

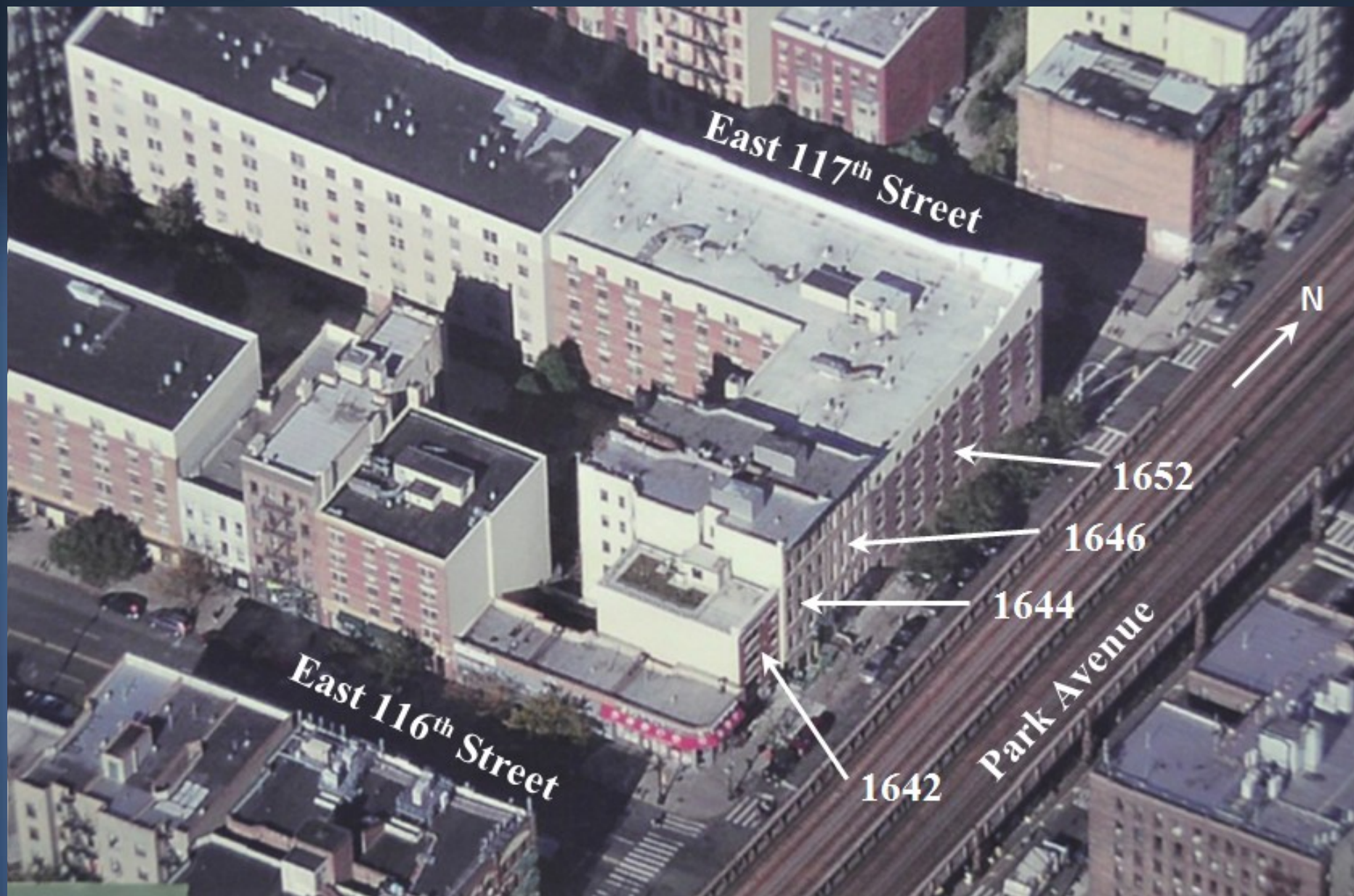


**National
Transportation
Safety Board**

Natural Gas Pipeline Accident Manhattan, New York March 12, 2014

New England Pipeline
