This publication contains briefs of selected pipeline accidents occurring during the calendar years 1976, 1977, 1978, and 1979. The brief format presents basic facts, conditions, and probable cause(s) in each instance.

File Numbers:
DCA-76-FP-021 DCA-77-FP-023 DCA-78-FP-021 FTW-79-FP-012 DCA-80-FP-002
DCA-77-FP-025 LAX-78-FP-001 FTW-79-FP-013 FTW-80-FP-002
DCA-78-FP-002 FTW-79-FP-003 FTW-80-FP-005 DCA-80-FP-006
LAX-78-FP-001 FTW-79-FP-004 DCA-78-PP-004 FTW-79-PP-004
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FTW-78-PP-007 FTW-79-PP-003 DCA-79-FP-001 DCA-79-PP-001
FTW-78-FP-009 FTW-79-PP-001 DCA-79-PP-001 DCA-81-FP-001
FTW-78-PP-010 FTW-79-PP-002 DCA-79-PP-001 DCA-81-PP-001
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DCA-79-FP-014 FTW-80-FP-001
DCA-81-FP-002 FTW-80-FP-001
DCA-81-FP-003

Key Words: External corrosion, improper operating procedure, outside force damage, rapidly expanding circumferential fracture, material failure, hydrogen stress cracking, inadequate control devices, soil movement, excavation damage, customer's service line, LPG gas, live abandoned service line gas compressor station.

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FOREWORD

The National Transportation Safety Board, in accordance with the provisions of the Independent Safety Board Act of 1974, has determined the probable cause of the accidents reported herein.

This publication contains the reports of 42 pipeline accidents arranged in chronological order.

The enclosed briefs are the reports of the National Transportation Safety Board and are thereby subject to the limitations of 49 USC 1903(c):

"No part of any report or reports of the Board, relating to any accident or the investigation thereof, shall be admitted as evidence or used in any suit or action for damages growing out of any matter mentioned in such report or reports."

For those readers who wish more detailed information, the original factual reports are on file in the Washington, D.C. office of the National Transportation Safety Board and may be examined. These reports will be reproduced for a fee covering reproduction costs and postage. Orders for materials are also subject to a user charge by the Board for special services, and such charges will be included in the bill.

National Transportation Safety Board
Public Inquiries Section
Washington, D.C. 20594
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EXPLANATORY NOTES

Scope

The accidents included herein are those occurrences incidental to pipeline operations which fall within the scope of Section 304 of the Independent Safety Board Act of 1974. As provided in this Section the Board shall investigate and determine facts, conditions, circumstances, and the probable cause of any pipeline accident in which there is a fatality, or substantial property damage.

The following definitions have been established by the Safety Board in implementing the Independent Safety Board Act of 1974 (49 USC 1901):

Fatality

"Fatality" means the death of a person either at the time a pipeline accident occurs or within 60 days thereafter.

Substantial Damage

"Substantial damage" means damage of $100,000 or more to pipeline and non-pipeline property.

The following definitions, as set forth in Title 49 of the Code of Federal Regulations, Parts 192 and 195, are applicable:

49 CFR 192.3

Gas

"Gas" means natural gas, flammable gas, or gas which is toxic or corrosive.

Main

"Main" means a distribution line that serves as a common source of supply for more than one service line.

Service Line

"Service line" means a distribution line that transports gas from a common source of supply to (a) a customer meter or the connection to a customer's piping, whichever is farther downstream, or (b) the connection to a customer's piping if there is no customer meter. A customer meter is the meter that measures the transfer of gas from an operator to a consumer.
Transmission Line

"Transmission line" means a pipeline, other than a gathering line, that:

(a) Transports gas from a gathering line or storage facility to a distribution center or storage facility;

(b) Operates at a hoop stress of 20 percent or more of SMYS: or

(c) Transports gas within a storage field.

Transportation of Gas

"Transportation of Gas" means the gathering, transmission, or distribution of gas by pipeline or the storage of gas, in or affecting interstate or foreign commerce.

Pipeline

"Pipeline" means all parts of those physical facilities through which gas moves in transportation, including pipe, valves, and other appurtenance attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies.

Pipeline Facility

"Pipeline facility" means new and existing pipelines, right-of-way, and any equipment, facility, or building used in the transportation of gas or in the treatment of gas during the course of transportation.

49 CFR 195.2

Liquid

"Commodity" means a hazardous material that is subject to Parts 172 and 173 of this chapter, petroleum, and petroleum products.

Pipeline System

"Pipeline system" or "pipeline" means all parts of a carrier's physical facilities through which commodities move in transportation that is subject to this part, including, but not limited to line pipe, valves and other appurtenances connected to line pipe, pumping units, fabricated assemblies associated with pumping units, metering and delivery stations and fabricated assemblies therein and carrier-controlled breakout tankage.
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<td>West Lafayette, Indiana</td>
<td>Indiana Gas Co., Inc.</td>
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**Brief of Accident**

**Accident:** At 5:51 p.m., m.d.t., on July 25, 1979, natural gas at 38 psig pressure escaping from a separation in a service line found at a 1-inch dresser coupling located underneath one of the apartments of a duplex house, accumulated, exploded, and ignited. Ignition occurred when one of the occupants struck a match to light a stove. The 3/4-inch steel mill-wrapped pipe was bent severely by a telephone company backhoe while working in the street to locate a telephone cable. The backhoe operator did not await the marking of the service line and did not know that the natural gas line was there until the excavation equipment hit it. The service line changed to 1-inch at the inlet side of the coupling and a 2-inch separation existed between the coupling and the pipe which indicated that the pipe had been pulled out. Two persons were killed, two persons were hospitalized for burns, the duplex apartment house was destroyed, and adjacent houses were damaged. The odor of gas was detected by residents but not reported.

**LOSSES:**

- **Fatalities:** 2
- **Reportable Injuries:** 2
- **Pipeline Damage:** $1,800
- **Non-Pipeline Damage:** $30,000

**Probable Causes:**

1. Pipeline damaged by backhoe.
2. Excavator unaware that he had damaged pipeline.
3. Failure of excavator to wait for marking of pipeline location.
4. Failure of residents to report gas odor.

**Other Factors:**

1.

**Probable Cause of Casualties:**

1. Fatalities due to burns and collapse of structure as a result of primary loss event.
2. Injuries due to burns and collapse of structure as a result of primary loss event.
3.

**Other Casualty Factors:**

1.
2.

**Recommendations:** None
NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.  20594  
Brief of Accident

<table>
<thead>
<tr>
<th>Co. Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
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<td>Lone Star Gas Co.</td>
<td>Gas</td>
<td>Natural Gas</td>
<td>5-29-78</td>
<td>Arlington, Texas</td>
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**Accident:** At 8:45 a.m., c.d.t., on May 29, 1978, natural gas leaking from two corrosion holes in a 1-inch bare steel gas customer yard line operating at a pressure of 11 psig and covered by 17 inches of soil which had been saturated by heavy rains the day before, migrated beneath a house resting on a pier and beam foundation, and was ignited by the pilot light on a gas hot water. The resulting explosion destroyed the one-story brick house and damaged adjacent houses. There were no fatalities or injuries. The bare yard line was part of an unprotected gas piping system leading from the outlet side of the curb valve to the inlet side of the customer's meter. The operator's service line was a coated and wrapped steel pipe connected to the main with an insulated coupling. There was no apparent insulated fitting between the fuel line and the uncoated yard line. As a result the yard line was anodic to the house piping, part of which was burned, and galvanic corrosion resulted.

