

# **Plastic Pipe Data Collection**

(PPDC)

# The Program

**A voluntary data collection program that supports an analysis of the frequency and causes of in-service plastic piping material failures.**



# Brief History

- ◆ **NTSB recommendation as a result of incidents in Waterloo, IA, Lake Dallas, TX and North Carolina (Report PB98-917001).**
- ◆ **OPS should gather information to monitor the susceptibility of aging plastic piping materials for brittle-like failures.**
- ◆ **OPS initiative in responding to NTSB.**

# The Committee

**Plastic Pipe Database Committee is composed of two members from each of the following groups:**

■ **OPS**

■ **NARUC**

■ **NAPSR**

■ **AGA**

■ **APGA**

■ **PPI**

# Program Issues

- ◆ **Voluntary participation.**
- ◆ **Gathering of future material failure data on in-service plastic piping.**
- ◆ **Allows submission of past failure data.**



# Program Issues

- ◆ **Does not include third party damage with one exception (previous impact).**
- ◆ **Company will determine cause of failure.**
- ◆ **Company identity will be confidential.**

# The Form

PLASTIC PIPE OR FITTING		FAILURE	
<b>IDENTIFICATION</b> <small>(Check one for Type of Material)</small>		<b>7a LOCATION</b>	
<b>TYPE OF MATERIAL</b>	<b>OTHER SPECIFICATIONS:</b>	PIPE	
ABS	MANUFACTURER:	FITTING <b>(Complete 7b)</b>	
CAB		JOINT <b>(Complete 7c)</b>	
HDPE - 3306	PRINT	<b>FAILURE IN</b>	
HDPE - 3406	LINE:	<b>7b FITTING (Check or apply)</b>	
HDPE - 3408		TRANSITION	
MDPE - 2306	SDR, DR, SCHEDULE or	VALVE (PLASTIC)	
MDPE - 2406	WALL THICKNESS:	METER RISER	
PB		MECHANICAL FITTING	
PVC	NOMINAL	HEAT FUSION FITTING	
OTHER(Describe):	SIZE:	ELECTROFUSION FITTING	
		OTHER(Describe):	
<b>DATE OF MANUFACTURE</b>			
<b>INSTALLATION AND OPERATIONS SECTION</b>			
<b>METHOD OF INSTALLATION (Check One)</b>		<b>TYPE of SOIL IN CONTACT W/ PIPE (Check One)</b>	
OPEN TRENCH		SAND	
BORED		LOAM	
FLOWED IN		CLAY	
INSERTION		ROCKY	
JOINT TRENCH		SLURRY	
PLANTED		OTHER(Describe):	
UNKNOWN			
OTHER(Describe):			
<b>OPERATING PRESSURE</b>			
<b>A. AT TIME OF FAILURE:</b>		<b>psi</b>	
<b>B. NORMAL RANGE (IF KNOWN)</b>		<b>psi</b>	
<b>DATE OF INSTALLATION (mo/day/yr)</b>			
<b>NOTICE OF FORM SUBMITTAL:</b>			
This form should be submitted even if not all data elements are available.			
<b>CONTACT NAME</b>		<b>PHONE NUMBER</b>	

<b>7c JOINT (Check or apply)</b>	
MECHANICAL	
ELECTROFUSION	
BUTT FUSION	
SOCKET FUSION	
SADDLE FUSION	
SOLVENT	
OTHER(Describe):	
<b>FAILURE CAUSE (Check all that apply)</b>	
SQUEEZE OFF	
POINT LOADING	
EXCESSIVE EXPANSION	
CONTRACTION	
EXCESS EXTERNAL EARTH LOADING	
INSTALLATION ERROR	
PREVIOUS IMPACT	
UNKNOWN	
OTHER(Describe):	
<b>DATE OF FAILURE (mo/day/yr)</b>	

# The Form

**One Page, Nine Sections**

## **Materials Section**

- 1. Pipe and Fittings Identification**
- 2. Date of Manufacture**

# The Form

## Installation & Operations Section

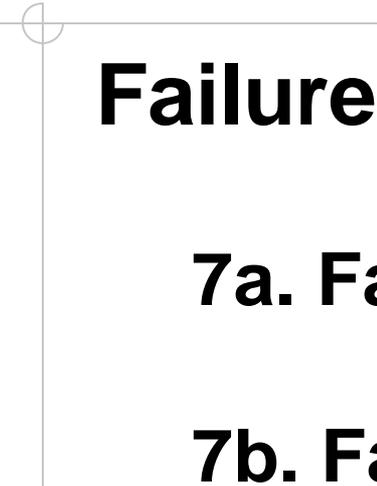
**3. Method of Installation**

**4. Type of Soil**

**5. Operating Pressure**

**6. Date of Installation**

# The Form



## Failure Analysis Section

**7a. Failure Location**

**7b. Failure in Fitting**

**7c. Failure in Joint**

**8. Failure Cause**

**9. Date of Failure**

# Materials Section

MATERIALS SECTION			
PLASTIC PIPE OR FITTING			
1 IDENTIFICATION		(Check one for Type of Material)	
TYPE OF MATERIAL		OTHER SPECIFICATIONS:	
<input type="checkbox"/>	ABS	MANUFACTURER:	
<input type="checkbox"/>	CAB		
<input type="checkbox"/>	HDPE - 3306	PRINT	
<input type="checkbox"/>	HDPE - 3406	LINE:	
<input type="checkbox"/>	HDPE - 3408		
<input type="checkbox"/>	MDPE - 2306	SDR, DR, SCHEDULE or	
<input type="checkbox"/>	MDPE - 2406	WALL THICKNESS:	
<input type="checkbox"/>	PB		
<input type="checkbox"/>	PVC	NOMINAL	
<input type="checkbox"/>	OTHER(Describe):	SIZE:	
<input type="checkbox"/>			
<input type="checkbox"/>			
DATE OF			
2 MANUFACTURE			

# Materials Section

## Pipe or Fitting Identification

Acrylonitrile-Butadiene-Styrene (ABS)



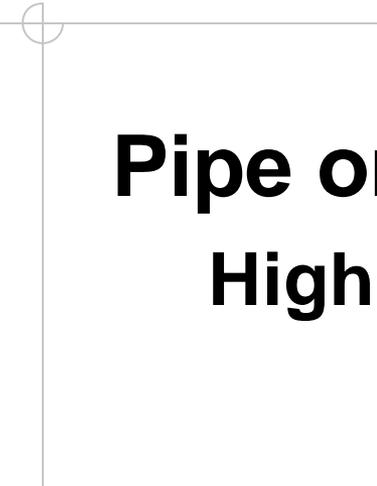
# Materials Section

## Pipe or Fitting Identification

**Cellulose-  
Acetate-  
Butyrate  
(CAB)**



# Materials Section



## Pipe or Fitting Identification

**High Density Polyethylene (HDPE 3306)**

# Materials Section

## Pipe or Fitting Identification

High Density  
Polyethylene  
(HDPE 3406)

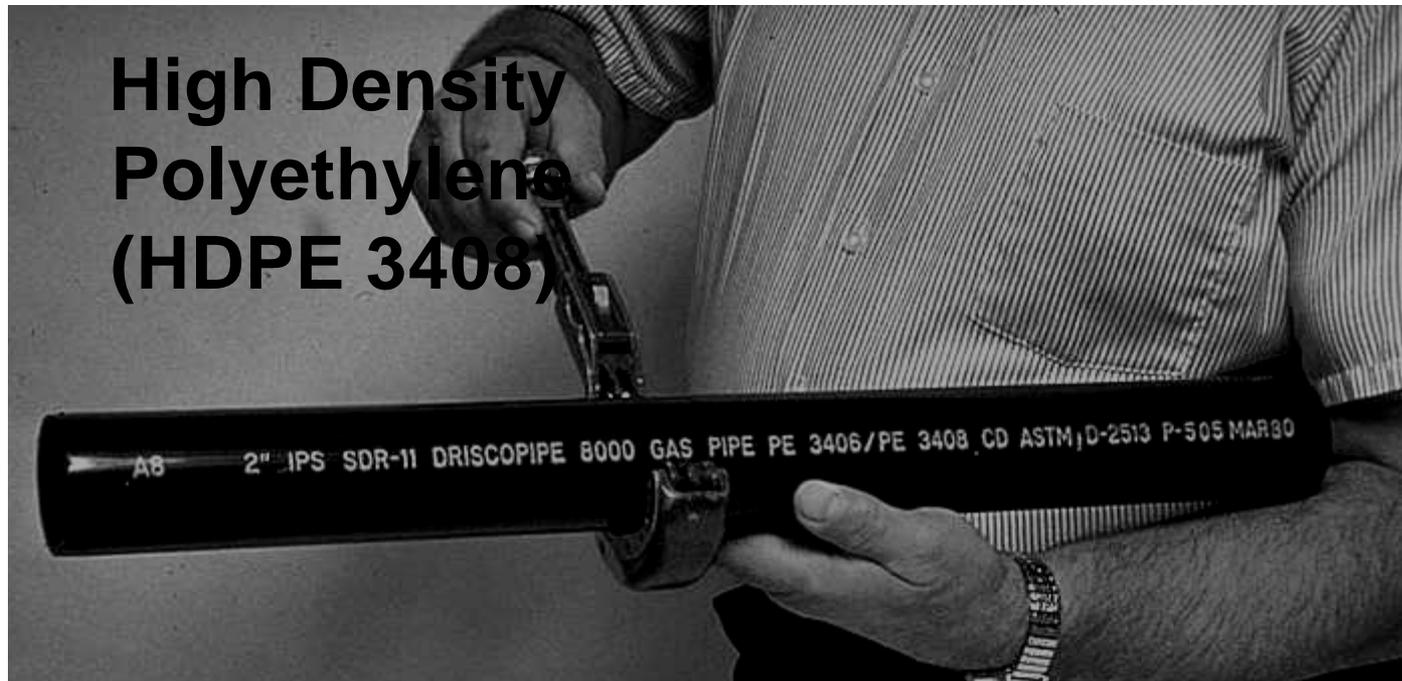


# Materials Section

## Pipe or Fitting Identification



High Density  
Polyethylene  
(HDPE 3408)



