

# EXAMPLES OF INDUSTRIAL INCIDENTS INVOLVING DDT AND DETONATION

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## Explosion in Solvent Recovery Plant

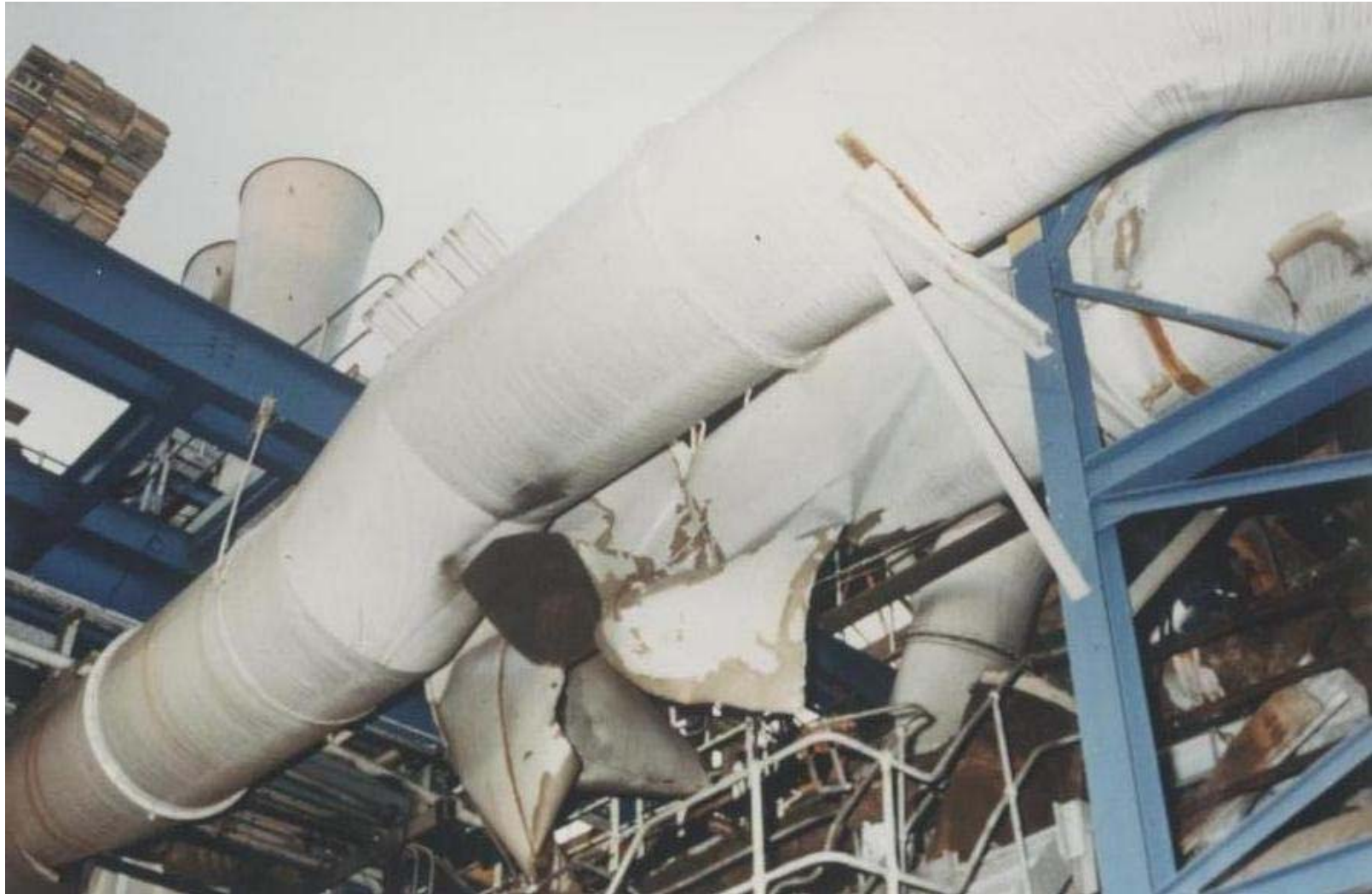
- Four large vessels containing activated carbon – usually three on recovery duty, one being desorbed using steam
- Used to adsorb solvent vapour from airstream
- Two out of four adsorption vessels being used, other two being repaired
- Started up, explosion occurred after approx. 3 days

# Explosion in Solvent Recovery Plant (cont.)



- Extensive severe plant damage, no serious injuries
- Much of ductwork severely damaged, approx. 7 m completely destroyed
- Most likely ignition source was welding near inadequately isolated flange
- Gaps around flange insufficient to quench flame (maximum experimental safe gap)
- Calculations showed that pressure effects too severe to be caused by deflagration in closed vessel
- Possibly galloping detonation (or very fast deflagration?)