**LOSSES:**  
- **Fatalities:**  
- **Reportable Injuries:**  
- **Damage Pipeline:**  
- **Damage Non-Pipeline:** $100,000

**Probable Causes:**  
1. Corrosion due to lack of cathodic protection.  
2.  
3.  

**Other Factors:**  
1. Improper/inadequate procedures for design, installation and inspection of gas service lines.  
2.  

**Probable Cause of Casualties:**  
1.  
2.  
3.  

**Other Casualty Factors:**  
1.  
2.  

**Recommendations:**  
R-79-32 & 33
Accident: At 7:45 a.m., c.s.t., on November 27, 1978, natural gas leaking from a circumferential fracture in a threaded, 1-inch steel nipple - part of the "swing connection," off the tap on a service line - operating at a pressure of 14 psig, migrated laterally along the gas main and water line beneath and into the house where it was ignited when an electric heater was turned off. An explosion and flash fire resulted, with the fire fatally injuring one occupant and seriously injuring the other. The house suffered extensive damage from the explosion and some fire damage.

<table>
<thead>
<tr>
<th>Probable Cause of Casualties:</th>
<th>1. Fatality and injury due to fire as direct result of primary loss event.</th>
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<td>Other Casualty Factors:</td>
<td>1.</td>
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<tr>
<td></td>
<td>2.</td>
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Recommendations: P-79-27, P-79-28
**NATIONAL TRANSPORTATION SAFETY BOARD**  
**WASHINGTON, D.C. 20594**  
**Brief of Accident**

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<td>Company</td>
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<tr>
<td>ALAGASCO</td>
<td>Distribution</td>
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**Accident:** Natural gas escaped from a circumferential break in a 3-inch cast-iron main located at a depth of 18 inches and operating at a pressure of 22 psig. An overlying sidewalk contained upward movement of the gas and part of it migrated laterally into the basement of a nearby building. Ignition of the gas was probably provided by a floor furnace, as indicated by its position relative to the damage in the basement and by the unusual explosive force which would have resulted from a high concentration of natural gas in the basement triggered when the lower explosive limit was reached in the floor furnace. This explosion and fire destroyed several commercial buildings and damaged over 50 other buildings. Metallurgical examination revealed that graphitization had weakened the pipe.

** LOSSES:**  
- Fatalities: 0  
- Reportable Injuries: 0  
- Pipeline Damage: $56,000  
- Non-Pipeline Damage: $1,500,000

**Probable Causes:**  
1. Material failure of cast-iron pipe due to graphitization which weakened material.  
2.  
3.

**Other Factors:**  
1. Environment - temperature change.  
2. Traffic vibration.  
   (Stresses which may have fractured weakened cast-iron pipe.)

**Probable Cause of Casualties:**  
1.  
2.  
3.

**Other Casualty Factors:**  
1.  
2.

**Recommendations:** None
Accident: A contractor, while excavating for a subway station, struck a new 1 1/4-inch steel coated service line operating at 7 inches of water column (7" W.C.). The impact of the heavy equipment (backhoe bucket) upon the 12-foot-long service line caused it to bend. The force of the impact pulled the elbow, which connected the service line to the indoor meter riser, approximately 52 inches into the brick wall. The break occurred on the pipe near the elbow. Natural gas escaped from the broken service line and migrated into the basement of the three buildings and ignited from an unknown source. The explosion and fire totally demolished three, three-story buildings, and severely damaged adjacent buildings. The service line locations in the area were visibly marked on the building walls with wide lines of yellow paint.

LOSSES: Fatalities 0; Reportable Injuries 0; Damage $596.00; Non-Pipeline Damage $120,000.00

Probable Causes: 1. Improper operating procedures for heavy excavation equipment.
2. 
3. 

Other Factors: 1. Operator's contractor human error.
2. Failure of the gas company to have a full-time inspector at the excavation site.

Probable Cause of Casualties: 1. 
2. 
3. 

Other Casualty Factors: 1. 
2. 

Recommendations: None
Accident:

At 9:54 a.m., c.s.t., on January 2, 1980, crude oil leaking from a fracture in a 22-inch Houma-Erath pipeline at a levee crossing at Berwick, LA, flowed under houses along the levee and was ignited by a gas hot water heater. The resulting fire injured two persons, one fatally, and destroyed five frame houses and one mobile home. Investigation revealed that the tie-in weld on the levee crossing was reinforced by a full-encirclement fillet-weld sleeve which stiffened the reinforced pipe area and provided stress concentrators at either end of the sleeve where the pipe was weakened by underbead cracking caused by the welding process. An imperfection in the base material, the chemical composition (a high carbon and manganese content), was a factor which increased the hardness of the heat-affected zone and promoted underbead cracking.

LOGSES:

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<th>Reportable Injuries</th>
<th>Pipeline Damage</th>
<th>Non-Pipeline Damage</th>
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<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>$110,000</td>
<td>$250,000</td>
</tr>
</tbody>
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Probable Causes:

1. Material failure of steel pipe due to use of full-encirclement, fillet-welded sleeve.
2. 
3. 

Other Factors:

1. Imperfection in base material.
2. 

Probable Cause of Casualties:

1. Fatality due to fire as a direct cause of primary loss event.
2. 
3. 

Other Casualty Factors:

1. 
2. 

Recommendations:
| DCA-78-PP-001 | People's Gas Light and Coke Company | Distribution | Natural Gas | 10/14/77 | 4930 W. Cortez Street | Chicago, Illinois |

**Accident:** Explosion and fire destroyed a two-family house and damaged adjacent buildings. Natural gas had entered the dwelling through a broken service head adapter which was used to connect inserted plastic service lines to the riser and meter set on the inside of the building. The adapter was broken when a contractor, employed by the city, pulled the 1 1/4-inch plastic-encased service line operating at 1/4 psig pressure while removing street curbs. Source of ignition is unknown. The contractor did not notify the utilities of planned excavations as required by the city code.

**Losses:**
- Fatalities: 1
- Reportable Injuries: 3
- Pipeline Damage: $700.00
- Non-Pipeline Damage: $100,000.00

**Probable Causes:**
1. Damage by human non-pipeline forces due to machine operator error, unaware of pipeline location.
2. Coordination failure, excavator made no effort to determine pipeline existence.
3. 

