

PRIMARY Phone: (651)2292421
Type of Organization: PUBLIC UTILITY

SUSPECTED RESPONSIBLE PARTY

Name: UNKNOWN

XX

INCIDENT LOCATION

1507 23RD AVE SOUTH County: CASS
City: FARGO State: ND

POTENTIALLY RELEASED MATERIAL(S)

CHRIS Code: ONG Official Material Name: NATURAL GAS
Also Known As:
Qty Released: 0 UNKNOWN AMOUNT Qty in Water: 0 UNKNOWN AMOUNT

DESCRIPTION OF INCIDENT

THE CALLER REPORTED THAT A HOUSE EXPLOSION POSSIBLY DUE TO A NATURAL GAS LEAK. THE CAUSE IS STILL BEING INVESTIGATED.

SENSITIVE INFORMATION

INCIDENT DETAILS

Package: NO
Building ID:
Type of Fixed Object: OTHER
Power Generating Facility: UNKNOWN
Generating Capacity:
Type of Fuel:
NPDES:
NPDES Compliance: UNKNOWN

IMPACT

Fire Involved: NO Fire Extinguished: UNKNOWN

INJURIES: YES 2 Hospitalized: 2 Empl/Crew: Passenger:
FATALITIES: NO Empl/Crew: Passenger: Occupant:
EVACUATIONS:NO Who Evacuated: Radius/Area:

Damages: YES \$50000

Closure Type	Description of Closure	Hours Closed	Direction of Closure
Air:	N		
Road:	N		Major Artery:N
Waterway:	N		
Track:	N		

Environmental Impact: UNKNOWN

Media Interest: NONE Community Impact due to Material:

REMEDIAL ACTIONS

FIRE DEPT IS ON SCENE, GAS HAS BEEN SHUT OFF TO THE PROPERTY.

Release Secured: UNKNOWN

Release Rate:

Estimated Release Duration:

WEATHER

Weather: CLEAR, 9F

ADDITIONAL AGENCIES NOTIFIED

Federal: NONE

State/Local: NDPSC

State/Local On Scene: FD

State Agency Number: NONE

NOTIFICATIONS BY NRC

CHEM SAFETY AND HAZARD INVEST BOARD (AFTER HOURS)

02-SEP-08 03:13 (202)3146290

DOT CRISIS MANAGEMENT CENTER (MAIN OFFICE)

02-SEP-08 03:13 (202)3661863

U.S. EPA VIII (MAIN OFFICE)

(303)2931788

NATIONAL INFRASTRUCTURE COORD CTR (MAIN OFFICE)

02-SEP-08 03:13 (202)2829201

NOAA RPTS FOR ND (MAIN OFFICE)

02-SEP-08 03:13 (206)5264911

NTSB PIPELINE (MAIN OFFICE)

02-SEP-08 03:13 (202)3146293

HOMELAND SEC COORDINATION CENTER (MAIN OFFICE)

02-SEP-08 03:13 (202)2828300

PIPELINE & HAZMAT SAFETY ADMIN (OFFICE OF PIPELINE SAFETY (AUTO))

02-SEP-08 03:13 (202)3660568

PIPELINE & HAZMAT SAFETY ADMIN (OFFICE OF PIPELINE SAFETY WEEKDAYS (VER

02-SEP-08 03:15 (202)3661863 DUTY OFFICER

ND EMERGENCY RESPONSE COMMISSION (MAIN OFFICE)

02-SEP-08 03:13 (701)3288100

DOI/OEPC DENVER (MAIN OFFICE)

02-SEP-08 03:13 (303)4452500

SURFACE TRANS SECURITY INSPECT PROG (COMMAND CENTER)

02-SEP-08 03:13 (773)8587516

ADDITIONAL INFORMATION

NONE

*** END INCIDENT REPORT #882452 ***

Report any problems by calling 1-800-424-8802

PLEASE VISIT OUR WEB SITE AT <http://www.nrc.uscg.mil>

Attachment 5

NSP Incident Report *PHMSA Form F7100.1 (03-04)*



U.S. Department of Transportation
Pipeline and Hazardous Materials Safety
Administration

INCIDENT REPORT - GAS DISTRIBUTION SYSTEM

Report Date _____
No. _____
(DOT Use Only)

INSTRUCTIONS

Important: Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the Office Of Pipeline Safety Web Page at <http://ops.dot.gov>.

PART A - GENERAL REPORT INFORMATION

Check: Original Report Supplemental Report Final Report

1. Operator Name and Address

- a. Operator's 5-digit Identification Number 3 / 1 / 6 / 3 / 6 /
- b. If Operator does not own the pipeline, enter Owner's 5-digit Identification Number / / / / /
- c. Name of Operator Northern States Power Company d/b/a Xcel Energy
- d. Operator street address 414 Nicollet Mall
- e. Operator address Minneapolis, Hennepin County, Minnesota 55401
City, County or Parish, State and Zip Code

2. Time and date of the incident

10 / 02 / 01 / 10 / 19 / 10 / 21 / 10 / 18 /
hr. month day year

3. Incident Location

- a. 2215 15th Street South
Street or nearest street or road
- b. Fargo, Cass County
City and County or Parish
- c. North Dakota 58103
State and Zip Code
- d. Latitude: 46 / 18 / 15 / 3 / 16 Longitude: -99 / 16 / 18 / 10 / 14 / 18
(if not available, see instructions for how to provide specific location)
- e. Class location description
 Class 1 Class 2 Class 3 Class 4
- f. Incident on Federal Land Yes No

4. Type of leak or rupture

- Leak: Pinhole Connection Failure (complete sec. F5)
 Puncture, diameter or cross section (inches) _____
- Rupture (if applicable):
 Circumferential - Separation
 Longitudinal
- Tear/Crack, length (inches) _____
- Propagation Length, total, both sides (feet) _____
- N/A
- Other: _____

5. Consequences (check and complete all that apply)

- a. Fatality Total number of people: / / / / /
Employees: / / / / / General Public: / / / / /
Non-employee Contractors: / / / / /
- b. Injury requiring inpatient hospitalization
Total number of people: 10 / 0 / 4 /
Employees: / / / 0 / General Public: 10 / 0 / 4 /
Non-employee Contractors: / / / 0 /
- c. Property damage/loss (estimated) Total \$152,000
Gas loss \$ _____ Operator damage \$2000
Public/private property damage \$150,000
- d. Gas ignited Explosion No Explosion
- e. Gas did not ignite Explosion No Explosion
- f. Evacuation (general public only) / / / / / people
Evacuation Reason:
 Unknown
 Emergency worker or public official ordered, precautionary
 Threat to the public
 Company policy

6. Elapsed time until area was made safe:

10 / 1 / hr. 2 / 5 / min.

7. Telephone Report

8 / 8 / 2 / 4 / 5 / 2 / / 10 / 19 / 10 / 21 / 10 / 18 /
NRC Report Number month day year

8. a. Estimated pressure at point and time of incident:

55 PSIG

b. Max. allowable operating pressure (MAOP): 60 PSIG

c. MAOP established by:

- Test Pressure _____ psig
- 49 CFR § 192.619 (a)(3)

PART B - PREPARER AND AUTHORIZED SIGNATURE

John L. Ness, Senior Specialty Engineer
(type or print) Preparer's Name and Title

(701) 241-8695
Area Code and Telephone Number

john.l.ness@xcelenergy.com
Preparer's E-mail Address

(701) 241-8682
Area Code and Facsimile Number

Ronald A. Jablinske
Authorized Signature (type or print) Name and Title

9/26/08 / (701) 241-8621
Date Area Code and Telephone Number

PART C - ORIGIN OF THE INCIDENT

1. Incident occurred on
 Main Meter Set
 Service Line Other: _____
 Pressure Limiting and Regulating Facility
2. Failure occurred on
 Body of pipe Pipe Seam
 Joint Component
 Other: _____
3. Material involved (pipe, fitting, or other component)
 Steel
 Cast/Wrought Iron
 Polyethylene Plastic (complete all items that apply in a-c)
 Other Plastic (complete all items that apply in a-c)
 Plastic failure was: a. ductile b. brittle c. joint failure
 Other material: _____
4. Year the pipe or component which failed was installed: 11 / 9 / 7 / 5 /

PART D - MATERIAL SPECIFICATION (if applicable)

1. Nominal pipe size (NPS) 1.5000 in.
 2. Wall thickness 0.0900 in.
 3. Specification PE 2306 (SDR 7.0) SMYS / / / / /
 4. Seam type N/A
 5. Valve type N/A
 6. Pipe or valve manufactured by Century Utility Products Inc. in year 11 / 9 / 7 / 2 /

PART E - ENVIRONMENT

1. Area of incident
 In open ditch
 Under pavement Above ground
 Under ground Under water
 Inside/under building Other: _____
2. Depth of cover: 18 inches

PART F - APPARENT CAUSE

Important: There are 25 numbered causes in this section. Check the box to the left of the primary cause of the incident. Check one circle in each of the supplemental items to the right of or below the cause you indicate. See the instructions for this form for guidance.

F1 - CORROSION

If either F1 (1) External Corrosion, or F1 (2) Internal Corrosion is checked, complete all subparts a - e.

1. External Corrosion
2. Internal Corrosion
- a. Pipe Coating
 Bare Localized Pitting
 Coated General Corrosion
 Unknown Other: _____
- b. Visual Examination
 Galvanic Stray Current
 Improper Cathodic Protection
 Microbiological
 Other: _____
- c. Cause of Corrosion
- d. Was corroded part of pipeline considered to be under cathodic protection prior to discovering incident?
 No Yes Unknown Year Protection Started: / / / / /
- e. Was pipe previously damaged in the area of corrosion?
 No Yes Unknown How long prior to incident: / / / / / years / / / / / months

F2 - NATURAL FORCES

3. Earth Movement ⇒ Earthquake Subsidence Landslide Other: _____
4. Lightning
5. Heavy Rains/Floods ⇒ Washouts Flotation Mudslide Scouring Other: _____
6. Temperature ⇒ Thermal stress Frost heave Frozen components Other: _____
7. High Winds

F3 - EXCAVATION

8. Operator Excavation Damage (including their contractors) / Not Third Party
9. Third Party Excavation Damage (complete a-d)
- a. Excavator group
 General Public Government Excavator other than Operator/subcontractor
- b. Type: Road Work Pipeline Water Electric Sewer Phone/Cable/Fiber Landowner Railroad
 Building Construction Other: _____
- c. Did operator get prior notification of excavation activity?
 No Yes: Date received: / / / / mo. / / / / day / / / / yr.
 Notification received from: One Call System Excavator General Contractor Landowner
- d. Was pipeline marked?
 No Yes (If Yes, check applicable items i - iv)
 i. Temporary markings: Flags Stakes Paint
 ii. Permanent markings: Yes No
 iii. Marks were (check one) Accurate Not Accurate
 iv. Were marks made within required time? Yes No

F4 - OTHER OUTSIDE FORCE DAMAGE

10. Fire/Explosion as primary cause of failure ⇒ Fire/Explosion cause: Man made Natural Describe in Part G
11. Car, truck or other vehicle not relating to excavation activity damaging pipe
12. Rupture of Previously Damaged Pipe
13. Vandalism

F5 – MATERIAL OR WELDS

Material

14. Body of Pipe ⇒ Dent Gouge Wrinkle Bend Arc Burn Other: Undetermined
15. Component ⇒ Valve Fitting Vessel Extruded Outlet Other: _____
16. Joint ⇒ Gasket O-Ring Threads Fusion Other: _____

Weld

17. Butt ⇒ Pipe Fabrication Other: _____
18. Fillet ⇒ Branch Hot Tap Fitting Repair Sleeve Other: _____
19. Pipe Seam ⇒ LF ERW DSAW Seamless Flash Weld
- HF ERW SAW Spiral Other: _____

Complete a-f if you indicate any cause in part F5.



a. Type of failure:

- Construction Defect ⇒ Poor Workmanship Procedure not followed Poor Construction Procedures
- Material Defect

b. Was failure due to pipe damage sustained in transportation to the construction or fabrication site? Yes No

c. Was part which leaked pressure tested before incident occurred? Yes, complete d-f, if known No

d. Date of test: / / mo. / / / day / / / yr.

e. Time held at test pressure: / / / hr.

f. Estimated test pressure at point of incident: _____ PSIG

F6 – EQUIPMENT OR OPERATIONS

20. Malfunction of Control/Relief Equipment ⇒ Valve Instrumentation Pressure Regulator Other: _____
21. Threads Stripped, Broken Pipe Coupling ⇒ Nipples Valve Threads Mechanical Couplings Other: _____
22. Leaking Seals

23. Incorrect Operation

- a. Type: Inadequate Procedures Inadequate Safety Practices Failure to Follow Procedures Other: _____
- b. Number of employees involved in incident who failed post-incident drug test: / / / / Alcohol test: / / / /
- c. Was person involved in incident qualified per OQ rule? Yes No d. Hours on duty for person involved: / / /

F7 – OTHER

24. Miscellaneous, describe: _____
25. Unknown
 Investigation Complete Still Under Investigation (submit a supplemental report when investigation is complete)

PART G – NARRATIVE DESCRIPTION OF FACTORS CONTRIBUTING TO THE EVENT (Attach additional sheets as necessary)

A gas leak occurred underground at the edge of the socket fusion coupling located upstream of the riser assembly. Gas migrated into the building and was ignited by an unknown source. A determination as to the cause of the leak cannot be made without additional testing.

Attachment 6

NSP Level 1 Emergency Response Procedure and Flow Chart

EMERGENCY LEVELS and COURSE OF ACTION

LEVEL 1 EMERGENCY

Level 1 events are dealt with by the first Gas Emergency Responder(s) using *Emergency Procedures* section 18.

(Level 1 flow chart/checklist)

Receiving and Classifying the Reported Event

The company employee, performing the customer service and/or dispatch function, is to obtain and document the information as detailed in *Receiving and Classifying Calls of Receiving, Classifying and Dispatching Emergencies*, section 18.

Dispatching orders

The company employee performing the dispatch function will receive the information and dispatch the appropriate Gas Emergency Responder(s) per the details in *Dispatching Orders of Receiving, Classifying and Dispatching Emergencies*, section 18.

Is immediate response required?

IF immediate response, to the situation, **is not** required,
THEN follow standard operating procedures and dispatch as appropriate.

IF immediate response, to the situation, **IS** required,
THEN proceed to next step, *Emergency Response*.

Emergency Response

The Gas Emergency Responder(s) will respond to the scene of the event and take action to Control the Emergency Situation, Secure the area and make safe any actual or potential hazard as detailed in subsection 18.9 – *Emergency Procedures*. In the event that the Emergency situation involves Xcel Energy propane facilities, the on duty dispatcher, plant operator, coordinator, or gas Manager responsible for dispatching/directing the emergency response should refer to subtopic *Propane Line* in subsection 18.9 – *Emergency Procedures*.

Report from the Gas Emergency Responder(s)

When the Gas Emergency Responder(s) reports from the scene of the event the, on duty, dispatcher, coordinator or gas manager responsible for dispatching/directing the Emergency Gas Operations will evaluate the information being reported and make the appropriate decisions.

Make Notifications

The on duty dispatcher will make the necessary notifications based on the needs and/or requests of the Gas Emergency Responder(s):

- Call and request local emergency response 911, if needed and not already summoned.
- Call for emergency utility locates, if needed.
- Notify the Gas Operations/Duty Manager, coordinator, and/or lead person, if needed.

Is this now a reportable DOT and/or State Agency Incident or Accident?

The, on duty, dispatcher, coordinator or gas manager responsible for dispatching/directing the Emergency Gas Operations will evaluate the situation and decide if the event is a reportable Incident or Accident, at this time.

IF this event **IS** a Reportable DOT and/or State Agency Incident or Accident, (See subsection 18.14 tables 18.14.1 and 18.14.2, *Telephonic Notification of Federal and State Agencies* for Reporting Criteria)

THEN notify, or direct dispatch to notify, the Operations/Duty manager and the appropriate unit or person responsible for making Telephonic notifications, **usually within one hour of the company being notified of the event.** (See section 18, *Person Reporting to Federal or State Agency*, of this plan)

Are additional Operating Area resources needed?

IF the situation can be made safe and/or the system returned to normal with current resources,

THEN do so, after which proceed to *De-escalation*.

IF resources beyond the current Gas Emergency Responder(s) are needed,

THEN go to *Level 2 Emergency*

EMERGENCY LEVELS and COURSE OF ACTION**LEVEL 2 EMERGENCY**

Level 2 events are handled using only normal Operating Area Resources.

(Level 2 flow chart/checklist)

Notifications

The on duty dispatcher, coordinator or gas manager responsible for dispatching/directing the Emergency Gas Operations will make the following communications:

- Make the call or direct Dispatch to call and request local emergency response 911, if needed and not already summoned.
- Make contacts or direct Dispatch to make necessary contacts/notifications of Gas Operations/Duty Manager, and identify and notify the Emergency Coordinator, advising them that the event has been elevated to a Level 2 Emergency.
- Keep in contact with the Gas Emergency Responder(s), direct field operations as necessary until the Emergency Coordinator assumes responsibility. If the Operating Area does not have an Emergency Coordinator for Level 2 Emergencies, or not for the current situation, then continue on duty and follow the instructions for the Emergency Coordinator.
- Activate additional Operating Area Gas Emergency Response personnel, if appropriate.

