# ACCIDENT TRENDS IN EXPLOSIVES MANUFACTURE

Peter Allan Moreton

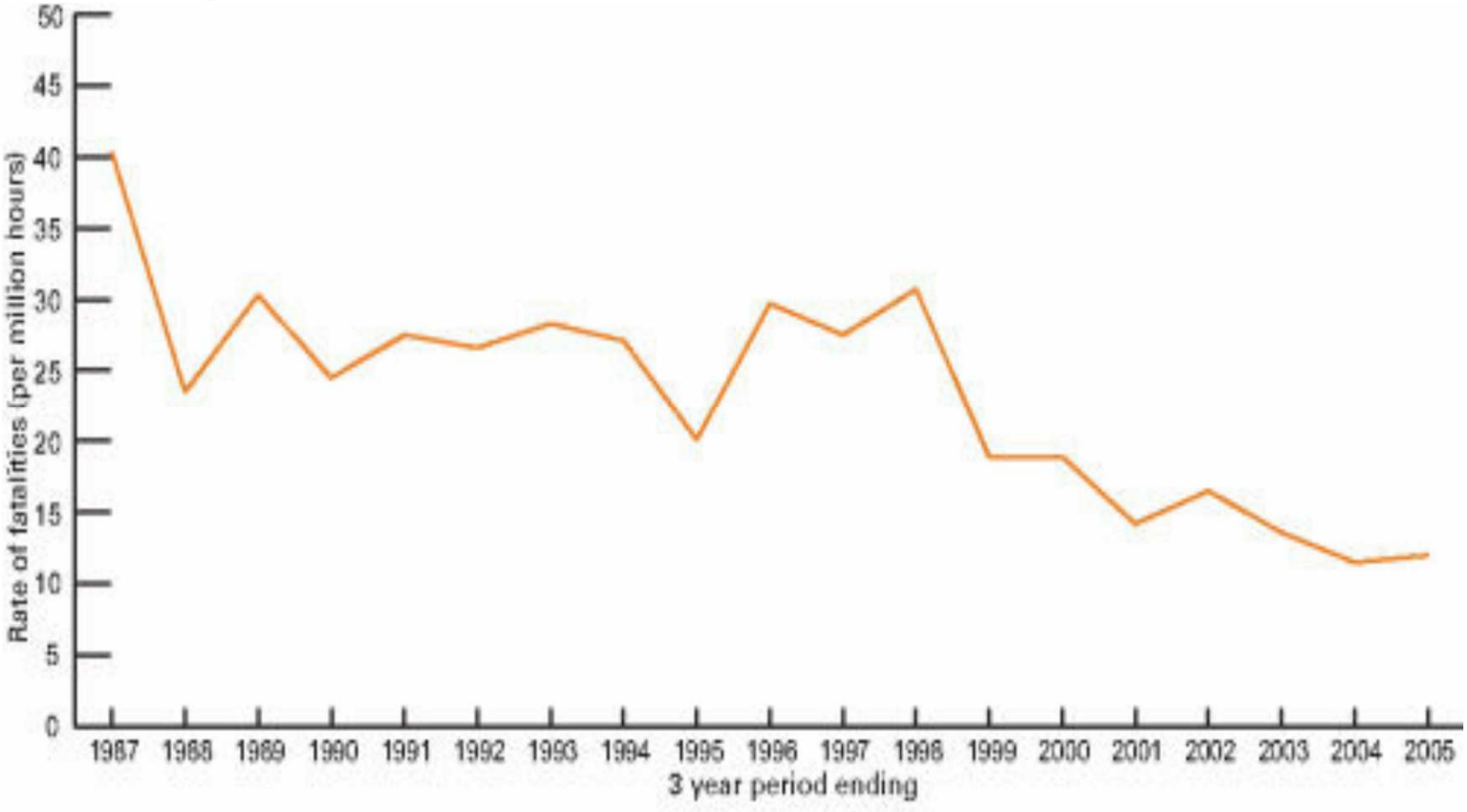
MBTB

# Key Points

- Hazardous activities rarely run accident free
- Safety can improve over time
- We need to ensure lessons learnt from past incidents are not forgotten
- Quality of incident reporting is key