# Materials Section

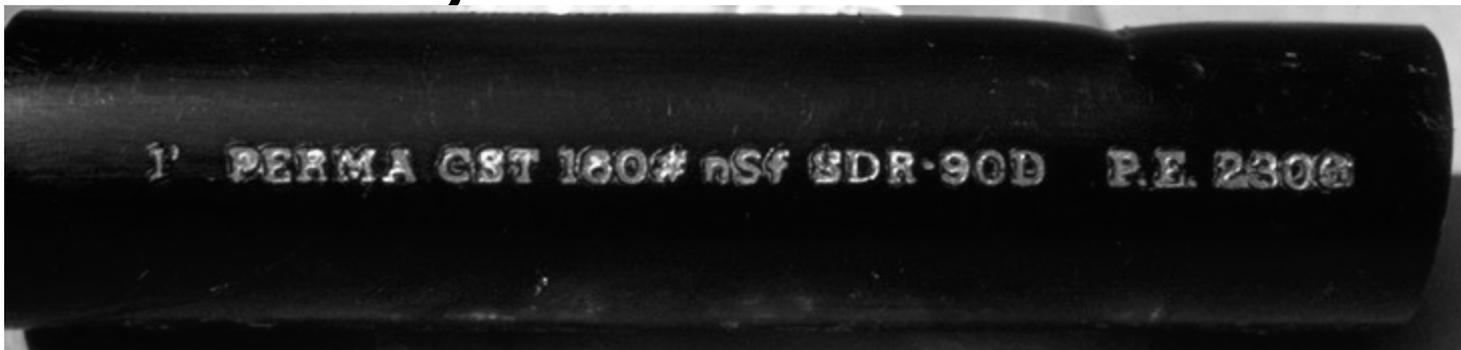
## Pipe or Fitting Identification

### Medium Density Polyethylene (PE 2306)



Century

PE 2306



Section 1

# Materials Section

## Pipe or Fitting Identification

### Medium Density Polyethylene (PE 2406)



# Materials Section

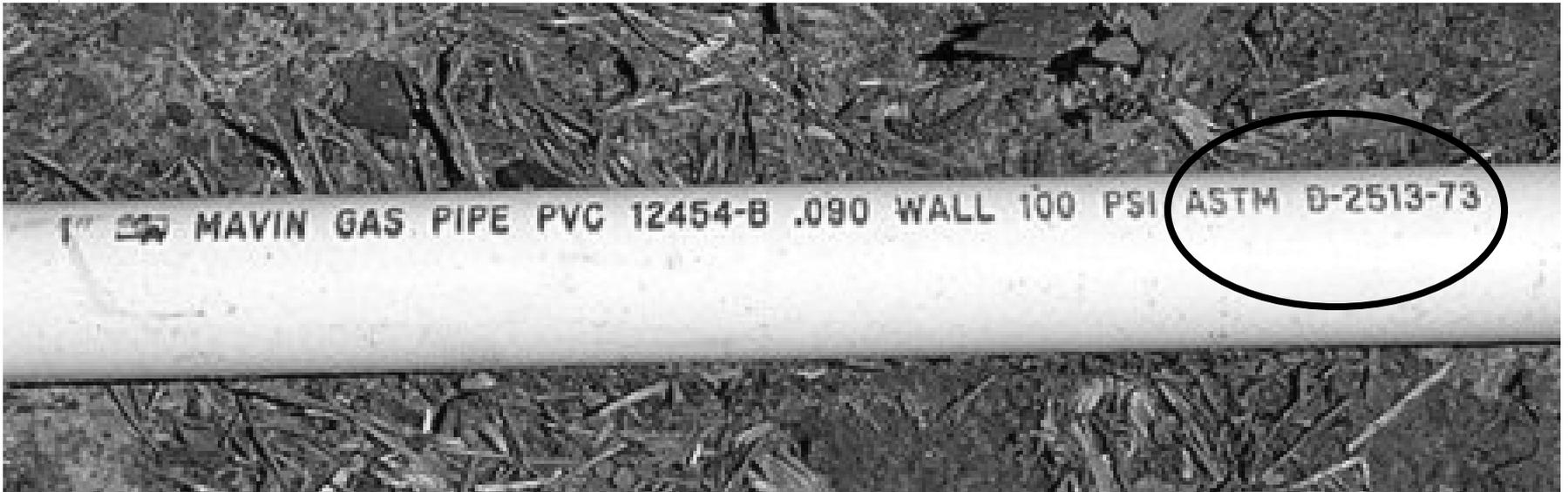


## Pipe or Fitting Identification

**Polybutylene (PB)**

# Materials Section

## Pipe or Fitting Identification



**Polyvinyl Chloride (PVC)**

# Materials Section

## Other Specifications

**Manufacturer**

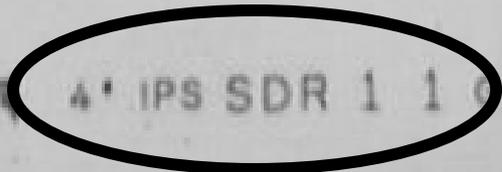
**Print Line**



**Date of manufacture may be in  
manufacturer's print line code**

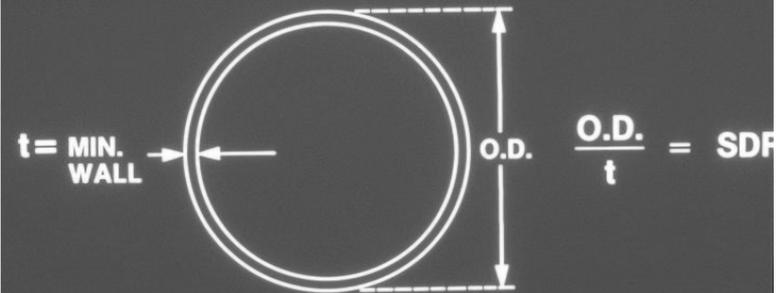
# Materials Section

Other  
Specifications



**Nominal  
Diameter**  
(IPS or CTS)

**SDR**  
Standard Dimension Ratio



↑  
The DR or SDR  
may be obtained  
by using calipers  
and calculating.

# Installation & Operations Section

INSTALLATION AND OPERATIONS SECTION			
METHOD OF INSTALLATION (Check One)		TYPE of SOIL IN CONTACT W/ PIPE (Check One)	
3	OPEN TRENCH	4	SAND
	BORED		LOAM
	PLOWED IN		CLAY
	INSERTION		ROCKY
	JOINT TRENCH		SLURRY
	PLANTED		OTHER(Describe):
	UNKNOWN		
	OTHER(Describe):		
OPERATING PRESSURE			
5	A. AT TIME OF FAILURE: _____ psig		
	B. NORMAL RANGE (IF KNOWN) _____ psig		
DATE OF INSTALLATION			
6	(mo/day/yr)		

# Installation Method

- ◆ **Method used to install the plastic**
- ◆ **Different methods induce different stresses**
- ◆ **If unknown, may use an educated guess supported by additional written assumptions**

# Installation Method

## Open Trench

Ditching machine, backhoe, etc.



Section 3

# Installation Method

## Bored

Pipe inserted or pulled into a bored hole produced by some type of equipment.



# Installation Method

## Plowed

Pipe is inserted through a chute or guide behind equipment with a plowing attachment.



# Installation Method

## Insertion

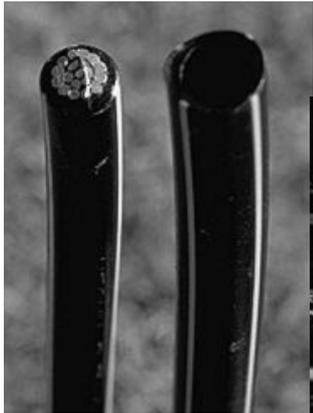
Pushed or pulled into an existing pipe.



# Installation Method

## Joint trench

Installed in the same trench as other utilities.



Section 3



# Installation Method

## Planted

Pipe is on a reel that is part of the trenching equipment.



