

## **APPENDIX N**

### **Plastic Piping Failure Report Form & Instructions**

**PPDC DATA COLLECTION INITIATIVE**

MATERIALS SECTION	
PLASTIC PIPE OR FITTING	
<b>1 IDENTIFICATION</b> (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	(Circle one and enter value below)
<input type="checkbox"/> MDPE - 2406	SDR, DR, SCHEDULE or
<input type="checkbox"/> PB	WALL THICKNESS:
<input type="checkbox"/> PVC	
<input type="checkbox"/> OTHER(Describe):	NOMINAL SIZE: _____
<b>2 DATE OF MANUFACTURE</b>	

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

FAILURE ANALYSIS SECTION	
FAILURE	
<b>7a LOCATION</b>	
<input type="checkbox"/>	PIPE
<input type="checkbox"/>	FITTING ( <b>Complete 7b</b> )
<input type="checkbox"/>	JOINT ( <b>Complete 7c</b> )
FAILURE IN	
<b>7b FITTING</b> (Check as applies)	
<input type="checkbox"/>	TRANSITION
<input type="checkbox"/>	VALVE (PLASTIC)
<input type="checkbox"/>	METER RISER
<input type="checkbox"/>	MECHANICAL FITTING
<input type="checkbox"/>	HEAT FUSION FITTING
<input type="checkbox"/>	ELECTROFUSION FITTING
<input type="checkbox"/>	OTHER(Describe): _____
FAILURE IN	
<b>7c JOINT</b> (Check as applies)	
<input type="checkbox"/>	MECHANICAL
<input type="checkbox"/>	ELECTROFUSION
<input type="checkbox"/>	BUTT FUSION
<input type="checkbox"/>	SOCKET FUSION
<input type="checkbox"/>	SADDLE FUSION
<input type="checkbox"/>	SOLVENT
<input type="checkbox"/>	OTHER(Describe): _____
FAILURE	
<b>8 CAUSE</b> (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): _____
DATE OF	
<b>9 FAILURE</b>	
(mo/day/yr) _____	

**NOTICE OF FORM SUBMITTAL:**

**This form should be submitted even if not all data elements are available.**

CONTACT NAME	PHONE NUMBER

## DOT PLASTIC PIPE DATA-SHARING INITIATIVE

### DEFINITIONS

#### Clarification of Data to Be Collected in The Plastic Piping Failure Report Form

##### 1) Plastic pipe or fitting identification

This is the plastic material that the pipe or fitting is made from. Typical materials are Polyethylene (PE), Polyvinyl Chloride (PVC), or Polyamide (PA). A two or three letter designation may be on the print line of the pipe or fitting or be available in company records.

###### a) Type of Material

The letter code indicating the material which the pipe is made from such as PE, PVC, or PA. If type of material is unknown, indicate color (For example, tan, orange, yellow, black, black-yellow, white-blue).

###### b) Manufacturer

This is the name of the company that produced the pipe or fitting. The manufacturer name would typically be on the print line of a pipe, on a sticker attached to a fitting or product or stamped into the fitting.

###### c) Print Line (if available)

The printed line of information on the pipe OD that contains all the pertinent information which relates to the traceability of the pipe.

###### d) SDR, DR, Schedule or wall thickness

The standard dimension ratio (SDR), dimensional ratio (DR), schedule or wall thickness. The SDR or DR is the pipe OD divided by pipe wall. The schedule number of the pipe is an alternate identifier. These numbers can be found on the print line or in the case of DR and SDR, by measuring the wall thickness and dividing it into the pipes outside diameter. The wall thickness is the measurement in inches between the inside and outside wall of the plastic pipe. It may be found on the print line or measured using a caliper.

###### e) Nominal Size

This is usually found on the print line as a number of inches and a three-letter designation such as IPS (Iron Pipe Size) or, CTS (copper tubing Size). This may be marked on company records as well.

##### 2) Date of Manufacture

This is the date the pipe was manufactured. This is typically found on the print line and may be coded. For assistance in reading the code contact the Manufacturer if they are still in business.

