

CASE STUDY

BP TEXAS CITY REFINERY EXPLOSION

MARCH 23, 2005 – TEXAS CITY, USA

Process Safety Management, Hazard Identification & Leadership Lessons



15
Fatalities



180+
Injured



Major
Refinery
Impact



Extensive
Investigation
Findings



This case study is an independent technical review by Alinoz Energy Consulting LLC based on publicly available investigation reports from the U.S. Chemical Safety and Hazard Investigation Board (CSB) and other authoritative sources.

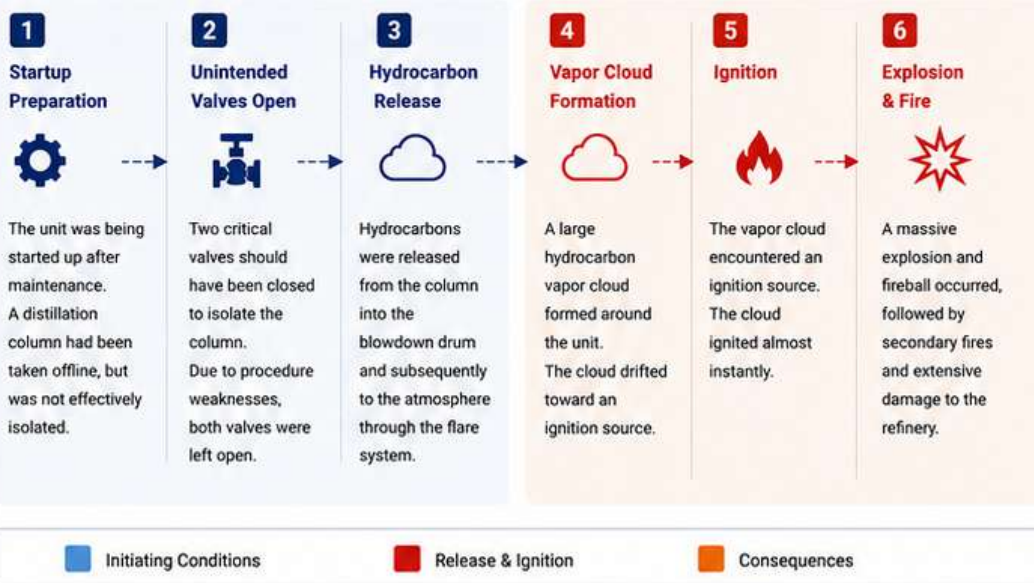
Alinoz was not involved in the incident or official investigation.

OVERVIEW

On March 23, 2005, a catastrophic explosion occurred during the startup of the Isomerization Unit at the BP Texas City Refinery. The incident killed 15 workers, injured more than 180 and caused extensive damage to the facility.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) determined that the incident was preventable and stemmed from significant failures in Process Safety Management (PSM), hazard identification, operating procedures, management of change, training, and safety culture.

ACCIDENT SEQUENCE



FACILITY & PROCESS



- BP Texas City Refinery
- Isomerization Unit
- Hydrocarbon isomerization process
- High pressure (up to ~490 psig) and elevated temperature operations

IMPACT



15
Fatalities



180+ Injured



Extensive damage to units and infrastructure



Significant financial, operational and reputational impact

FAILED OR INEFFECTIVE BARRIERS



HAZARD IDENTIFICATION

Inadequate identification of startup hazards and incorrect lineups.



PROCEDURES

Procedures were unclear, complex, and did not ensure critical isolation.



TRAINING & COMPETENCY

Operators were not adequately trained on startup and isolation requirements.



MANAGEMENT OF CHANGE

Changes to the process and procedures were not effectively managed.



SUPERVISION

Inadequate oversight of startup activities and procedure compliance.



SAFETY CULTURE

Production pressures and complacency weakened attention to process safety.

KEY INVESTIGATION FINDINGS (CSB)

- The incident was preventable.
- BP's Process Safety Management (PSM) system was not adequately implemented.
- Hazard analyses (PHA/HAZOP) were deficient and failed to identify the startup hazards.
- Operating procedures were inadequate and did not provide clear, actionable steps.
- Training and competency of operations personnel were insufficient.
- Supervision and management oversight were inadequate.
- A weak safety culture allowed performance erosion over time.



The explosion caused extensive damage to the Isomerization Unit and surrounding process units.

10 LESSONS FOR TODAY'S PROCESS INDUSTRIES

- Conduct High-Quality Hazard Reviews**
Ensure PHAs/HAZOPs are thorough, team-based and reflect real operating scenarios.
- Manage Change Effectively**
Any change to equipment, procedures, or operations must be reviewed for safety impact.
- Develop Clear, Usable Procedures**
Procedures must be simple, specific and easy to follow—especially for startups.
- Ensure Competent & Trained Personnel**
Operators must be trained, qualified and fully understand the hazards and procedures.
- Strong Supervision & Accountability**
Supervisors must actively verify and reinforce compliance with critical steps.
- Verify Critical Isolations**
Independent verification of lineups and isolations is essential before startup.
- Understand & Manage Complacency**
Complacency is a silent killer—vigilance must be maintained at all times.
- Build a Strong Process Safety Culture**
Leadership commitment and open communication are foundations of safety.
- Learn from Experience**
Investigate incidents, learn from near misses and share lessons widely.
- Integrate Barriers, Don't Rely on One**
Use multiple independent protection layers to prevent and mitigate major events.

