1

On March 23rd 2005, the BP petroleum refinery in Texas City, TX experienced a major explosion and fire that resulted in the death of 15 workers, the injury of over 100 people, and massive damages that resulted in a two-year shutdown for a major unit in the refinery.

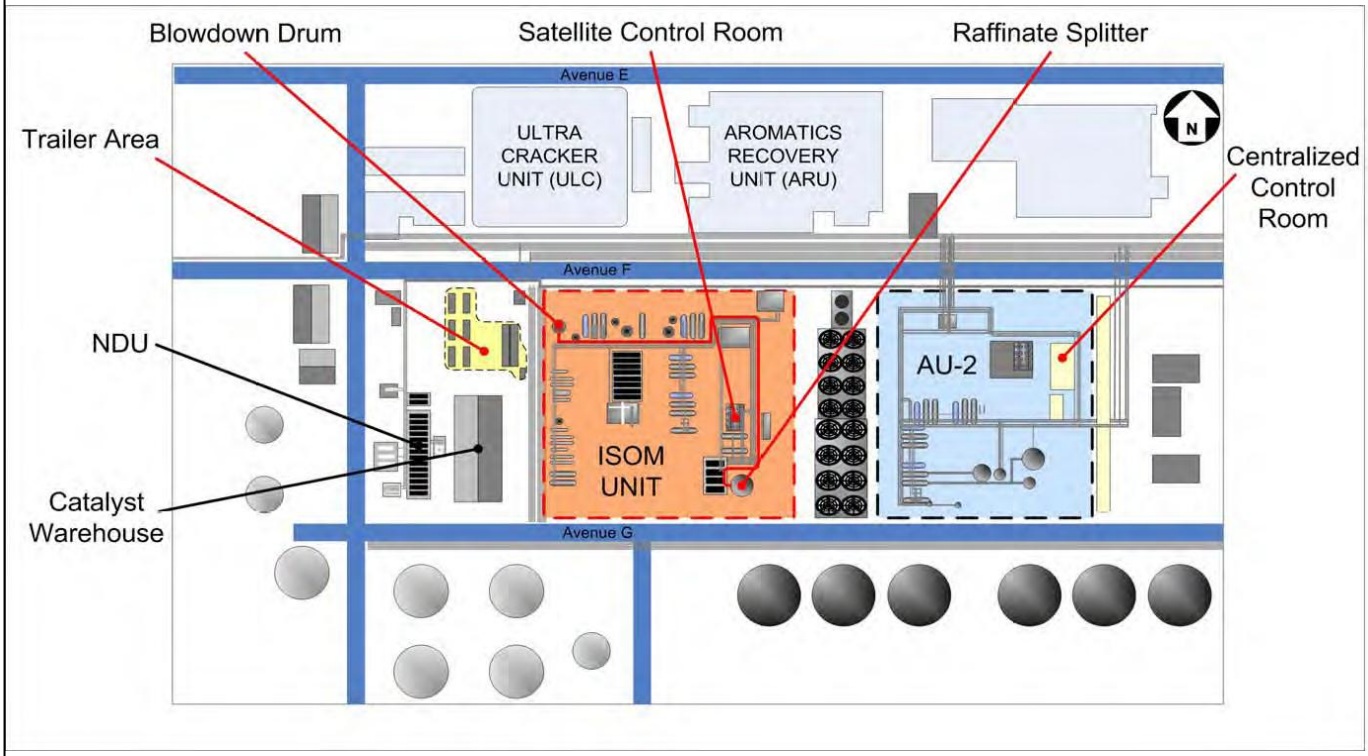
The accident has been investigated thoroughly and reported on in three documents, all available via the internet.

