Natural Gas Pipeline Accident

Manhattan, New York

March 12, 2014
Manhattan, New York (Harlem)

- Consolidated Edison
- 8-inch cast iron/plastic distribution line (1890 / 2011)
- 8 in wc MAOP, 6 in wc operating
- 8 Fatalities
- 48 injuries
Utilities in the Accident Block

1640  1642  1644  1646  1652

Destroyed in explosion  Destroyed in explosion

Gas service valve

12" Cast iron water main

12" Cast iron gas main

8" HDPE gas main

Gas service tee
gas leak location

Water main break

Gas service valves

Sidewalk/West curb - Park Ave.

8" Cast iron gas main

Plastic to cast iron joint

4' x 2'8" Brick sewer main

Sewer breach
1' high x 3'4" long
Saddle Fusion Joint Exemplar Test Piece

- Tee Bead
- Pipe Bead
- Heating Iron Bead
On-Scene Activities - Service Tee

- Gas Main
- Service Line
- Service Tee
Fusion Joint – Incomplete Fusion

- Radial band pattern (60%)
- Is incomplete fusion
- Is a weld defect
- Weak bond strength
- Caused by contamination or inadequate surface preparation before fusion welding

Service Tee Fracture Face
Service Tee – Crack at Outlet

- No evidence of pre-existing crack
- Rapid loading event from post-accident excavation
2014 Sewer Main Damage
Conclusions

• Large hole in the sewer dated back to 2006
• Service tee to gas main weld not properly cleaned – lack of fusion
• Supporting soil under the plastic gas main washed into the damaged sewer for many months
Conclusions (cont’d)

• Gas leak resulted when sagging gas main opened the defective weld

• Post-accident excavation work
  – Separated the service tee from the main
  – Cracked the branch outlet

• Water main cracked after the explosion
Probable Cause

- Defective service tee fusion weld leaked gas, which migrated into the building and ignited
- Unrepaired sewer line breach allowed groundwater to undermine the supporting soil under the gas main and overstress the defective weld
Recommendations

• City of New York - Improve sewer main integrity process

• Consolidated Edison - Revise plastic pipe fusion procedure
  – Cleaning methods
  – Improve final visual inspection
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