Level 2 Coordinator assumes responsibility for Emergency Operations

If an Emergency Coordinator is not assigned to the Level 2 event, then the dispatcher on duty continues with the following appropriate steps. One of the Emergency Coordinator's responsibilities is to assure that the necessary calls/notifications are made and may make these them self or direct that the calls/notifications be made by other personnel working in the Office Command Center.

- Notify Gas Operations/Duty Manager, Emergency Responders, in the field and Dispatch function that the Emergency Coordinator has assumed responsibility for Emergency Operations.
- Maintain communication with Gas Emergency Responders/Field Command Center
- Review information from the event site and/or request update from Gas Emergency Responders
- Request response by local emergency responders, if needed and not already on the scene.

Is this now a Reportable DOT and/or State Agency Incident or Accident?

(See subsection 18.14, tables 18.14.1 and 18.14.2, *Telephonic Notification of Federal and State Agencies* for Reporting Criteria)

Develop a Tactical Plan

- Assess the situation
- Determine the scope/boundaries of the event
- Obtain Engineering input, if appropriate
- Obtain information from Gas Control, if appropriate
- If the event involves propane facilities, refer to subtopic *Propane Line*, subsection 18.9 – *Emergency Procedures*.
- Develop approach for corrective action
- Assess time and resource requirements for corrective action
- Determine crew shifts, if appropriate
- Direct Gas Emergency Responder's overall operations to alleviate the situation.
- Document the Tactical Plan and/or revisions to it

Make determinations and activate resources

- Activate required Operating Area Gas Emergency Response Resources. Direct notification of additional personnel for response to emergency event.
If Operating Area resources will not be sufficient to adequately handle the emergency,
Then go directly *Level 3 Emergency* otherwise continue to next step.
- Determine need and location of Office Command Center. Choose location / facility, if not already done, and notify appropriate dispatch, management and response personnel.
- Determine need and location of Field Command Center. Choose location / facility, if not already done, and notify event appropriate dispatch, management and response personnel.
- Request emergency utility location service, as needed
- Activate Scribe(s), if needed.
- Activate Notifier(s), if needed.
- Obtain Runner(s) to deliver information, parts, tools, equipment, etc. to necessary locations, as needed.

- Contact Distribution Mapping and/or appropriate Engineering and/or Design Unit(s), if additional maps or plats are needed,
- Direct notification of Energy Delivery Logistics/Stores, if materials or supplies are needed
- Make or direct additional Inter-company Notifications, as necessary. (See *Functional Responsibilities*, section 18, for specific management/unit/dept responsibilities.)
 - Field Operating Directors
 - Claims
 - Media Relations
 - Delivery Safety Department
 - Gas Engineering Unit
 - Operating Area Engineering/Design Unit
 - Gas Capacity Planning
 - Gas and Electric distribution offices in Operating Area, if appropriate
 - Customer Service, if they are not already involved
- Make arrangements with locksmiths and local law enforcement agencies, if locked buildings/residences will have to be entered
- Notify appropriate Medical unit/provider, if Post-incident Testing is needed

Perform Job/Safety Briefing

The Emergency Coordinator is charged with the task of performing the Job/Safety Briefing. If logistics do not readily facilitate the Emergency Coordinator performing it in person, they may designate a supervisory or lead person, in the field to conduct the briefing(s) and debriefing(s).

- Discuss current status of emergency.
- Discuss approach for corrective action.
- Discuss time and resource requirements for implementing corrective action.
- Communicate plan of action. If changes, in the plan of action, become necessary, all members of the crew, who are affected by the change, are to be notified and have the changes explained.
- Outline immediate job goal(s).
- Assign tasks, making sure each member understands the items covered so there can be no possibility of misunderstanding.
- Identify potential hazards and the methods to be applied in protecting against such hazards.
- Identify and issue, if necessary, proper safety equipment.

- Debrief at end of each shift.

Conduct Status Evaluation

- Evaluate adequacy of resources to restore service in a safe and timely manner.
- Re-estimate time for restoration of service.
- Distribute status information
- Update appropriate personnel/units
- Continue to direct Gas Emergency Responder's overall operations to alleviate the situation.

Are resources from outside the Operating Area needed?

IF the situation can be made safe and/or the system returned to normal with current resources,

THEN do so, after which proceed to *De-escalation*.

IF resources beyond the Operating Area are needed,

THEN go to *Level 3 Emergency*

EMERGENCY LEVELS and COURSE OF ACTION**LEVEL 3 EMERGENCY**

Level 3 events are those that can be handled by using resources from outside of the Operating Area but within the Company.

(Level 3 flow chart/checklist)

Notifications

The, on duty, dispatcher, coordinator or gas manager responsible for dispatching/directing the Emergency Gas Operations will make the following communications:

- Make the call or direct Dispatch to call and request local emergency response 911, if needed and not already summoned.
- Make contacts or direct Dispatch to make necessary contacts/notifications of Gas Operations/Duty Manager, and identify Emergency Coordinator (if different person/unit is responsible for Level 3 Emergency Coordination), advising them that the event has been elevated to a Level 3 Emergency.
- Keep in contact with the Gas Emergency Responder(s), direct field operations as necessary, remain on duty until the Level 3 Emergency Coordinator assumes responsibility.
- Activate additional Operating Area Gas Emergency Response personnel, if appropriate.

Level 3 Coordinator assumes responsibility for Emergency Operations

One of the Emergency Coordinator's responsibilities is to assure that the necessary calls/notifications are made and may make these them self or direct that the calls/notifications be made by other personnel working in the Office Command Center.

- Notify Gas Operations/Duty Manager, Emergency Responders, in the field and Dispatch function that the Level 3 Emergency Coordinator has assumed responsibility for Emergency Operations.
- Maintain communication with Gas Emergency Responders/Field Command Center
- Review information from the event site and/or request update from Gas Emergency Responders
- Request response by local emergency responders, if needed and not already on the scene.

Is this now a Reportable DOT and/or State Agency Incident or Accident?

(See subsection 18.14, tables 18.14.1 and 18.14.2, *Telephonic Notification of Federal and State Agencies* for Reporting Criteria)

Develop or Update Tactical Plan

- Assess the situation
- Determine the scope/boundaries of the event
- Obtain Engineering input, if appropriate
- Obtain information from Gas Control, if appropriate
- If the event involves propane facilities, review subtopic *Propane Line* in subsection 18.9 – *Emergency Procedures*.
- Develop approach for corrective action
- Assess time and resource requirements for corrective action
- Determine crew shifts
- Direct Gas Emergency Responder’s overall operations to alleviate the situation.
- Document the Tactical Plan and/or revisions to it

Make determinations and activate resources

- Activate required “In Company” Gas Emergency Response Resources. Direct notification of additional personnel for response to emergency event.

If “In Company” resources **will not** be sufficient to adequately handle the emergency,

Then go directly to *Level 4 Emergency* otherwise continue to next step.

- Determine need and location of Office Command Center. Choose location / facility, if not already done, and notify appropriate dispatch, management and response personnel.
- Determine need and location of Field Command Center. Choose location / facility, if not already done, and notify event appropriate dispatch, management and response personnel.
- Request emergency utility location service, as needed
- Activate Scribe(s), as needed.
- Activate Notifier(s), as needed.
- Obtain Runner(s) to deliver information, parts, tools, equipment, etc. to necessary locations, as needed.
- Contact Distribution Mapping and/or appropriate Engineering and/or Design Unit(s), if additional maps or plats are needed,

- Direct notification of Fleet, if additional transportation or equipment is needed.
- Direct notification of Energy Delivery Logistics/Stores, as materials or supplies are needed
- Direct notification of Business Systems/Information Technology, if additional computer and/or communication equipment is needed
- Make or direct additional Inter-company Notifications, as necessary. See ***Functional Responsibilities***, section 18, for specific management/unit/dept responsibilities.
 - Field Operating Directors
 - Claims
 - Media Relations
 - Delivery Safety Department
 - Gas Engineering Unit
 - Operating Area Engineering/Design Unit
 - Gas Capacity Planning
 - Gas and Electric distribution offices in Operating Area
 - Customer Service, if they are not already involved
- Direct contact of building facilities management for additional parking, rest rooms, office space, parking etc. at Office Command Center and Field Command Location, as applicable.
- Arrange for food for workers, if needed
- Arrange or direct reservations for workers overnight accommodations, if needed
- Make arrangements with locksmiths and local law enforcement agencies, if locked buildings/residences will have to be entered
- Notify appropriate Medical unit/provider, if Post-incident Testing is needed

Perform Job/Safety Briefing

The Emergency Coordinator is charged with the task of performing the Job/Safety Briefing. If logistics do not readily facilitate the Emergency Coordinator performing it in person, they may designate a supervisory or lead person, in the field to conduct the briefing(s) and debriefing(s).

- Discuss current status of emergency
- Discuss approach for corrective action.
- Discuss time and resource requirements for implementing corrective action.
- Communicate plan of action. If changes, in the plan of action, become necessary, all members of the crew, who are affected by the change, are to be notified and have the changes explained.

- Outline immediate job goal(s)
- Assign tasks, making sure each member understands the items covered so there can be no possibility of misunderstanding.
- Identify potential hazards and the methods to be applied in protecting against such hazards.
- Identify and issue, if necessary, proper safety equipment
- Debrief at end of each shift.

Conduct Status Evaluation

- Evaluate adequacy of resources to restore service in a safe and timely manner.
- Re-estimate time for restoration of service.
- Distribute status information
- Update appropriate personnel/units
- Continue to direct Gas Emergency Responder's overall operations to alleviate the situation.

Are resources from outside the Company needed?

IF the situation can be made safe and/or the system returned to normal with current resources,

THEN do so, after which proceed to *De-escalation*.

IF resources beyond those inside the company are needed,

THEN go to *Level 4 Emergency*

EMERGENCY LEVELS and COURSE OF ACTION**LEVEL 4 EMERGENCY**

Level 4 events are those are those that are be handled using resources outside of the Company.

(Level 1 flow chart/checklist)

Notifications

The, on duty, dispatcher, coordinator or gas manager responsible for dispatching/directing the Emergency Gas Operations will make the following communications:

- Make the call or direct Dispatch to call and request local emergency response 911, if needed and not already summoned.
- Make contacts or direct Dispatch to make necessary contacts/notifications of the Director of D C&M, the Gas Operations/Duty Manager, and identify Emergency Coordinator (if different person/unit is responsible for Level 4 Emergency Coordination), advising them that the event has been elevated to a Level 4 Emergency.
- Keep in contact with the Gas Emergency Responder(s), direct field operations as necessary, remain on duty until the Level 4 Emergency Coordinator assumes responsibility.
- Activate additional Gas Emergency Response personnel, if appropriate.

Level 4 Coordinator assumes responsibility for Emergency Operations

One of the Emergency Coordinator's responsibilities is to assure that the necessary calls/notifications are made and may make these them self or direct that the calls/notifications be made by other personnel working in the Office Command Center.

- Notify Gas Operations/Duty Manager, Emergency Responders, in the field and the Dispatch function that the Level 4 Emergency Coordinator has assumed responsibility for Emergency Operations.
- Maintain communication with Gas Emergency Responders/Field Command Center
- Review information from the event site and/or request update from Gas Emergency Responders
- Request response by local emergency responders, if needed and not already on the scene.

Is this now a Reportable DOT and/or State Agency Incident or Accident?

(See subsection 18.14, tables 18.14.1 and 18.14.2, *Telephonic Notification of Federal and State Agencies* for Reporting Criteria)

Develop and/ or update Tactical Plan

- Assess the situation
- Determine the scope/boundaries of the event
- Obtain Engineering input, if appropriate
- Obtain information from Gas Control, if appropriate
- If the event involves propane facilities, refer to subtopic *Propane Line*, subsection 18.9 – *Emergency Procedures*.
- Develop approach for corrective action
- Assess time and resource requirements for corrective action
- Determine crew shifts
- Direct Gas Emergency Responder's overall operations to alleviate the situation.
- Document the Tactical Plan and/or revisions to it

Make determinations and activate resources

- Activate required "Out of Company" Gas Emergency Response Resources. Direct notification of additional personnel for response to emergency event. Consider assigning someone to track this activity.
- Contact Sourcing Strategist if assistance is needed with outside contractor or other utility company agreements.
- Determine need and location of Office Command Center. Choose location / facility, if not already done, and notify appropriate dispatch, management and response personnel.
- Determine need and location of Field Command Center. Choose location / facility, if not already done, and notify event appropriate dispatch, management and response personnel.
- Request emergency utility location service, as needed
- Activate Scribe(s), or additional if needed.
- Activate Notifier(s), or additional if needed.
- Obtain Runner(s) to deliver information, parts, tools, equipment, etc. to necessary locations, or additional if needed.
- Contact Distribution Mapping and/or appropriate Engineering and/or Design Unit(s), if additional maps or plats are needed.

- Direct notification of Fleet, if additional transportation or equipment is needed.
- Direct notification of Energy Delivery Logistics/Stores, as materials or supplies are needed.
- Direct notification of Business Systems/Information Technology, if additional computer and/or communication equipment is needed
- Make or direct additional Inter-company Notifications, as necessary. (See *Functional Responsibilities*, section 18, for specific management/unit/dept responsibilities.)
 - Field Operating Directors
 - Claims
 - Media Relations
 - Delivery Safety Department
 - Gas Engineering Unit
 - Operating Area Engineering/Design Unit
 - Gas Capacity Planning
 - Gas and Electric distribution offices in Operating Area
 - Customer Service, if they are not already involved
 - Competitive Resourcing
 - Business Operations & Planning
- Direct contact of building facilities management for additional parking, rest rooms, office space, parking etc. at Office Command Center and Field Command Location, as applicable.
- Arrange for food for workers, if needed
- Arrange or direct reservations for workers overnight accommodations, if needed
- Make arrangements with locksmiths and local law enforcement agencies, if locked buildings/residences will have to be entered
- Notify appropriate Medical unit/provider, if Post-incident Testing is needed

Perform Job/Safety Briefing

The Emergency Coordinator is charged with the task of performing the Job/Safety Briefing. If logistics do not readily facilitate the Emergency Coordinator performing it in person, they may designate a supervisory or lead person, in the field to conduct the briefing(s) and debriefing(s).

- Discuss current status of emergency
- Discuss approach for corrective action.
- Discuss time and resource requirements for implementing corrective action.

- Communicate plan of action. If changes, in the plan of action, become necessary, all members of the crew, who are affected by the change, are to be notified and have the changes explained.
- Outline immediate job goal(s)
- Assign tasks, making sure each member understands the items covered so there can be no possibility of misunderstanding.
- Identify potential hazards and the methods to be applied in protecting against such hazards.
- Identify and issue, if necessary, proper safety equipment
- Debrief at end of each shift.

Conduct Status Evaluation

- Evaluate adequacy of resources to restore service in a safe and timely manner.
- Re-estimate time for restoration of service.
- Distribute status information
- Update appropriate personnel/units
- Continue to direct Gas Emergency Responder's overall operations to alleviate the situation.

Are more resources needed?

IF the situation can be made safe and/or the system returned to normal with current resources,

THEN do so, after which proceed to *De-escalation*.

IF more resources from "In or Outside of the Company" are needed,

THEN make arrangements as necessary and return to *Develop and/or update Tactical Plan* above.

EMERGENCY LEVELS and COURSE OF ACTION

De-escalation

(De-escalation flow chart/checklist)

At a point in the event, when the situation has been made safe, service has or is being restored, field operations are, or soon will be, completed and system operations are, or soon will return to normal, then the Emergency Coordinator may consider De-escalation.

De-escalation of small scale emergencies may consist of picking up and leaving the event site, while this process in larger scale emergencies may require days to accomplish. In either case there are required follow up tasks that must be accomplished.

Determine if de-escalation can begin

IF the emergency situation has been made safe,

And IF service, in the case of a system outage, has been or is nearly restored (personnel, materials, and equipment are in place and in progress),

And IF system operation has or will shortly be returned to normal,

And IF the individuals/units responsible for overall emergency coordination and field operations agree that this is the proper course,

Then begin de-escalation.

Begin De-escalation

Develop a plan for de-escalation, as appropriate. Release personnel and equipment, as they are no longer needed at the scene of the emergency.

- Debrief personnel before they are released. Notes of any relevant comments should be taken and saved for review during the investigations that will take place at the conclusion of the event.
- Assure that all damage is documented. Samples of failed material shall be collected with adequate documentation. See section 18, *Documentation, Review and Investigation* for more details.
- Collect all forms and records generated
- Release excess “Out of Company” personnel and equipment, as they are no longer needed
- Release excess “In Company” personnel and equipment, as they are no longer needed
- Release excess Operating Area personnel and equipment, as they are no longer needed
- Release/notify support personnel/units as they are no longer needed
- Review need for Employee Assistance Program (EAP) debriefing, and make arrangements if necessary.