- CSB Accident Report
- "Baker" Report
- BP Report

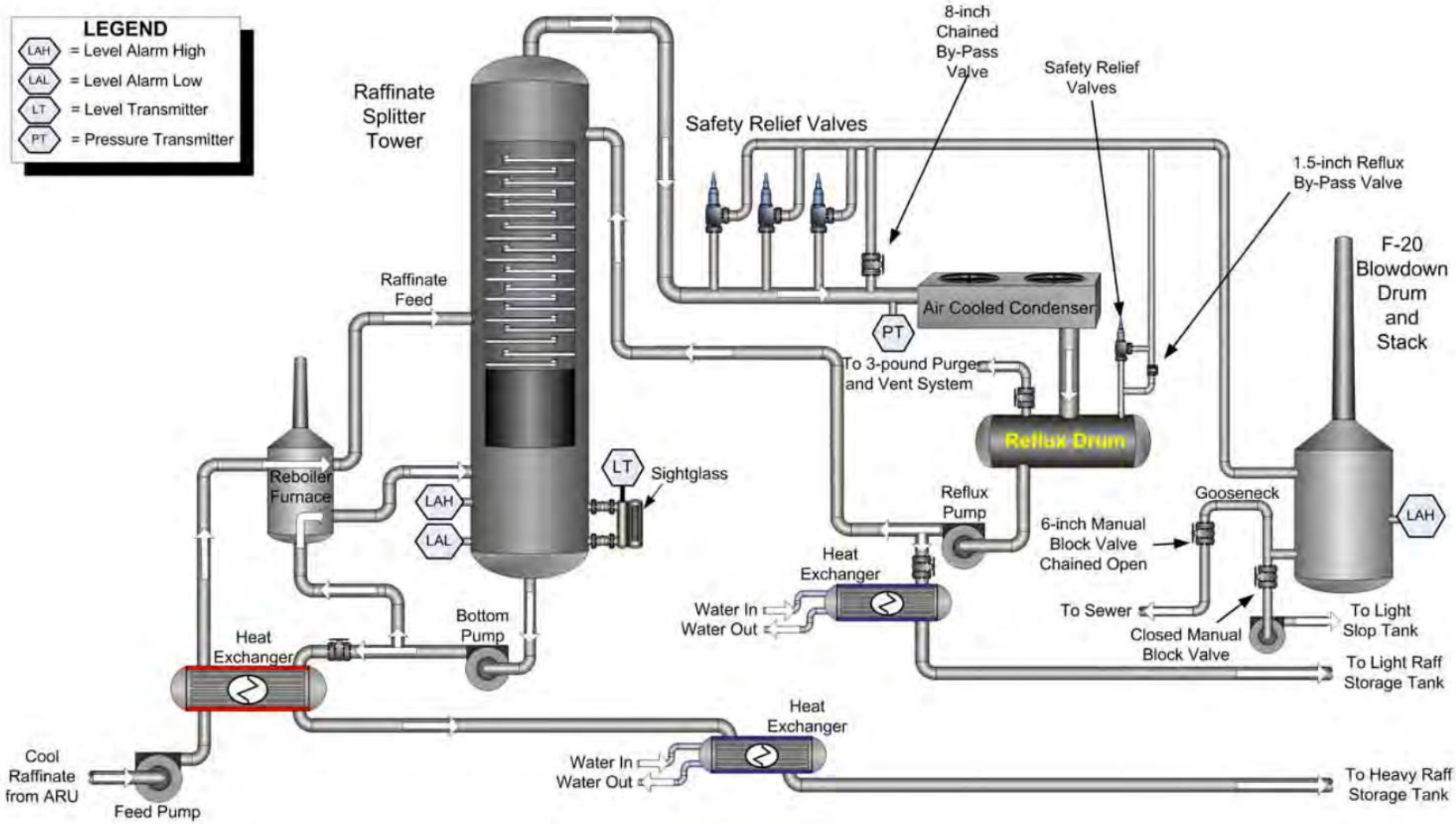
The following gives a few key figures that we will use during the class discussions.

2

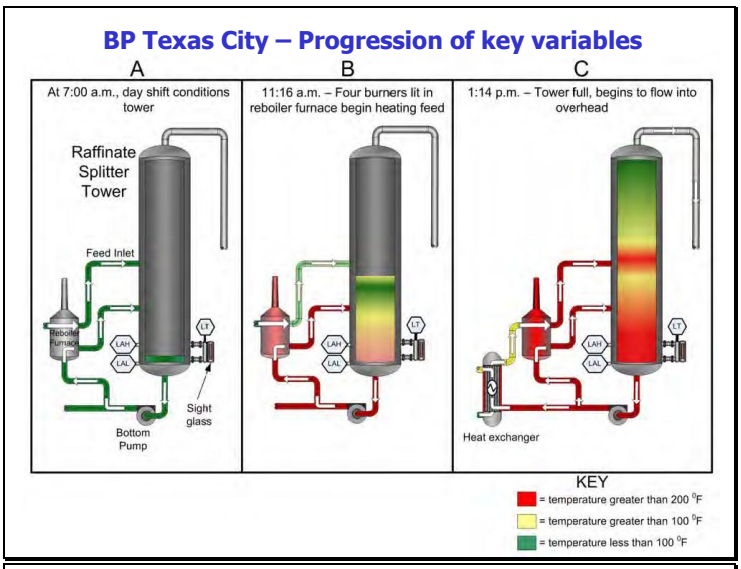
BP Process Unit Physical Layout (plot plan)



