



CASE STUDY
Fire at Formosa Plastics Corporation

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Incident Description

This case study examines a hydrocarbon release and subsequent fire and explosions that occurred in the Olefins II unit at the Formosa Plastics Corporation, USA, (Formosa) Point Comfort, TX, complex.¹

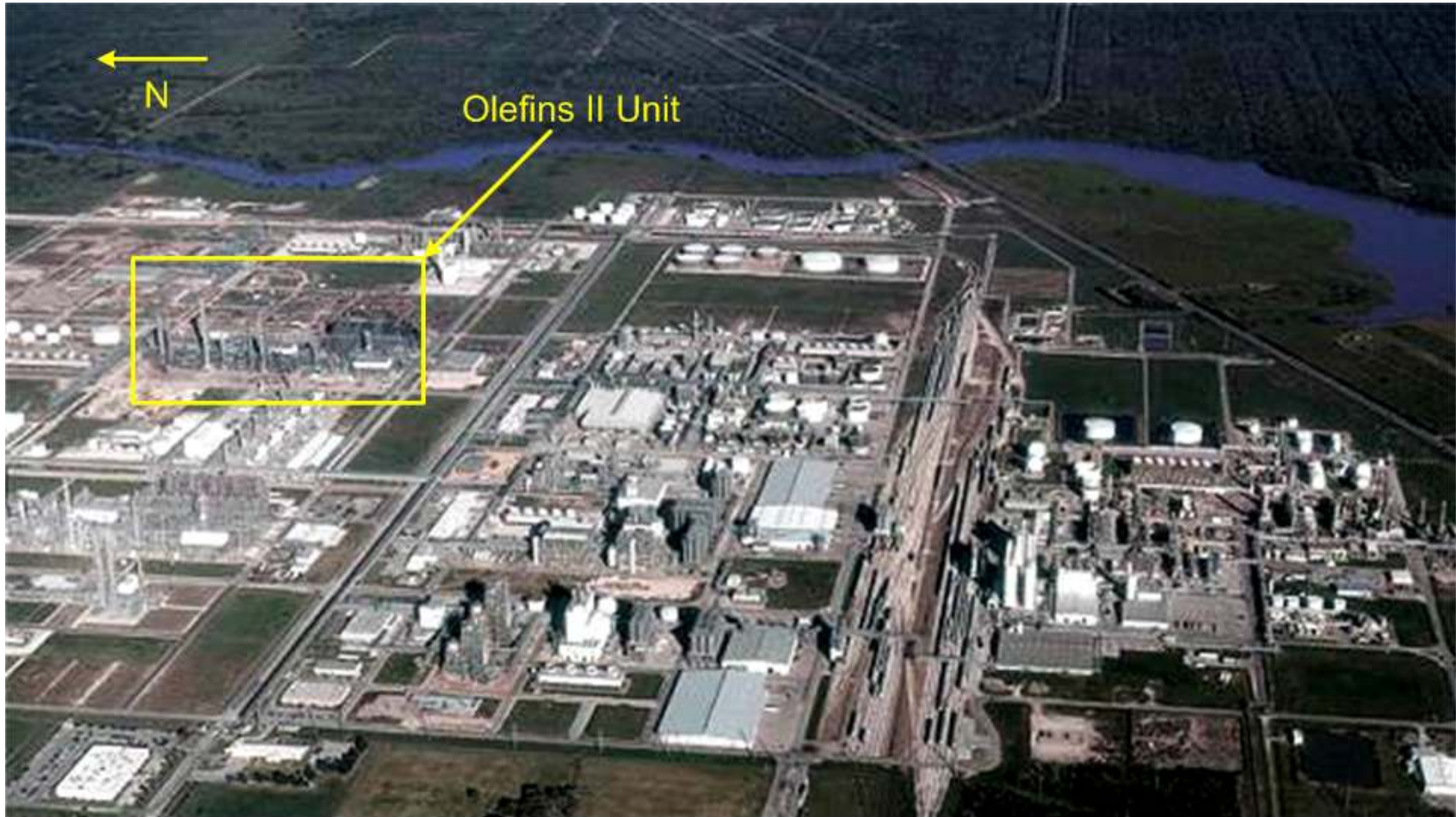
At about 3:05 PM on October 6, 2005, a trailer being towed by a forklift snagged and pulled a small drain valve out of a strainer in a liquid propylene system. Escaping propylene rapidly vaporized, forming a large flammable vapor cloud.