After review, was this a reportable DOT or State Agency Incident or Accident?

IF the event **was not** a DOT and/or state agency Reportable Incident or Accident,

Then proceed with De-escalation, *Reviews and Investigations*.

IF this event is **now** a Reportable DOT and/or State Agency Incident or Accident and notification, of appropriate person or unit, has not taken place (See section 18.14, tables 18.14.1 and 18.14.2, *Telephonic Notification of Federal and State Agencies* for Reporting Criteria).

THEN notify the Operations/Duty manager and the appropriate unit or person responsible for making Telephonic notifications. (See section 18, *Person Reporting to Federal or State Agency*, of this plan)

IF the event **has been telephonically reported** as a reportable incident, but after review **it was not** a DOT and/or state agency Reportable Incident or Accident,

Then notify the appropriate unit or person responsible for making Telephonic notifications, to make a retraction. See section 18, *Incident Reports, Retraction of Telephonic Notice (Non-Reportable Incidents)*.

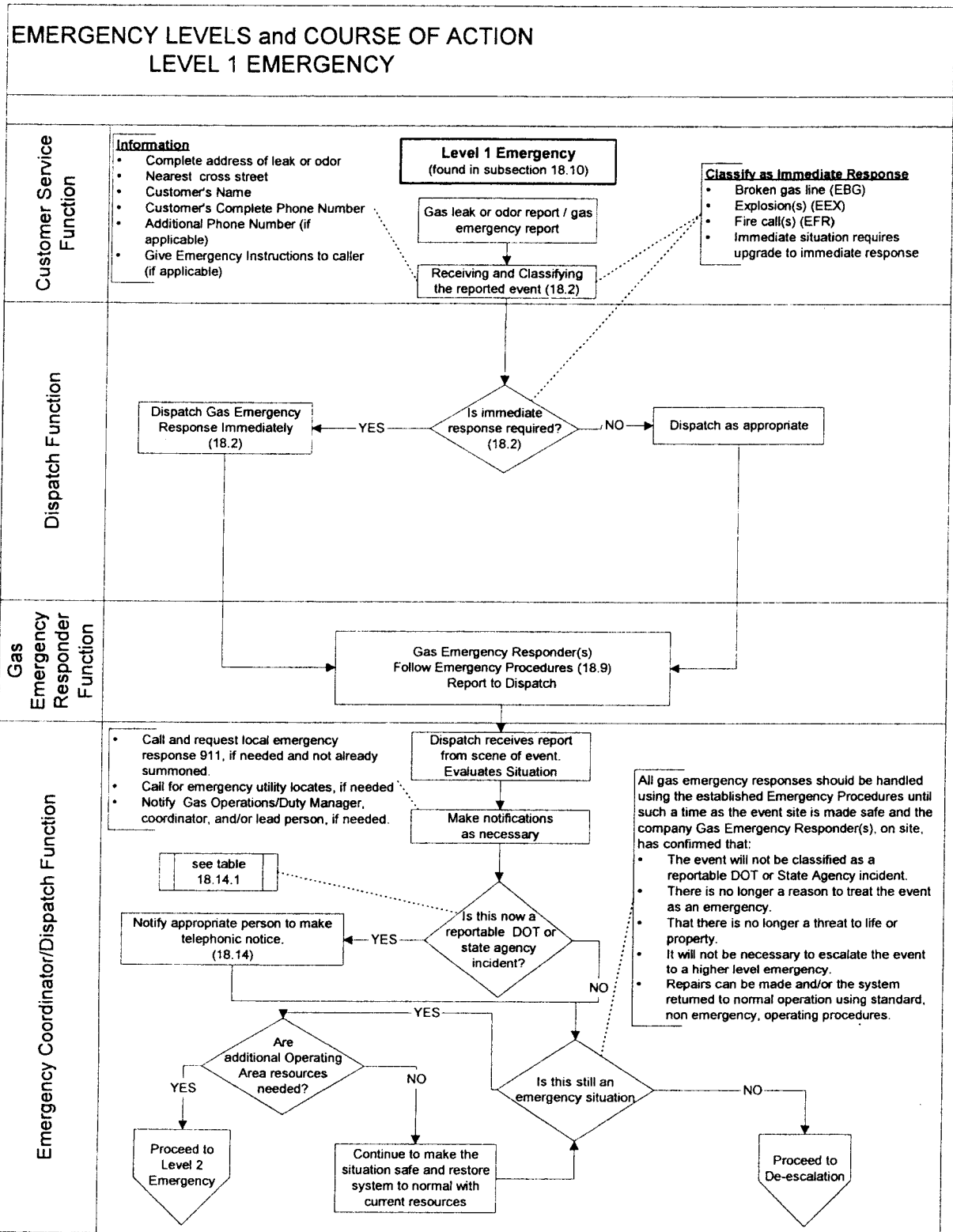
IF the event **was** a DOT and/or state agency Reportable Incident or Accident and it has been telephonically reported,

Then:

- The Gas Operations/Duty Manager assures that the information, necessary to complete the DOT and/or State Agency Incident or Accident Report/forms, is immediately compiled after the event.
- The Gas Operations Manager shall see that the report is completed as soon as practical after the incident and then forwarded to the person or unit responsible for reporting to the Federal or State Agencies. See *Incident Reports, Written Reports Following Telephonic Notice* in section 18, for more details
- Form PHMSA F7100.1 shall be used for all distribution system incidences, form PHMSA F7100.2 shall be used for all transmission/gathering system incidences, and PHMSA 7000-1 for Propane Accidents. For copies of these forms and/or the instructions to complete them, contact *Gas Standards* or print copies off of the *Gas Standards web site*.

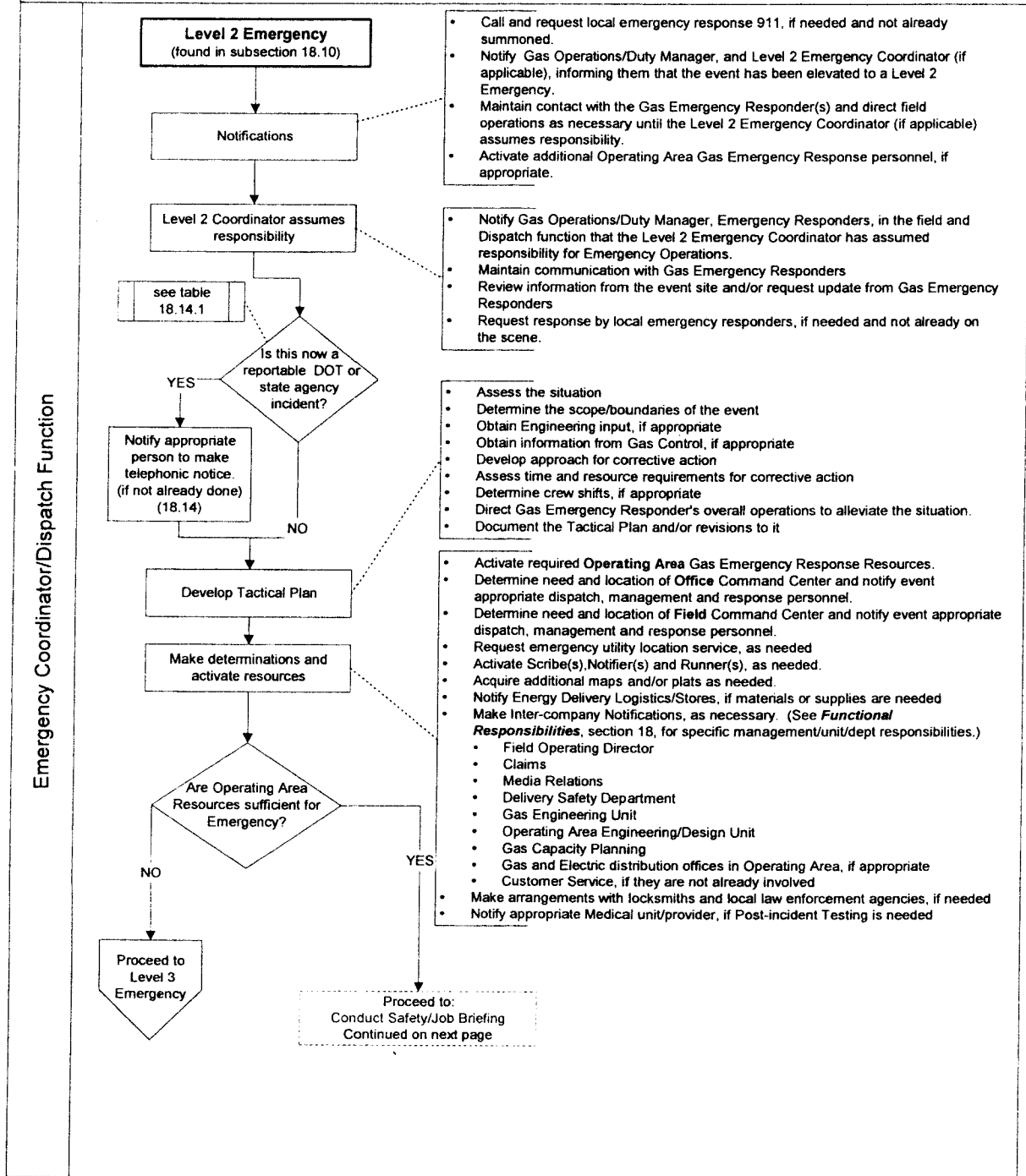
Reviews and Investigations

The Gas Operations Manager has the responsibility to assure that all of the necessary reviews and investigations take place in a timely manner. See section 18, *Documentation, Review and Investigation* for more details. The Gas Operations Manager will designate adequate appropriate company personnel, involved in the Emergency event, to participate in these reviews and investigations.



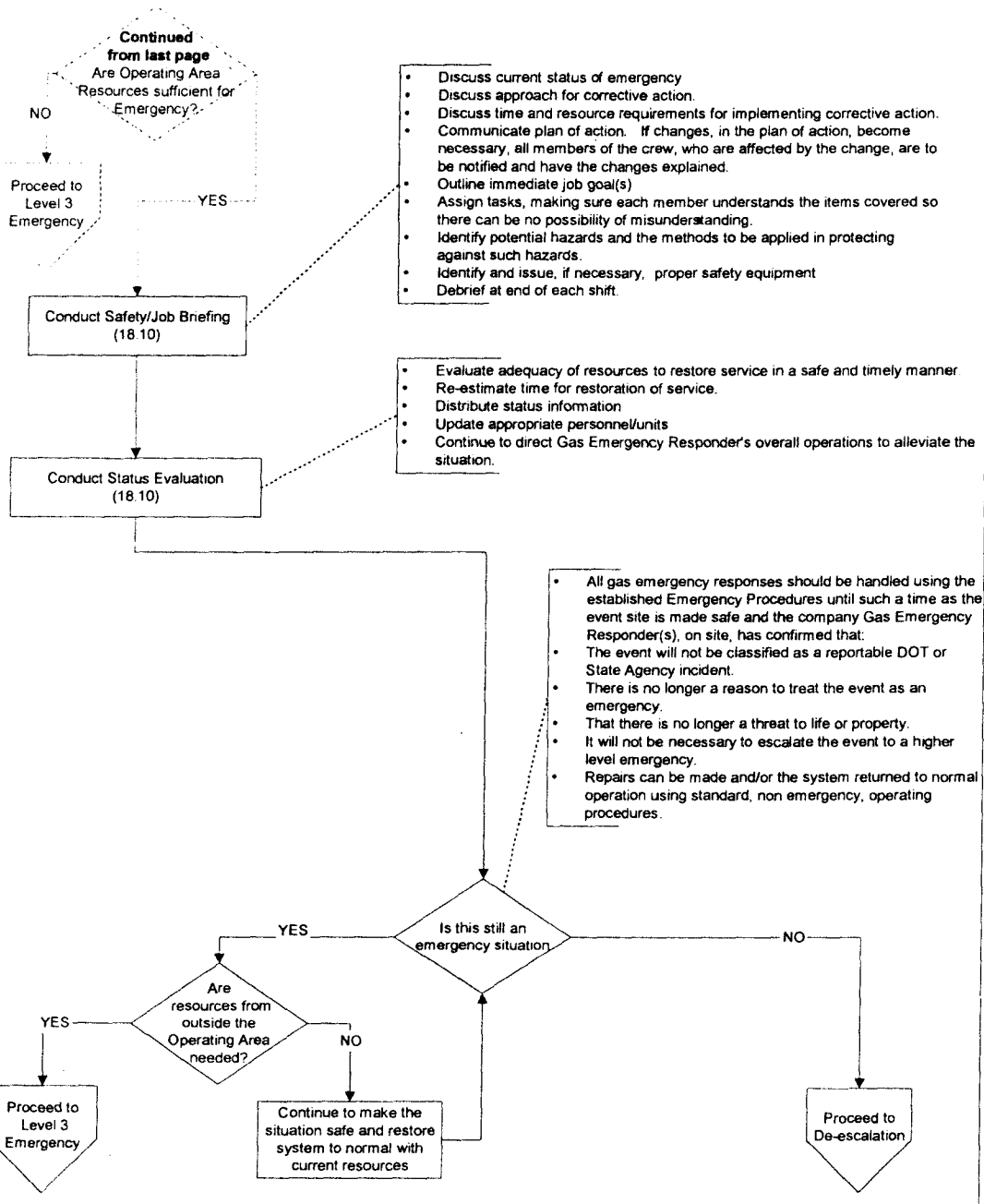
This page intentionally left blank

EMERGENCY LEVELS and COURSE OF ACTION
LEVEL 2 EMERGENCY

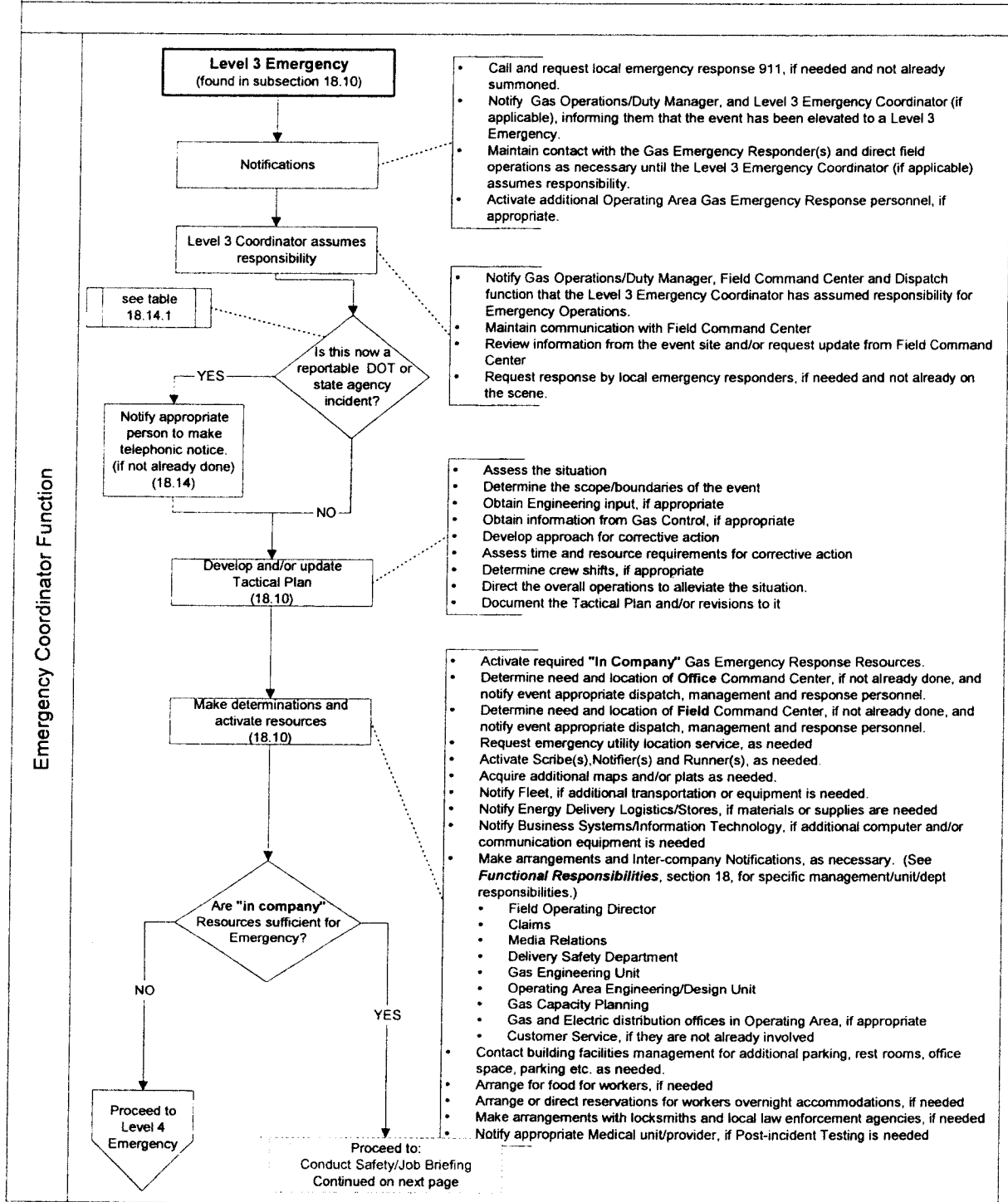


EMERGENCY LEVELS and COURSE OF ACTION
LEVEL 2 EMERGENCY (continued)