**Other Factors:**
1. 
2. 

**Probable Cause of Casualties:**
1. Fatally burned.
2. 
3. 

**Other Casualty Factors:**
1. 
2. 

**Recommendations:** P-78-15; P-78-16; P-78-17.
Accident: At 1:10 p.m., c.d.t., on October 13, 1979, in Chrisman, Illinois, natural gas at a pressure of 28 psig leaked from the parted seam caused by excavation damage to a 1 1/4-inch scotch-coated steel service line, at its crossing of a water line which had been installed nearly perpendicular to and beneath it some six months previously. The gas migrated beneath and into a one-story, slab-mounted, cement block, newly remodeled commercial building where it was subjected to an unknown source of ignition resulting in an explosion and fire, fatally injuring one person, critically injuring another, and completely destroying the building and contents. Gas servicemen did not respond to a report of gas odors just prior to explosion; and previous odor complaints to owner by tenants were not acted upon.

Probable Causes: 1. Pipeline damaged by backhoe.
2. Excavator unaware that he had damaged pipeline.
3. Failure of public to report gas odor.
4. Human failure to execute emergency procedures properly (respond to leak report).

Probable Cause of Casualties: 1. Fatality due to smoke inhalation and burns as a result of the primary loss event.
2. Injury due to burns and collapse of structure as a result of the primary loss event.

Recommendations: None
Accident: A liquid pump station was pumping product (normal butane and ethane-propane mix) with its two units when a massive seal leak occurred on one of the pumps. Automatic systems shut down both units in response to leaks, but there was sufficient discharge of product to cause an explosion and fire which in turn damaged closed valves and resulted in further leakage and discharge of product. Both gas-driven turbines, one pump and other pipeline facilities were damaged beyond repair.

LOSSES:  
Fatalities 0  Reportable Injuries 0  Damage $300,000.00  Damage $--

Probable Causes:  
1. Material failure of pump shaft seal due to above normal deterioration wear.
2. 
3. 

Other Factors:  
1. 
2. 

Probable Cause of Casualties:  
1. None
2. 
3. 

Other Casualty Factors:  
1. None
2. 

Recommendations:
**Accident:** At 8:15 a.m., c.d.t., on August 13, 1979, a compressor station operator stood partially in front of a scraper trap closure while opening it and the explosive force of rapidly expanding natural gas, which had been confined at an estimated pressure of 100 psig, fatally injured him after tearing the closure off its hinge. He had previously opened the 2-inch blowdown valve 2 or 3 times and had left the valve open, but failed to verify pressure within the 10-inch scraper trap by use of a pressure indicator valve. The 750 psig line pressure, introduced into the trap with an 8-inch polyurethane sphere was not completely relieved because the relatively flexible pig blocked the 2-inch blowdown outlet. The operator was not familiar with the polyurethane pig since this was the first one used in this line. The rigid neoprene pig, normally in use, was effectively prevented from blocking the blowdown outlet by a narrow strip of barstock; the polyurethane pig did block the pressure blowdown opening. Pipeline Non-Pipeline

**Losses:** Fatalities 1; Reportable Injuries 0; Damage $1,000; Damage $ 

**Probable Causes:**
1. Failure to properly follow complete procedure ("non use of equipment required by procedures" and unnecessary exposure when opening closure).
2. 
3. 

**Other Factors:**
1. "System change made without adequate system test" producing unforeseen consequences.

**Probable Cause of Casualties:**
1. Fatality due to internal injuries, struck by pipe closure. 

**Other Casualty Factors:**
1. 

**Recommendations:** None
Accident: At 1:14 p.m., c.s.t., on November 17, 1979, in Fort Payne, Alabama, natural gas leaking from a circumferential fracture in a 4-inch cast iron main operated by DeKalb-Cherokee Natural Gas District at a pressure of 25 psig migrated beneath the foundation of a 4-apartment residential building where it was subjected to an unknown source of ignition. The resulting explosion and fire fatally injured one person, slightly injured three others, destroyed the building, completely destroyed an adjacent building and damaged several others. Metallurgical analysis revealed that graphitization had not weakened the pipe.

Probable Causes: 1. Material failure of cast iron due to stress induced by frost action and other indeterminate forces.

Probable Cause of Casualties: 1. Fatality due to fire and asphyxiation as a result of primary loss event.

Recommendations: None
Accident: At 10:25 a.m., c.s.t., on August 28, 1978, natural gas which escaped from a 2.7-inch long circumferential fracture in a socket heat-fusion coupling on a 2-inch P.E. main operating at a pressure of 40 PSIG, migrated beneath a one-story residence and was subjected to an unknown source of ignition. The resulting explosion and fire injured one person, destroyed the house and damaged three others. Investigation revealed that: (1) the coupling was manufactured with a thermoplastic material which had a poor service history, (2) the coupling was stressed by subsidence related to sewer construction and a subsequent main extension over the sewer 6 years prior to the accident.

LOSSES: Fatalities -0-, Reportable Injuries -1-, Damage $2,000.00

Probable Causes: 1. Failure to execute installation procedures properly

2.

3.

Other Factors: 1. Imperfection in base material of plastic fitting (polyethylene coupling).

2.

Probable Cause of Casualties: 1. Injury due to fire as a result of primary loss event.

2. Injury due to collapse of structure as a result of primary loss event.

3.

Other Casualty Factors: 1.

2.

Recommendations: P-79-12, P-79-13, P-79-14
Pipeline Accident:  FY 77, Qtr. 3rd

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carson Gas Company</td>
<td>Distribution</td>
<td>Vaporized</td>
<td>06/28/77</td>
<td>Greenville, North Carolina</td>
</tr>
<tr>
<td></td>
<td>Propene Gas</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accident: Explosion and fire destroyed a single family house. A contractor, repairing a septic system, pulled a 3/4-inch propane gas service line operating at 10-15 psig and broke the pipe at a threaded connection. The gas entered the house under the slab foundation and through an opening where the service line riser went through the slab flooring. A flash of fire was seen at the base of the hot water heater seconds before the explosion. The gas was supplied from a 1,000 gallon propane storage tank. The contractor, not knowing the kind of line he had pulled, ignored what possible damage had been done and pushed the pipe back in the ditch without checking for hazards.

Losses: Fatalities 2; Reportable Injuries 2; Damage $150.00; Damage $25,000.00

Probable Causes:
1. Damage by human non-pipeline forces due to machine operator error, unaware of pipeline location.
2. Excavator concealed damage to pipeline.
3. Human failure... failure to detect escape of gas.

Other Factors:
1. 
2. 

Probable Cause of Casualties:
1. Fatalities from collapse of structure.
2. Critically burned.
3. 

Other Casualty Factors:
1. 
2. 

Recommendations: None
### Brief of Accident

**Company** | Southern Connecticut Gas  
**Type** | Distribution  
**Commodity** | Natural Gas  
**Date** | 10-18-77  
**Location** | 8-unit apartment complex  

**Accident:** Natural gas leaked from a circumferential break in a 4-inch cast-iron pipe located 2 feet from a 8-unit apartment complex. The gas migrated into the corner apartment and was ignited by some unknown source. Heavy rains and a broken drain line contributed to the erosion of support from beneath the pipe and to the heaving and swelling of the soil around and above the pipe. Graphitization of the pipe wall had weakened it at the point of failure.