# Installation Method

## Unknown

**Used ONLY  
when  
there are no  
records  
or other  
indications  
available.**



# Installation Method

## Other

**A method not previously listed, but is known. Describe on the blank line.**

# Type of Soil in Contact with the Pipe

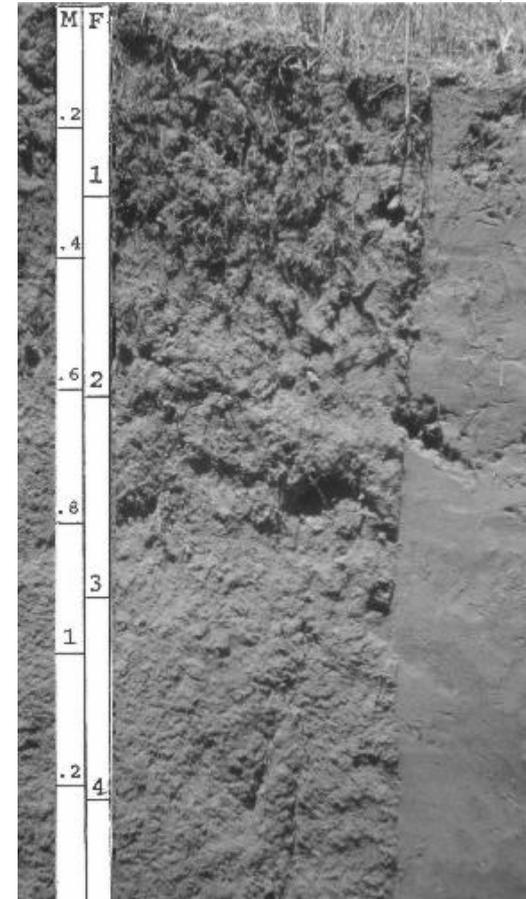
- ◆ Sand
- ◆ Loam
- ◆ Clay
- ◆ Rocky
- ◆ Slurry
- ◆ Other

TYPE of SOIL IN CONTACT W/ PIPE	
4	(Check One)
	SAND
	LOAM
	CLAY
	ROCKY
	SLURRY
	OTHER(Describe):

# Soil Classifications

## Sand

- **Sedimentary material, finer than a granule and coarser than silt, with grains between 0.00236 in. (0.06mm) and 0.0078 in. (2.0 mm) <sup>1</sup>.**
- **In which more than half of the coarse material are smaller than 3/16 in. (4.75 mm) (passing IS sieve 480) <sup>2</sup>.**



1. PPDC definition

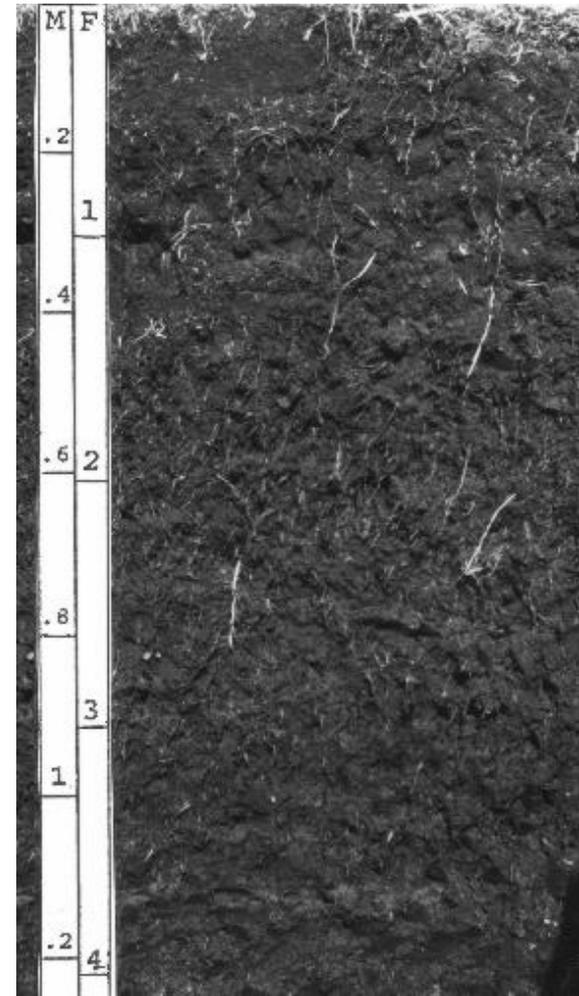
2. Field classification of soils based on Casagrande classification

# Soil Classifications

## Loam

Soil that has no or few rocks or pebbles but has some peat or peat like parts in the soil<sup>1</sup>.

1. PPDC definition



# Soil Classifications

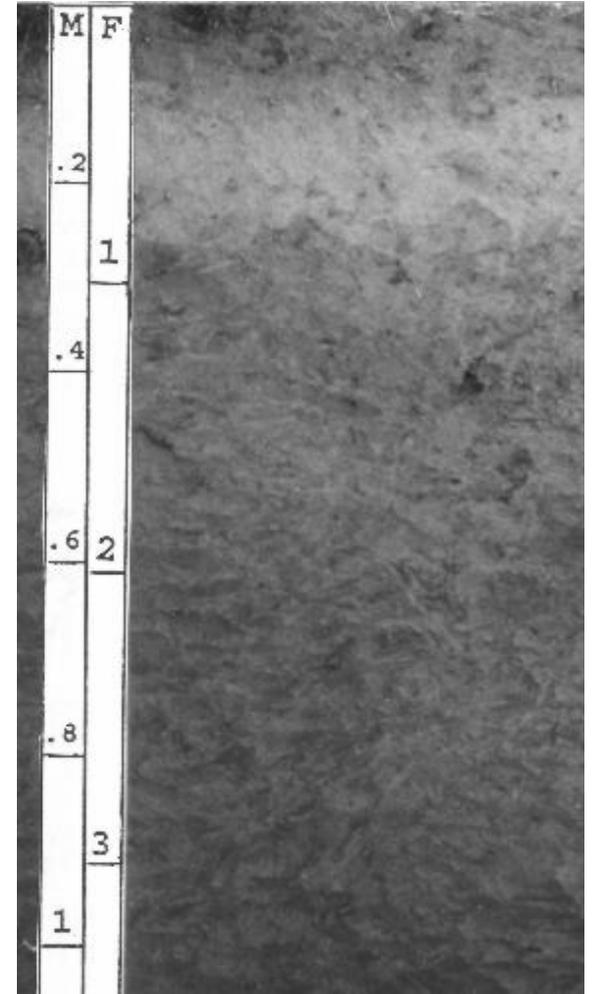
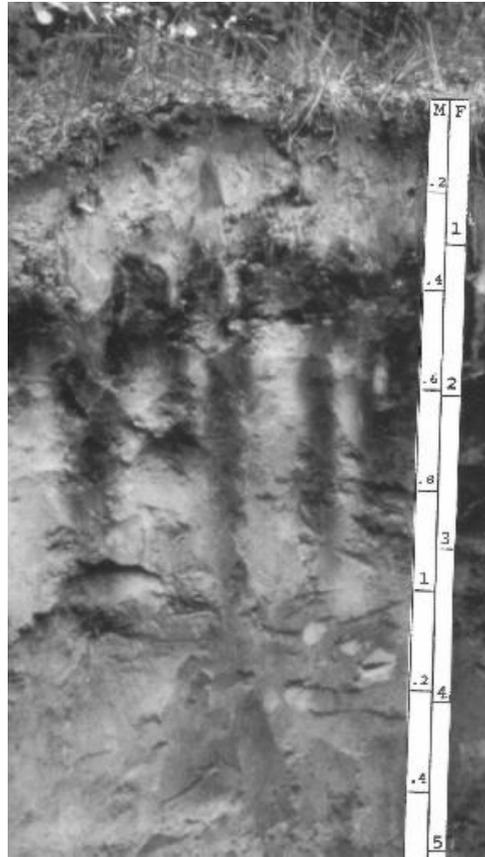
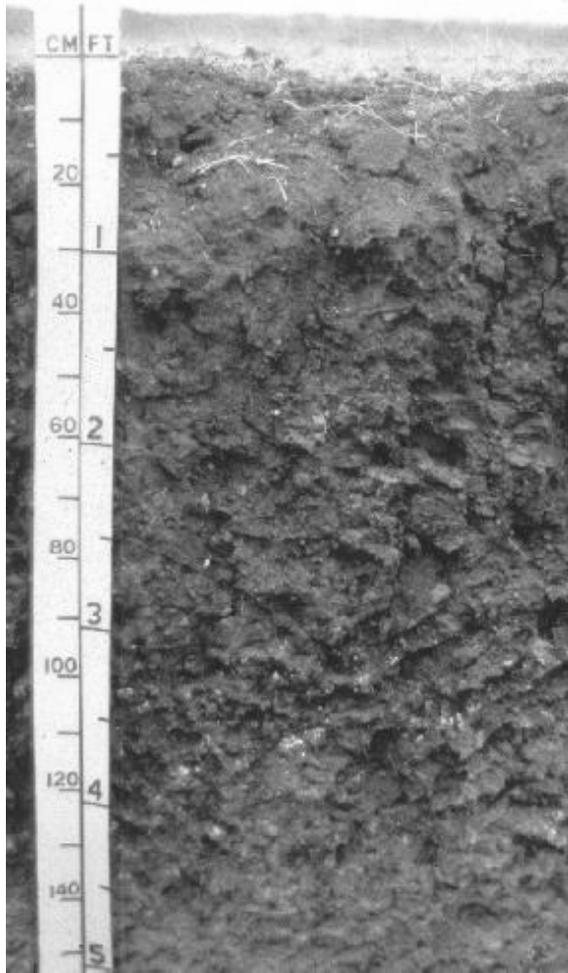
## Clay

- **Very fine soil that becomes slimy or plastic when mixed with water and compacts tightly<sup>1</sup>.**
- **Soil passing a No. 200 (75- $\mu$ m) U.S. standard sieve that can be made to exhibit plasticity within a range of water contents and exhibits considerable strength when dry<sup>2</sup>.**

1. PPDC definition

2. ASTM D2487

# Clays



# Soil Classifications

## Rocky

**Describe shape of rocks;**

- ◆ **Rounded and smooth**
- ◆ **Angular with sharp edges**
- ◆ **Angular with rounded edges**



# Soil Classifications

## Slurry

A mixture of clay and water or other soil materials.