Operators immediately began to shut the plant down and attempt to isolate the leak. They tried to reach and close manual valves that could stop the release; however, the advancing vapor cloud forced them to retreat. At the same time, control room operators shut off pumps, closed control valves, and vented equipment to the flare stack to direct flammable gases away from the fire.

At about 3:07 PM, the vapor ignited, creating an explosion. The explosion knocked down several and burned two (one seriously) operators exiting the unit. Flames from the fire reached more than 500 feet in the air.

Because of the size of the fire, Formosa initiated a site-wide evacuation. Fourteen workers sustained minor injuries including scrapes and smoke inhalation. The extensive damage shut down Olefins II unit for 5 months.

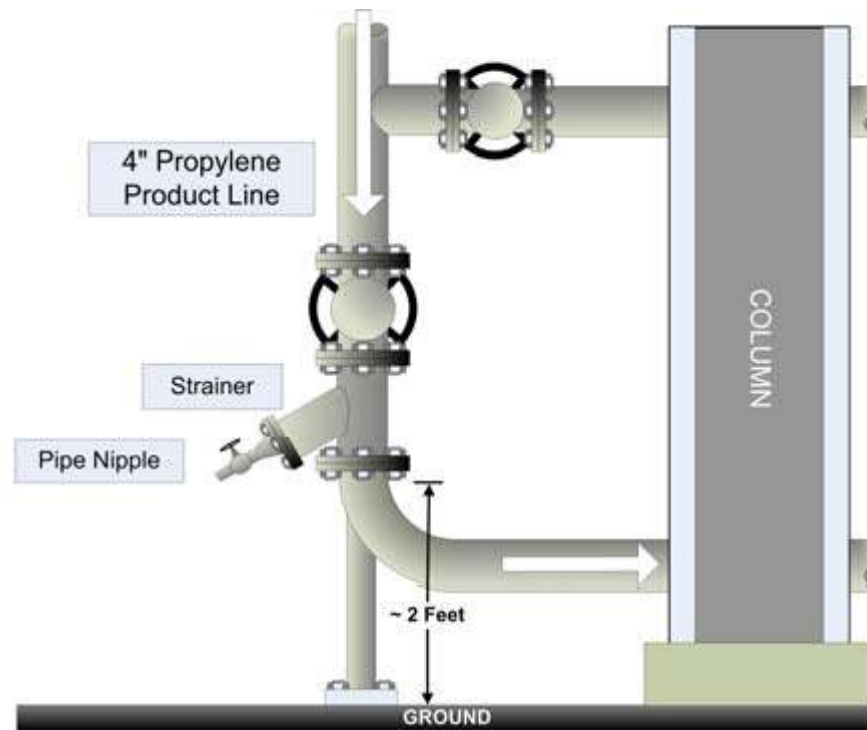
Formosa Point Comfort complex.



Formosa ERT equipment.