Emergency Coordinator/Dispatch Function

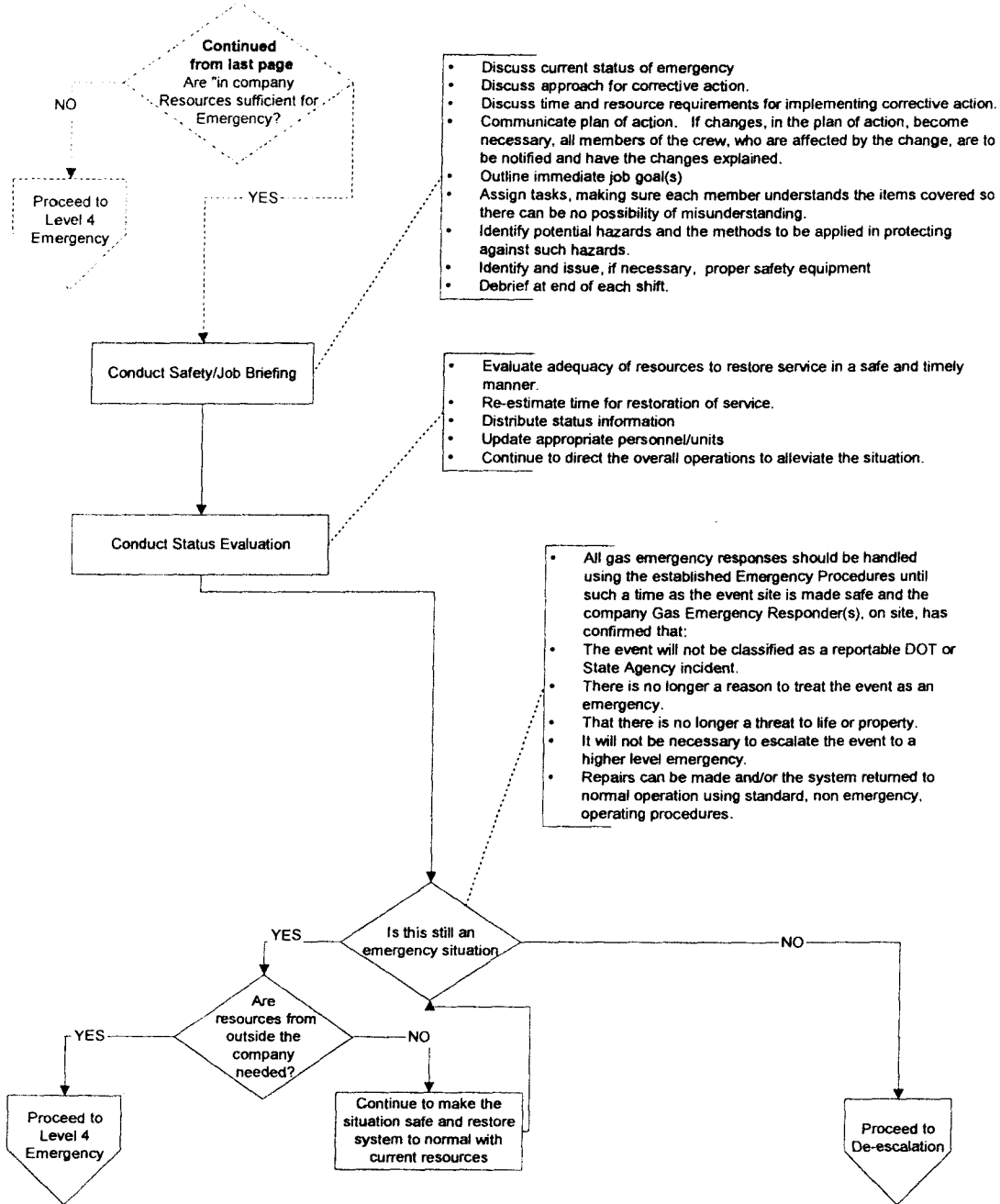


EMERGENCY LEVELS and COURSE OF ACTION
LEVEL 3 EMERGENCY

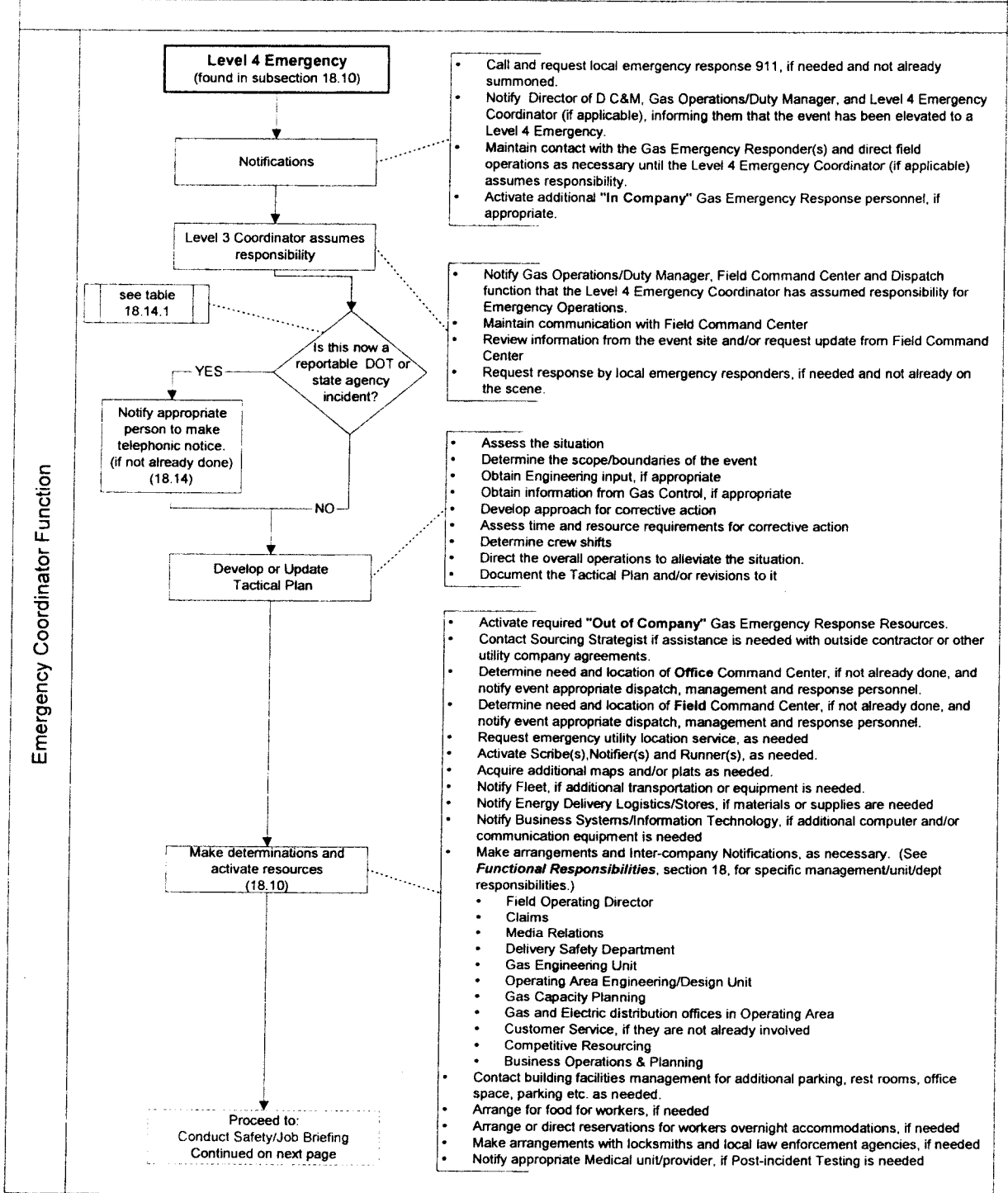


EMERGENCY LEVELS and COURSE OF ACTION
LEVEL 3 EMERGENCY (continued)

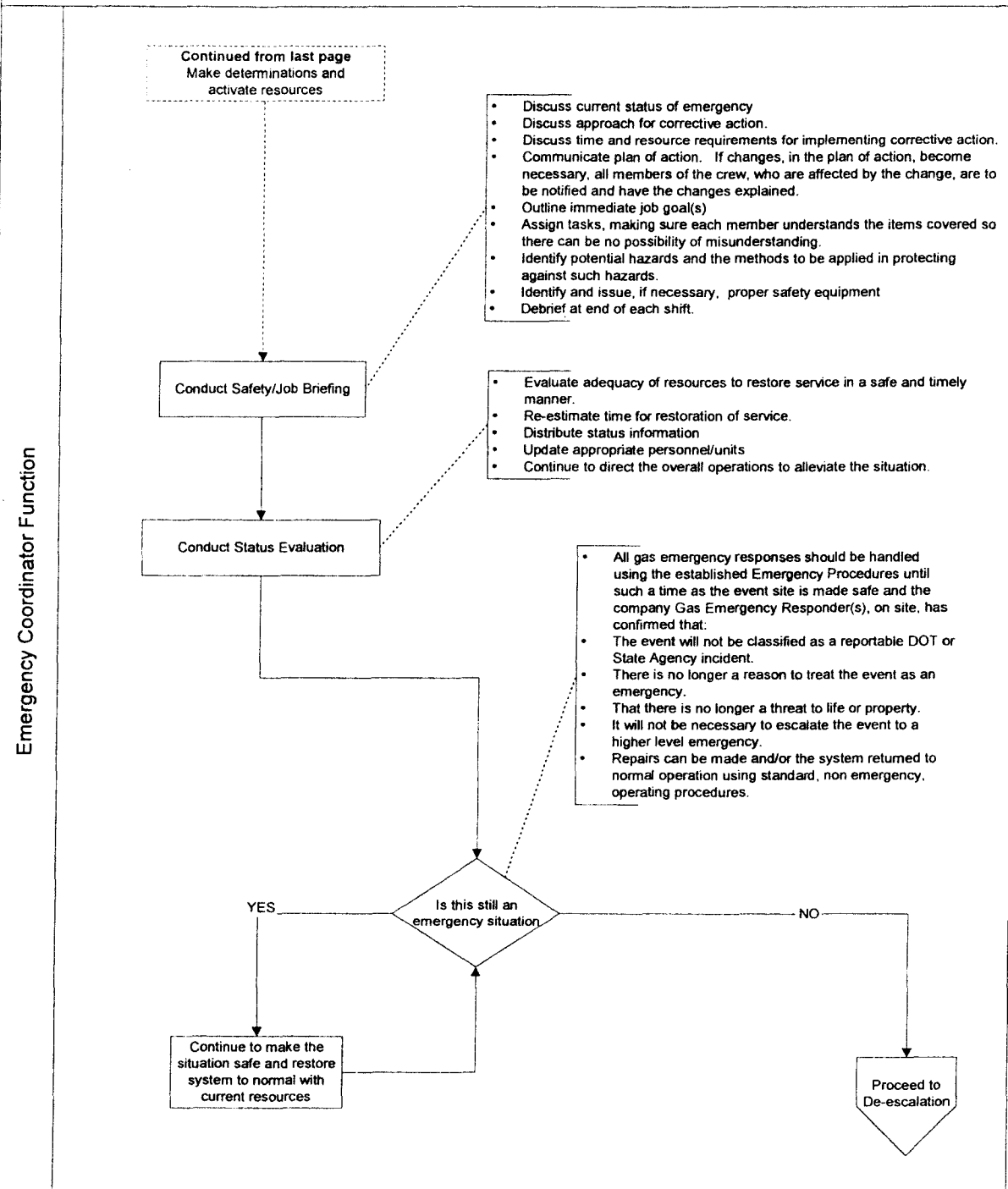
Emergency Coordinator Function



EMERGENCY LEVELS and COURSE OF ACTION
LEVEL 4 EMERGENCY

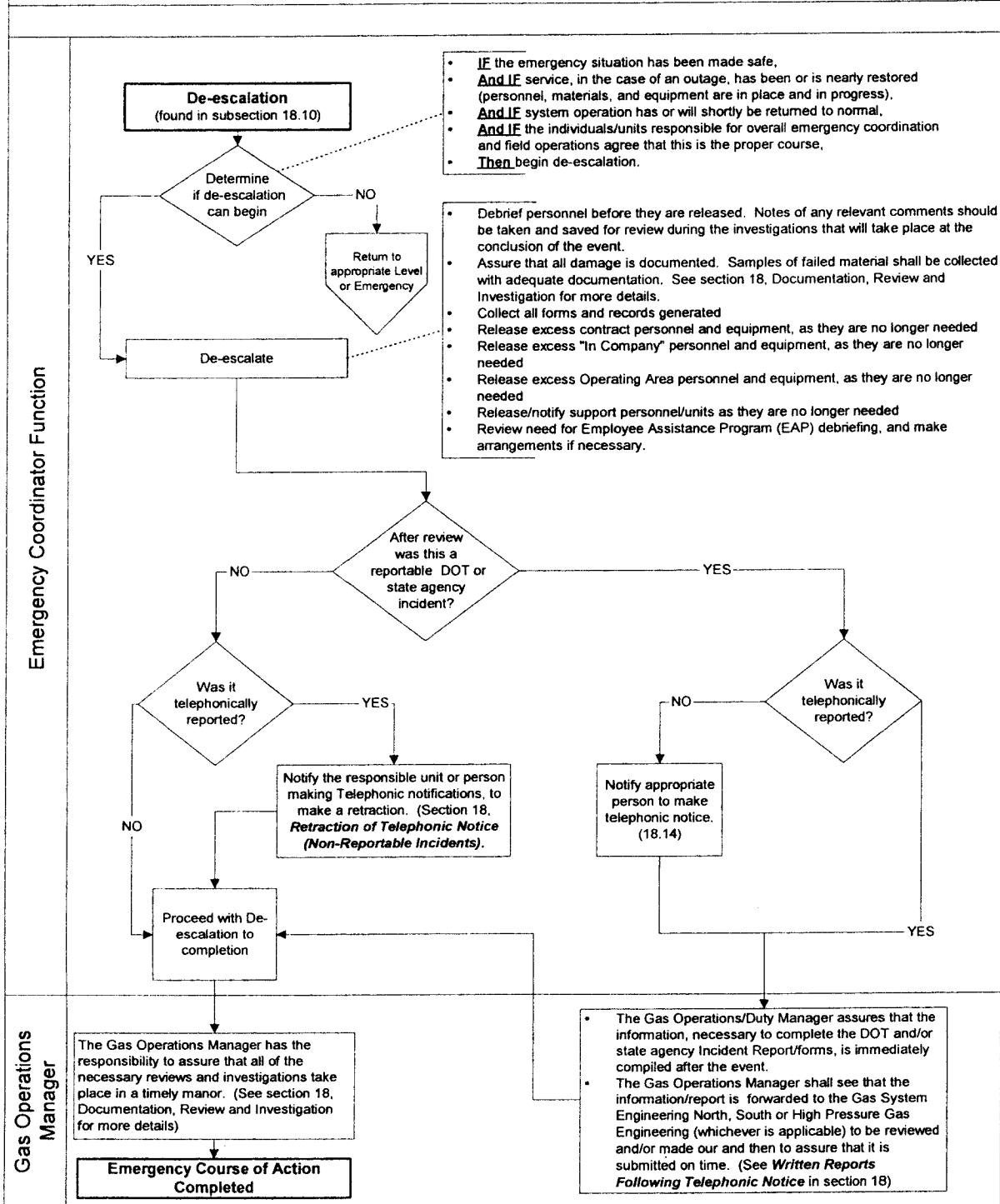


EMERGENCY LEVELS and COURSE OF ACTION
LEVEL 4 EMERGENCY (continued)



EMERGENCY LEVELS and COURSE OF ACTION

De-escalation



Attachment 7

Distribution System Specifications

Gas Facility Operator:	Northern States Power Company dba Xcel Energy 2302 Great Northern Drive, PO Box 2747, Fargo, ND 58102
Gas Facility	
Type:	Natural gas distribution, service line
Operating Pressure:	55 pounds per square inch gage (psig)
MAOP:	60 psig, maximum allowable operating pressure
Service Line:	Century Utility Products, Inc., polyethylene 2306, ASTM D2513
Size:	1/2 inch (copper tube size), 5/8 inch outside diameter
Coupler Type	Aldyl A fusion coupler
Riser	Steel with Aldyl A polyethylene transition (anode attached during installation)

Attachment 8

Public Service Commission Incident Investigators

Primary: Kevin Hanson
Assistant Director, Testing & Safety Division
Gas Pipeline Safety Inspector

Secondary: Patrick Fahn
Director, Compliance & Competitive Markets Division
Commission Gas Pipeline Safety Consultant

Director: Alan Moch
Director, Testing & Safety Division

Attachment 9

NSP Socket Fusion Procedure



Kerry C. Koep
Assistant General Counsel

414 Nicollet Mall, 5th Floor
Minneapolis, Minnesota 55401
Phone: **612.215.4583**
Fax: 612.215.4544

June 15, 2009

Mr. Kevin Hanson, Assistant Director
Testing and Safety Division
North Dakota Public Service Commission
600 E. Boulevard Ave., Dept. 408
Bismarck, ND 58505-0480

Dear Mr. Hanson:

Please be advised that Xcel Energy recently located a page that was part of the Northern States Power Gas Standards Manual from 1973. This document contains information that was previously requested by the NDPSC in its request of October 6, 2008 (Data request number 1-9).