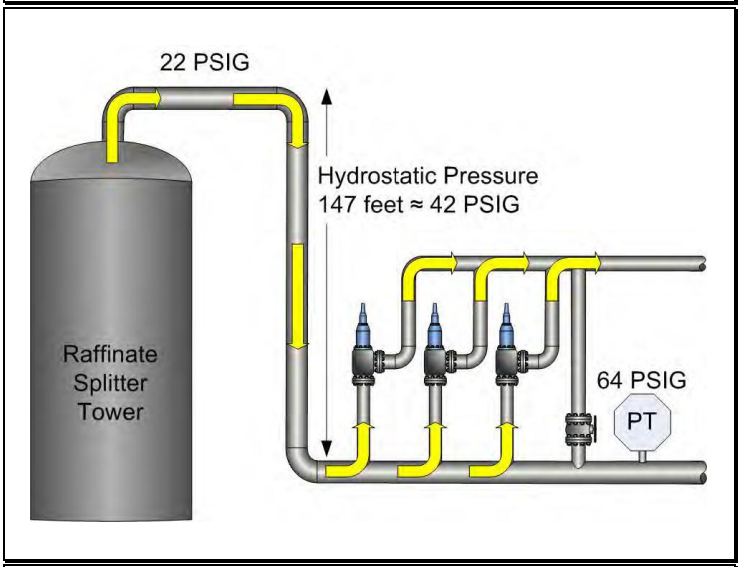
BP Texas City Raffinate Tower and Blowdown Drum



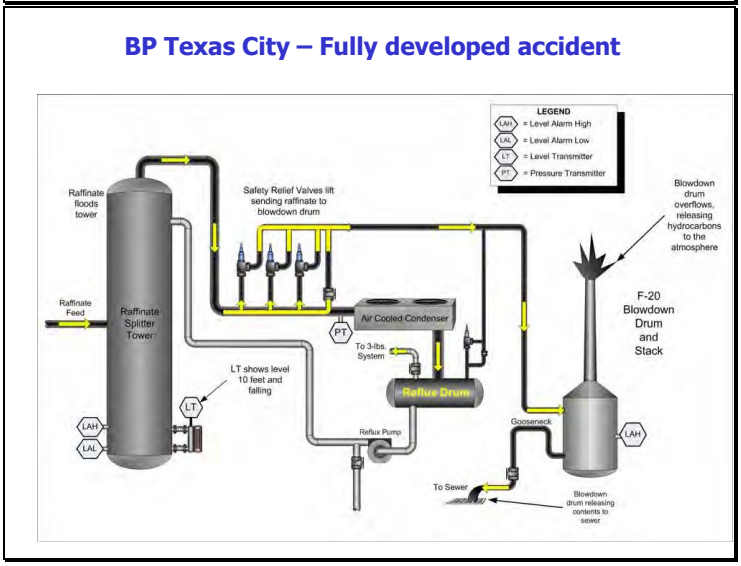
3


BP Texas City – Progression of key variables
A
At 7:00 a.m., day shift conditions tower
B
11:16 a.m. – Four burners lit in reboiler furnace begin heating feed
C
1:14 p.m. – Tower full, begins to flow into overhead
Raffinate Splitter Tower
Feed Inlet
Reboiler Furnace
LAH
LAL
LT
Sight glass
Bottom Pump
Heat exchanger
KEY
= temperature greater than 200 °F
= temperature greater than 100 °F
= temperature less than 100 °F

4


22 PSIG
Hydrostatic Pressure
147 feet ≈ 42 PSIG
Raffinate Splitter Tower
64 PSIG
PT

5


BP Texas City – Fully developed accident
LEGEND
LAH = Level Alarm High
LAL = Level Alarm Low
LT = Level Transmitter
PT = Pressure Transmitter
Raffinate floods tower
Safety Relief Valves lift sending raffinate to blowdown drum
Blowdown drum overflows, releasing hydrocarbons to the atmosphere
Raffinate Feed
Raffinate Splitter Tower
Air Cooled Condenser
PT
To 3-lbs System
F-20 Blowdown Drum and Stack
LT shows level 10 feet and falling
LT
LAH
LAL
Reflux Drum
Reflux Pump
Gooseneck
LAH
To Sewer
Blowdown drum releasing contents to sewer

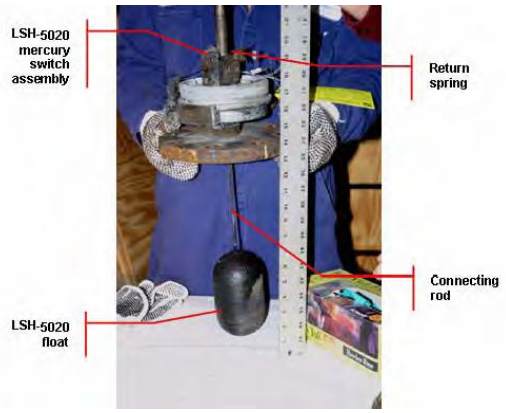
6

Tower bottoms level sensor used out-of-date density for liquid. Also, the actual density changed as the temperature changed.

7

Tower bottoms level float and alarm switch. Study indicates that the cause of the failure was likely the switch, not the displacer.

8



The blowdown drum level alarm. Investigation showed that the (hollow) float had a hole due to corrosion. It was filled with liquid, and naturally, did not float.

Workshop on BP Texas City Accident

Good aspects of the design

Good Design Aspect	Comments of Design Aspect Did it function well or not and why

Poor aspects of the design

Poor Design Aspect	Comments of Design Aspect Why was it poor and how could it have been corrected