# Soil Classifications

## Other

**None of the above. Please describe in detail.**

# Pressure & Installation Dates

## Operating Pressure

- At Time of Failure
- Normal Range
  - ◆ Operating pressure range over a full year

## Date of Installation

- From Company Records

OPERATING				
<b>5</b>	PRESSURE			
A.	AT TIME OF FAILURE:			
				psig
B.	NORMAL RANGE (IF KNOWN)			
				psig
DATE OF				
<b>6</b>	INSTALLATION			
	(mo/day/yr)			

# Failure Analysis

◆ Failure Location

◆ Failure in Fitting

◆ Failure in Joint

◆ Failure Cause

◆ Date of Failure

FAILURE ANALYSIS SECTION	
FAILURE	
<b>7a</b>	LOCATION
	PIPE
	FITTING (Complete 7b)
	JOINT (Complete 7c)
FAILURE IN	
<b>7b</b>	FITTING (Check as applies)
	TRANSITION
	VALVE (PLASTIC)
	METER RISER
	MECHANICAL FITTING
	HEAT FUSION FITTING
	ELECTROFUSION FITTING
	OTHER(Describe):
FAILURE IN	
<b>7c</b>	JOINT (Check as applies)
	MECHANICAL
	ELECTROFUSION
	BUTT FUSION
	SOCKET FUSION
	SADDLE FUSION
	SOLVENT
	OTHER(Describe):
FAILURE	
<b>8</b>	CAUSE (Check all that apply)
	SQUEEZE OFF
	POINT LOADING
	EXCESSIVE EXPANSION
	/CONTRACTION
	EXCESS EXTERNAL
	EARTH LOADING
	INSTALLATION ERROR
	PREVIOUS IMPACT
	UNKNOWN
	OTHER(Describe):
DATE OF	
<b>9</b>	FAILURE
	(mo/day/yr)

# Failure Location

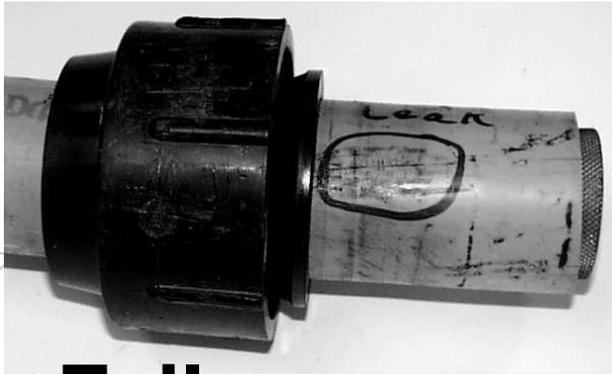
◆ **Pipe - Meaning the pipe wall**

◆ **Fitting - Meaning the fitting, not the joint between pipe and fitting**

FAILURE ANALYSIS SECTION	
	FAILURE LOCATION
	PIPE
	FITTING (Complete 7b)
	JOINT (Complete 7c)

◆ **Joint - Meaning the joint between a fitting and the pipe or a butt fusion between two sections of pipe**

# Pipe



**Failure occurs in the pipe wall. Does not include third-party damage, except failures that occur as a (delayed) result of a previous impact.**



# Failure in Fitting

This category is to include:

- Transitions
- Valves
- Meter risers
- Mechanical fittings
- Heat fusion fittings
- Electrofusion fittings
- Others



# Transition

- ◆ A plastic-to-steel transition or a plastic-to-plastic transition.
- ◆ Includes mechanical metal and plastic couplings and factory produced weld-in and fuse-in transition fittings.



# Valves

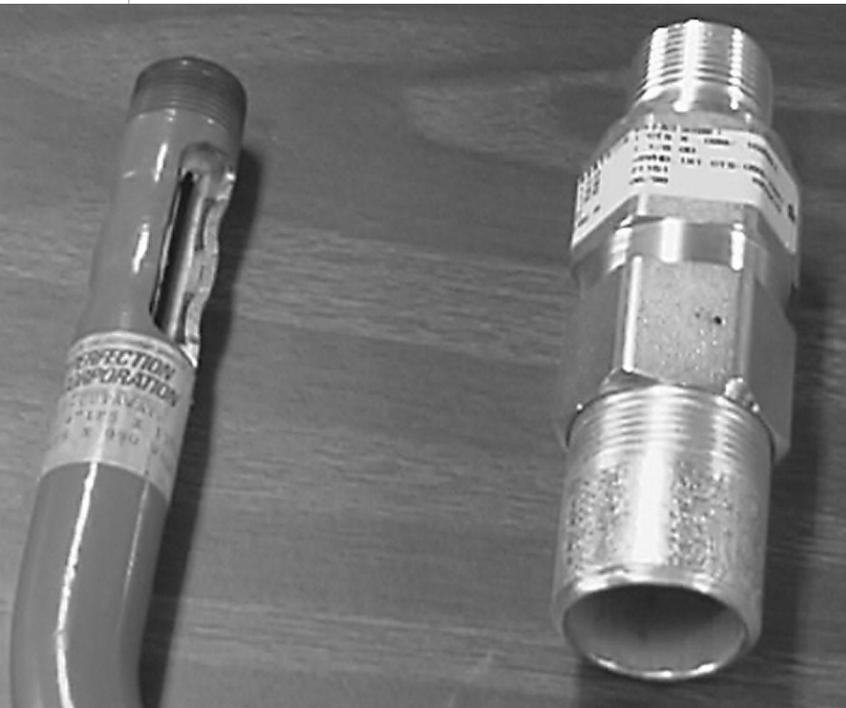
Failure in a plastic valve body.



# Meter Riser



1/2" PE 3408 heat damage inside a riser

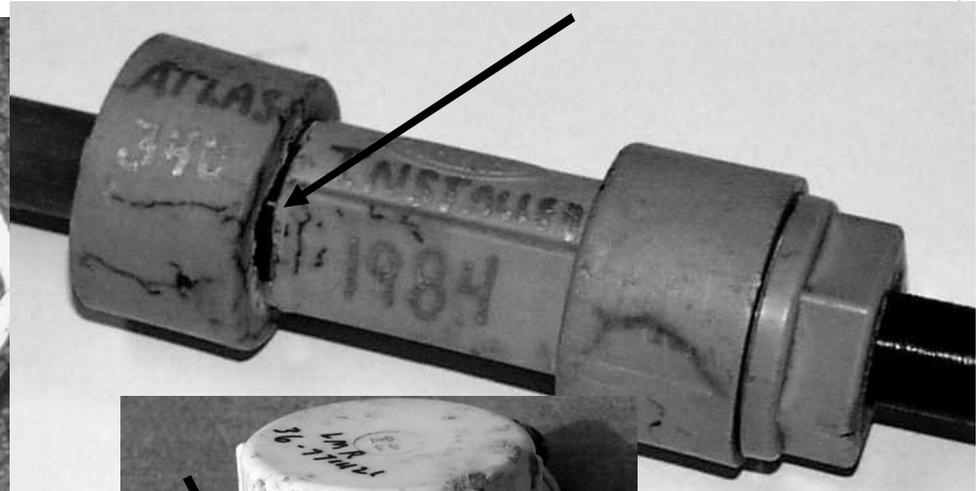


**Includes anodeless risers and steel risers which are joined to plastic below ground.**

# Mechanical Fitting

- ◆ **Meaning the failure occurred within the body of a plastic mechanical fitting.**
- ◆ **It does not include plastic-to-steel couplings; they are considered transition fittings.**

# Mechanical Fittings



# Heat Fusion Fittings

- ◆ Does not include failures in butt fusion, but would include seam failure of molded fittings.