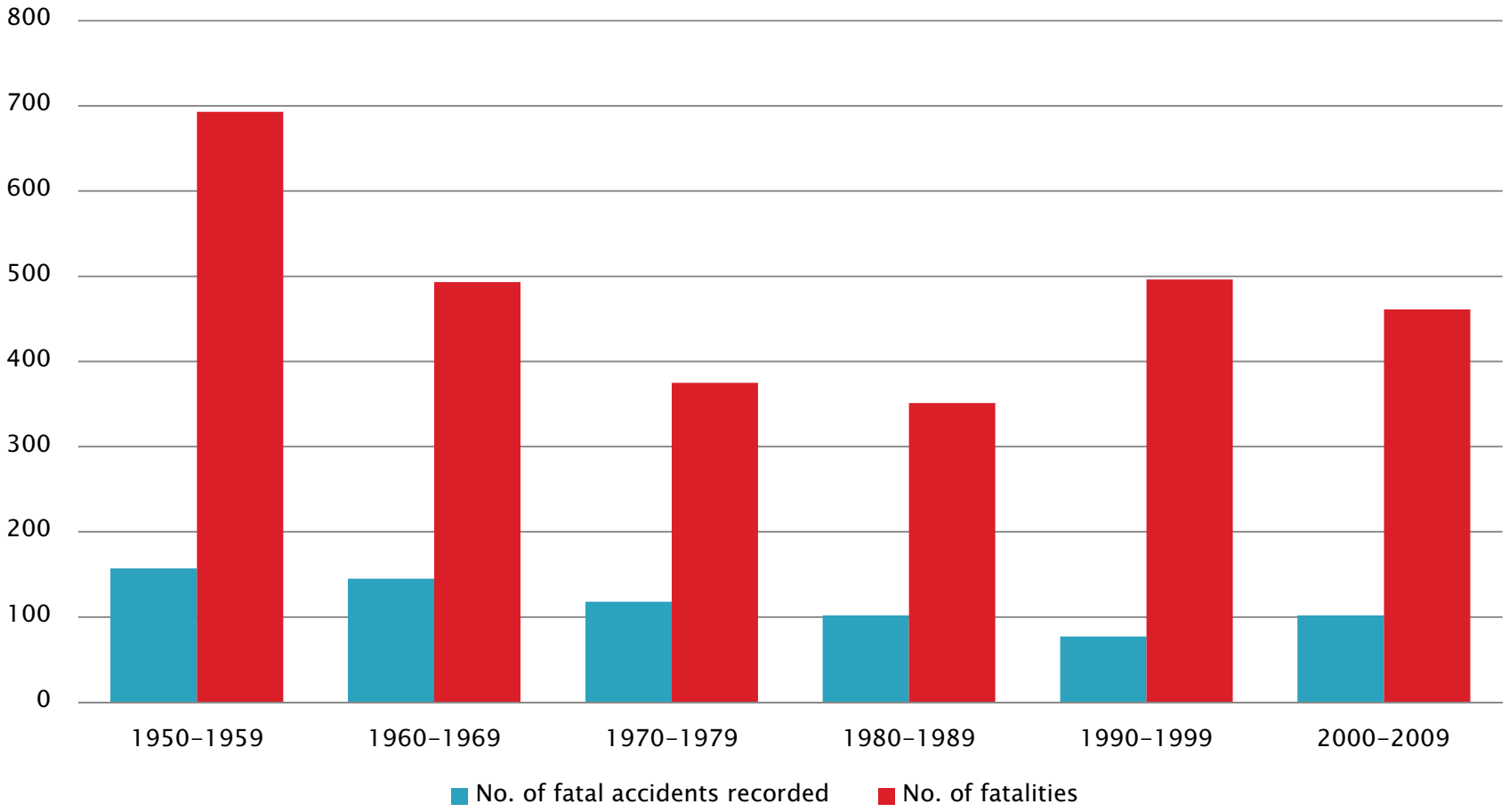
MBTB

# Rate of Fatalities Worldwide – Large Western-built Jets (3 year moving average)



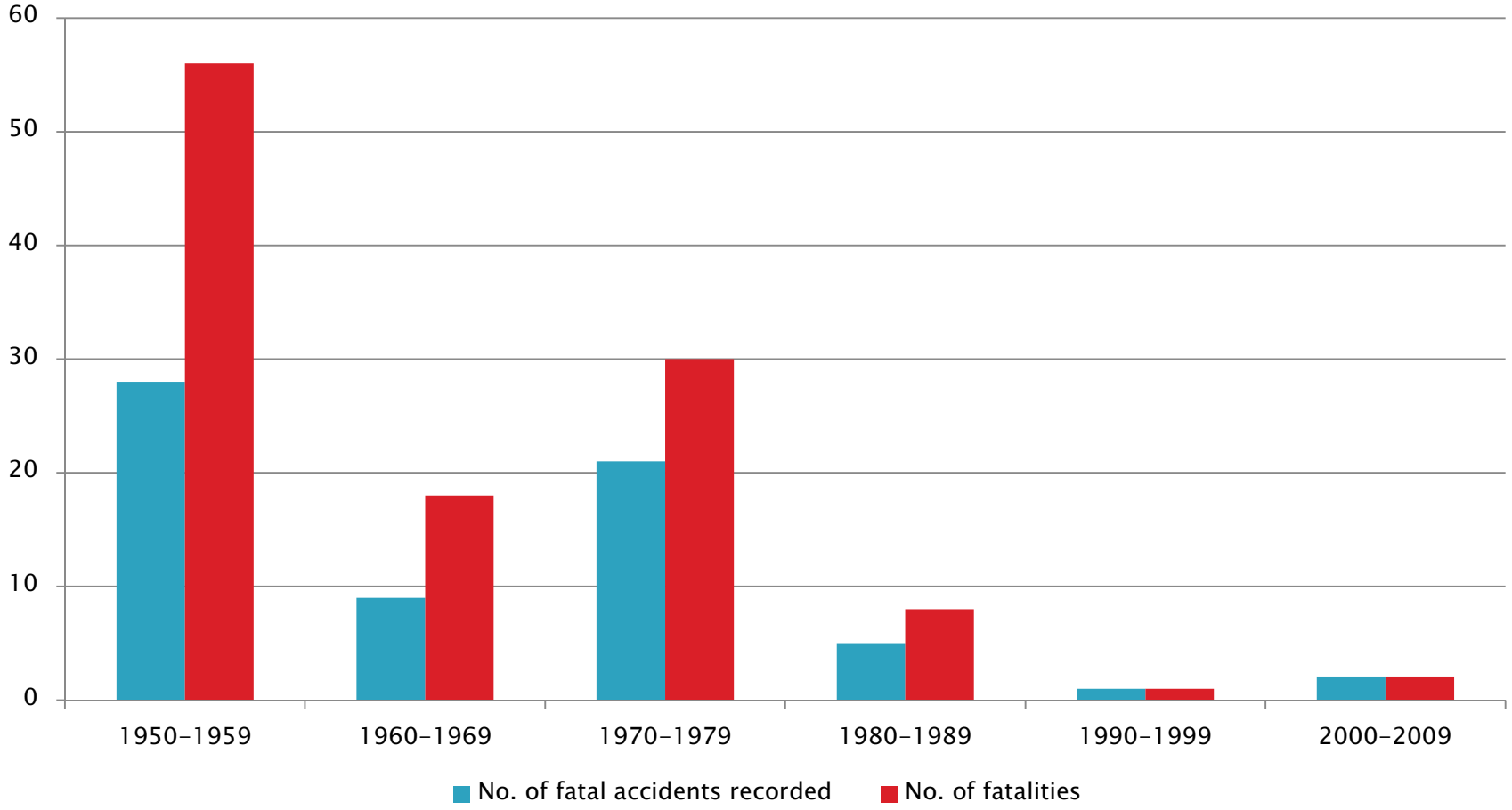

MBTB

# Numbers of fatal incidents and fatalities recorded each decade for explosives manufacture worldwide – 1950–2009



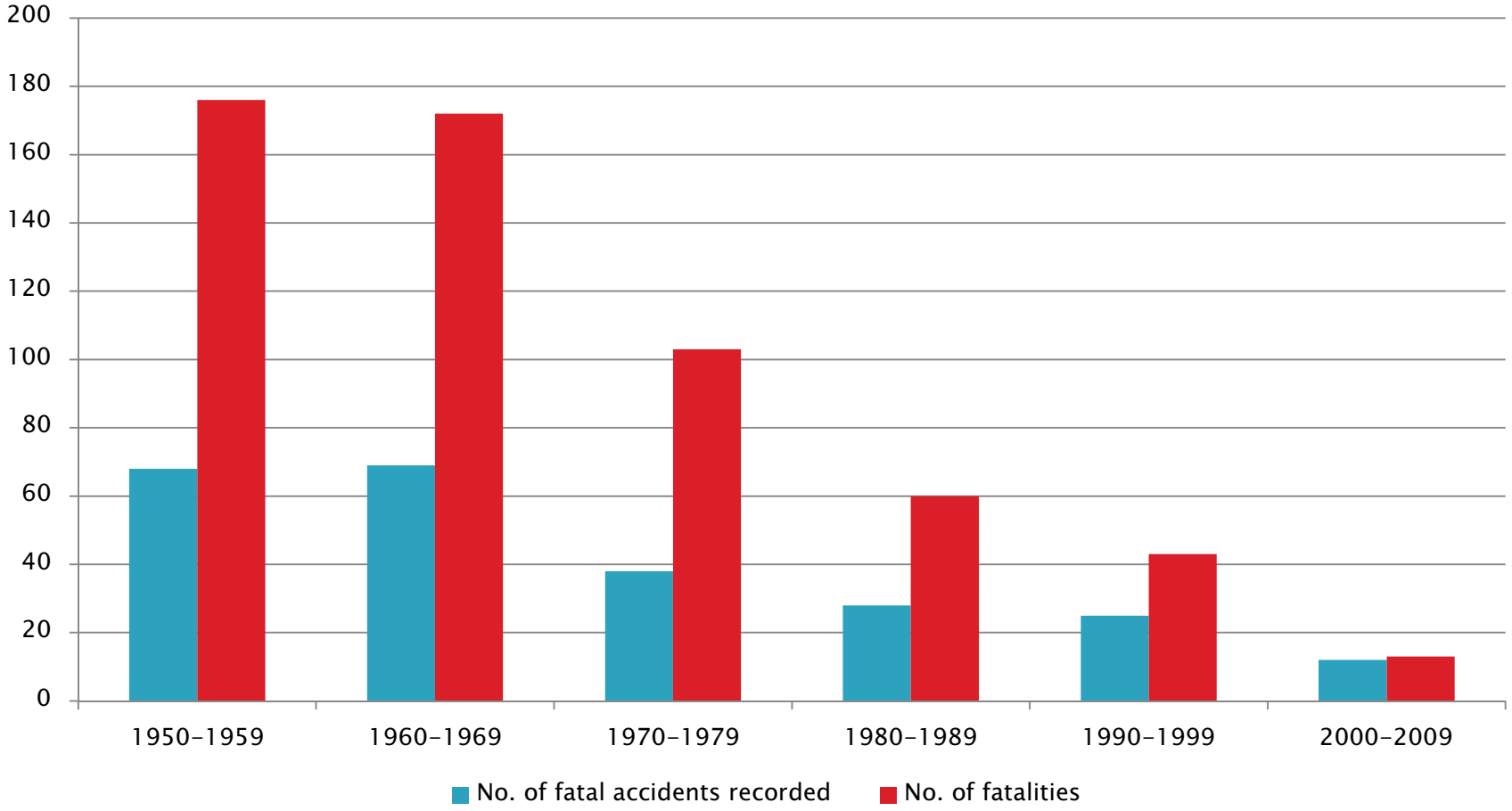

MBTB

# Numbers of fatal incidents and fatalities recorded each decade for explosives manufacture UK – 1950–2009



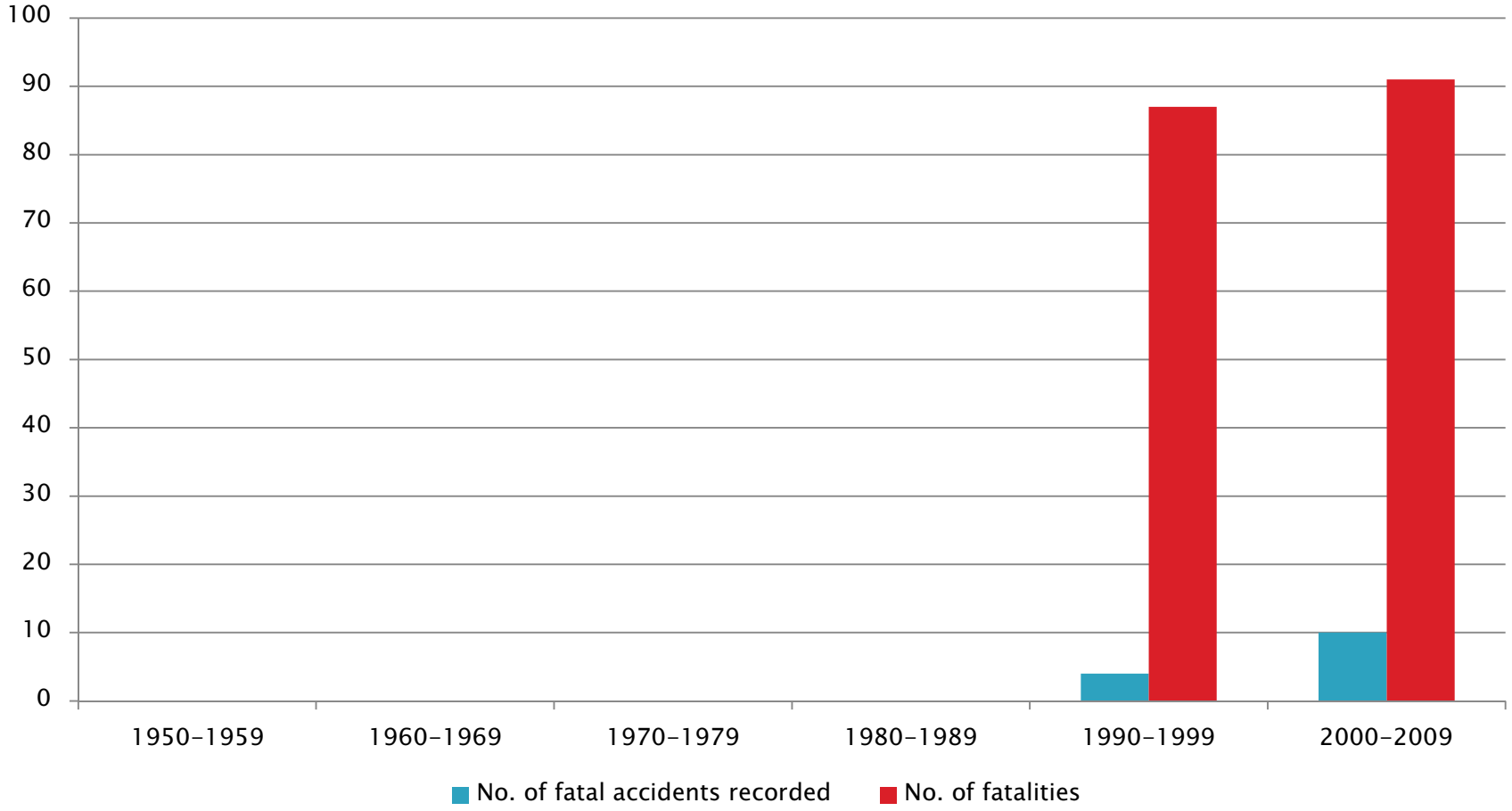

MBTB

# Numbers of fatal incidents and fatalities recorded each decade for explosives manufacture USA – 1950–2009



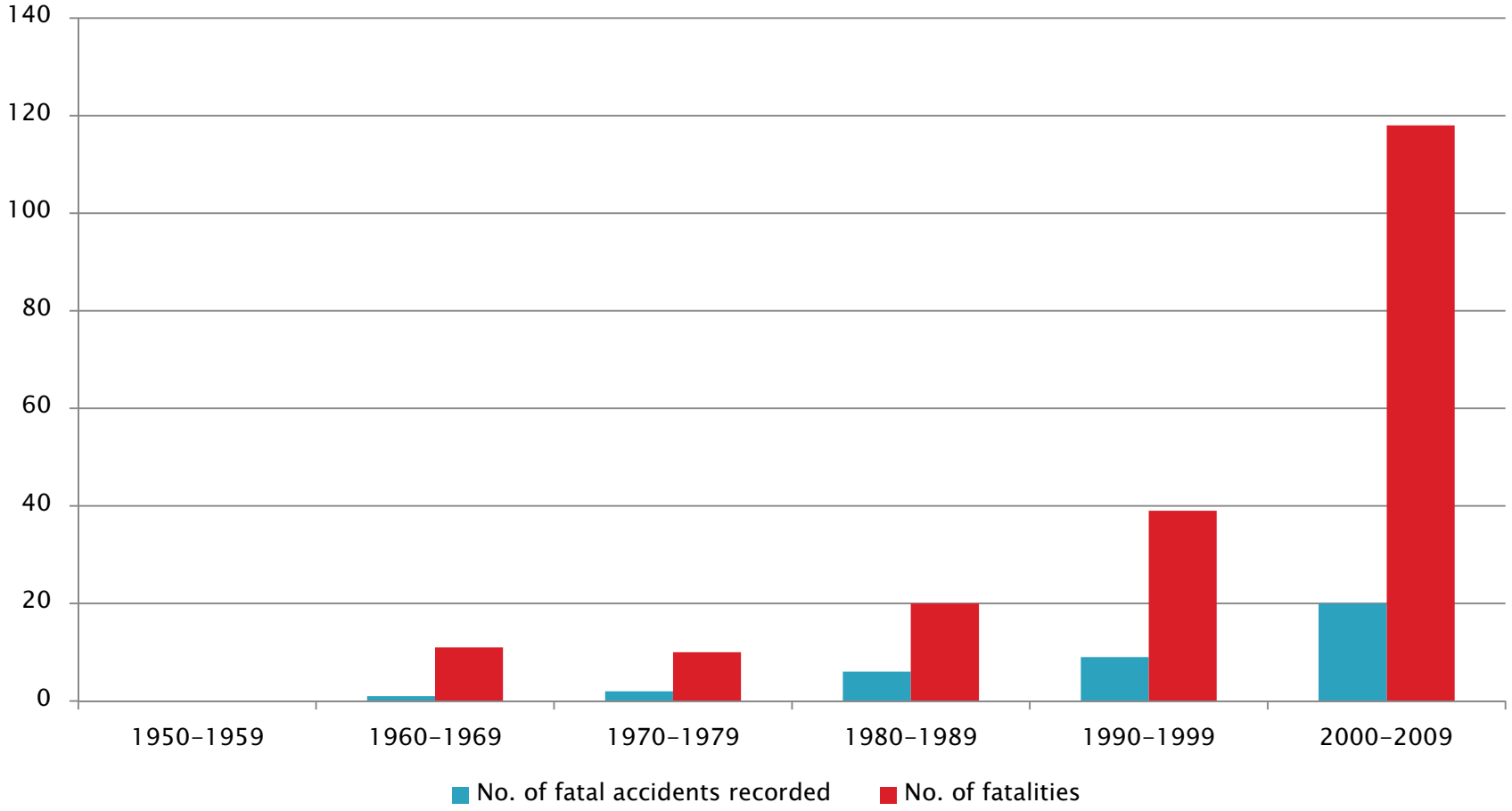