### LOSSES:

<table>
<thead>
<tr>
<th>Fatalities</th>
<th>Reportable Injuries</th>
<th>Pipeline Damage</th>
<th>Non-Pipeline Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>-</td>
<td>$3,000</td>
<td>$80,000</td>
</tr>
</tbody>
</table>

### Probable Causes:

1. Graphitization of cast-iron main.
2. Damage by natural forces:
   - a) Washout from rain and/or erosion
   - b) Earth slide/movement, moisture related.
3. 

### Other Factors:

1. 
2. 

### Probable Cause of Casualties:

1. Fatally burned.
2. 
3. 

### Other Casualty Factors:

1. 
2. 

### Recommendations:

None
Accident: At 2:10 a.m., c.s.t., on February 10, 1979, natural gas escaping from a circumferential fracture in an 8-inch cast iron main operating at a pressure of 32 psig migrated into a commercial building where it was subjected to an unknown source of ignition. The resulting explosion and fire destroyed three commercial buildings and damaged many others. There were no casualties. Metallurgical examination revealed that graphitization nearly penetrated the pipe wall in the area of the fracture. And the pipe had been subjected to frost action during its 50-year service life with the frost line being lower than its 36-inch depth at the time of the accident.

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hastings Utilities</td>
<td>Gas Distribution</td>
<td>Natural Gas</td>
<td>2-10-79</td>
<td>Hastings, Adams Co., Nebraska</td>
</tr>
</tbody>
</table>

**LOSSES:**

- **Fatalities:** 0
- **Reportable Injuries:** 0
- **Pipeline Damage:** $29,000
- **Non-Pipeline Damage:** $4,000,000

**Probable Causes:**
1. Material failure of cast-iron pipe due to graphitization which weakened material.
2. Damage by frost action.
3. 

**Other Factors:**
1. None
2. 

**Probable Cause of Casualties:**
1. None
2. 
3. 

**Other Casualty Factors:**
1. None
2. 

**Recommendations:** None
Accident: At 6:00 a.m., c.d.t., on May 5, 1977, natural gas escaping from a 1/4" x 1/2" hole in a 1 1/4-inch steel service riser operating at a pressure of 15 psig was subjected to an unknown source of ignition, exploded and burned, destroying three commercial buildings and damaging three others. The 1 1/4-inch service had been installed in 1956 prior to the requirements for electrical isolation, to serve an inside meter. The hole was partially enclosed in the bottom of an 8-inch concrete slab where the riser from the below-grade service entered the building and ascended to a regulator and meter which were vented to the outside. New, uncorroded metal spatter, on the exterior of the pipe only, covered rust and earth adjacent to the half-moon shaped hole.

LOSSES: Fatalities - 0 - ; Reportable Injuries - 0 - ;

Probable Causes: 1. Damage by lighting.
2. 
3. 

Other Factors: 1. 
2. 

Probable Cause of Casualties: 1. None
2. 
3. 

Other Casualty Factors: 1. 
2. 

Recommendations: None
NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C. 20594  
Brief of Accident

<table>
<thead>
<tr>
<th>FTW-79-F-P683</th>
<th>Pipeline Accident: FY 79, Qtr. 2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Type</td>
</tr>
<tr>
<td>Lone Star Gas Co.</td>
<td>Distribution</td>
</tr>
</tbody>
</table>

Accident: At 7:40 p.m., c.s.t., on January 11, 1979, natural gas leaking from a circumferential opening in a 1-inch steel service line, operating at a pressure of 28 psig, migrated laterally beneath and into a house where it was subjected to an unknown source of ignition. The resulting explosion and fire fatally injured one occupant, critically injured the other, who died 10 days later, and badly damaged the house. Leakage occurred at the mill-wrapped, anode-protected main, resulting in insufficient cathodic protection.

**LOSSES:**
- **Fatalities:** 2
- **Reportable Injuries:** 0

**Pipeline Damage:** $1,000

**Non-Pipeline Damage:** $3,000

**Probable Causes:**
1. External corrosion due to the lack of cathodic protection.
2. 
3. 

**Other Factors:**
1. Earth movement, moisture related, causing direct damage to pipeline.
2. 

**Probable Cause of Casualties:**
1. Fatalities due to fire as a result of primary loss event.
2. 
3. 

**Other Casualty Factors:**
1. 
2. 

**Recommendations:** None
Accident: Natural gas leaking from a corrosion hole in an inactive 1-inch service line "operating" at a pressure of 15 psig, migrated laterally beneath a concrete slab into a building where it was subjected to an unknown source of ignition. The resulting explosion and fire injured 6 persons and destroyed the building and contents. The corrosion hole developed in the steel service at its point of contact with a 4-inch cast-iron sewer line where the coating had been damaged and a bare spot developed. The process of corrosion probably began prior to the installation of anodes, with the steel service being anodic to the cast-iron sewer, according to consultants hired by the operator. The sewer also shielded the service from cathodic protection current.

<table>
<thead>
<tr>
<th>LOSSES:</th>
<th>Fatalities</th>
<th>Reportable Injuries</th>
<th>Pipeline Damage</th>
<th>Non-Pipeline Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>6</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

Probable Causes:
1. External corrosion due to failure of pipe coating because of physical damage; condition not detected.
2. Inadequate leakage survey procedures for maintenance of gas service line.
3. 

Other Factors:
1.
2.

Probable Cause of Casualties:
1. Injuries were due to explosion and fire as a direct result of the primary loss event.
2.
3.

Other Casualty Factors:
1.
2.

Recommendations: Pending
Accident: At 6:30 c.s.t., October 31, 1976, natural gas which had escaped from a circumferential break in a 2 1/2-inch cast-iron main owned by the Lewisburg Gas Department, operating at a pressure of 15 psig, migrated beneath a one-story house at 720 Crestland Drive, in Lewisburg, Tennessee, exploded and then burned. The gas was ignited by an unknown source. Two people were injured and the house was destroyed. When the gas main break was exposed, it was revealed that the cast-iron main was lying directly on a rock in the bottom of the trench. A large truck hauling creek gravel had been crossing over the pipe, creating a downward force which broke the cast-iron main. Ten days after the accident one of the injured person died.

Probable Causes: 1. Inadequate ditch inspection during construction (no padding under main.)  
2. Overstressing of pipeline through heavy equipment above pipeline.

Other Factors: 1. 
2. 

Probable Cause of Casualties: 1. Fire, explosion and injuries from collapse of structure. 
2. 
3. 

Other Casualty Factors: 1. 
2. 

Recommendations: None
### Accident
The accident was the result of natural gas leakage from a one-inch mill wrapped steel service line which had broken at threads entering a ninety (90) degree elbow because of stress created by installation misalignment. The gas migrated from the thread break, located 14 inches from the block foundation, then through the foundation into the basement where it exploded and burned when ignited by an unknown source. One person was critically injured and later died. The house suffered some structural and fire damage.