### **3) Method of Installation**

This is the method that was used to install the plastic pipe into the ground. Different methods of installation place different stresses on the plastic pipe. If the method of installation is not known factually, the investigator may record an educated guess if that guess is supported by additional written assumptions.

a) Open trench

This is where a trench is dug, the plastic is installed and the ditch is recovered with backfill according to accepted practices.

b) Bored

The plastic pipe is inserted into a bored hole produced by some type of drilling equipment according to accepted practices. This is sometimes referred to as directional drilling or guided boring.

c) Plowed in

The plastic pipe is inserted through a chute or guide behind a tractor or earth moving equipment with a plowing attachment and the pipe is installed as the plow moves across the ground.

d) Insertion

The plastic pipe is installed by pushing or pulling into an existing pipe that is usually metal.

e) Joint trench

The plastic pipe is installed into the same trench as other utilities such as sewer, water, electricity and telephone.

f) Planted

The plastic pipe is on a reel that is a part of the trenching equipment and is fed into the ground as the equipment moves along the ground. There is a reduced tensile stress on the pipe as opposed to plowing.

g) Unknown

Only use unknown when there are no records or other indications of installation method. It is important to identify the installation method where possible.

h) Other

Installation was done by a method not listed here and the method of installation is known. Please describe the method on the blank line of the form.

### **4) Type of soil in contact with pipe**

This is to determine the kind of soil that was in contact with the plastic pipe.

a) Sand

A sedimentary material, finer than a granule and courser than silt, with grains between 0.06 and 2.0 millimeters in diameter.

b) Loam

Soil that has no or few rocks or pebbles but has some peat or peat like parts in the soil.

c) Clay

Very fine soil that becomes slimy or plastic when mixed with water and compacts tightly and is hard to remove from the ditch and from your boots.

d) Rocky

Are the rocks mostly smooth and rounded, such as at the beach or in rivers, or are they sharp and angular such as those caused by excavation and/or blasting.

e) Slurry

A mixture of water and clay or other soil materials.

f) Other

None of the above, please describe.

## **5) Operating Pressure**

a) At time of failure

The pressure at which the line was operating when the failure occurred or was discovered.

b) Normal Range (If known)

The operating pressure range over a full year.

## **6) Date of Installation**

The date (typically found in Company Records) when the pipe was installed.

## **7) Failure Analysis Section**

### **7a) Failure Location**

This replies to the question: Where did the failure happen?

i) Pipe

The failure was in the plastic pipe.

ii) Fitting

The failure was in the fitting, not in the joint between the pipe and the fitting.

iii) Joint

The failure was in the joint between the pipe and the fitting or between two sections of pipe.

**7b) Failure in Fitting**

i) Transition

The failure was at a plastic-to-steel transition fitting. This includes both mechanical pullout-proof metal and plastic couplings and factory produced weld-in and fuse-in transition fittings.

ii) Valve (plastic)

The failure was at a plastic valve - either fusion or mechanically joined types.

iii) Meter riser

There are two basic types of meter risers: the first is the anodeless riser in which the plastic is the gas carrier up inside the steel riser casing to a point above grade: the second is the all steel riser in which the plastic is fitted to a steel compression fitting, below ground, at the end of the horizontal leg of the riser. Almost all risers installed today are the "anodeless" type.

iv) Mechanical fitting

The failure occurred within the body of a mechanical fitting. This includes stab type, screw on, bolt on, and mechanical tapping tees made of metal and plastic. This will include both pullout-proof and seal only types but does not include plastic-to-steel couplings, they are considered transition fittings. This would only apply to failures in the bodies of mechanical fittings and not failures in the joints between the fittings and pipe.

v) Heat Fusion fitting

The failure occurred in a conventional or hot plate fusion fitting. This would include conventional plastic fusion fittings such as socket fusion couplings, ells and tees and saddle fusion tees. This would not include butt fusion joints but would include failures in the mold seams of molded plastic fittings. This would only apply to failures in the bodies of fusion fittings and not failures in the joints between the fittings and pipe.

vi) Electrofusion fitting

The failure occurred in an electrofusion fitting. This would include electrofusion saddles, patching saddles and couplings, ells, and tees. This would not include butt fusion joints, but would include failures in the bodies or seams of molded or extruded body electrofusion fittings. This would not apply to failures in the joints between the fittings and pipe.

vii) Other

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

### **7c) Failure in Joint**

The failure was in the joint between the pipe and the fitting or between two sections of pipe.