MBTB

# Numbers of fatal incidents and fatalities recorded each decade for explosives manufacture China – 1950–2009



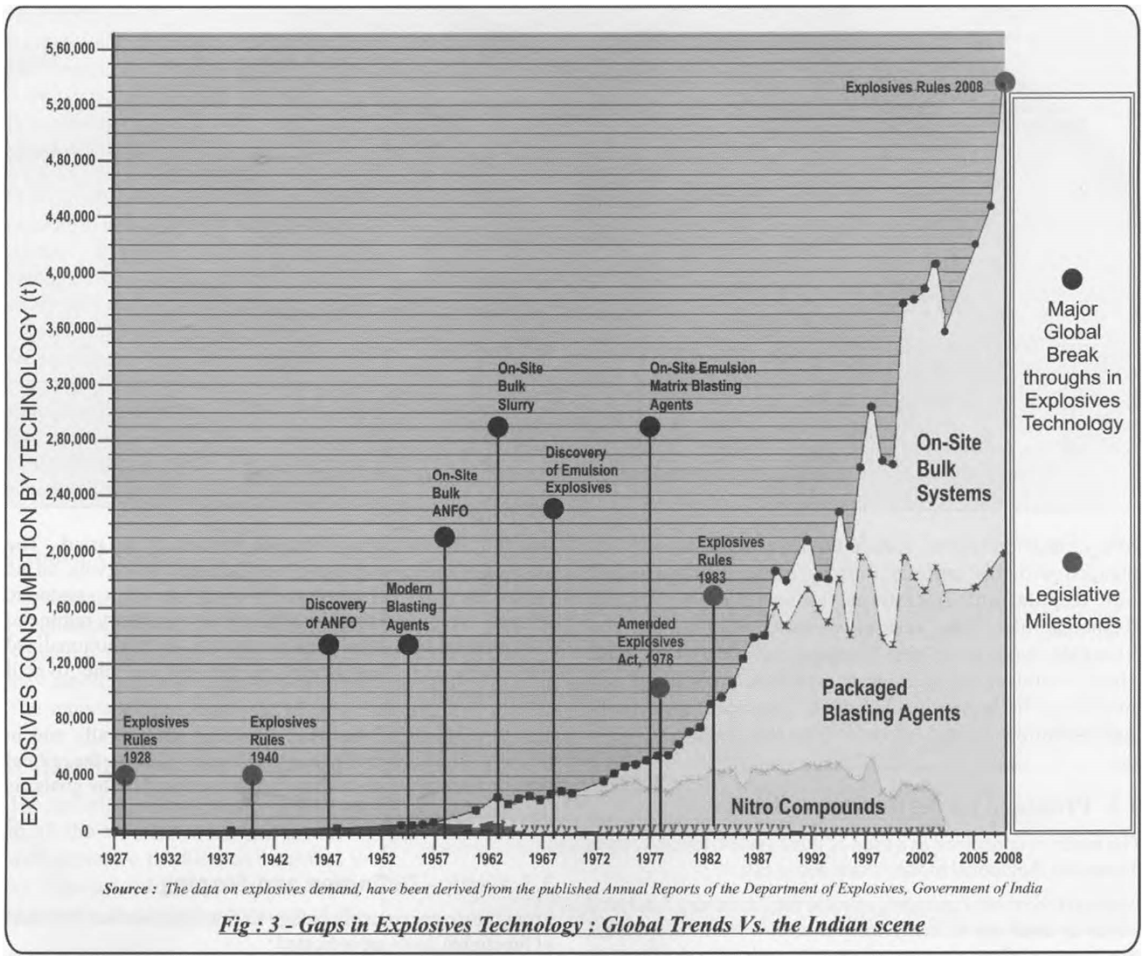

MBTB

# Numbers of fatal incidents and fatalities recorded each decade for explosives manufacture India – 1950–2009




MBTB

# Explosives Consumption in India 1927–2008 (Visfotak 2009)




*Source :* *The data on explosives demand, have been derived from the published Annual Reports of the Department of Explosives, Government of India*