Safety Seminar
West Dover, VT
October 20, 2015

- Stephen Klejst
- Deputy Managing Director

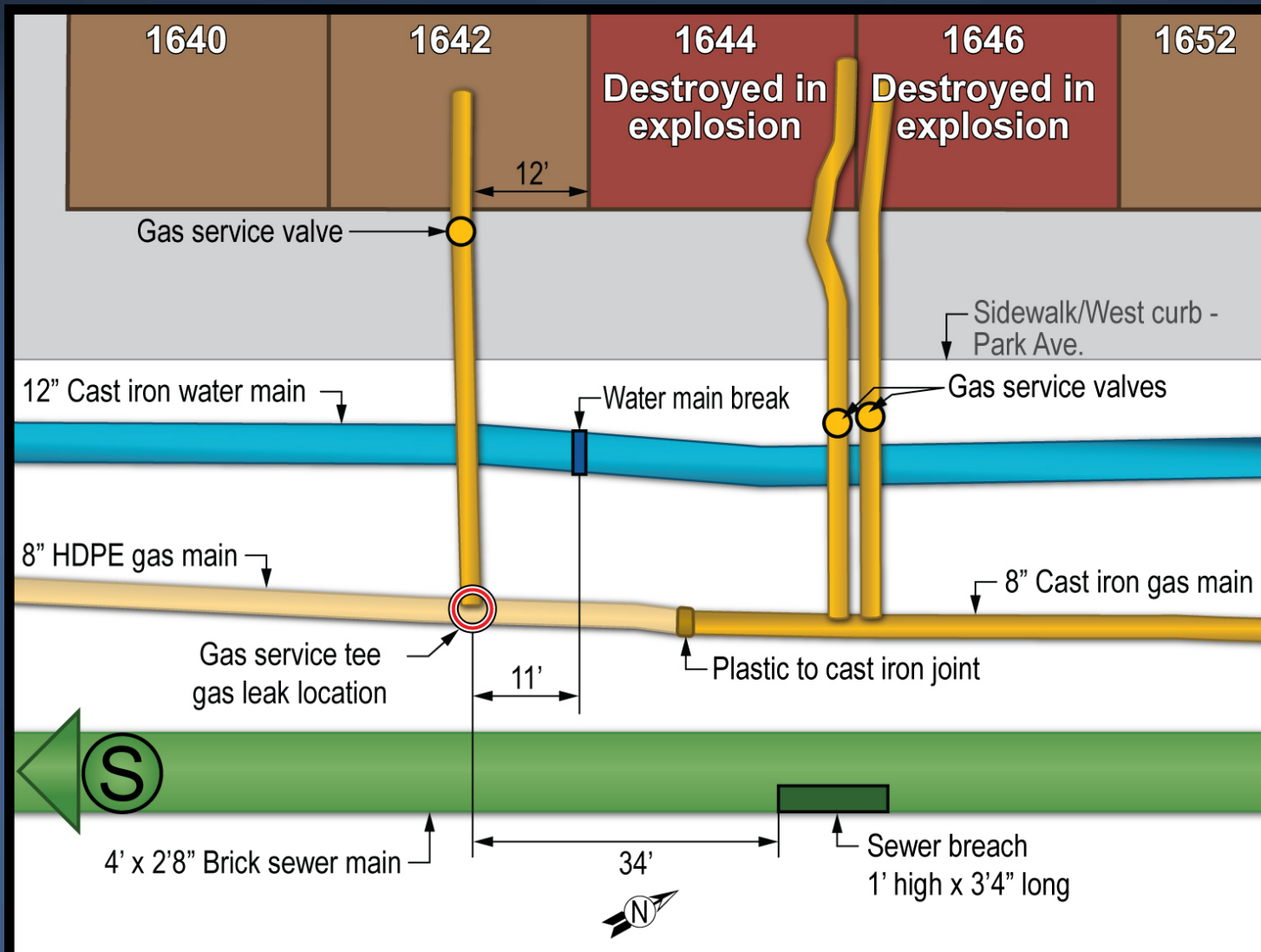


Manhattan, New York (Harlem)