### LODGER
<table>
<thead>
<tr>
<th>Fatalities</th>
<th>Reportable Injuries</th>
<th>Pipeline Damage</th>
<th>Non-Pipeline Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

### Probable Causes
1. Failure to execute installation procedures properly.
2.
3.

### Other Factors
1.
2.

### Probable Cause of Casualties
1. Due to fire as a result of primary loss event.
2.
3.

### Other Casualty Factors
1.
2.

### Recommendations
None
### Brief of Accident

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Gas &amp; Electric Co.</td>
<td>Natural Gas Distribution</td>
<td>Natural Gas</td>
<td>4/19/79</td>
<td>Mountain View, Santa Clara Co., California</td>
</tr>
</tbody>
</table>

**Accident:** On April 19, 1979, a 12-inch steel gas distribution main with a Maximum Allowable Operating Pressure of 153 psig was struck and ruptured by a bulldozer adjacent to a pipeline marker while it was clearing and grading a fire-break and access road in a rock quarry near Mountain View, California. The escaping gas was ignited by the bulldozer and the resulting fire destroyed the bulldozer and critically injured the operator who died 19 days later.

**Losses:**
- Fatalities: 1
- Reportable Injuries: 0
- Pipeline Damage: $10,000
- Non-Pipeline Damage: $10,000

**Probable Causes:**
1. Damage by outside party excavator due to machine operator's error in judgement.
2. 
3. 

**Other Factors:**
1. 
2. 

**Probable Cause of Casualties:**
1. Fatally burned.
2. 
3. 

**Other Casualty Factors:**
1. 
2. 

**Recommendations:** None
<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nebraska City Utilities</td>
<td>Gas</td>
<td>Natural Gas</td>
<td>9-1-78</td>
<td>Nebraska City, Nebraska</td>
</tr>
</tbody>
</table>

**Accident:** A pickup truck, driven by a 77-year-old man, departed from the highway and traveled over 300 feet to a location 35 feet south of the shoulder of the road where it struck a 4-inch gas transmission line which was operating at a pressure of 600 psig and rose above the ground to a gate valve and regulator installation. The collision, resulting explosion and fire fatally injured the driver, destroyed the pickup, broke the pipeline completely in two, damaged the remainder of the installation, broke an electric pole and 2 guy wires, and interrupted the gas service of 55 customers.

**LOSSES:**
- **Fatalities:** 1
- **Injuries:** 0
- **Pipeline Damage:** $?
- **Non-Pipeline Damage:** $2,000

**Probable Causes:**
1. Accidental damage - facility struck by vehicle.
2.
3.

**Other Factors:**
1.
2.

**Probable Cause of Casualties:**
1. Fatality due to injuries sustained in motor vehicle accident with fire.
2.
3.

**Other Casualty Factors:**
1.
2.

**Recommendations:** None
<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Orleans Public Service</td>
<td>Distribution</td>
<td>Natural Gas</td>
<td>2/7/78</td>
<td>New Orleans, Louisiana</td>
</tr>
</tbody>
</table>

**Accident:** Natural gas escaping from a circumferential fracture in a 16-inch cast-iron main, operating at a pressure of 14 psig and located beneath a street at a depth of 31 inches, passed through a void beneath the pavement toward the curb and over a storm drain into two raised duplex "garden homes" which were completely destroyed when ignition by an unknown source caused an explosion and fire. Lateral migration of gas through the sewer system quickly involved two other buildings – commercial – and residential at either corner and severely damaged them. Occupants of the buildings escaped without injury. The 6-inch cast-iron main was installed in 1927; its 12-foot joints were clamped and concrete was poured over each during the period 1930 - 37. Failures on the 137,890 feet of 16-inch cast-iron, currently in service, total nine. Metallurgical examination revealed that graphitization had partially penetrated the pipe wall.

**Losses:**
- **Fatalities:** 0
- **Reportable Injuries:** 0
- **Damage:** $5,709
- **Non-Pipeline Damage:** $150,000

**Probable Causes:**
1. Material failure of cast-iron pipe due to graphitization weakened the material.
2. 
3. 

**Other Factors:**
1. 
2. 

**Probable Cause of Casualties:**
1. 
2. 
3. 

**Other Casualty Factors:**
1. 
2. 

**Recommendations:** None
Accident: At 1:10 a.m., c.s.t., on January 19, 1979, natural gas which had escaped from a circumferential fracture at the threads of a 1-inch nipple above the service tap on a 6-inch main, operating at a pressure of 28 psig, migrated laterally beneath and into a house where it was subjected to ignition by a gas-fired furnace or water heater. The resulting explosion and fire killed one resident, critically injured the other and completely destroyed the house. Gas odors had been detected by the residents but not reported to the gas company. The operator's "swing connection", which is no longer used, was designed to withstand the damaging effect of stress caused by the expansion and contraction of the clay soil as it became wet and then dried. However, the threaded fitting, used contrary to industry standards, was unable to withstand the soil movement. It fractured in the thread which acted as a stress concentrator.

Probable Causes:
1. Failure to comply with industry standards.
2. Soil stress, moisture related (expansion and contraction).
3. Failure of public (casualties) to report gas odor.

Other Factors:
1. 
2. 

Probable Cause of Casualties:
1. Fatality due to fire as a result of primary loss event.
2. Injury due to fire as a result of primary loss event.
3. 

Other Casualty Factors:
1. 
2. 

Recommendations: P-79-27, P-79-28
NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.  20594  
Brief of Accident

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cities Service Pipeline Co.</td>
<td>Liquid</td>
<td>Propane</td>
<td>8/20/79</td>
<td>Orange, Texas</td>
</tr>
<tr>
<td></td>
<td>Petroleum</td>
<td></td>
<td></td>
<td>(Orange County)</td>
</tr>
</tbody>
</table>

**Accident:** On August 20, 1979, a bulldozer operated by the Orange County Drainage District, Orange, Texas, began to clean a farm drainage ditch with a generally north-south alignment. After making several passes across the ditch, the operator headed the bulldozer south along the length of the ditch. At 2:15 p.m., the corner of the blade cut into a propane line, owned by the Cities Service Pipe Line Company, which crossed beneath the ditch in an east-west direction. Propane at 350 psig escaped and was ignited within seconds. The resulting fire killed one person and injured another, and caused considerable property damage.

**Losses:**  
- Fatalities: 1  
- Reportable Injuries: 1  
- Pipeline Damage: $190,000.00  
- Non-Pipeline Damage: $99,000.00

**Probable Causes:**  
1. Damage by outside party excavator due to machine operator error, unaware of pipeline existence.  
2.  
3.  

**Other Factors:**  
1. Coordination failure: No one-call notification requirement.  
2. Coordination failure: Pipeline does not appear on excavator’s maps.  
3. Coordination failure: Inexperienced operator did not determine pipeline existence.  
4. Inadequate basic system design (regarding depth of burial which was not required at time of initial construction).

**Probable Cause of Casualties:**  
1. Fatality and injury due to fire as a result of primary loss event.  
2.  

**Other Casualty Factors:**  

**Recommendations:** P-80-1, P-80-2, P-80-3-4, P-80-5 through 7
A transmission company's remote compressor station developed a natural gas leak which was ignited by one of the engines. The engine stopped instantly when its combustion air was snuffed out, but its vital functions (oil pressure, temperature, suction and discharge pressures, etc.) continued momentarily. The radio alarm relay system became inoperative since it was activated by energy from the engine magneto. The fire weakened the 2-inch bypass between headers which was then ruptured by the discharge pressure and a large volume of gas escaped. The gas volume increased as additional leaks developed. Two of the station's three units were destroyed and the third was severely damaged. Total gas loss was estimated to be 3.24 MMscf.