This document is attached as NDPSC 01204. Please consider this as a supplemental response to Xcel Energy's earlier responses to your request for information.

Please feel free to contact me at 612-215-4583 with any questions or concerns regarding this submittal. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kerry C. Koep', written over a horizontal line.

Kerry C. Koep
Assistant General Counsel

Enclosure

cc: Tim Thornton
Garrett Finnegan
John Ness

.6 Laying Pipe

Pipe shall be laid in the trench in such a manner that there shall be firm and substantially continuous bearing under the pipe. It shall fit the ditch without the use of external force to hold it in place until the backfill is completed.

.61 General

The approved sizes of pipe have sufficient wall thickness to withstand direct burial, insertion, bending, handling and hot tapping. Mains must have a minimum of 24" cover. Conditions in the area must be considered to determine if more cover may be required. Visually inspect all pipe when installed and allow time for it to attain ground temperature before final connection is made.

.62 Installation Procedures for Plastic Pipe

.621 Direct Burial

Open trench, or planting should be employed for installation. Pull-in is not recommended. Marker tape (Allen System or equal) must be placed 18" directly above the main and #14 plastic coated wire (copper or copper-clad) laid with the pipe for future location electronically.

.622 Insertion

Old main can be inserted with plastic pipe when special care is given to reaming and support at the ends of the old main as well as effective sealing. Carefully inspect the plastic pipe when inserting and avoid kinking and scraping. The lead end must be closed before inserting.

.623 Bends and Branches

Bends are recommended to change direction with plastic pipe. The minimum bending radius is ten (10) times the outside diameter but no kinked, cracked or miter bend is allowed. Use fittings to make a sharp bend or branch.

.624 Field Repair, Hot Taps & Purging

Cut out and replace any section of pipe that is damaged excessively. Hot taps, especially branching saddles, shall be installed by trained and experienced crews. Plastic pipe is purged by pinching 24" from the cap, cutting 12" from the cap, install a vent riser, and operate the pinching tool as a valve. Reconnect with a fusion coupling. Refer to manufacturer's literature for instructions and limitations regarding pinch-off.

.625 Protective Sleeves

All transition joints (2" and smaller) except for the flange type joint are to be sleeved. This will provide necessary reinforcing to counter shear forces at this type of joint. (See G-D7.62-D1)

.7 Backfilling

.71 Material

Backfilling will normally be done with the excavated soil. In rock excavation, backfill shall be sand or suitable loam soil. A sand cushion shall also be placed under the pipe where rock exists. Where there are rocks in the backfill material, these shall be kept away from the pipe or removed. These soil conditions require a minimum 6 inch layer of rock free backfill over the pipe. Any local requirements on backfilling and restoration of streets must be observed.

6. Heat Fusion Techniques

.1 General

The methods and procedures outlined here are not intended to cover every situation. They serve as a guide for the field operations personnel with the stipulation that when weather conditions or field conditions necessitate variation from these standards the variations are conservative and when working over live gas, variations be attempted in small increments so as to minimize the possibility of blow out. Extra caution should be taken anytime field conditions require modification of these techniques during installation of multi-saddle, tapping tees, or branching saddles on live mains.

These standards are written to cover Century Utility Products Type II, Grade 3 P.E. and DuPont Type II, Grade 3, P.E.

.11 Melt Pattern

The melt pattern or patch on Century Type II Grade 3 polyethylene pipe is not as deep or as runny as in the DuPont pipe of the same type material. No attempt should be made to increase the melt pattern of Century polyethylene pipe by increasing the heating cycle. The heating cycles for the two materials are the same - the melt characteristics are different.

.2 Socket Fusion

.21 General

Generators for electric heat fusion tools should be 1500 watt AC minimum. Gas fired tools are set up for propane.

.22 Procedure

Step (1) Clean pipe ends and socket thoroughly.

Step (2) Chamfer pipe lightly. (Heavy deep chamfer weakens bond by reducing bond area) Chamfering applies to 1 1/2" and larger pipe sizes.

Step (3) Apply depth gauge.

Step (4) Apply cold ring flush against depth gauge.

Step (5) Apply heating iron to pipe and socket at approximately the same time and heat for required time.

Step (6) Snap iron off pipe and coupling simultaneously.

Step (7) Force socket onto pipe after quick inspection of melt pattern. Socket fitting should be forced against cold ring and held with positive pressure for 15 to 30 seconds.

.23 Special

(a) Heat fusion temperature should be 515^oF. (Ranging from a minimum 500^o F and a maximum 525^oF.)

(b) Clean teflon surfaces with wooden stick.

(c) Periodic checks should be run on heating iron to insure proper thermometer operation. Gas fired tools, because of improper care, tend to give false thermometer readings. Spare thermometers should always be on hand.

(d) Carbon build-up on fusion tools may be cleaned at end of day by leaving excess P.E. on hot iron, cooling iron and pulling P.E. off cold joining faces.

- (e)
- | <u>Socket Fusion Cycles</u> | | |
|-----------------------------|----------------------|---------------------|
| <u>Pipe Size</u> | <u>Heating Cycle</u> | <u>Cooling Time</u> |
| 1/2 cts. to 1" | 4 to 6 | 60 |
| 1 1/2 to 2" | 8 to 10 | 60 |
| 3 & 4" | 11 to 15 | 120 |
- (f) Any socket fitting with grease or oil on ID should be discarded or in case of large expensive fittings, returned to shop for cleaning with degreaser and then light emery paper. Grease and oil are the worst enemy of fusion joints.

.3 Tapping Tee - Saddle Fusion

.31 General

Saddle fusion, tapping tees and multi-saddles depend upon full pattern on both pipe and saddle.

.32 Procedure

- Step (1) Clean pipe and saddle. Sand both lightly with 120 grit emery paper. (Make sure no moisture is on either joining surface.)
- Step (2) Clamp pipe with 2 cold rings. (Install cold ring clamp assembly.)
- Step (3) Check heating iron temperature. Temperature should be 515°.
- Step (4) Press heating iron onto pipe for 2-3 seconds to check pattern.
- Step (5) Heat pipe and saddle simultaneously for 20 seconds pressing firmly with 50 to 75 lbs.
- Step (6) Snap iron off pipe and saddle off iron.
- Step (7) Check saddle and pipe for full melt. (Do this quickly.)
If check does not indicate a full melt pattern, move to a new location and repeat steps 1 - 7.
- Step (8) Press saddle firmly on pipe and hold for 30 seconds.
- Step (9) Let cool for 3 to 5 minutes and pressure test saddle.
- Step (10) Connect service line and tap. Add protective sleeve.
- Step (11) Add cap. Cap should be installed with hard hand pressure. (Tapping tee only.) Do not use wrench.

Special - In the event accidental overheating should cause pipe to expand indicating potential blow out do not press tapping tee or multi-saddle on main since this will increase the possibility of blow out. Cool pipe as quickly as possible.

.4 Emergency Squeeze Off

In case of an emergency the gas flow may be temporarily stopped off on plastic pipe sizes 1" CTS and under by simply crimping the pipe back on itself, thereby, stopping gas flow. After gas has been stopped, tape both pieces of pipe together so that pipe is fastened securely. Cut out crimped area when permanent repair is made.

- (1) When using squeezing tool, care should be taken to prevent over-squeezing or accidental crimping of pipe. (Use stops.)
- (2) Always use clean round squeeze bars.
- (3) Point of squeeze should be located at least one foot from nearest fusion fitting.
- (4) When working on broken main squeeze at least 3 feet from break.
- (5) Use wet cloth across all plastic lines while making repairs to prevent ignition from static electricity.

.5 Cold Weather Procedures

.51 Socket Fusions

When making socket joints in cold weather, insert male end of joint into the tool, and very slowly rotate tool. When pipe has come into full contact with tool, start cycle count. On the other side, (coupling) slide the coupling on the tool when the cycle counting is started on the female side of the tool, as described above. Saddle fusion technique-cold weather.

.52 Saddle Fusions

- Step (1) Using an above the ditch sample piece of pipe (sample pipe must be DuPont's Aldyl "A"), which has been exposed to the weather for at least one hour, after installing a cold ring clamp assembly, press heating iron on pipe for 3 seconds to check pattern.
- Step (2) Heat pipe for 20 seconds.
- Step (3) Snap off tool and observe melt.
- Step (4) If melt insufficient, reheat sample using additional 3 second timing. Continue as necessary until proper timing is established.
- Step (5) Go to pipe in ditch, install cold ring clamp assembly.
- Step (6) Press heating iron on pipe for 3 seconds, check pattern.
- Step (7) Heat pipe and saddle simultaneously for the time required in test sample. (Item (4) above.)
- Step (8) Snap iron off pipe and saddle.
- Step (9) Check each for full melt pattern quickly. (Do not confuse melt appearance with full melt pattern.)
- Step (10) Press saddle firmly on pipe and hold for 30 seconds.
- Step (11) Let cool for 5 minutes and pressure test.

(D6.5)

.5 Cold Weather Procedures

.51 Socket Fusions

When making socket joints in cold weather, insert male end of joint into the tool, and very slowly rotate tool. When pipe has come into full contact with tool, start cycle count. On the other side, (coupling) slide the coupling on the tool when the cycle counting is started on the female side of the tool, as described above.

.52 Saddle Fusions - Cold Weather Technique

- Step (1) Using an above the ditch sample piece of pipe (sample pipe must be DuPont's Aldyl "A"), which has been exposed to the weather for at least one hour, after installing a cold ring clamp assembly, press heating iron on pipe for 3 seconds to check pattern.
- Step (2) Heat pipe for 20 seconds.
- Step (3) Snap off tool and observe melt.
- Step (4) If melt insufficient, reheat sample using additional 3 second timing. Continue as necessary until proper timing is established.
- Step (5) Go to pipe in ditch, install cold ring clamp assembly.
- Step (6) Press heating iron on pipe for 3 seconds, check pattern.
- Step (7) Heat pipe and saddle simultaneously for the time required in test sample. (Item (4) above.)
- Step (8) Snap iron off pipe and saddle.
- Step (9) Check each for full melt pattern quickly. (Do not confuse melt appearance with full melt pattern.)
- Step (10) Press saddle firmly on pipe and hold for 30 seconds.
- Step (11) Let cool for 5 minutes and pressure test.

.6 Butt Fusion

.61 General

Butt fusion is a method of joining polyethylene pipe and fittings. The butt fusion joint eliminates the stress concentration caused by a change in section which is present in socket fusion joints. Butt fusion must be done with a butt fusion machine. Using this machine and the correct procedure will produce reliable joints stronger than the pipe itself.

.62 Procedure

- Step (1) Plug in heater 110 AC only - set degrees as required.
a. 3000 watt generator is the minimum size.
- Step (2) Retract machine's movable shell back against the stops.
- Step (3) Swing facing unit into place and lock.
- Step (4) Place pipe in machine using adapter, if necessary, and tighten.
- Step (5) Using handle lever, bring pipe ends together against facer and turn on facer motor. Apply pressure until speed-up of motor or STOPS bottom out.
- Step (6) Remove facer and check alignment (maximum outside diameter misalignment 1/64 for 2" and 1/32 for larger.)

FORM 17-0877

NORTHERN STATES POWER COMPANY GAS UTILITIES	DRAWN	FILMED	REV	GAS CONSTRUCTION STANDARDS	
	CHECKED R.C.S. DATE 8-15-77	APPROVED <i>H.A.A.</i>	A	SHEET	D-21

NDPSC 01192

- Step (7) Place heater at required degrees into position and butt pipe ends sharply against heater and hold with 70-100 inch pounds pressure per pipe manufacturer's table.
- Step (8) Begin timing when slight bead becomes visible completely around entire circumference of both pipe ends. Check heating time on fusion cycle table for size and type of pipe.
- Step (9) Bring two ends of pipe together quickly at required torque pressure shown on butt fusion procedure table and hold firmly to assure complete contact, and hold according to specified time for given sizes.
- Step (10) Clean heater faces.

.63 Pipe can normally be handled with care 2 to 10 minutes after fusion. Allow further cooling (10 to 20 minutes) to full strength before subjecting the pipe to severe handling stress.

.64 Inspection
The field technique for evaluating a joint is bead appearance. Inspect the entire circumference of the fused joint for uniform nonporous bead alignment and appearance. Improper fusion must be redone.

.65 Cold Weather Procedure
Follow the standard procedure with particular attention to fusion steps. The timed heating cycles remain the same, but it may take longer to develop the initial melt bead completely around the pipe ends.

- (1) Do not increase pressure.
- (2) Do not increase the temperature of heating iron.
- (3) Keep pipe and equipment free of ice and snow.

7. Construction Practices and Procedures

.1 General

Each main must be constructed in accordance with the preceding written standards. In addition it must be recognized that construction practices and procedures are just as important as material and equipment specifications in order to assure completed construction that meets the desired standards. All local construction requirements in regard to permits, easements, and right-of-way, street excavation, and restoration specifications must be complied with. Interference with other utility structures must be coordinated. Where there has been a lapse of time between the field engineering and start of construction, clearances must be rechecked to assure that the location selected for the new construction is still satisfactory.

.2 Inspection

Each main installed in the distribution system must be inspected by the foreman in charge or a designated company inspector to insure that it is constructed in accordance with these standards. Materials shall conform with the specifications prescribed in both the appropriate company material standards and these construction standards. All material should be checked

FORM 17-0877

NORTHERN STATES POWER COMPANY	DRAWN	FILMED	REV	GAS CONSTRUCTION STANDARDS	
	CHECKED <i>RC.S.</i>	APPROVED <i>HLA</i>	A	SHEET	D-22
	DATE <i>8-15-77</i>				

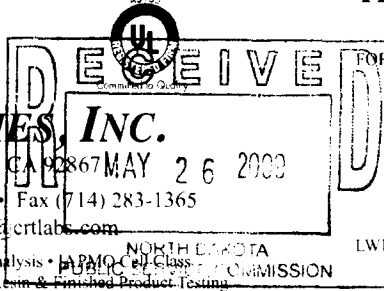
Attachment 10

CRT Laboratories, Inc. Final Lab Report



CRT LABORATORIES, INC.

1680 North Main Street, Orange, CA 92667
(800) 597-LABS (5227) • (714) 283-2032 • Fax (714) 283-1365
www.crtlabs.com • e-mail: crtlabs@crtlabs.com



Public Service Commission (ND)
600 E. Boulevard Avenue, Department 408
Bismarck, ND 58505-0480
Tel: (701) 328-2401 / Fax: (701) 328-2133
ATTN: Darrell Nitschke / Alan Moch

LWR NO: 17936 DATE: April 29, 2009

ASTM Physical & Mechanical • Chemical-Thermal Analysis • APAC Cell Class
Geosynthetic Materials • Plumbing & Faucet Assemblies • Resin & Finished Product Testing

BACKGROUND:

The customer submitted one assembly for failure analysis. The sample was delivered on 02/02/2009 via Excel Energy courier. Visual inspection was performed on 02/02/2009 and no "visual" defects were noted. Testing in accordance with CRT approved test protocol dated 11/21/2008, in addition to advance check # 51355318 received on 02/03/2009.