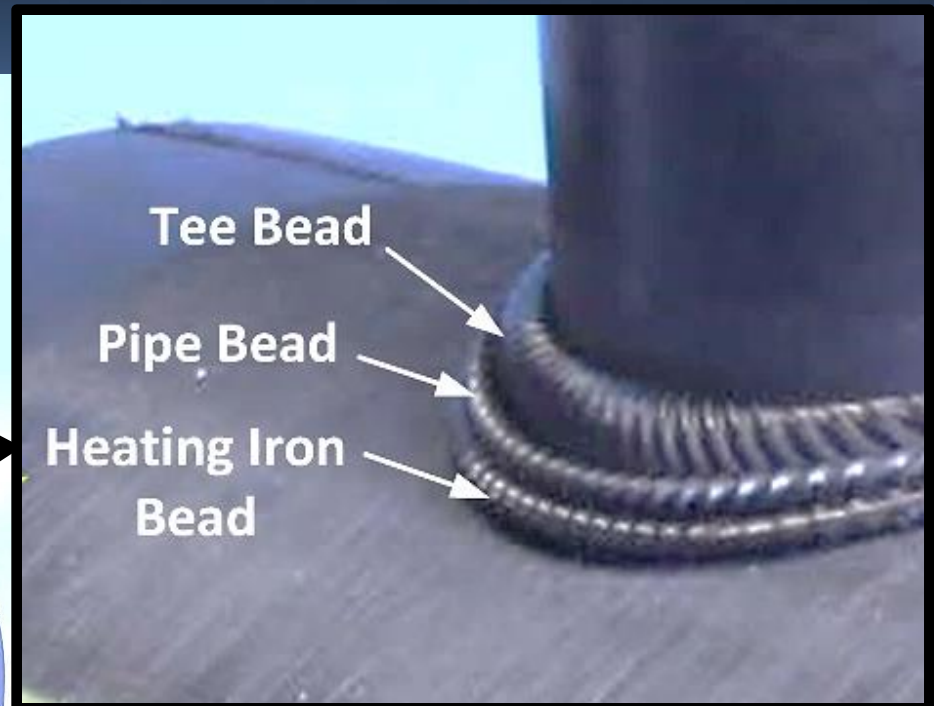
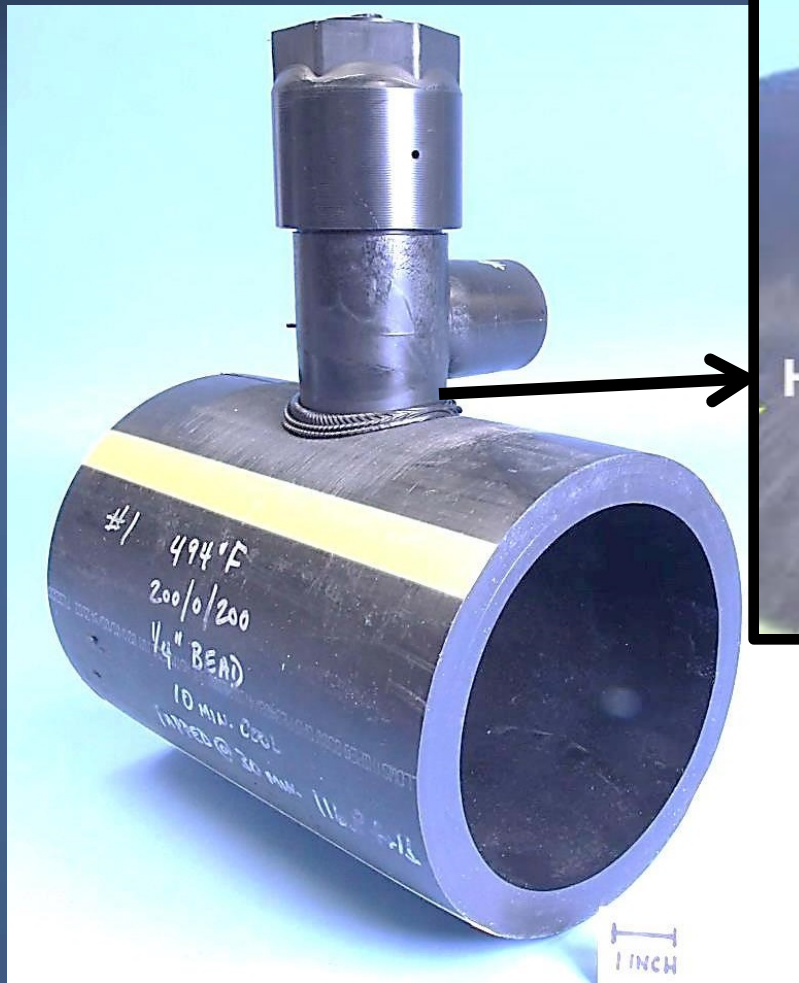
- Consolidated Edison
- 8-inch cast iron/plastic distribution line (1890 / 2011)
- 8 in wc MAOP, 6 in wc operating
- 8 Fatalities
- 48 injuries