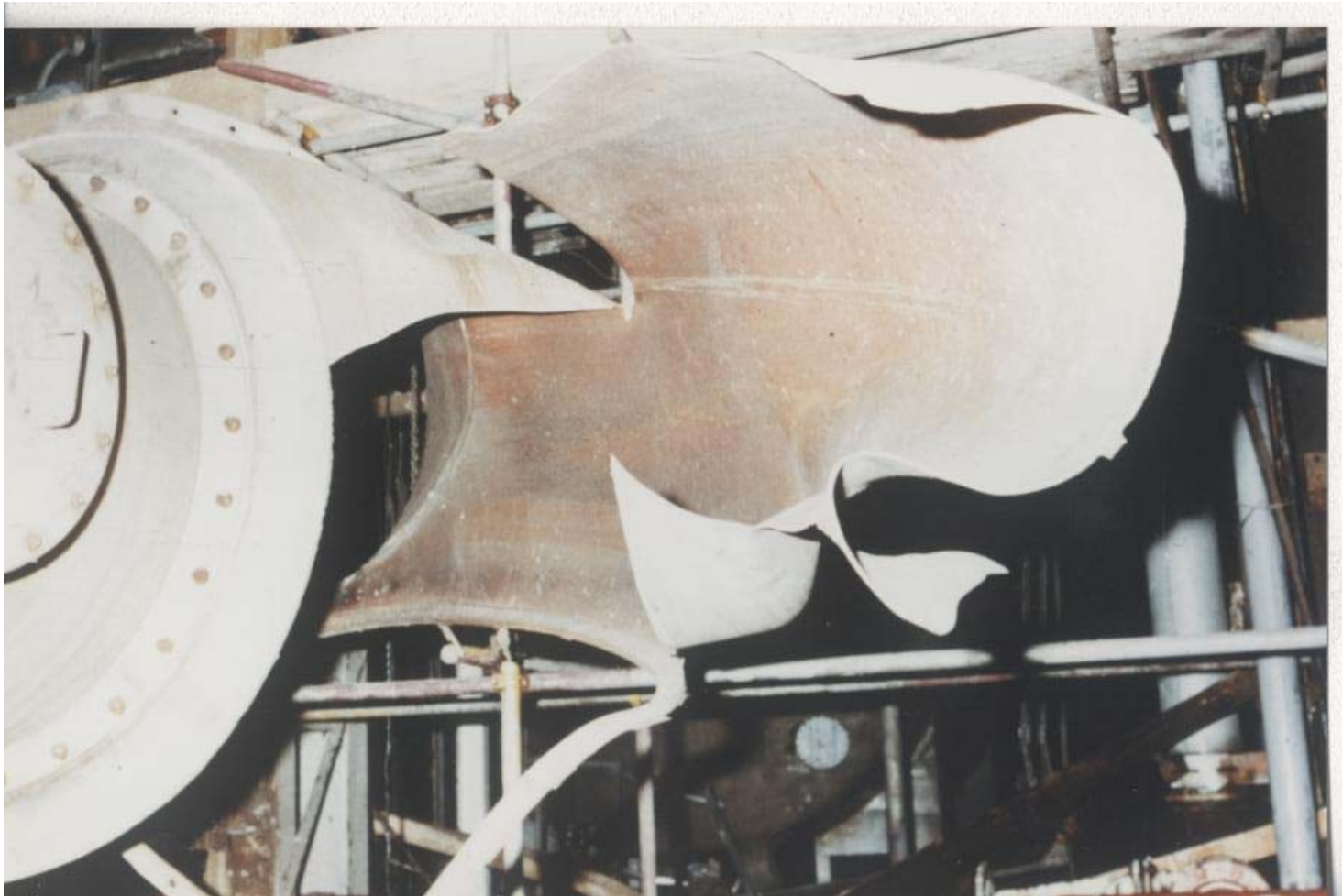
# Explosion in solvent recovery plant



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# Explosion in solvent recovery plant



# Explosion in Solvent Recovery Plant (cont.)



- Novel plant configuration - modifications
- Personnel very experienced with the plant but very limited knowledge of hazards
- Implications of flammable atmosphere in ductwork
- Production pressure
- No hazard studies on modified plant
- Company procedures unclear on what/whether hazard studies needed on plant modifications

# Port Hudson, Missouri

- December 9<sup>th</sup>, 1970
- Liquid propane pipeline, pressure approx. 942 psig
- Break in pipeline, pumps automatically shut down
- Liquid propane released (approx. 70 te in first 24 mins)
- Flowed into a valley
- Spray plume approx. 15 to 20 m high, crater dug by escaping liquid approx 1 m deep, 3 m diameter
- Violent explosion approx. 20 mins after leak started
- Valley “lit up”, sudden flash, firestorm
- No fatalities or serious injuries – rural area, impromptu evacuation, flying glass
- Severe damage over approx. 10 acres, witness knocked down half a mile away, car swerved 15 miles away



## Port Hudson, Missouri (cont.)

- Investigation by D.S Burgess and M.G. Zabetakis, US Bureau of Mines
- “Unmistakably the result of a detonation” – severity of damage, speed of event
- Initiated by an explosion in a warehouse – refrigerator motor?
- Led to detonation of the unconfined cloud
- “The topography and the weather were nearly perfect for forming an extensive zone of detonable mixture”
- Calculations estimated volume of detonable mixture was approx. 31,000 m<sup>3</sup>, TNT equivalent 50 tons
- Firestorm due to afterburning of residual over-rich propane
- Public hearing: 13<sup>th</sup> comparable release of propane from this pipeline
- Published report: “Detonation of a Flammable Cloud Following a Propane Pipeline Break”, available to print on demand at <http://www.ntis.gov> - \$33