***Fig : 3 - Gaps in Explosives Technology : Global Trends Vs. the Indian scene***

MBTB

# Analyzing the causes of incidents

- Electronic databases are vital
- EIDAS was inaugurated in late 1980s
- SAFEX became a major contributor in 2005

MBTB

# Uses of EIDAS

- Provides input for HAZID studies
- Allows trends to be monitored
- Assists incident investigations
- Provides data to validate explosion effects models
- Aids the preparation and evaluation of Seveso II Safety Reports

MBTB

# Past Accident Review Process

- What controls are in place to prevent the identified fault from arising?
- What controls are in place to prevent ignition in the event that the identified fault does occur?
- What controls are in place to limit the effects of an ignition?
- What controls are in place to protect personnel in the event of an ignition?

MBTB

# Part of an accident checklist for blending/mixing operations

| Energetic stimulus | Generic fault condition | Specific fault condition | Root cause |
|---|---|---|---|
| Impact or friction | Foreign object | Foreign object in raw ingredients | Failure of QA process |
| Impact or friction | Foreign object | Foreign object introduced by operative | Process Instructions ignored |
| Impact or friction | Foreign object | Foreign object introduced by operative | Sabotage |
| Impact or friction | Foreign object | Foreign object from equipment | Poor design/maintenance of equipment |
| Impact or friction | Foreign object | Fall of fixture/fitting | Poor design/maintenance of process building |
| Impact or friction | Blade/paddle hits wall of mixer | Equipment incorrectly set up | Inadequate training; Process Instructions ignored |
| Impact or friction | Blade/paddle hits wall of mixer | Faulty equipment | Poor design/maintenance |
| Impact or friction | Blade/paddle hits wall of mixer | Lightning causes programmable controller malfunction | Inadequate lightning protection (LPS or surge arrestors)<br>Poor design of software modules in PLC |
| Impact or friction | Blade/paddle hits wall of mixer | Material hardens in mixer paddle | Process Instructions ignored<br>Poor design/maintenance |

MBTB

# Conclusion

- This paper has considered the use of electronic databases for:
  - Analyzing trends in incident data
  - Performing Past Accident Reviews
- In both cases good practice in incident reporting is key

MBTB