**LOSSES:** Fatality: 0; Reportable Injury: 0; Pipeline Damage: $500,000; Non-Pipeline Damage: $0

**Probable Causes:**
1. Lack of or inadequate automatic shutoff devices.
2. Lack of or inadequate control devices.
3. 

**Other Factors:**
1. Base material failure of steel length of pipe due to excessive heat.
2. 

**Probable Cause of Casualties:**
1. 
2. 
3. 

**Other Casualty Factors:**
1. 
2. 

**Recommendations:** P-79-1
At 3:00 a.m., c.s.t., on October 24, 1978, natural gas escaping from a ruptured 30-inch pipeline operating at a pressure of 560 psig was subjected to an unknown source of ignition, exploded and burned. There were 6 fatalities and 47 injuries resulting from the fire. One house, a barn and 7 mobile homes were destroyed and several were damaged. Thirteen vehicles were destroyed and several damaged. The extent of damage may be related to encroachment by the trailers on the pipeline right-of-way with the destroyed house located 40 feet from the point of rupture and the mobile home park located adjacent to the 50-foot pipeline right-of-way. The considerable delay in shutting off the flow of gas was due to the erroneous indication that the parallel 24-inch line had failed but the delay apparently was not a factor which affected the casualties. Metallurgical analysis revealed that the failure was due to hydrogen cracking (or possible stress corrosion cracking).

**PROBABLE CAUSES:**
1. The pipeline failure was due to hydrogen stress cracking.
2. 
3. 

**OTHER FACTORS:**
1. 
2. 

**PROBABLE CAUSE OF CASUALTIES:**
1. The fatalities and injuries were due to fire as a result of the primary loss event.
2. 
3. 

**RECOMMENDATIONS:** None
Accident: The accident was the result of a natural gas leak from a fracture caused by the improper installation of a 2-inch Acrylonitrile Butadiene Styrene plastic main in a common trench with a telephone cable. Approximately 4 to 5 feet of the cable were overlaid by the plastic pipe. Tamping and settlement of backfill material created ovality in the supported segment of pipe, with stress and time causing the fracture. Natural gas escaping from this fracture in the main, operating at a pressure of 29 psig migrated through highly permeable soil, beneath a slab and upwards into a house where ignition by an unknown source resulted in one fatality, five injuries, one house destroyed, two others extensively damaged and eleven other homes partially damaged.

LOSSES: Fatalities: 1; Reportable Injuries: 5; Pipeline Damage: $5,000; Non-Pipeline Damage: $300,000

Probable Causes: 1. Improper construction.
2.
3.

Other Factors: 1. Inadequate ditch inspection during construction.
2. Inadequate lower-in inspection during construction.

Probable Cause of Casualties: 1. Fatality due to injuries from collapse of structure due to primary loss event.
2. Injuries due to fire and collapse of structure due to primary loss event.
3.

Other Casualty Factors: 1.
2.

Recommendations: None
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

Brief of Accident

FTW-79-P-014

Pipeline Accident: FY 79, Qtr. 4th

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dow Chemical USA</td>
<td>Liquid</td>
<td>Natural Gas</td>
<td>9-4-79</td>
<td>Pierre Part, Assumption Parish, Louisiana</td>
</tr>
<tr>
<td></td>
<td>Gathering</td>
<td>Liquids</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accident: At 12:15 p.m., c.d.t., on September 4, 1979, the tugboat "White Face," towing the barge "Intercoastal 103" in Lake Verret below Pierre Part, LA, backed into and ruptured a 10-inch Dow Chemical, U.S.A. pipeline containing natural gas liquids under a pressure of 640 psig. The resulting explosion and fire were responsible for two fatalities, one injury, destruction of the tugboat, barge, and severe damage to the swamp-buggy backhoe on the barge. The pipeline had only 2 feet of cover and was within 5 feet of the water surface of the point of rupture, as indicated by a postaccident survey.

LOSSES: 
- Fatalities: 2
- Reportable Injuries: 1

Pipeline Damage: $240,000
Non-Pipeline Damage: $245,000

Probable Causes:
1. Pipeline damaged by tugboat (operator error - failed to follow instructions).
2. Failure to comply with Federal regulation (inadequate depth of burial as required by Corps of Engineers Section 10 Permit)
3. Improper/inadequate pipeline construction/inspection.

Other Factors:
1.
2.

Probable Cause of Casualties:
1. Fatalities and injury due to fire/asphyxiation as a result of primary loss event.
2.
3.

Other Casualty Factors:
1.
2.

Recommendations: None
Accident: A man entering a small cellar beneath the office of a commercial greenhouse, struck a match to light his cigarette, a flash fire resulted, burning him critically and resulting in minor damage to the cellar. The man died later that night. A 12-inch, bare-steel, 80-psig pressure main running from south to north, and west of the west building line was excavated 16 feet south of the south building line and 5 feet west of the west building line where two (2) corrosion-caused leaks were found and repaired the same evening. Four additional corrosion leaks and one leaking clamp were repaired later. A 4-inch hole in the greenhouse was located approximately 18 feet from the gas main. The leaking gas could have entered the greenhouse cellar through this drain hole.

Probable Causes: 1. Material failure due to corrosion.
2. Corrosion survey of this bare steel main had not been made to determine if active corrosion existed.

Other Factors: 1.
2.

Probable Cause of Casualties: 1. Fatality due to fire.
2.
3.

Other Casualty Factors: 1.
2.

Recommendations: P-79-34, P-79-35 through 37
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594
Brief of Accident

JCA-79-FP-020

Company: Atlanta Gas Light Company
Type: Distribution
Commodity: Natural Gas
Date: 07/25/79
Location: Roswell, Georgia

Accident: At approximately 8:10 a.m., e.d.t., July 25, 1979, near Roswell, Georgia, a contractor was boring a 20-inch hole under a county road when the cutting head on the auger penetrated a 4-inch plastic main. Natural gas at 54 psig pressure migrated through the bore hole into the bore pit where it ignited. Ignition was from the diesel engine used to power the auger. A workman in the pit received fatal burns; the fireman received hand and arm burns while rescuing the workman still in the pit. The two way gas flow was stopped in approximately two hours by pinching the plastic main a short distance east of the rupture with a hydraulic vice, and closing a valve at the end of a 6-inch connecting section of steel pipe just west of the rupture. The 4-inch plastic gas main was not marked for this specific project, nor was a request made to the gas company to mark the gas main for this specific project.

Losses:
- Fatalities: 1
- Reportable Injuries: 1
- Pipeline Damage: $600.00
- Non-Pipeline Damage: $3,500.00

Probable Causes:
1. Damage by outside contractor; non-pipeline damage by failure of the contractor to make the necessary calls for utility locations.
2.
3.

Other Factors:
1. None
2.

Probable Cause of Casualties:
1. Fatal burns.
2.
3.