CRT order entry log date: 02/03/2009 / **Report due date:** 04/29/2009

CRT Notes:

Excel Energy and opposing expert arrived on 03/25/2009 to witness slicing the assembly down the axis of the tubing, which was approved by Alan Moch on 03/25/2009 (approximately 10 A.M.) via telecom

Product ID: Fargo Gas Riser with approximately 3ft pigtail with an in-line PE coupling fused to Century PE tan tubing

PREPARATION:

Conditioning – ASTM D 618, 40 hours in a standard laboratory environment
CNC & Machining – CRT / ASTM methods
Nitrogen (N₂) – ASTM D 3418

TEST PROCEDURES:

Pinhole Leak Scope:
Fiber-optic, Stereo-zoom Microscopic – CRT methods (Forensic Engineering)
Double-scan Thermal Analyses (DSC) – Differential-scanning Calorimetry – ASTM D 3418 / CRT methods (50°C thru 300°C)
Fourier-transform Infrared Microspectroscopy (FT-IR) – CRT methods
Fractology – Forensic Engineering
Melt Flow Rate (g/10 min) – ASTM D 1238 (190°C / 2.16Kg.)
Alternate – Dimensions per ASTM D 2513-08b(09) (Table-2)

Courtesy testing:

TEST PROCEDURES:

Fusion Bead Scope:
SEM-EDS (X-ray) – Forensic Engineering
Tensile Bead properties @ 23°C (Strip Tensiles) – CRT / ASTM / CRT modified methods
Double-scan Thermal Analyses, N₂ (DSC) – Differential-scanning Calorimetry – ASTM D 3418/CRT methods (50°C through 300°C @ 10°C/min)
Fourier-transform Infrared Microspectroscopy (FT-IR) – CRT methods
Fractology – Forensic Engineering

Specimen Retain: BB (30-day retain only unless otherwise specified)

CRT LABORATORIES, INC.

UL Approved-Registered / UL-ISO 9001:2000 Certified – ISO-IEC 17025 Compliant

Ken A. Le Jeune
COO / Laboratory Director

Jeffrey A. Blackford
Senior Laboratory Manager

12 GS-08-765 Filed: 5/26/2009 Pages: 13
Final Laboratory Report on Riser

The liability of CRT Labs with respect to the work and report covered herein, shall in no event exceed the amount of the invoice. We recommend consideration that correlative data be generated by other laboratories in matters of litigation. CRT will retain tested samples for 30 days after testing is completed, unless other arrangements are agreed upon at the time order is placed. This report, whether in whole or in part, any logo, etc., in advertising or publicity must have CRT's written permission prior to use. This test data is for exclusive use of the client to who it is addressed and results apply only to sample(s) tested and does not apply to similar or identical products. This report shall not be reproduced except in full. Testing performed in accordance with ISO 17025. Form Q.S. 43 (10-05)

**CRT LABORATORIES, INC.**

1680 North Main Street, Orange, CA 92867

(800) 597-LABS (5227) • (714) 283-2032 • Fax (714) 283-1365

www.crtlabs.com • e-mail: ctrlabs@crtlabs.com

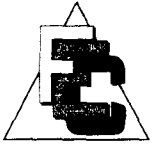
ASTM Physical & Mechanical • Chemical-Thermal Analysis • IAPMO Cell Class
Geosynthetic Materials • Plumbing & Faucet Assemblies • Resin & Finished Product TestingFOR: Public Service Commission (ND)
600 E. Boulevard Avenue, Department 408
Bismarck, ND 58505-0480
Tel: (701) 328-2401 / Fax: (701) 328-2133
ATTN: Darrell Nitschke / Alan Moch

LWR NO.: 17936 DATE: April 29, 2009

TABLE 1

SCOPE: Failure analysis**SAMPLE ID:** Fargo Gas Riser w/approximately 3ft pigtail with an in-line PE coupling fused to Century PE Tan Tubing**TEST RESULTS:** The final results of testing are shown below, along with other attached data. In addition, Forensic Engineering report shall be sent by hard copy to Mr. Darrell Nitschke (Executive Secretary).**Fiber-optic analysis:** Forensic Engineering report shall be sent directly to the client via hard copy.

	<u>Sample-1 (Pinhole Leak scope)</u>	<u>Sample-2 (Fusion Bead scope)</u>
	N/A	SEM-EDS (X-ray) See attached SEM photos
Tensile Strip @ 23°C	2,110 – 2,249 Yield Psi	2,518 – 2,457 Yield Psi
Avg.:	2,180 Psi / 15 MPa	2,487 Psi / 17.1 MPa
Tensile Strip @ 23°C	27.2% – 31.9% Yield Elongation	21.6% – 21.4% Yield Elongation
Avg.:	29.6%	21.5%
Tensile Strip @ 23°C	82.93 – 90.10 Peak Pounds	87.59 – 82.70 Peak Pounds
Avg.:	86lbs (tubing only)	85lbs (bead to coupling only)
Differential-scanning (DSC)	127.3°C peak melt temperature Typical for PE base materials No foreign material detected	128.6°C peak melt temperature Typical for PE base materials No foreign material detected
Crystallinity % (PP)	27.2	33
Heat of Fusion (PP)	85.6 J/g	98.8 J/g
Maximum induction point (degradation)	253.0°C (good quality)	245°C (decent quality)
Fourier-transform Infrared (FT-IR)	Polyethylene (identical to sample-2)	Polyethylene (identical to sample-1)
Contamination:	No foreign material detected	No foreign material detected
Melt Flow Rate (g/10 min)	0.354 – 0.348 – 0.348	N/A
Avg.:	0.35 g/10 min	N/A
Std. Dev.:	0.003465	N/A
	Fractional melt base (indicative to HDPE for Tubing)	N/A
Dimensionals:	0.003465	N/A
(ASTM D 2513-08b)	O.D. (0.621" – 0.629")	N/A
Avg.:	0.625" / Pass	N/A
	Wall Thickness (0.090" – 0.099")	N/A
Avg.:	0.091" / Pass	N/A



Forensic Engineering Consultants, LLC

2512 Chambers Road, Suite 208, Tustin, CA 92780
www.ForEnCon.com Email: info@ForEnCon.com
(714) 573-4006 FAX (714) 573-4608

April 29, 2009
File Number 209077

CRT Laboratories
1680 N. Main
Orange, CA 92867

Attn.: Mr. Ken Le Jeune

RE: Plastic welds
Laboratory Work Request 17936

BACKGROUND

It was reported that a plastic tube had failed at a welded joint after several decades of service in a gas meter. We were requested to examine a portion of the tube to determine the cause of its failure and to visually evaluate an associated plastic weld.

EXAMINATION AND ANALYSIS

The submitted materials consisted of two sections of plastic welds, each at a lap joint in which a tube had been inserted into a fitting. Both the tubes and fittings were reportedly constructed of high density polyethylene. The larger of the received items was a longitudinal half section of a fitting end and approximately four inch length of tubing. The other, smaller received item was a longitudinal half section of a fitting end containing the failed end of the joined tube. The mating side of this failure – the tube length beyond the fitting end – was not received for examination.

Both items were inspected with the aid of a binocular microscope. Although the weld bead on the end of the larger section fitting appeared somewhat irregular, the fusion between the fitting and tube at the cross section appeared sound. There was no visual evidence of any lack of

fusion, entrapped foreign material or voids. Because the length of this lap joint substantially exceeded the wall thickness of the tube, it was anticipated that a tensile overload of these materials would result in a fracture through the tube, while leaving the welded joint intact.

The welded joint of the failed item appeared similarly sound, with two exceptions. The cross section displayed a lack of fusion for a length of approximately 0.03 inch at the end of the fitting, although there was no evidence that this feature had contributed to the crack in the tube. More significantly, the fracture surface at this weld exhibited a cavity containing approximately eight particles of apparent sand. Chevron marks and radiating patterns on the fracture surface indicated that the crack had originated at the inboard edge of this cavity. These features revealed that this void had served as a stress concentrator that contributed to the failure.

Other features suggested that the joint had experienced a relatively high load or stress at the time of the failure. The fracture surfaces displayed no evidence of joint having been weakened during service. There was no evidence of environmental stress cracking, progressive craze cracking or fatigue cracking. Although the originally fabricated joint had been weakened by the presence of entrapped debris, the final cracking from that site appeared to occur as a single, sudden event.

Although the received section did not contain the entire crack surface, the received crack pattern suggested that the joint had experienced a bending load – with tensile stress being concentrated at one side of the tube – at the time of failure. Also, the cavity did not appear to be centered at the middle of the crack. This suggested that although the cavity served as a crack initiation site, the overall tube had been highly stressed in bending at the time of failure.

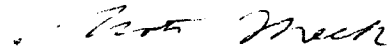
CONCLUSIONS

The welded joint at the cross section of the larger received item appeared to be sound.

The failure of the cracked tube was attributed to the combination of a cavity formed by debris entrapped at the time of welding that served as a stress concentrator and a relatively high bending load at the time of failure.

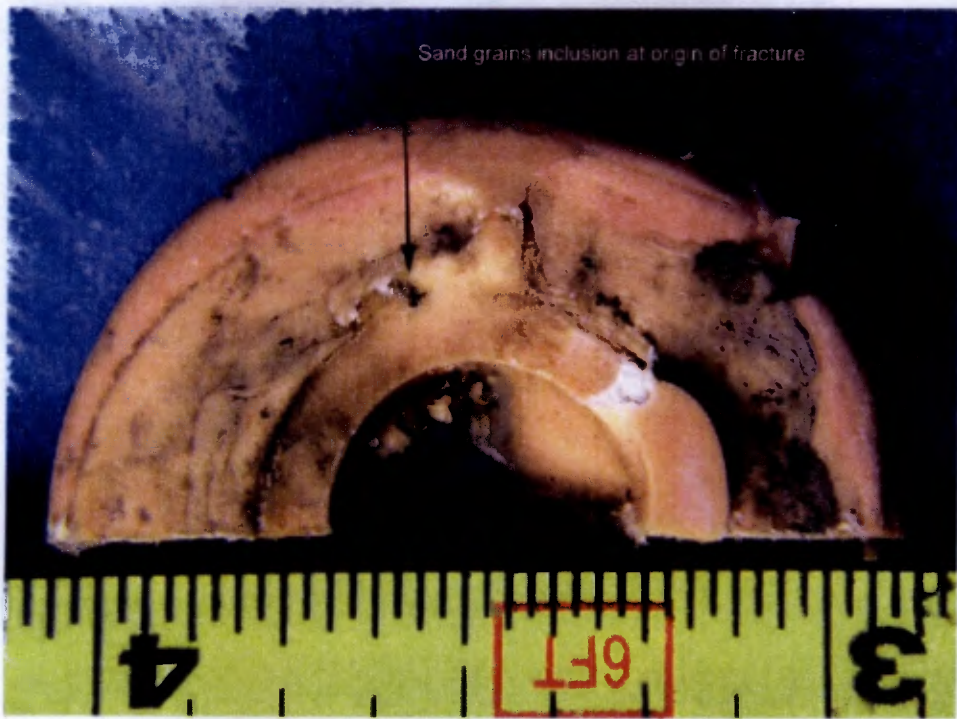
Respectfully submitted,

FORENSIC ENGINEERING CONSULTANTS

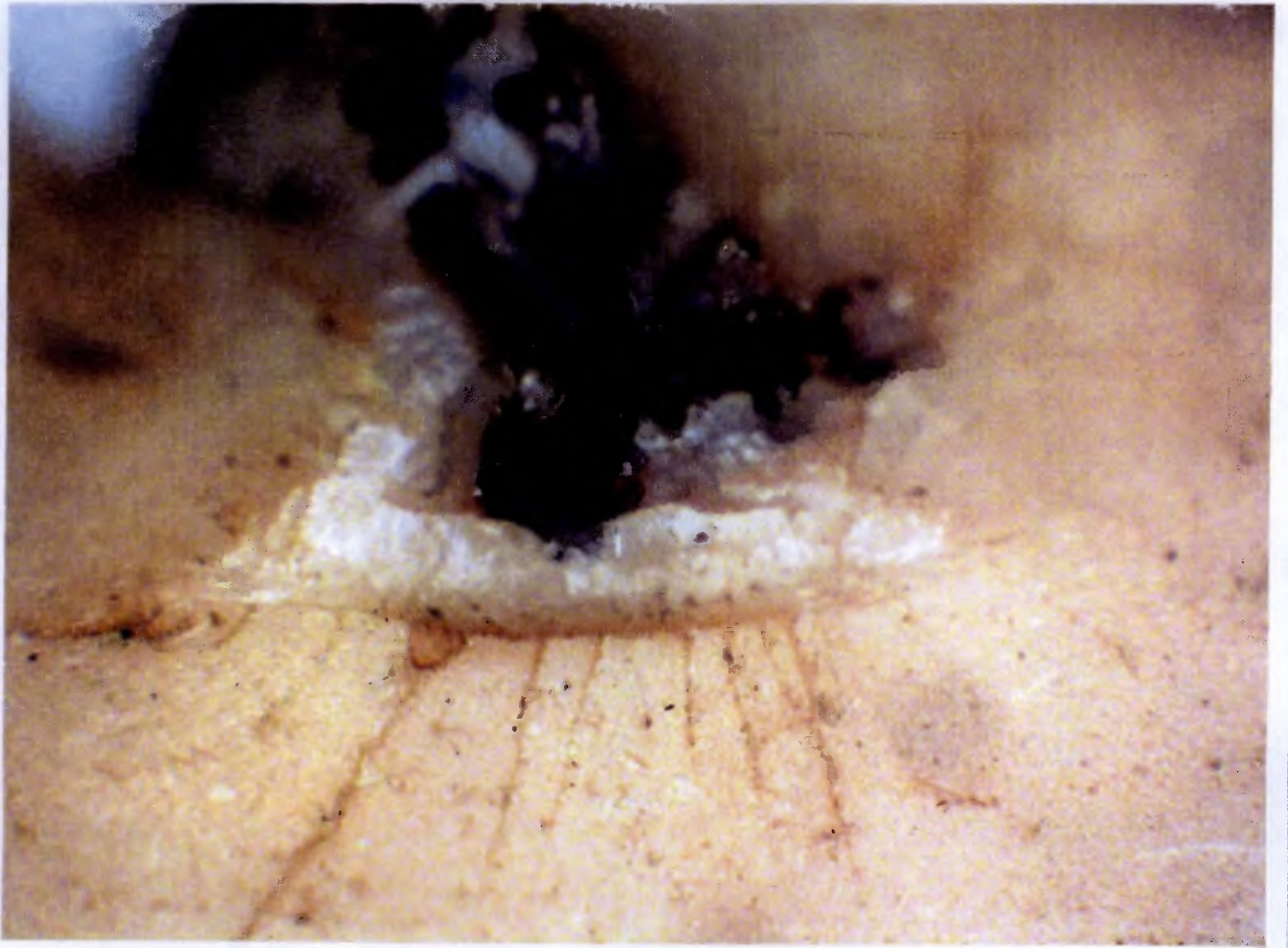


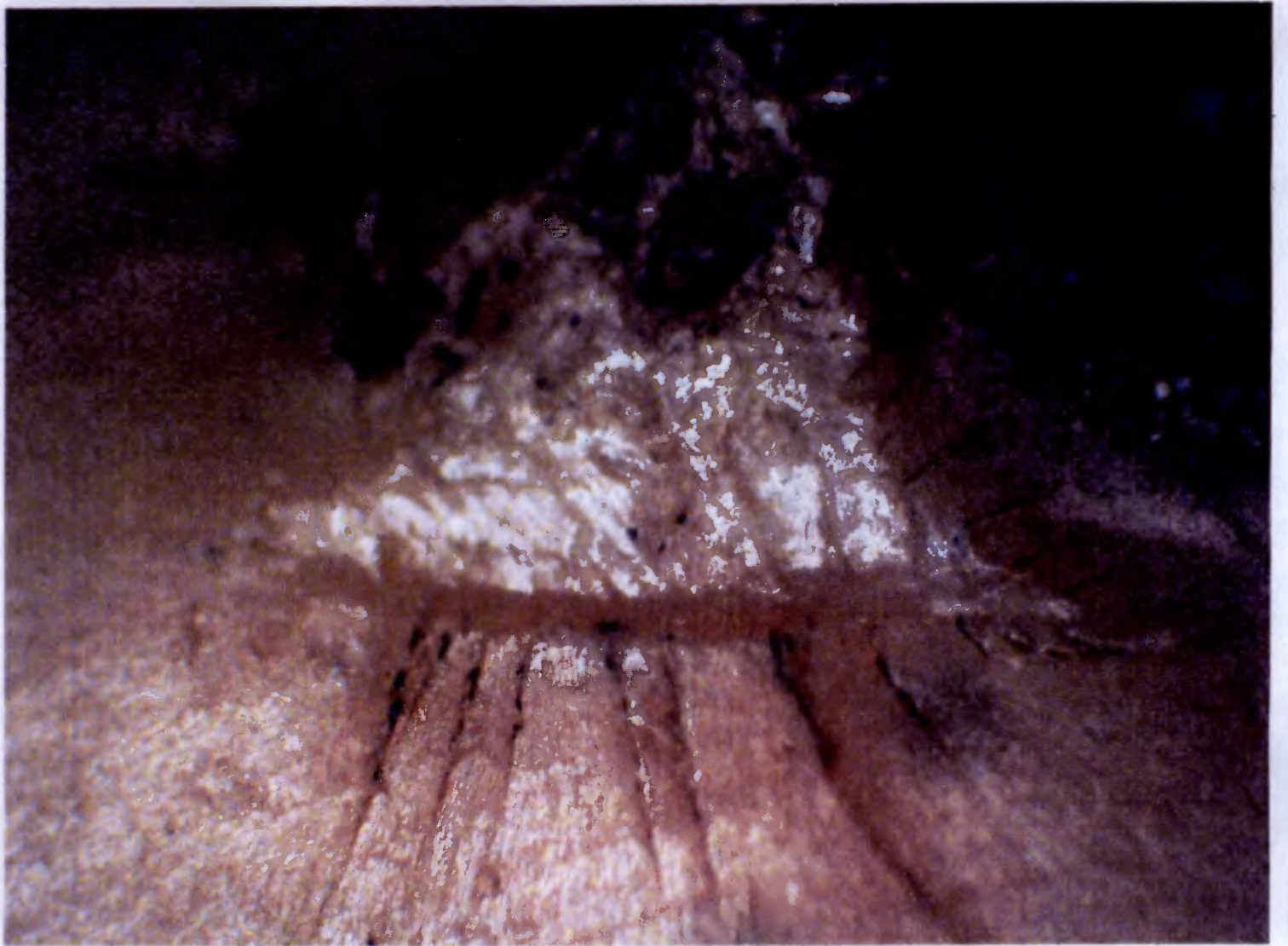
Scott Meek, B.S.
Registered Professional Engineer
Texas License No. 44413