- i) Mechanical

The failure was at a mechanical joint. This would include all types as described above in section 7b) iv).

- ii) Electrofusion

The failure was in the electrofusion joint. This would include couplers, eels, tees, saddle tees, branch saddles, and patching saddles.

- iii) Butt fusion

The failure occurred in a hot plate fused butt fusion joint.

- iv) Socket fusion

The failure occurred in a hot plate fused socket fusion joint.

- v) Saddle fusion

The failure occurred in a hot plate fused saddle fusion joint. This would not include either electrofusion saddles or mechanical saddles.

- vi) Solvent

The failure occurred in the joining area of a solvent cemented joint. This would only apply to solvent cement plastics such as PVC or ABS.

- vii) Other

The failure was at a joint not listed, please describe details here.

### **8) Failure Cause**

What caused the failure of the plastic pipe?

- a) Squeeze off

There is an indication that the failure occurred at a current or previously squeezed off location. (This is one cause of a brittle-type crack.)

- b) Point loading

There is evidence of a foreign object ( e.g. rock, tree root, etc.) pushing or rubbing against the pipe. (This is one cause of a brittle-type crack).

- c) Excessive expansion/contraction

This will be discovered upon leak repair. Examination of the pipe and coupling will determine if the fault was due to poor installation or third party damage. If the failure is ductile and in the pipe rather than the joint, the failure is probably third party damage caused by a backhoe snag or the like. If the plastic pipe has pulled out and shows signs of scraping where it was inserted into the coupling, the failure is likely to be poor installation especially if the coupling is a pullout-proof type. If the failure is slow crack growth adjacent to the fitting, this could be due to fatigue or excessive bending caused by point loading at the joint and/or a failure to properly sleeve or obtain support through backfilling.

d) Excess external earth loading

Examination of the failed section of pipe will reveal if the pipe was excessively bent, kinked or mishandled. If the failure is the brittle type, it will occur at the area of maximum stress. If this is where a protective sleeve should have been installed, or where a moving load was being applied such as a driveway and the pipe was installed shallow or poorly backfilled then the cause is clear. Examination of the leak and the area of the leak should provide the answer. This type of failure usually occurs because of bending and stress loading where a pipe (more flexible) enters a fitting such as a socket fusion fitting (less flexible).

e) Installation Error

Leakage was caused by failure to follow proper installation procedures or operating instructions.

f) Previous Impact

The sample was originally submitted as a plastic pipe material failure and upon further examination it was determined there were multiple modes of failure. An example would be a brittle crack through the pipe wall next to a third party (outside force) gouge that initiated the crack in the pipe wall. If the pipe failure occurred sometime after the impact, then this is reported as a Previous Impact pipe failure using the plastic pipe database form. Failures reported or eligible to be reported as third party damage under the Common Ground Initiative would not be reported again under this category.

g) Unknown

The sample was destroyed or an unusual event occurred so that the failure cause could not be determined.

h) Other

Did your examination reveal any other cause of failure (e.g. static electricity, electrostatic discharge, pin holing, overpressure, excessive temperature)? Please describe it here. The description "outside force" is not sufficiently specific and in some cases may inadvertently duplicate items included under the other categories above, where specific data are being sought by the PPDC for specific causes. Examples of such are:

- tree roots which fall under category 8(b) Point Loading,
- excessive earth loading which falls under category 8(d) Excess External Earth Loading, or
- delayed third party damage which falls under category 8(f) Previous Impact.

Therefore, if you use outside force, as the failure cause, please be more specific and describe what caused the outside force. For example, if it is lightning or static electricity, please specify as such. Please refer to the definitions in the first sentence of the first paragraph under this heading.

## 9) Date of Failure

The date the failure occurred or was discovered. If you are submitting data whose failure date predates January 25, 2001, and you do not know the actual date of failure to at least the month/year, please indicate this is historical data by entering 01/01/1950 under this entry. This date will serve as a flag for the actual date on any failure known to have occurred prior to January 25, 2001.