Other Casualty Factors:
1. None
2.

Recommendations: None
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

Brief of Accident

DCA-79-FP-007

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumers Power Company</td>
<td>Distribution</td>
<td>Natural Gas</td>
<td>01/16/79</td>
<td>1014 E 6th Street</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Royal Oak, Michigan</td>
</tr>
</tbody>
</table>

Accident: At approximately 5:00 a.m., e.d.t., in January 16, 1979, a natural gas explosion and fire destroyed the residence at 1014 East Sixth Street on Royal Oak, Michigan. Natural gas leaking from the broken threads of a 2 3/8 inch steel main screwed into a 2-inch pipe coupling migrated under frost and frozen earth, entered the residence where it was ignited from an unknown source. One person was killed and two were injured; adjacent houses and several vehicles were also damaged. The investigation revealed that the accident could have been caused by improper procedures used to backfill an excavation at a threaded and coupled joint in the gas main. Frost and frozen earth at a depth of approximately 22 inches was a contributing factor in the migration of the gas.

LOSSES: Fatalities 1; Reportable Injuries 2; Pipeline Damage $3,500.00; Non-Pipeline Damage $80,000.00

Probable Causes: 1. Improper backfill over a 2-inch threaded and coupled steel gas main.

2. Improper support under the coupling and pipe prior to backfill.

Other Factors: 1.

2.


2. Injuries from burns and collapse of structure.

Other Casualty Factors: 1.

2.

Recommendations: None
Accident: A contractor, while excavating for an addition to the house involved, struck a 3/4-inch steel service line, breaking it between the cut off valve and drip tee inside the house. Gas at 18 psig pressure was blowing directly into the house for about 10 minutes. The contractor went into the basement of the house to see if he could cut off the flow of gas. At this point ignition occurred from an unknown source. The contractor was seriously burned. The contractor did not use the one-call system in Prince Georges County for location of utilities. The gas company was unaware of construction around the gas service.

Probable Causes: 1. Damage by Human Error: Non pipeline-damage by failure of contractor to use the Prince George's County one-call system for line location.

Other Factors: 1. 

Probable Cause of Casualties: 1. Injury was from explosion and fire
**NATIONAL TRANSPORTATION SAFETY BOARD**

**WASHINGTON, D.C. 20594**

Brief of Accident

<table>
<thead>
<tr>
<th>Pipeline Accident: FY 78, Qtr. 1st</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company</strong></td>
</tr>
<tr>
<td>Arkansas Louisiana Gas Company</td>
</tr>
</tbody>
</table>

**Accident:** A city bulldozer was assisting the fire department extinguish a smoldering fire at an abandoned city landfill. Its blade struck an 8-inch transmission line carrying natural gas at a pressure of 260 psig. The threaded and coupled pipe pulled apart. The escaping gas ignited, severely burning the bulldozer operator and he died 16 days later. Four others were burned and two required lengthy hospitalization. The bulldozer and lowboy were destroyed. The operator's shutdown interrupted service to 75 customers.

**Losses:**

<table>
<thead>
<tr>
<th>Fatalities</th>
<th>Reportable Injuries</th>
<th>Pipeline Damage</th>
<th>Non-Pipeline Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>$12,000.00</td>
<td>$127,000.00</td>
</tr>
</tbody>
</table>

**Probable Causes:**
1. Damage by outside party excavator due to machine operator error, unaware of pipeline existence.
2. 
3. 

**Other Factors:**
1. 
2. 

**Probable Cause of Casualties:**
1. Due to fire as a result of primary loss event.
2. 
3. 

**Other Casualty Factors:**
1. 
2. 

**Recommendations:** None
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594
Brief of Accident

Pipeline Accident: FT 79, Qtr. 3rd

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi Gas Pipeline Corporation</td>
<td>Gas</td>
<td>Natural</td>
<td>05/25/79</td>
<td>Slapout, Oklahoma</td>
</tr>
</tbody>
</table>

Accident: At 7:00 p.m., c.d.t., on May 25, 1979, natural gas under a pressure of approximately 800 psig blew a unibolt closure and hinged support off of a 10-inch scraper launcher/receiver when a company employee apparently attempted to remedy a seal leak at the coupling by striking it with a 10-pound brass sledgehammer without first blowing down the equipment to reduce the pressure. The company employee stood in front of the closure while striking it, and the explosive force of rapidly expanding natural gas at 800-psig pressure hurled him against a launcher/receiver on a 6-inch pipeline located behind him. Injuries received by this man were fatal.

LOSSES:
- Fatalities: 1
- Reportable injuries: 0
- Damage: $1,000

Probable Causes:
1. Improper operating procedures for a scraper trap.
2. Improper procedures for maintenance of a scraper trap.
3.

Other Factors:
1.
2.

Probable Cause of Casualties:
1. Fatality due to explosive force as a result of primary loss event.
2.
3.

Other Casualty factors:
1. Inadequate maintenance of scraper trap closure.
2. Improper leak repair procedure by use of hammer prior to pressure relief.
**Pipeline Accident:** FY 79, Qtr. 2nd

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rocky Mountain Natural</td>
<td>Gas Distribution</td>
<td>Natural Gas</td>
<td>3/30/79</td>
<td>Snowmass Village, Almont Co., Colorado</td>
</tr>
</tbody>
</table>

**Accident:** Natural gas leaked from a fractured 2-inch plug valve on a gas main and migrated into a building where it was ignited by an unknown source, exploded and burned totally destroying the six-unit, three-story condominium. The valve failure was the result of hillside soil movement in reaction to freezing and thawing. The odor was detected on the night before the accident but not reported.

<table>
<thead>
<tr>
<th>LOGSES:</th>
<th>Fatalities</th>
<th>Reportable Injuries</th>
<th>Damage</th>
<th>Pipeline</th>
<th>Non-Pipeline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>2</td>
<td>$2,000</td>
<td></td>
<td>$800,000</td>
</tr>
</tbody>
</table>

**Probable Causes:**
1. Natural forces - earth movement, temperature related (freeze-thaw cycle).
2. 
3. 

**Other Factors:**
1. Failure of public to report gas odor promptly.
2. 

**Probable Cause of Casualties:**
1. Injuries from fire.
2. Injuries from collapse of structure.
3. 

**Other Casualty Factors:**
1. 
2. 

**Recommendations:** None
**Accident:** A pipeline contractor's ditching machine ruptured a 4-inch propane gathering line under a static pressure of 500 psig. Three hours after the rupture, the pipeline contractor's superintendent, who had re-entered the area and parked his pickup truck 650 feet from the break, attempted to start his truck. The explosion and fire critically burned the superintendent, who died 40 days later. The ditching machine, truck and several acres of pasture were destroyed, and 1,530 barrels of propane were lost. The pipeline company which engineered the line being ditched by the contractor did not provide maps to indicate the location of the propane line.

**Losser:**

<table>
<thead>
<tr>
<th>Fatalities</th>
<th>Reportable Injuries</th>
<th>Pipeline Damage</th>
<th>Non-Pipeline Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>$18,360.00</td>
<td>$-</td>
</tr>
</tbody>
</table>

**Probable Causes:**

1. Damage by outside party excavator due to machine operator error, unaware of pipeline existence.
2. Failure of personnel to detect hazardous conditions due to error in judgment.
3. Coordination failure, notification system failed to forward pipeline location to excavator.