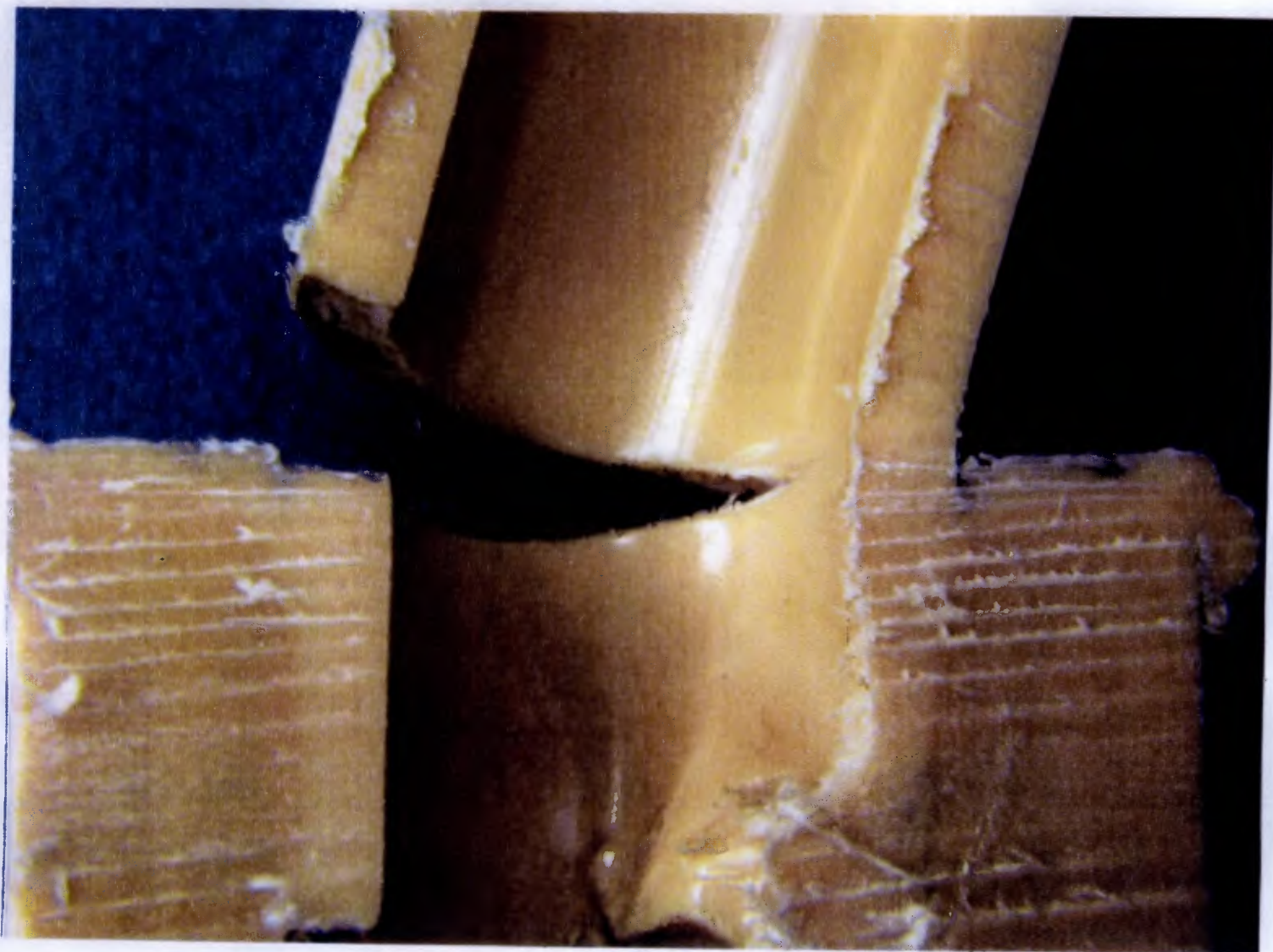
Sand grains inclusion at origin of fracture









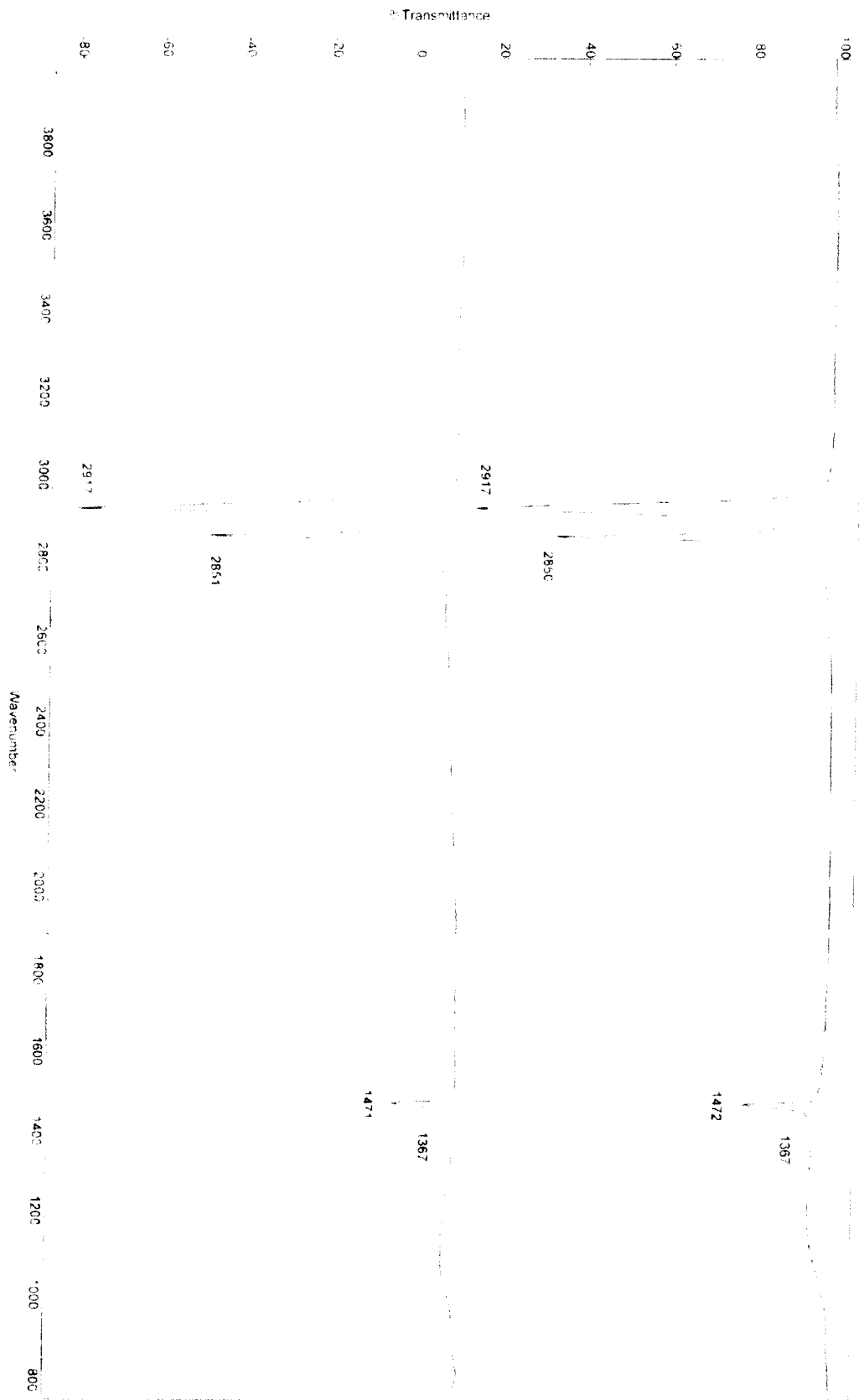






fused bead area

Pinhole area



No significant differences are seen between the spectra.

Attachment 11

Federal Advisory Bulletins Concerning Century Pipe

Advisory Bulletin ADB-99-01

[Notices] [Page 12211-12212]

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

Potential Failure Due to Brittle-Like Cracking Certain Polyethylene Plastic Pipe Manufactured by Century Utility Products Inc

AGENCY: Research and Special Programs Administration (RSPA), DOT.

ACTION: Notice; issuance of advisory bulletin on Century polyethylene gas pipe to owners and operators of natural gas distribution systems.

SUMMARY: This advisory bulletin is directed at owners and operators of natural gas distribution systems that have installed plastic pipe extruded by Century Utility Products Inc. from Union Carbide Corporation's DHDA 2077 Tan medium density polyethylene resin (Century pipe). Pipe manufactured between 1970 and 1973 may fail in service due to its poor resistance to brittle-like cracking. Operators with Century pipe in their systems should closely monitor this pipe for leaks with increased leak survey frequency. Century pipe that may be improperly installed, repaired, or operating in an environment that impairs pipe strength should be replaced.

ADDRESSES: This document can be viewed on the Office of Pipeline Safety (OPS) home page at: <http://ops.dot.gov>.

FOR FURTHER INFORMATION CONTACT: Gopala (Krishna) Vinjamuri at (202) 366-4503, or by E-mail at vinjamuri@rspa.dot.gov.

SUPPLEMENTARY INFORMATION:

I. Background

The National Transportation Safety Board (NTSB) recently published the results of a special investigation into accidents that involved plastic pipe currently in use to deliver natural gas to residential and business use. The report, Brittle-Like Cracking in Plastic Pipe for Gas Service (NTSB/SIR-98/01; April 23, 1998) suggested that "[d]espite the general acceptance of plastic piping as a safe and economical alternative to piping made of steel and other materials, [a] number of pipeline accidents investigated have involved plastic piping that cracked in a brittle-like manner." Copies of this report may be obtained from NTSB Public Inquiry Office by calling 202-314-6551.

The phenomenon of brittle-like cracking in plastic pipe as described in the NTSB report and generally understood within the plastic pipeline industry relates to a part-through crack initiation in the pipe wall followed by stable crack growth at stress levels much lower than the stress required for yielding, resulting in a very tight slit-like opening and gas leak. This failure mode is difficult to detect until significant amount of gas leaks out of the pipe, and potentially migrates into closed space such as basements of dwellings. Premature brittle-like cracking requires relatively high localized stress intensification that may be a result from geometrical discontinuities, excessive bending, improper fitting assemblies, and/or dents and gouges. Because this failure mode exhibits no evidence of gross yielding at the failure location, the term brittle-like cracking is used. This phenomenon is different from brittle fracture, in which the failure results in fragmentation of the pipe.

NTSB also alleged that the guidance provided by manufacturers and industry standards for the installation of plastic pipe is inadequate for limiting stress intensification, particularly at plastic service connections to steel mains, many of these connections may have been installed without adequate protection from shear and bending forces that may result in brittle-like cracking.

Century Pipe

Between 1970 and 1973, Century Utility Products Inc. (a/k/a AMDEVCO), now defunct, marketed medium density polyethylene plastic pipe and fittings (Century pipe) in sizes ranging from 1/2 inch to 4 inches for use in natural gas distribution. These plastic pipes and fittings were manufactured by extrusion from Union Carbide Corporation's DHDA 2077 Tan resin, and was marked PE 2306 in accordance with American Society for Testing and Materials (ASTM) standards. Following investigation of a series of incidents, including the December 2, 1979, explosion in a residence in Tuscola, Illinois, and the October 17, 1994, accident in Waterloo, Iowa, that resulted in several fatalities, it was established that the Union Carbide's DHDA 2077 Tan resin lacks adequate resistance to brittle-like cracking and is prone to relatively short life when subjected to high local stress concentration. The pipe in the Tuscola, Illinois, accident failed in less than 8 years, and the pipe in the Waterloo, Iowa, accident failed within 23 years in service. It has been established that Century pipe exhibited significantly higher leak rate in comparison with other polyethylene, steel, and cast iron pipe used in natural gas distribution systems.

Following the Waterloo, Iowa, accident, RSPA has taken number of actions, including gathering Century pipe installation data. Also, remedial action has been taken by various operators in mid-western states where much of the Century pipe produced was known to have been installed. It is RSPA's understanding that the operators having Century pipe in their systems have initiated close monitoring and some have replacement program in progress.

NTSB recommended that RSPA notify owners and operators of natural gas systems who continue to use Century pipe of the potential for premature failures by brittle-like cracking and the need to "[d]evelop a plan to closely monitor the performance of and to

identify and replace, in a timely manner, any piping that indicates poor performance based on such evaluation factors as installation, operating and environmental conditions, piping failure characteristics and leak history."

II. Advisory Bulletin (ADB-99-01)

To: Owners and Operators of Natural Gas Distribution Pipeline Systems.

Subject: Susceptibility of certain polyethylene pipe manufactured by Century Utility Products Inc. to premature failure due to brittle-like cracking.

Purpose: To advise natural gas distribution pipeline owners and operators of the need to closely monitor and replace as necessary polyethylene natural gas pipe manufactured by Century Utility Products Inc. between 1970 and 1973 that is susceptible to brittle-like cracking.

Advisory: All owners and operators of natural gas distribution systems who have installed and continue to use polyethylene pipe extruded by Century Utility Products Inc. (now defunct) from the resin DHDA 2077 Tan resin manufactured by Union Carbide Corporation during the period 1970 to 1973 (Century pipe) are advised that this pipe may be susceptible to premature failure due to brittle-like cracking. Premature failures by brittle-like cracking of Century pipe is known to occur due to poor resin characteristics, excessive local stress intensification caused by improper joints, improper installation, and environments detrimental to pipe long-term strength. All distribution systems containing Century pipe should be monitored to identify pipe subject to brittle-like cracking. Remedial action, including replacement, should be taken to protect system integrity and public safety.

In addition, in light of the potential susceptibility of Century pipe to brittle-like cracking, RSPA recommends that each natural gas distribution system operator with Century pipe revise their plastic pipe repair procedure(s) to exclude pipe pinching for isolating sections of Century pipe. Additionally, RSPA recommends replacement of any Century pipe segment that has a significant leak history or which for any reason is of suspect integrity.

Authority: 49 U.S.C. Chapter 601; 49 CFR 1.53.

Issued in Washington, DC on March 5, 1999.
Richard B. Felder,
Associate Administrator for Pipeline Safety.
[FR Doc. 99-6013 Filed 3-10-99; 8:45 am]
BILLING CODE 4910-60-P

Advisory Bulletin ADB-99-02

[Notices][Page 12212-12213]

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

Potential Failures Due to Brittle-Like Cracking of Older Plastic Pipe in Natural Gas Distribution Systems

AGENCY: Research and Special Programs Administration (RSPA), DOT.

ACTION: Notice; issuance of advisory bulletin on brittle-like failures of plastic pipe to owners and operators of natural gas distribution systems.

SUMMARY: RSPA is issuing this advisory bulletin to owners and operators of natural gas distribution systems to inform them of the potential vulnerability of older plastic gas distribution pipe to brittle-like cracking. The National Transportation Safety Board (NTSB) recently issued a Special Investigation Report (NTSB/SIR-98/01), Brittle-like Cracking in Plastic Pipe for Gas Service, that described how plastic pipe installed in natural gas distribution systems from the 1960s through the early 1980s may be vulnerable to brittle-like cracking resulting in gas leakage and potential hazards to the public and property. RSPA has also issued an additional advisory bulletin (ADB-99-01) reminding natural gas distribution system operators of the potential poor resistance to brittle-like cracking of certain polyethylene pipe manufactured by Century Utility Products, Inc.

ADDRESSES: This document can be viewed on the Office of Pipeline Safety (OPS) home page at: <http://ops.dot.gov>.

FOR FURTHER INFORMATION CONTACT: Gopala K. Vinjamuri, (202) 366-4503, or by email at gopala.vinjamuri@rspa.dot.gov.