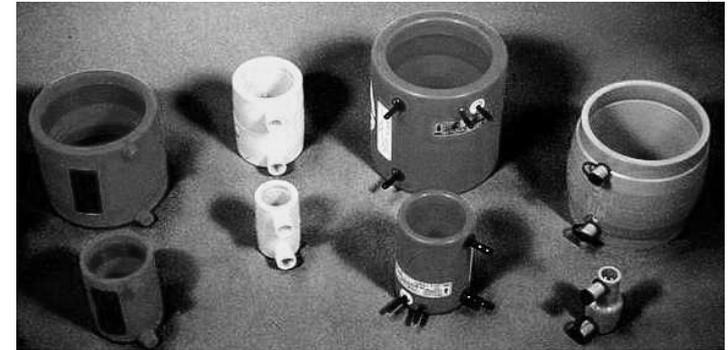


2" PE 3408 - possible external force

- ◆ Does not include failures in joints between fittings and pipe.

# Electrofusion Fittings

◆ Failure occurs in the body of the fitting or seam of the fitting.



◆ Does not include the joint between fitting and pipe.

# Other

If the fitting does not match any of the above, please describe.



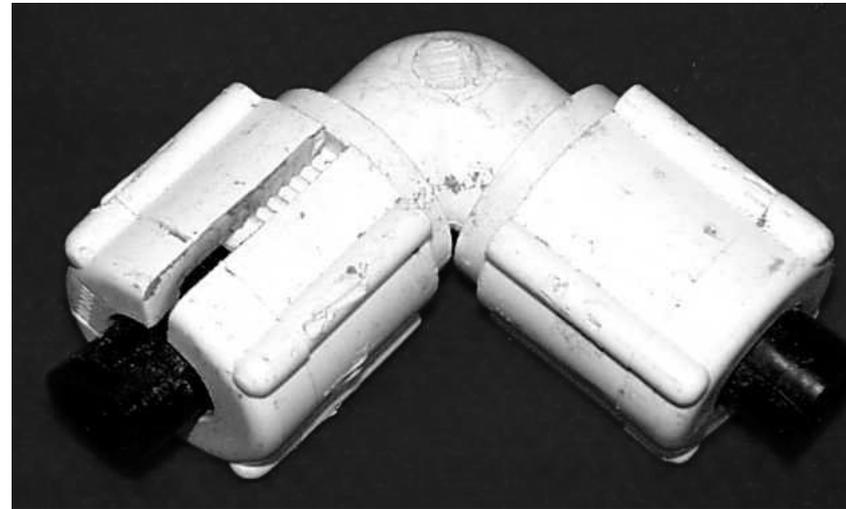
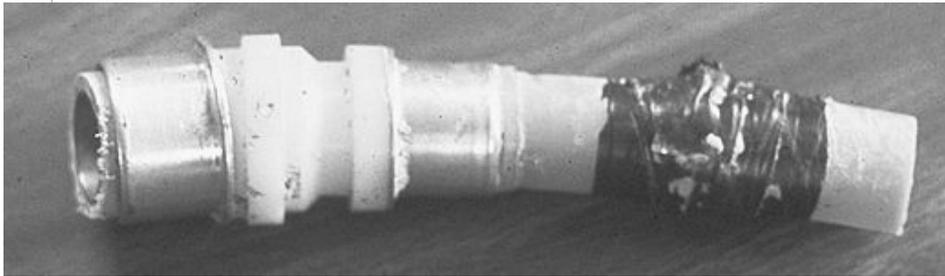
# Failure in Joint

**Failure occurred  
at the joint  
between  
the pipe and  
the fitting.**

FAILURE IN	
7c	JOINT (Check as applies)
	MECHANICAL
	ELECTROFUSION
	BUTT FUSION
	SOCKET FUSION
	SADDLE FUSION
	SOLVENT
	OTHER(Describe):

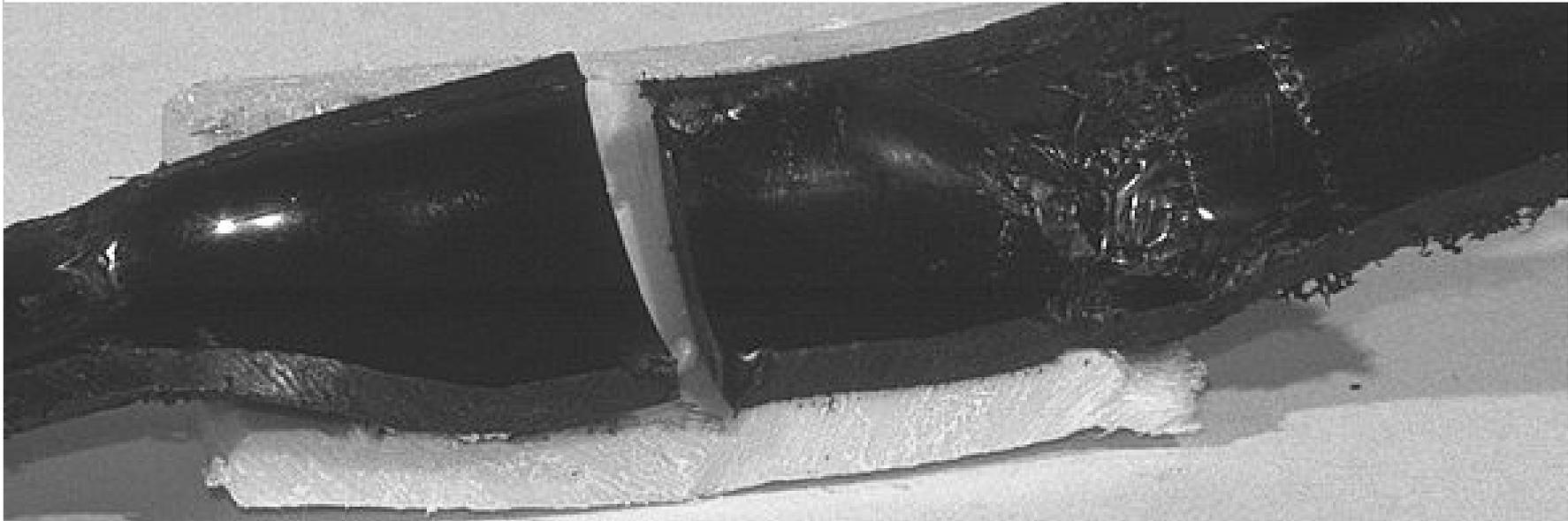
# Mechanical Joints

**Plastic material failure in the joint, including all types of fittings described in section b) iv.**



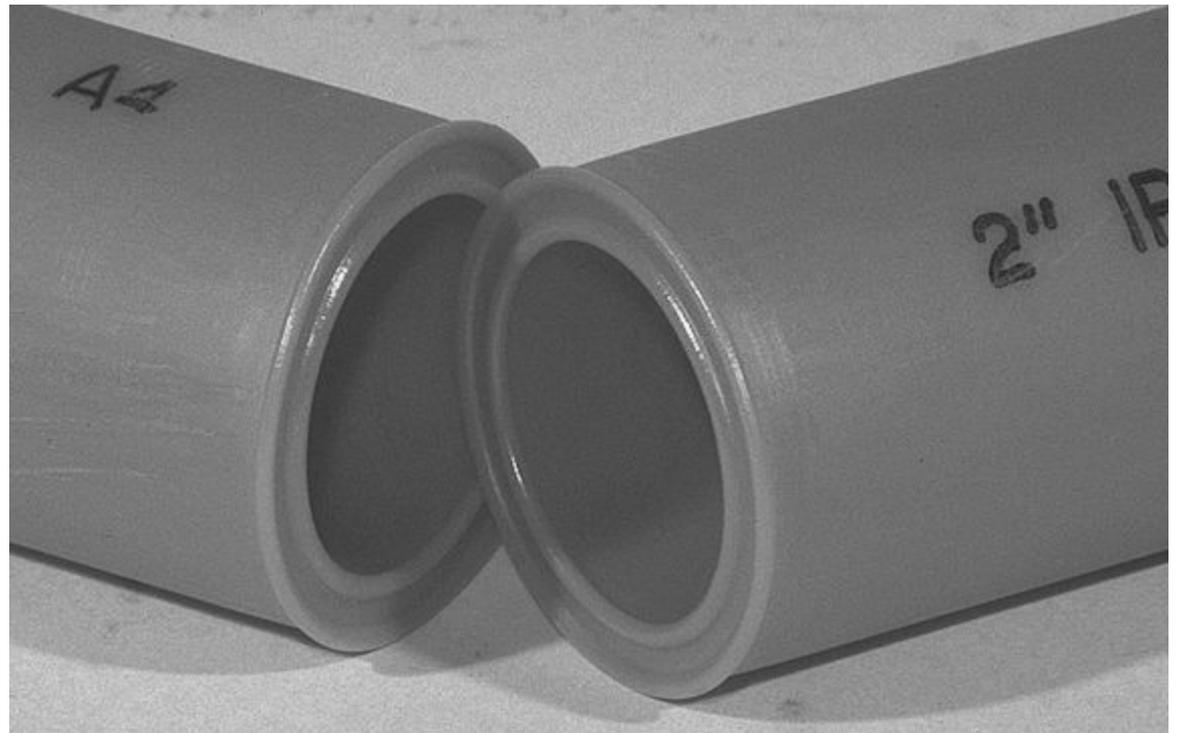
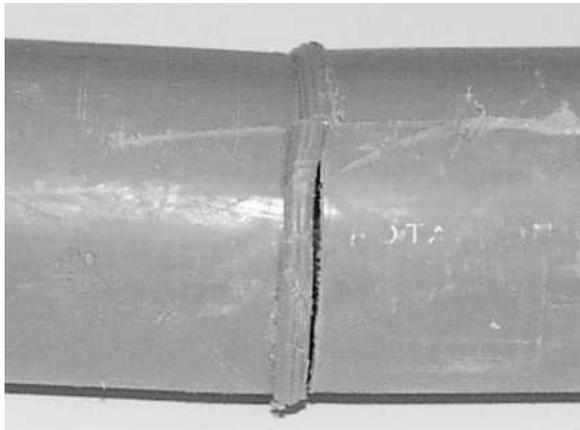
# Electrofusion Joints