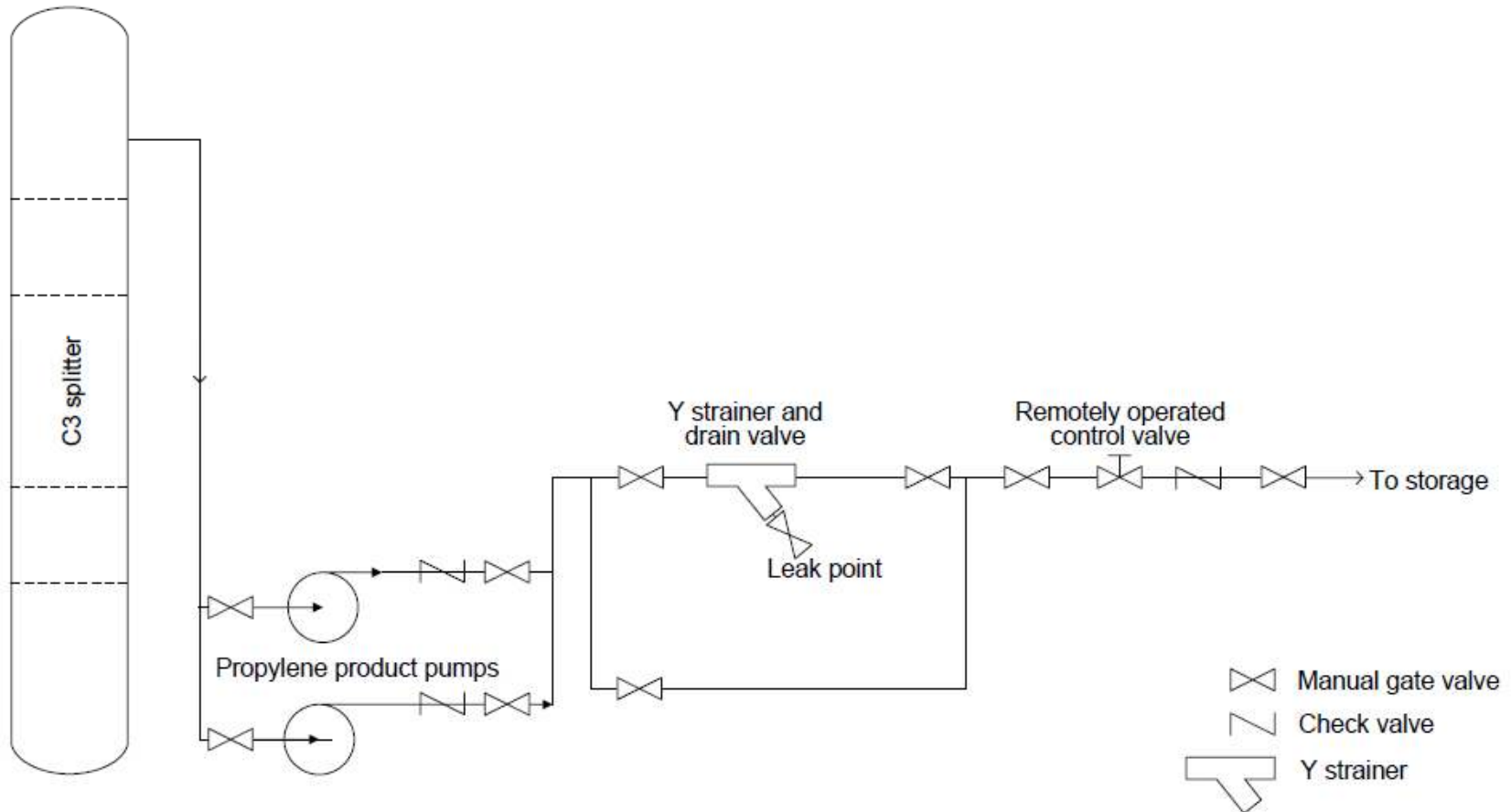
Pipe and valve arrangement : No Vehicle Impact Protection



Fireproofed and bare steel support columns.



Propylene Product Flow



Flame Resistant Clothing

Flame resistant clothing (FRC) can limit the severity of burn injuries to workers in plants where flash fires may result from uncontained flammable liquids and gases. Neither of the two operators burned in this incident was wearing FRC. Had they been, their injuries would likely have been less severe.

Process Hazard Analysis



In Process Hazard Analysis and in PSSR (Pre Start Up Safety Review) Vehicle Impact Protection and Administrative control was considered for Fire Protection Equipment but it was not considered for specific process equipments.

During the facility siting analysis, the hazard analysis team discussed what might occur if a vehicle (e.g., fork truck, crane, man lift) impacted process piping. While the consequences of a truck impact were judged as “severe,” the frequency of occurrence was judged very low (i.e., not occurring within 20 years), resulting in a low overall risk rank. Because of the low risk ranking, the team considered existing administrative safeguards adequate and did not recommend additional traffic protection.

Remote Equipment Isolation

Companies should address isolation philosophy as part of the hazard review process.

Formosa addressed isolating minor leaks in the hazard analysis and verified that operators could isolate minor leaks with local valves. However, the written hazard analysis did not consider a catastrophic loss of containment within the unit, and did not consider if local isolation valves would be accessible or if remotely operated isolation devices would be necessary.

Lessons Learned

1. Hazard Reviews :

When performing a hazard analysis, facility siting analysis, or pre-startup safety review, vehicle impact and remote isolation of catastrophic releases should be investigated.

2. Flame resistant clothing :

The use of FRC may limit the severity of injury to employees who work in plants with large inventories of flammable gases and liquids.

Use of Current Standards :

Evaluate the applicability and use of current consensus safety standards when designing and constructing a chemical or petrochemical process plant. This should include reviewing and updating earlier designs used for new facilities.

Thank You