SUPPLEMENTARY INFORMATION:

I. Background

The National Transportation Safety Board (NTSB) recently issued a Special Investigation Report (NTSB/SIR-98/01), Brittle-like Cracking in Plastic Pipe for Gas Service, that described how plastic pipe installed in natural gas distribution systems from the 1960s through the early 1980s may be vulnerable to brittle-like cracking resulting in gas leakage and potential hazards to the public and property. An NTSB survey of the accident history of plastic pipe suggested that the material may be susceptible to premature brittle-like cracking under conditions of local stress intensification because of improper joining or

installation procedures. Hundreds of thousands of miles of plastic pipe have been installed, with a significant amount installed prior to the mid-1980s. NTSB believes any vulnerability of this material to premature failure could represent a potentially serious hazard to public safety.

The NTSB report addressed the following safety issues:

- The vulnerability of plastic pipe to premature failures due to brittle-like cracking;
- The adequacy of available guidance relating to the installation and protection of plastic pipe connections to steel mains; and
- Performance monitoring of plastic pipeline systems as a way of detecting unacceptable performance in piping systems.

Copies of this report may be obtained by calling NTSB's Public Inquiry Office at 202-314-6551.

The phenomenon of brittle-like cracking in plastic pipe as described in the NTSB report and generally understood within the plastic pipeline industry relates to a part-through crack initiation in the pipe wall followed by stable crack growth at stress levels much lower than the stress required for yielding, resulting in a very tight slit-like opening and gas leak. Although significant cracking may occur at points of stress concentration and near improperly designed or installed fittings, small brittle-like cracks may be difficult to detect until a significant amount of gas leaks out of the pipe, and potentially migrates into an enclosed space such as a basement. Premature brittle-like cracking requires relatively high localized stress intensification that may be a result from geometrical discontinuities, excessive bending, improper fitting assemblies, and/or dents and gouges. Because this failure mode exhibits no evidence of gross yielding at the failure location, the term brittle-like cracking is used. This phenomenon is different from brittle fracture, in which the failure results in fragmentation of the pipe.

The report suggests that the combination of more durable plastic pipe materials and more realistic strength testing has improved the reliability of estimates of the long-term hydrostatic strength of modern plastic pipe and fittings. The report also documents that older polyethylene pipe, manufactured from the 1960s through the early 1980s, may fail at lower stresses and after less time than was originally projected. NTSB alleges that past standards used to rate the long-term strength of plastic pipe may have overrated the strength and resistance to brittle-like cracking of much of the plastic pipe manufactured and used for gas service from the 1960s through the early 1980s.

In 1998, NTSB made several recommendations to trade organizations and to the Research and Special Programs Administration (RSPA) on the need for a better understanding of the susceptibility of plastic pipe to brittle-like cracking. NTSB recommended that RSPA "[d]etermine the extent of the susceptibility to premature

brittle-like cracking of older plastic piping (beyond that marketed by Century Utilities Products Inc.) that remains in use for gas service nationwide."

II. Advisory Bulletin (ADB-99-02)

To: Owners and Operators of and Natural Gas Distribution Pipeline Systems

Subject: Potential susceptibility of plastic pipe installed between the 1960 and the early 1980s to premature failure due to brittle-like cracking.

Purpose: To inform natural gas distribution pipeline operators of the need to determine the extent of susceptibility to brittle-like cracking of plastic pipe installed between the years 1960 and early 1980s.

Advisory: A review of Office of Pipeline Safety (OPS) reportable natural gas pipeline incidents and the findings of NTSB Special Investigation Report (NTSB/SIR-98/01) indicates that certain plastic pipe used in natural gas distribution service may be susceptible to brittle-like cracking. The standards used to rate the long-term strength of plastic pipe may have overrated the strength and resistance to brittle-like cracking of much of the plastic pipe manufactured and used for gas service from the 1960s through the early 1980s.

It is recommended that all owners and operators of natural gas distribution systems identify all pre-1982 plastic pipe installations, analyze leak histories, and evaluate any conditions that may impose high stresses on the pipe. Appropriate remedial action, including replacement, should be taken to mitigate any risks to public safety.

Authority: 49 U.S.C. Chapter 601; 49 CFR 1.53.

Issued in Washington, D.C. on March 3, 1999.

Richard B. Felder,

Associate Administrator for Pipeline Safety.

[FR Doc. 99-6051 Filed 3-10-99; 8:45 am]

BILLING CODE 4910-60-P

Advisory Bulletin (ADB-02-7)

[Notices][Page 70806-70808]
Billing Code: 4910-60-P

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

Notification of the Susceptibility to Premature Brittle-like Cracking of Older Plastic Pipe.

AGENCY: Research and Special Programs Administration (RSPA), DOT.

ACTION: Notice; issuance of advisory bulletin.

SUMMARY. RSPA is issuing this follow-up advisory bulletin to owners and operators of natural gas distribution systems to inform them of the susceptibility to premature brittle-like cracking of older plastic pipe and the voluntary efforts to collect and analyze data on plastic pipe performance. A Special Investigation Report issued by the National Transportation Safety Board (NTSB) described how plastic pipe installed in natural gas distribution systems from the 1960s through the early 1980s may be vulnerable to brittle-like cracking resulting in gas leakage and potential hazards to the public and property. On March 11, 1999, RSPA issued two advisory bulletins on this issue. The first bulletin reminded natural gas distribution system operators of the potential poor resistance to brittle-like cracking of certain polyethylene pipe manufactured by Century Utility Products, Inc. The second bulletin advised natural gas distribution system operators of the potential vulnerability of older plastic pipe to brittle-like cracking.

ADDRESS: This document can be viewed on the Office of Pipeline Safety (OPS) home page at: <http://ops.dot.gov>.

FOR FURTHER INFORMATION CONTACT: Gopala K. Vinjamuri, (202) 366-4503, or by email at gopala.vinjamuri@rspa.dot.gov.

SUPPLEMENTARY INFORMATION

I. Background

On April 23, 1998, NTSB issued a Special Investigation Report (NTSB/SIR-98/01), Brittle-like Cracking in Plastic Pipe for Gas Service, that describes how plastic pipe installed in natural gas distribution systems from the 1960s through the early 1980s may be vulnerable to brittle-like cracking resulting in gas leakage and potential hazards to the public and property. An NTSB survey of the accident history of plastic pipe suggested that the material may be susceptible to premature brittle-like cracking under conditions of local stress intensification because of improper joining or installation procedures.

Hundreds of thousands of miles of plastic pipe have been installed, with a significant amount installed prior to the early-1980s. NTSB believes any vulnerability of this material to premature cracking could represent a potentially serious hazard to public safety. Copies of this report may be obtained by calling NTSB's Public Inquiry Office at 202-314-6551.

RSPA has already issued two advisory bulletins on this issue. The first advisory bulletin, ADB-99-01, which was published in the Federal Register on March 11, 1999 (47 FR 12211), reminded natural gas distribution system operators of the potential poor resistance to brittle-like cracking of certain polyethylene pipe manufactured by Century Utility Products, Inc. The second advisory bulletin, ADB99-02, also published in the Federal Register on March 11, 1999 (47 FR 12212), advised natural gas distribution system operators of the potential brittle-like cracking vulnerability of plastic pipe installed between the 1960s and early 1980s.

The phenomenon of brittle-like cracking in plastic pipe as described in the NTSB report and generally understood within the plastic pipeline industry relates to a part-through crack initiation in the pipe wall followed by stable crack growth at stress levels much lower than the stress required for yielding, resulting in a very tight slit-like openings and gas leaks. Although significant cracking may occur at points of stress concentration and near improperly designed or installed fittings, small brittle-like cracks may be difficult to detect until a significant amount of gas leaks out of the pipe, and potentially migrates into an enclosed space such as a basement. Premature brittle-like cracking requires relatively high localized stress intensification that may be a result from geometrical discontinuities, excessive bending, improper installation of fittings, and dents and gouges. Because this failure mode exhibits no evidence of gross yielding at the failure location, the term brittle-like cracking is used. This phenomenon is different from brittle fracture, in which the pipe failure causes in fragmentation of the pipe.

The NTSB report suggests that the combination of more durable plastic pipe materials and more realistic strength testing has improved the reliability of estimates of the long-term hydrostatic strength of modern plastic pipe and fittings. The report also documents that older polyethylene pipe, manufactured from the 1960s through the early 1980s, may fail at lower stresses and after less time than was originally projected. NTSB alleges that past standards used to rate the long-term strength of plastic pipe may have overrated the strength and resistance to brittle-like cracking of much of the plastic pipe manufactured and used for gas service from the 1960s through the early 1980s.

In 1998, NTSB made several recommendations to trade organizations and to RSPA on the need for a better understanding of the susceptibility of plastic pipe to brittle-like cracking. This advisory bulletin responds to one of the NTSB recommendations. It is that RSPA "[d]etermine the extent of the susceptibility to premature brittle-like cracking of older plastic piping (beyond that marketed by Century Utilities Products Inc.) that remains in use for gas service nationwide. Inform gas system operators of the findings and require them to closely monitor the performance of the older plastic piping and to identify and replace, in a timely manner, any of the piping that indicates poor

performance based on such evaluation factors as installation, operating, and environmental conditions; piping failure characteristics; and leak history."

In order to obtain the most complete information on the extent of the susceptibility to premature brittlelike cracking of older plastic pipe, a meeting was convened in May 1999 with all the stakeholders to determine how information on older plastic pipe could be assembled. The meeting included representatives of the American Gas Association (AGA), the American Public Gas Association (APGA), the Gas Research Institute (GRI) (now the Gas Technology Institute), the Midwest Energy Association (MEA), and the Plastic Pipe Institute (PPI).

As a result of the May 1999 meeting, the Joint Government-Industry Plastic Pipe Study Committee was formed to address the recommendations of the NTSB Special Investigation Report. The committee held three separate meetings to prepare a draft response to the NTSB recommendations and a draft industry notification of brittle-like cracking problems, the subject of this advisory bulletin. The committee membership consisted of a representative from OPS, a gas distribution operator from AGA, and the Transportation Safety Institute. Meetings were facilitated by General Physics Corporation, Columbia, MD. One of the committee findings was that there is a lack of data available from the industry to completely identify older plastic pipe that is still in service and may be susceptible to brittle-like cracking.

This finding led to the formation of the Plastic Pipe Database Committee (PPDC) to develop a process for gathering data on future plastic pipe failures with involvement from the states, which have assumed the authority from OPS over gas distribution systems, where most of the plastic pipe is installed. The PPDC is comprised of representatives from Federal and State regulatory agencies and from the natural gas and plastic pipe industries. Members include AGA, APGA, PPI, the National Association of Regulatory Utility Commissioners (NARUC), the National Association of Pipeline Safety Representatives (NAPSR), and OPS.

The PPDC database is expected to improve the knowledge base of gas utility operators and regulators and is intended to help reveal any failure trends associated with older plastic piping materials. The PPDC's mission is "to develop and maintain a voluntary data collection process that supports the analysis of the frequency and causes of in-service plastic piping material failures." It provides an opportunity for government and industry to work together to evaluate the extent of plastic pipe performance problems and to mitigate any risks to safety. The PPDC started gathering data in January 2001 from OPS and State pipeline safety agencies. For more information on the PPDC, go to the AGA web page (www.aga.org), and enter "PPDC" in the keyword search.

II. Advisory Bulletin (ADB-02-7)

To: Owners and Operators of Natural Gas Distribution Pipeline Systems

Subject: Notification of the Susceptibility to Premature Brittle-like Cracking of Older Plastic Pipe.

Advisory: In recent years, brittle-like cracking has been observed in some polyethylene pipes installed in gas service through the early 1980s. This brittle-like cracking (also known as slow crack growth) can substantially reduce the service life of polyethylene piping systems.

The susceptibility of some polyethylene pipes to brittle-like cracking is dependent on the resin, pipe processing, and service conditions. A number of studies have been conducted on older polyethylene

pipe. These studies have shown that some of these older polyethylene pipes are more susceptible to brittle-like cracking than current materials. These older polyethylene pipe materials include the following:

- Century Utility Products, Inc. products.
- Low-ductile inner wall "Aldyl A" piping manufactured by Dupont Company before 1973.
- Polyethylene gas pipe designated PE 3306. (As a result of poor performance this designation was removed from ASTM D-2513.)

The environmental, installation, and service conditions under which the piping is used are factors that could lead to premature brittle-like cracking of these older materials. These conditions include, but are not limited to:

- Inadequate support and backfill during installation
- Rock impingement
- Shear/bending stresses due to differential settlement resulting from factors such as:
 - o Excavation in close proximity to polyethylene piping
 - o Directional drilling in close proximity to polyethylene piping
 - o Frost heave
- Bending stresses due to pipe installations with bends exceeding recommended practices

Damaging squeeze-off practices

Service temperatures and service pressures also influence the service life of polyethylene piping. Piping installed in areas with higher ground temperatures or operated under higher operating pressures will have a shorter life.

Gas system operators may experience an increase in failure rates with a susceptible material. A susceptible material may have leak-free performance for a number of years before brittle-like cracks occur. An increase in the occurrence of leaks will typically be the first indication of a brittle-like cracking problem. It is the responsibility of each pipeline operator to monitor the performance of their gas system. RSPA issues the following recommendations to aid operators in identifying and managing brittle-like cracking problems in polyethylene piping involving taking appropriate action, including replacement, to mitigate any risks to public safety.

Because systems without known susceptible materials may also experience brittle-like cracking problems, RSPA recommends that all operators implement the following practices for all polyethylene piping systems:

1. Review system records to determine if any known susceptible materials have been installed in the system. Both engineering and purchasing records should be reviewed. Based on the available records, identify the location of the susceptible materials. More frequent inspection and leak surveys should be performed on systems that have exhibited brittle-like cracking failures of known susceptible materials.
2. Establish a process to identify brittle-like cracking failures. Identification of failure types and site installation conditions can yield valuable information that can be used in predicting the performance of the system.
3. Use a consistent record format to collect data on system failures. The AGA Plastic Failure Report form (Appendix F of the AGA Plastic Pipe Manual) provides an example of a report for the collection of failure data.
4. Collect failure samples of polyethylene piping exhibiting brittle-like cracking. Evidence of brittle-like cracking may warrant laboratory testing. Although every failure may not warrant testing, collecting samples at the time of failure would provide the opportunity to conduct future testing should it be deemed necessary.
5. Whenever possible record the print line from any piping that has been involved in a failure. The print line information can be used to identify the resin, manufacturer and year of manufacture for plastic piping.
6. For systems where there is no record of the piping material, consider recording print line data when piping is excavated for other reasons. Recording the print line data can aid in establishing the type and extent of polyethylene piping used in the system.

(49 U.S.C. chapter 601; 49 CFR 1.53)
Issued in Washington, DC, on November 21, 2002.

Stacey L. Gerard
Associate Administrator for Pipeline Safety.

[FR Doc. 02-30055 Filed 11-25-02; 8:45 am]

Advisory Bulletin (ADB-02-7) – Correction

[Notices][Page 72027]

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

Notification of the Susceptibility to Premature Brittle-Like Cracking of Older Plastic Pipe

AGENCY: Research and Special Programs Administration (RSPA), DOT.

ACTION: Notice; correction.

SUMMARY: In the Federal Register of November 26, 2002, (67 FR 70806) the Research and Special Programs Administration (RSPA) published a notice document issuing an advisory bulletin on the susceptibility to premature brittle-like cracking of older plastic pipe (ADB-02-7). RSPA is submitting this correction notice to reflect minor wording changes and include a website address.

EFFECTIVE DATE: This correction takes effect November 26, 2002.

FOR FURTHER INFORMATION CONTACT: Gopala K. Vinjamuri, (202) 366-4503, or by email at gopala.vinjamuri@rspa.dot.gov.

SUPPLEMENTARY INFORMATION:

Correction

The last sentence in the first paragraph of the Supplementary Information heading under I. Background, reads:

Copies of this report may be obtained by calling NTSB's Public Inquiry Office at 202-314-6551.

We are revising this sentence to add NTSB's website address. The sentence is revised to read as follows:

Copies of this report may be obtained by calling NTSB's Public Inquiry Office at 202-314-6551, or on the NTSB website at www.nts.gov.

In the fourth paragraph under SUPPLEMENTARY INFORMATION, the first sentence reads:

The NTSB report suggests that Remove the word "suggests" and replace with the word "states".

In the fourth paragraph under Supplementary Information, the third sentence reads:

NTSB alleges that Remove the word "alleges" and replace with the word "concluded".

Under II. Advisory Bulletin (ADB-02-7) of the SUPPLEMENTARY INFORMATION heading, in the second paragraph under Advisory. The fourth sentence reads:

These older polyethylene pipe materials include the following:

The sentence is revised to read as follows:

These older polyethylene pipe materials include, but are not limited to:

Issued in Washington, DC on November 27, 2002.
James K. O'Steen,
Deputy Associate Administrator for Pipeline Safety.
[FR Doc. 02-30615 Filed 12-2-02; 8:45 am]

BILLING CODE 4910-60-P