**Failure occurred at the joint. Includes ells, tees, saddle tees, couplings, etc.**



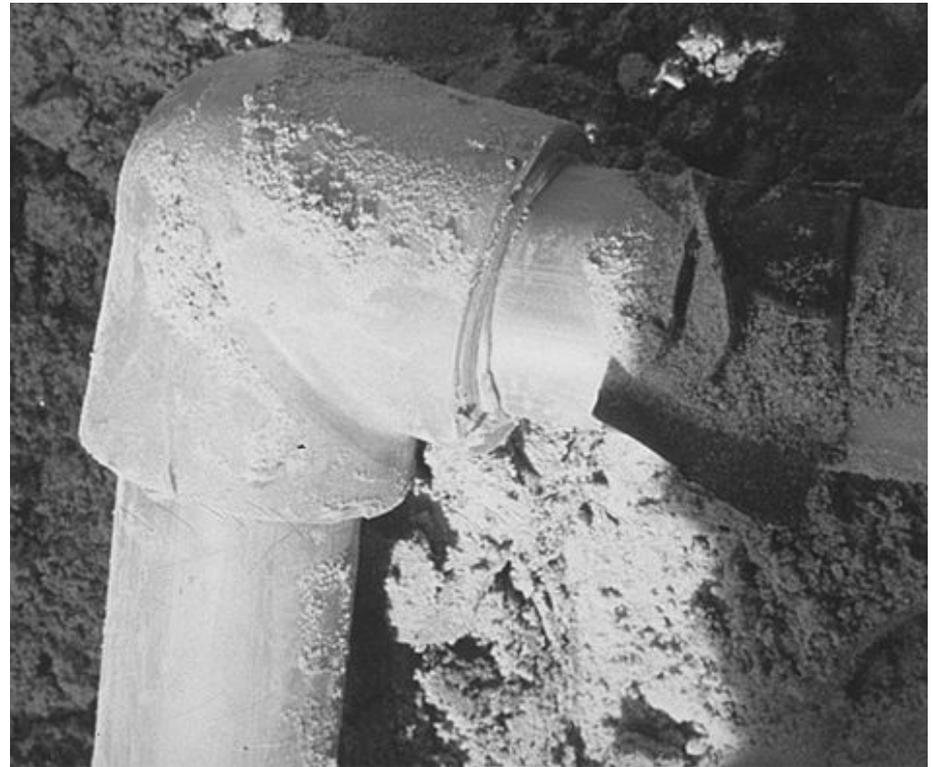
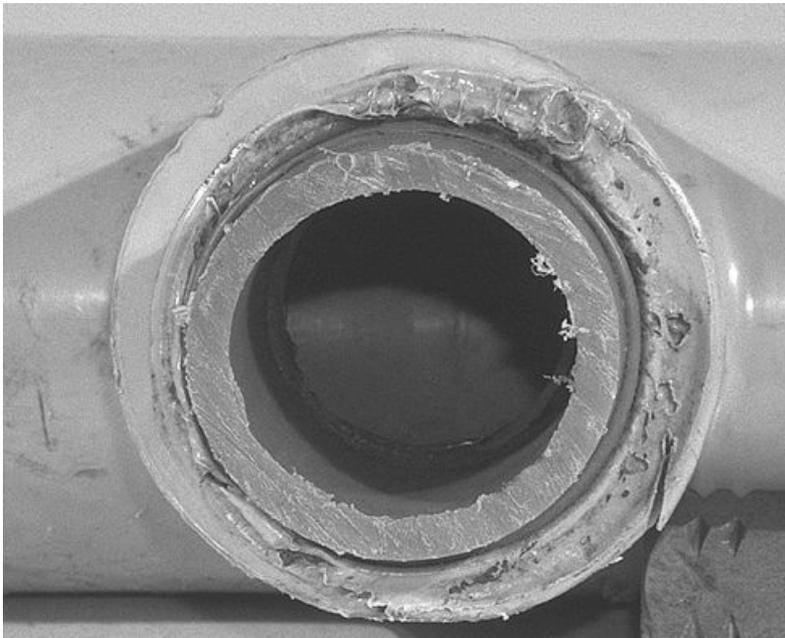
# Butt Fusion

Failure occurred at a hot plate butt fusion joint.



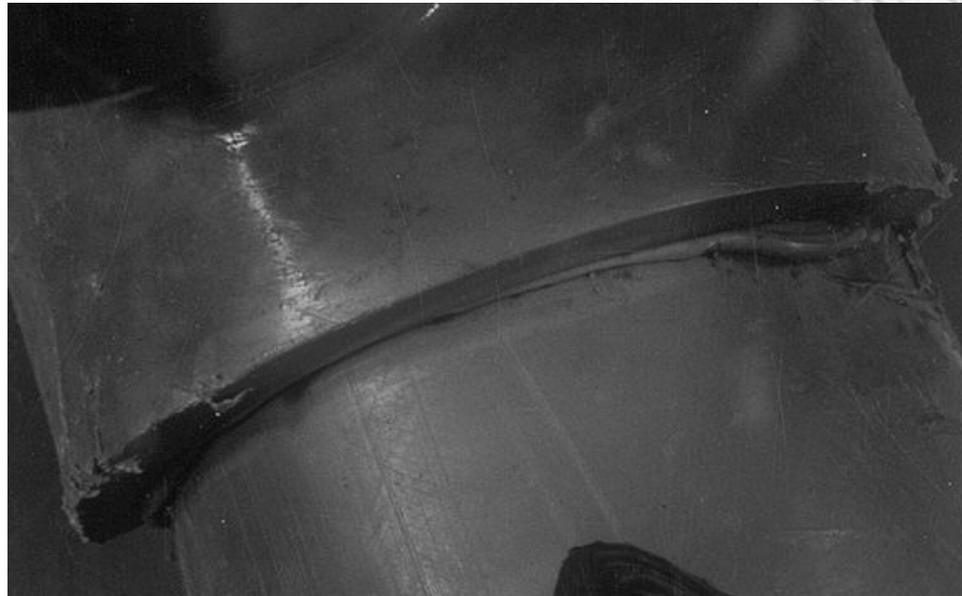
# Socket Fusion

**Failure occurred at a hot plate socket fusion joint.**



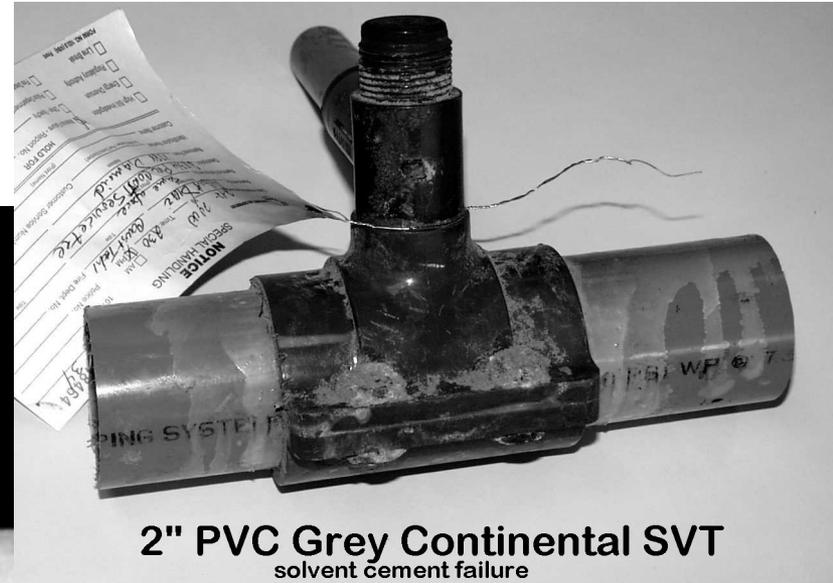
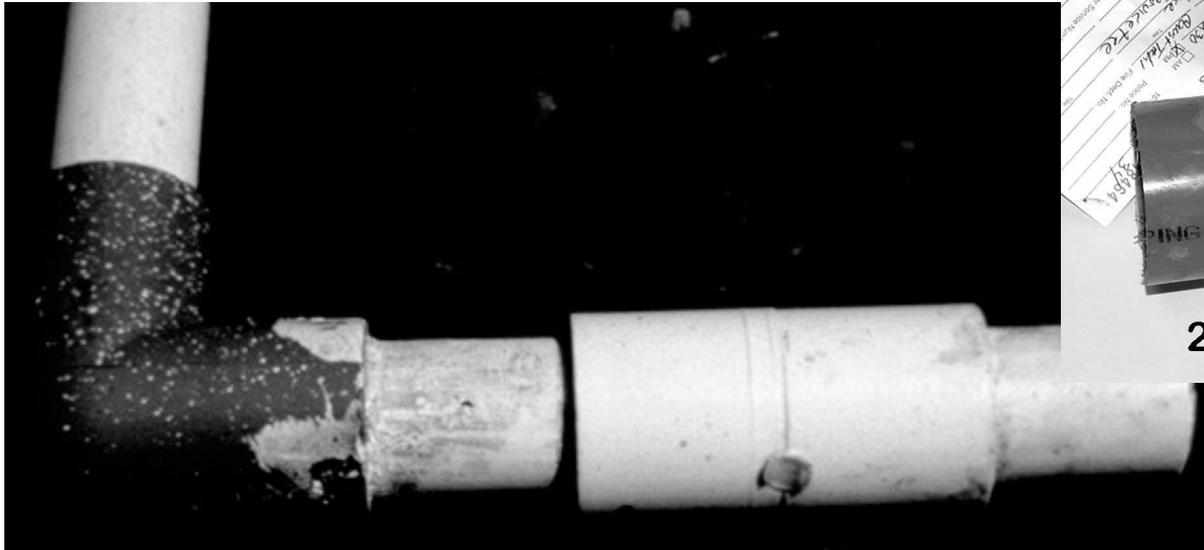
# Saddle Fusion