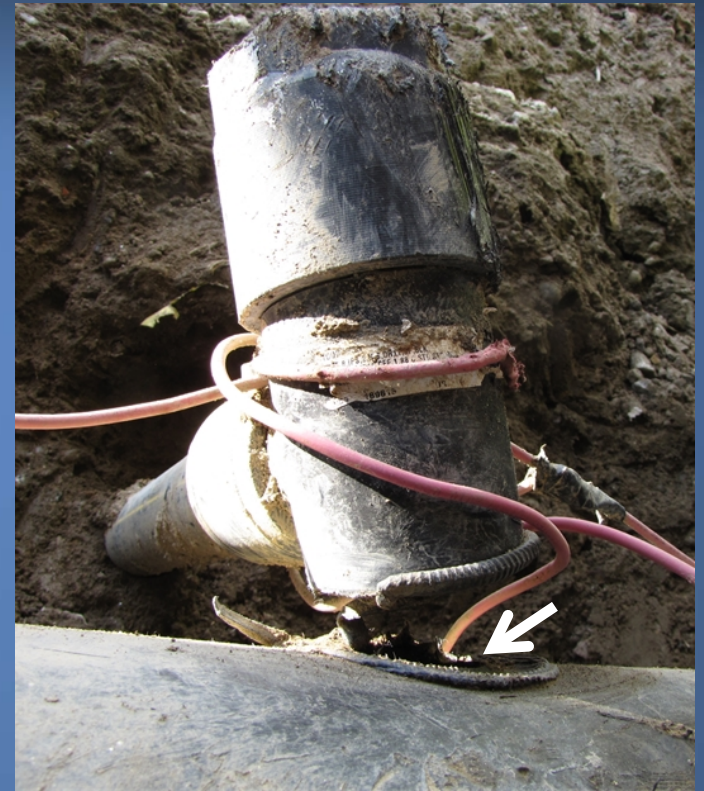
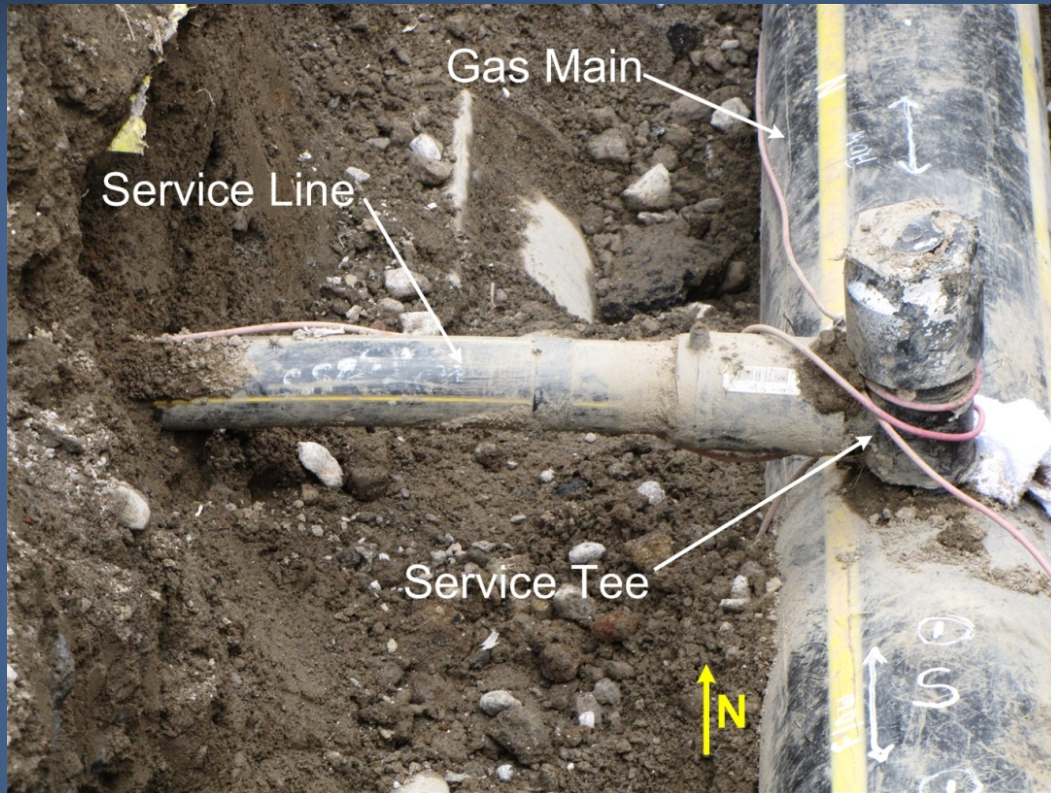
Utilities in the Accident Block



