San Bruno Pipeline Failure

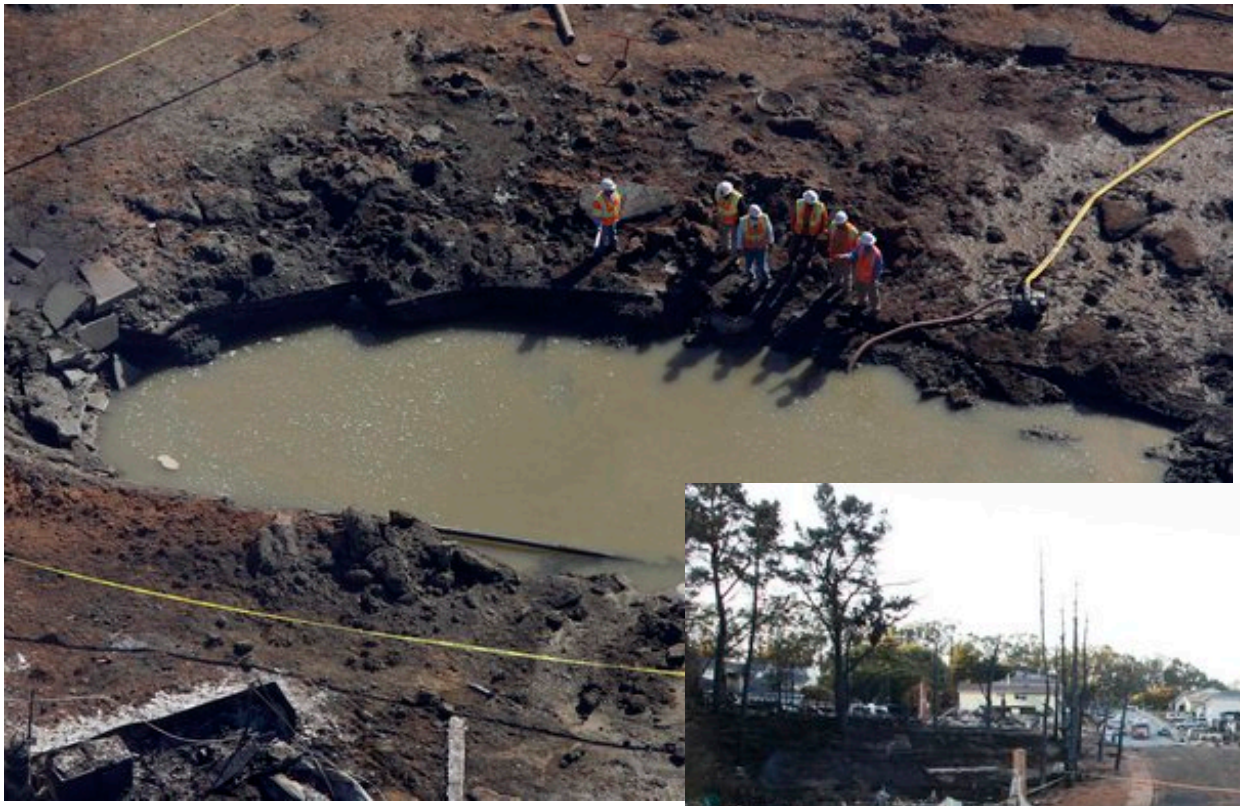
UKOPA Safety Alert October 2010

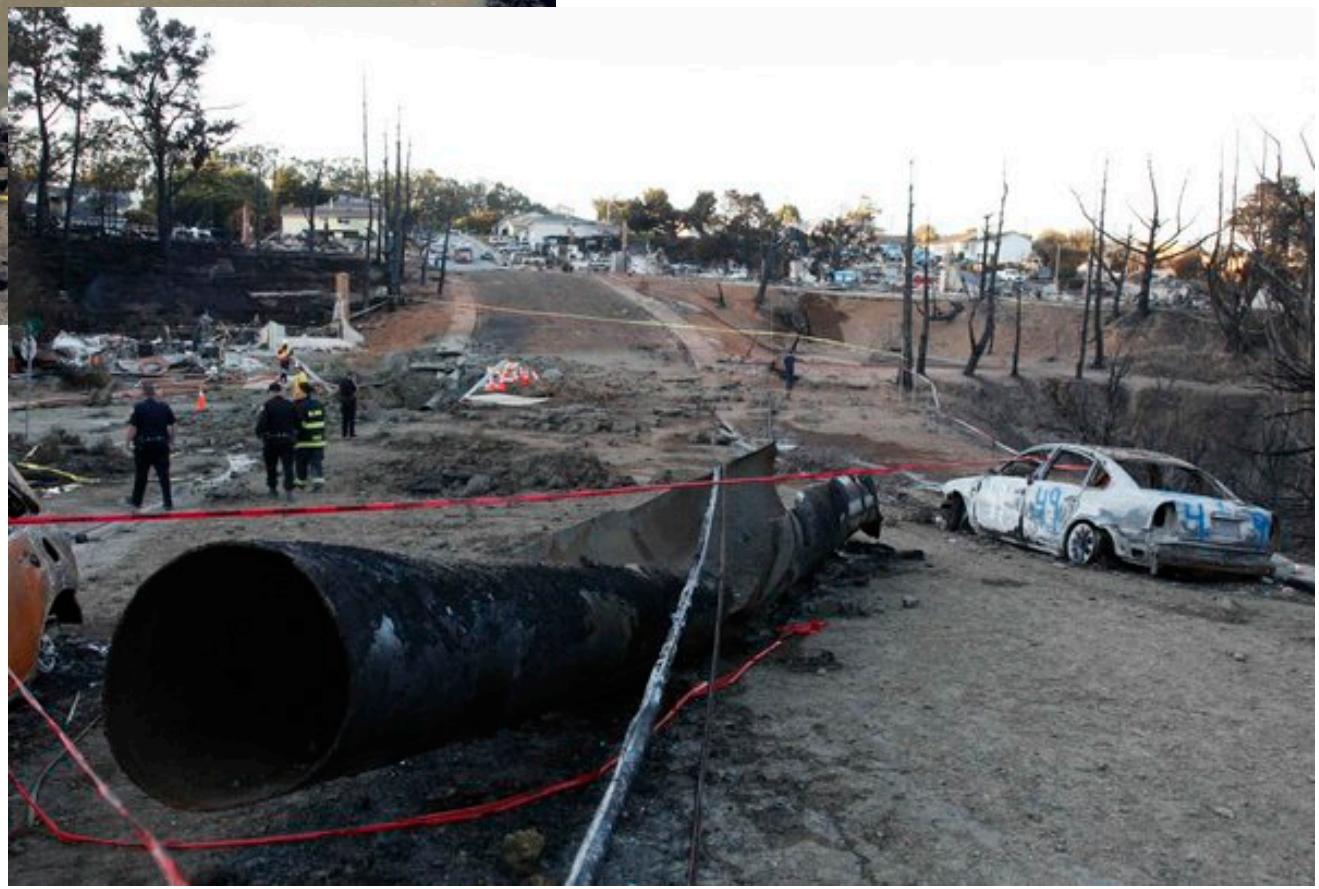
UKOPA/SA/10/0055

Outline of Report

- Internet photographs
- Photographs of failed section made available by National Transportation Safety Board (Training Centre, Virginia, 30th September)
- Pipeline details
- Incident details
- Speculated causes
- Issues raised

Natural Gas Pipeline Failure, San Bruno, California, 9th September 2010






HAZARDOUS MATERIAL DO NOT ENTER

Photographs of failed section made available by NTSB

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Pipeline Details

- Pipeline Operator – Pacific Gas & Electric (PG&E)
- 30 inch (762mm) diameter and 0.375 inch (9.52mm) wall thickness.
- Commissioned 1956
- MAOP 400 psi (27.5 bar)
- Operating pressure 375 psi, pressure at failure 386 psi.
- ASME B31.8 Area Class 3 max allowable DF 0.5
- Material grade B or X35
- Unpiggable (due to changes in dia and bend construction)

Pipeline Details

- External corrosion surveys were conducted in November 2009 and leakage survey in March 2010.
- At the time of construction:-
  - Relevant pipeline code was the first edition of what is now ASME B31.8, published in 1952 and considerably revised and expanded in 1955.
  - There was no code requirement to hydrotest
  - There was little development in the area
- Area Class 3:-
  - >46 buildings within a ¼ mile strip centered on the pipeline over a length of 1 mile
  - High Consequence Area (HCA)

Incident Details

- 8 fatalities
- 52 injuries (hospitalised, 8 critical)
- 37 properties destroyed
- Crater 167 ft (50m) x 26 ft (8m)
- 28 ft (8.5m) section thrown 100 ft (30m)
- Fireball height estimated 1000 ft (300m)
- Subsequent flames 100 ft (30m) from burning buildings
- Time to locate and close nearest isolation valves – 1 hr 46 mins

Speculated Causes

- Corrosion :-
  - External
  - Internal (due to liquids in line)
- Fatigue (of original fabrication defect)
- Local ground disturbance (caused by sewer pipe replacement using a pipe bursting technique below the pipeline, carried out in 2008)
- Over pressure (due to loss of SCADA during power outage prior to failure)

Issues Raised

- Time to locate and shut manual block valves
- Integrity management of old pipelines
- Adequacy and implementation of the operator's emergency response plan
- Lack of local knowledge of the pipeline and the emergency response plan
- Response of people following the incident (people were observed i) running to the scene, and ii) filming the incident)
- Level of development around the pipeline