**Failure occurred on a hot plate saddle fusion joint. It would not include electrofusion or mechanical saddles.**



# Solvent Cement Joints

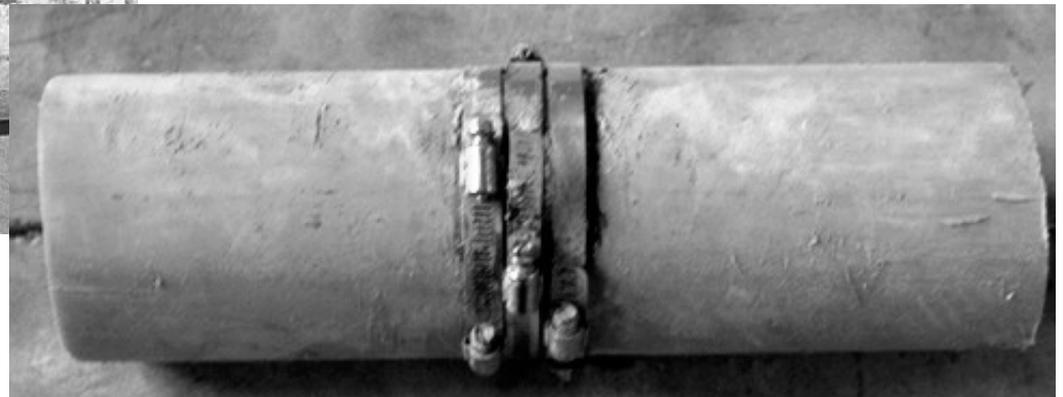
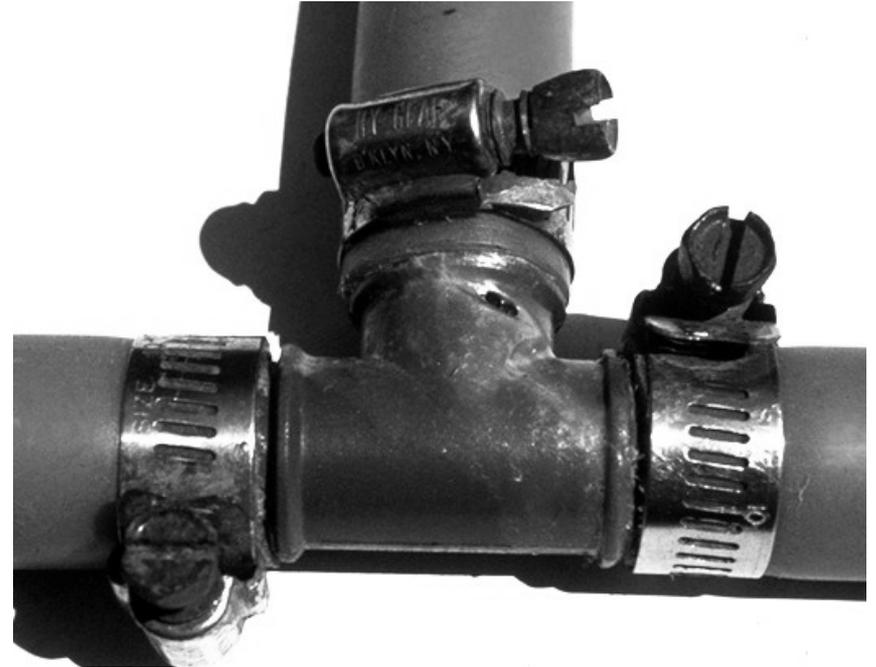
Failure occurred in the solvent fused joining area. Would only apply to materials such as PVC or ABS.



2" PVC Grey Continental SVT  
solvent cement failure

# Other Joint Failures

Failure occurred  
at a joint not listed.  
Provide details.



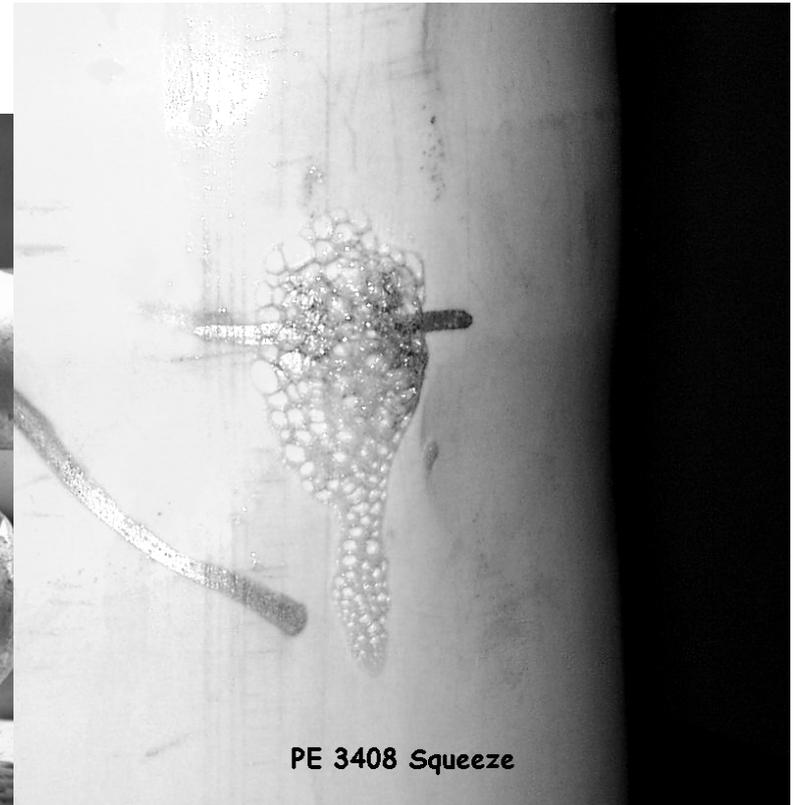
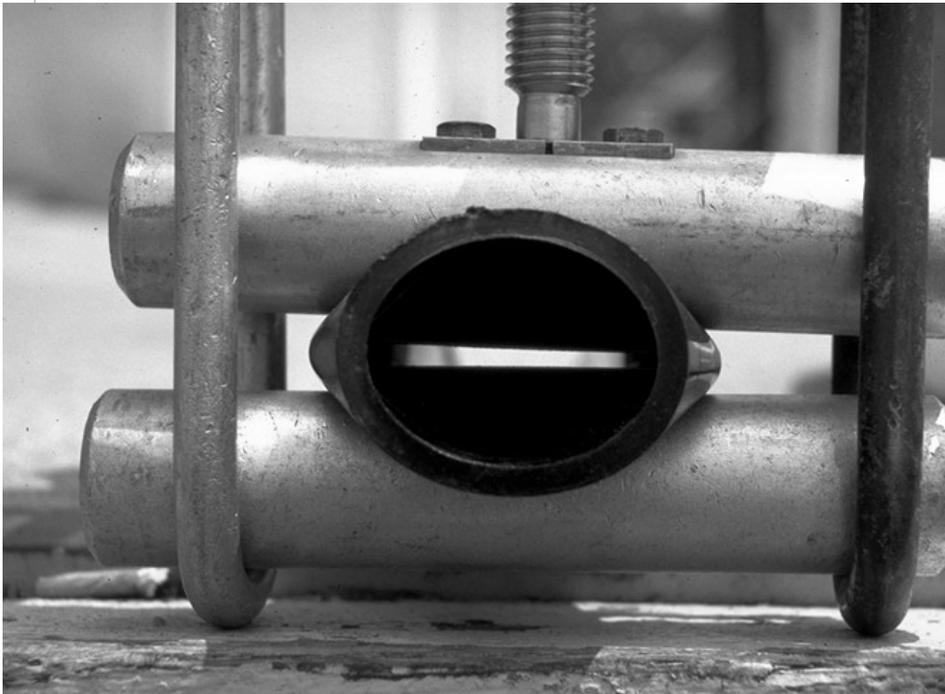
# Failure Causes