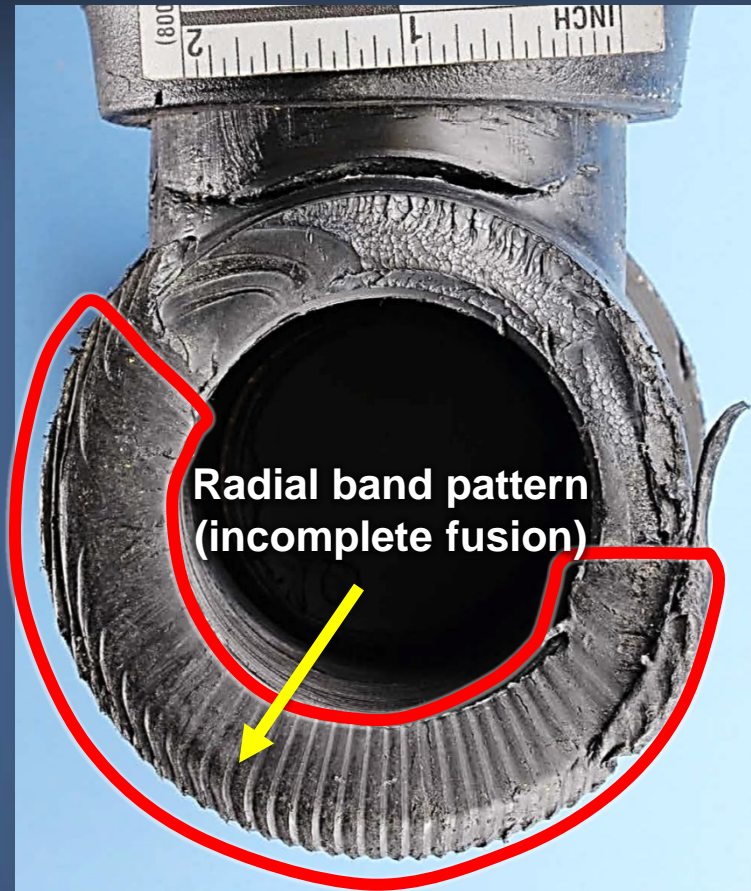
Saddle Fusion Joint Exemplar Test Piece



On-Scene Activities - Service Tee



Fusion Joint – Incomplete Fusion

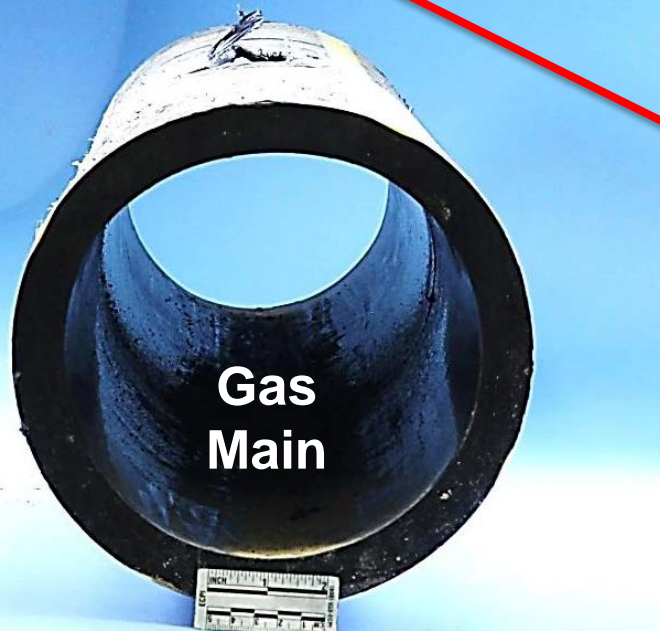


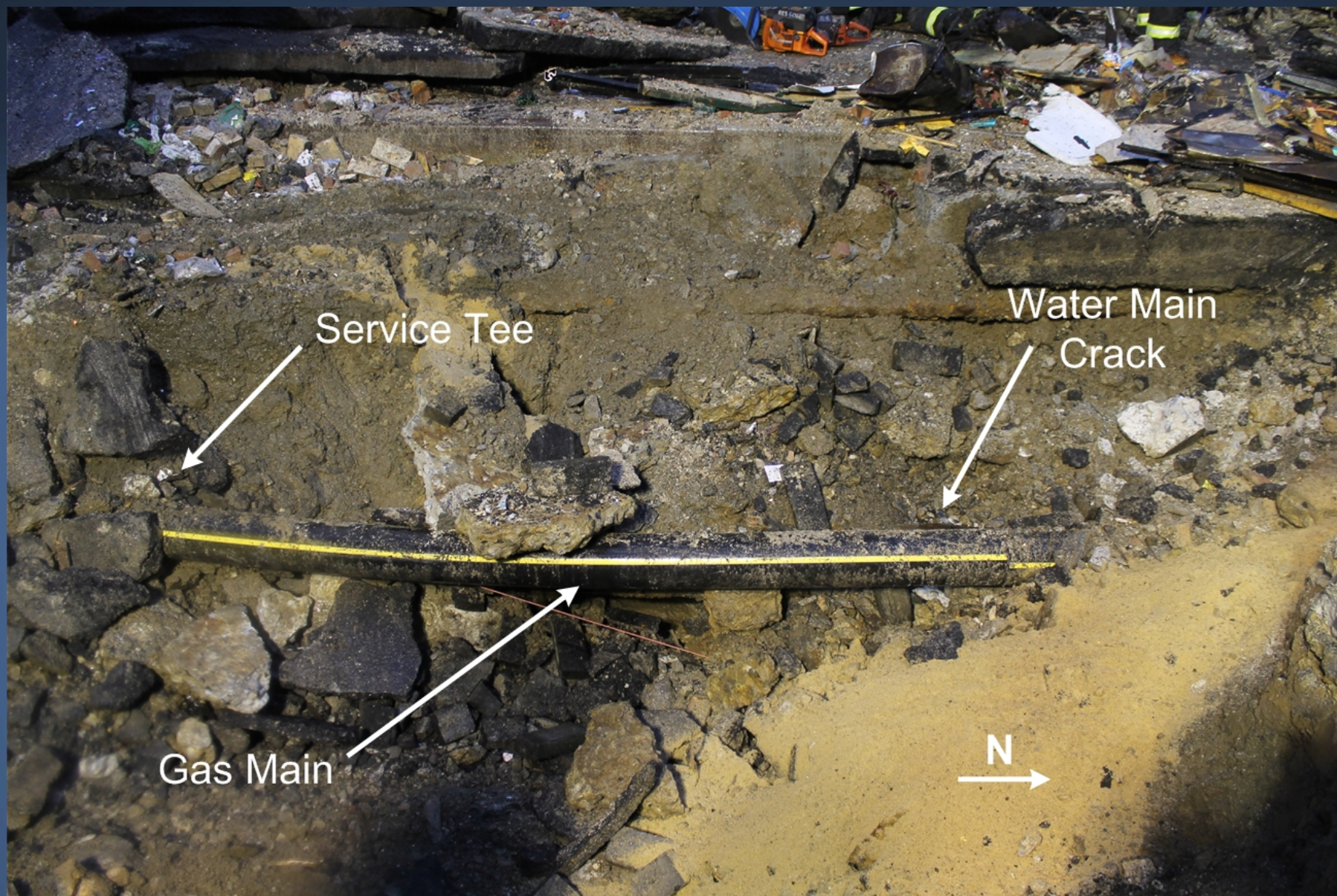
- Radial band pattern (60%)
- Is incomplete fusion
- Is a weld defect
- Weak bond strength
- Caused by contamination or inadequate surface preparation before fusion welding

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



National Transportation Safety Board