**Other Factors:**

1. 
2. 

**Probable Cause of Casualties:**

1. Fatally burned.
2. 
3. 

**Other Casualty Factors:**

1. 
2. 

**Recommendations:** None
NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.  20594  
Brief of Accident

<table>
<thead>
<tr>
<th>DCA-78-FP-99</th>
<th>Pipeline Accident: FY 78, Qtr. 2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Type</td>
</tr>
<tr>
<td>Bay State Gas Company</td>
<td>Distribution</td>
</tr>
<tr>
<td>Commodity</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Date</td>
<td>1/25/78</td>
</tr>
<tr>
<td>Location</td>
<td>458 Canton Street</td>
</tr>
<tr>
<td></td>
<td>Stoughton, Massachusetts</td>
</tr>
</tbody>
</table>

Accident: Natural gas at 45 psig leaked from a fractured 6-inch steel main and migrated under a paved street and frozen earth into a residential dwelling. The gas was ignited by some unknown source. The building was destroyed and one person killed. Excavation of the failed pipe showed that the rupture occurred at a welded joint. The pipe was installed in 1948, prior to federal regulations. A fire continued to burn in the lawn and above the fractured main until valves were located and turned off 5 1/2 hours after the explosion. One valve isolating the leak failed to seal and a valve closer to the leak was finally closed and it held. This valve was overlooked during the initial shutdown.

Losses: Fatalities 1; Reportable Injuries 2; Damage $3,000.00; Damage $40,000.00

Probable Causes:
2. Inadequate welding inspection during construction.
3. 

Other Factors:
1. 
2. 

Probable Cause of Casualties:
1. Fatally burned.
2. 
3. 

Other Casualty Factors:
1. 
2. 

Recommendations: None
**Accident:** An outside riser and a 1-inch service, entering the rear of a commercial building to serve an inside meter, was accidentally dislodged by a front end loader clearing snow in the alley. This pulled the service from the meter, resulting in the escape of natural gas at a pressure of 6 inches, w.c. The gas ignited by an unknown source, exploded and burned. Four people were killed, including two gas servicemen who had responded promptly to the leak call. The building was destroyed and the adjacent one was damaged.

**Probable Causes:**
1. Overstressing of inside service line due to snow and ice removal by front-end loader adjacent to outside service riser.
2. 
3. 

**Other Factors:**
1. 
2. 

**Probable Cause of Casualties:**
1. Due to fire, asphyxiation and injuries from collapse of structure.
2. 
3. 

**Recommendations:** None
NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.  20594  
Brief of Accident

LAX-78-PP-001  

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona Public Service Co.</td>
<td>Distribution</td>
<td>Natural Gas</td>
<td>12/10/77</td>
<td>Tempe, Arizona</td>
</tr>
</tbody>
</table>

Accident: Explosion and fire destroyed a four-unit apartment complex. Natural gas at 38 psig leaked from a crack in a 2-inch plastic Acrylonitrile Butadiene Styrene main. The gas migrated through the ground under a paved parking area and into the building 35 feet away. The gas was ignited when an occupant lit a cigarette. The main had 35 inches of cover and excavation revealed that the 2-inch pipe had been damaged previously and a piece of tape had been applied to the damaged area by non-pipeline personnel. The fire was extinguished in one hour.

Losses: 

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Non-Pipeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatality</td>
<td>2</td>
</tr>
<tr>
<td>Reportable Injuries</td>
<td>3</td>
</tr>
<tr>
<td>Damage</td>
<td>$1,000.00</td>
</tr>
</tbody>
</table>

Probable Causes: 1. Overstressing of pipeline through heavy equipment above pipeline.
2. Specific cause unknown.
3.

Other Factors: 
1. 
2.

Probable Cause of Casualties: 1. Critically burned
2. Injuries from collapse of structure
3.

Other Casualty Factors: 
1. 
2.

Recommendations: None
Pipeline Accident: FY 78, Qtr. 3rd

Company: Lovaca Gathering Company
Type: Transmission
Commodity: Natural Gas
Date: 4/7/78
Location: Wemlar, Texas (Colorado County)

Accident: Two men were performing routine calibration and maintenance on a gray cast-iron, positive displacement meter at a town border station, while serving the city on bypass, when the meter exploded, injuring both persons and interrupting service to 798 customers. The meter exploded at something less than the full inlet pressure of 165 psig when the downstream prover valve was closed before the meter reached line pressure and pressure on either side of the diaphragm equilibrated. Metallurgical examination revealed the existence of casting defects which weakened the case. The 49-year-old meter with a working pressure of 250 psig had been tested at least once to twice its working pressure, but had been used in many locations without additional strength tests. The company meter repair shop had no facilities capable of testing meters to more than 100-psig pressure. The bulky 900-lb meter had been bumped and dented in handling and additional stresses had been imposed by the tightening of its screws each time it was reassembled.

Losses: Fatalities 0; Reportable Injuries 1; Damage $7,743

Probable Causes:
1. Improper procedure for maintenance (strength testing) of iron-case meters.
2. Manufacturing defects in iron-case meter due to error in manufacturing procedures.
3. Material failure of iron-case meter due to (possible) previous damage which weakened material.

Other Factors:
1. 
2. 

Probable Cause of Casualties:
1. Injury from flying objects (fragments of meter case) due to primary loss event.
2. 
3. 

Other Casualty Factors:
1. 
2. 

Recommendations: None
## Brief of Accident

**DCA-78-7-P004**

### Pipeline Accident: FY 78, Qtr. 1st

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>Commodity</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indiana Gas Co., Inc.</td>
<td>Distribution</td>
<td>Natural Gas</td>
<td>11/24/77</td>
<td>West Lafayette, Indiana</td>
</tr>
</tbody>
</table>

### Accident:
Natural gas leaking from a circumferential break in a 6-inch cast iron main (located at a depth of 26 inches) migrated about 5 feet to a perpendicular sanitary sewer, through the backfill in the sewer trench and under a house built upon a concrete slab. Part of the gas entered the house through floor heating conduits and was ignited at 2:05 a.m., e.s.t., on November 24, 1977, when an occupant attempted to light a cigarette with a lighter. An explosion and fire resulted. The residence was damaged and both occupants were injured. One died 11 days later as a result of burns. Metallurgical analysis attributed the failure to graphitization and/or material failure. There was no suggestion of stress other than that induced by temperature change.

### LOSSES:
- **Fatalities**: 1
- **Reportable Injuries**: 1
- **Pipeline Damage**: $3,000
- **Non-Pipeline Damage**: $10,000

### Probable Causes:
1. Material failure of cast-iron pipe due to graphitization which weakened material.
2. 
3. 

### Other Factors:
1. 
2. 

### Probable Cause of Casualties:
1. Due to fire as result of primary loss event.
2. 
3. 

### Other Casualty Factors:
1. 
2. 

### Recommendations:
None