**What caused the plastic pipe or fitting to fail?**

FAILURE	
8	CAUSE (Check all that apply)
<input type="checkbox"/>	SQUEEZE OFF
<input type="checkbox"/>	POINT LOADING
<input type="checkbox"/>	EXCESSIVE EXPANSION
<input type="checkbox"/>	/CONTRACTION
<input type="checkbox"/>	EXCESS EXTERNAL
<input type="checkbox"/>	EARTH LOADING
<input type="checkbox"/>	INSTALLATION ERROR
<input type="checkbox"/>	PREVIOUS IMPACT
<input type="checkbox"/>	UNKNOWN
<input type="checkbox"/>	OTHER(Describe):
<input type="checkbox"/>	
<input type="checkbox"/>	

# Squeeze Off

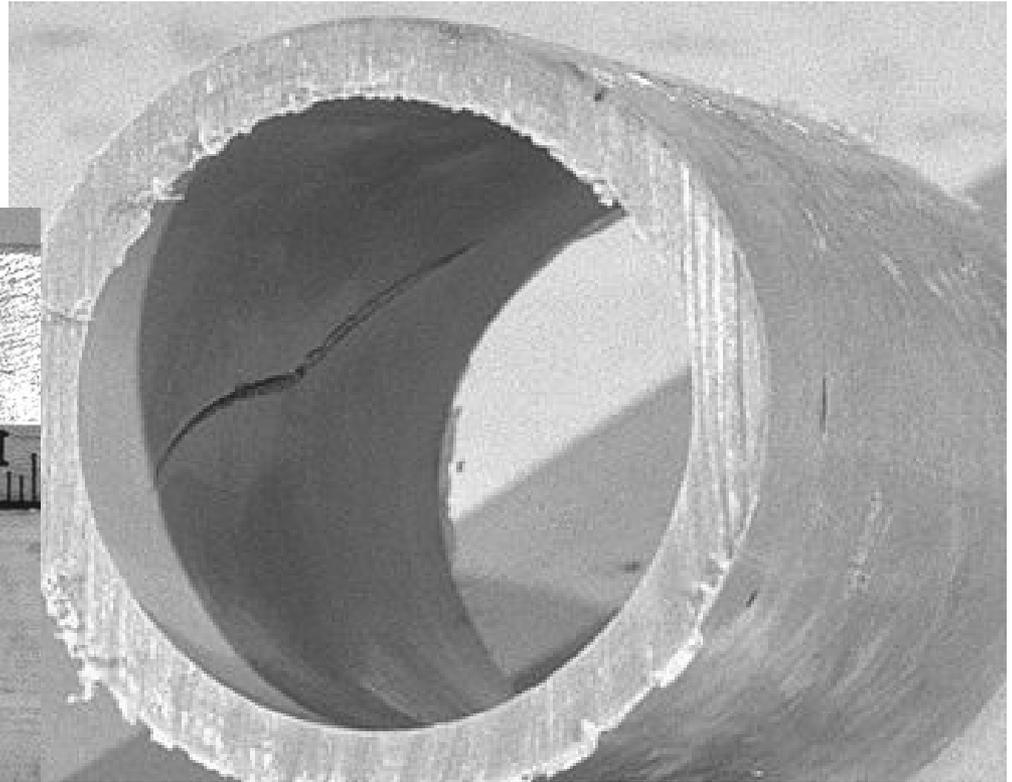
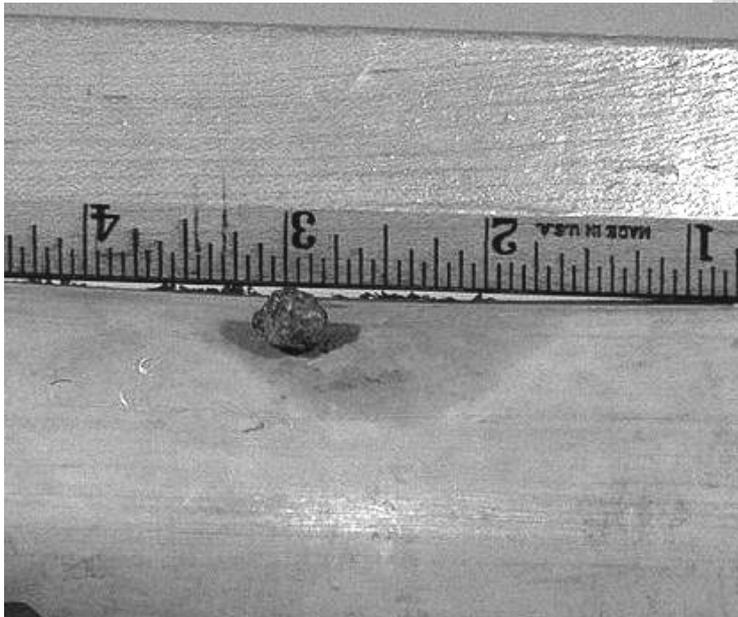
Indicators point to failure at a current or previously squeezed area.



PE 3408 Squeeze

# Point Loading

This includes rock impingement or tree roots pushing or rubbing against the pipe.



# Excessive Expansion/Contraction

- ◆ **This category includes items such as pipe pull out.**
- ◆ **Examination will determine that failure is not third-party damage, poor installation practice, or excessive bending.**

# Excess External Earth Loading



**This will include:**

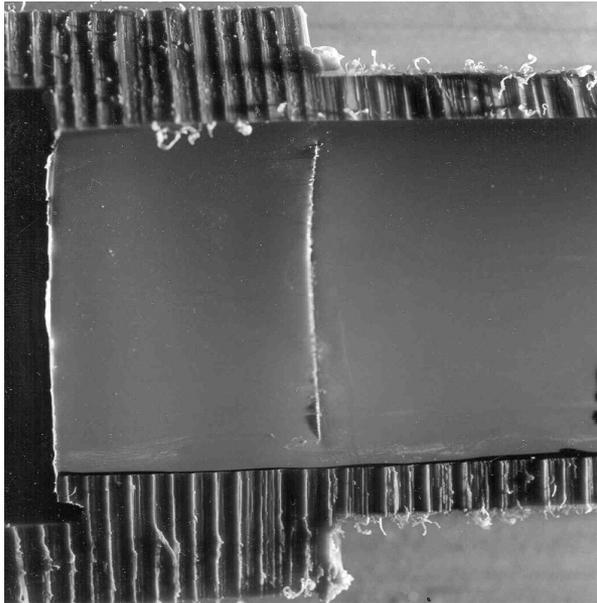
- Excessive bending
- Kinked



# Excess External Earth Loading

This will include:

- Mishandled
- Shallow installations
- Poorly backfilled



# Installation Error

**Failure caused by improper installation or operating instructions.**



# Previous Impact

- ◆ Failures which occur at time of impact are not reported here.



- ◆ If crack occurs adjacent to an area that shows signs of previous third-party damage it would be included.

# Unknown

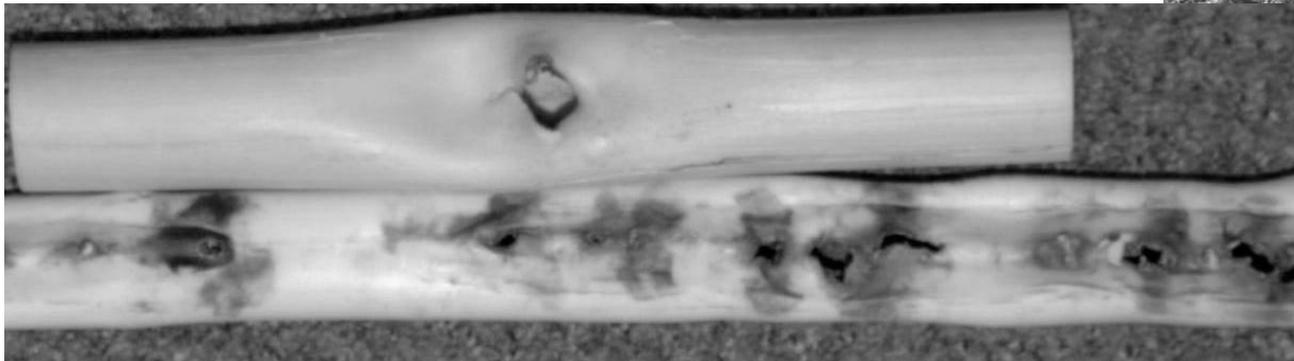
**Failure mode could not be determined or sample was destroyed.**



# Other

## Includes

- Static electricity
- Pin holing
- Overpressure
- Excessive temperature
- Lighting



# Contacts

**For more information or to voluntarily participate, contact the American Gas Association.**

- George Mosinskis (202)824-7341  
Email: gmosinskis@aga.org
- Dave Shin (202)824-7314  
Email: dshin@aga.org

**AGA's Web Site ([www.aga.org](http://www.aga.org)) contains all PPDC information such as white paper(s), forms, reports, etc.**