



BUNCEFIELD INCIDENT:

SAPREF RESPONSE

BACKGROUND



In response to the Buncefield Incident, SAPREF conducted a risk assessment guided by our Design and Engineering best Practices, on all Refinery and Island View Storage tanks in 2007. The recommendation from this assessment was to install independent high-level instruments on all tanks containing Class I and Class II products.

Further to this review, in 2010, SAPREF then embarked on a Model Bowtie (MBT) Review to address the consequences associated with atmospheric storage tank overfills where it was realized that further barriers were required.

Of the 226 tanks present at the site, 86 were found to have gaps to ALARP. The Layers of Protection Analysis (LOPA) process was then used to evaluate the barriers that can most effectively reduce risks to ALARP.

RISK ASSESSMENT

The product class is determined from flash point data:

Product Class	Definition
Class O	Liquefied petroleum gas, LPG
Class I products	Liquids which have flash points below 21 °C.
Class II (1) products	Liquids which have flash points from 21 °C up to and including 55 °C, handled below flash point.
Class II (2) products	Liquids which have flash points from 21 °C up to and including 55 °C, handled at or above flash point.
Class III (1)	Liquids which have flash points from 55 °C up to and including 100 °C, handled below flash point.

The risk assessment considered the following escalations in the event of a tank Overfill scenario:

- Pool fire: Has the potential to damage equipment leading to further loss of containment and potential pool fires or tank fires.
- Flash fire following overfilling: Has the potential to ignite flammable material resulting in potential tank fires.
- Vapor cloud explosion following overfilling: Has the potential to damage equipment leading to further loss of containment and potential pool fires or tank fires (as was observed at a Buncefield-type incident).

RISK ASSESSMENT



The initial assessment therefore recommended an independent high-level instrument be installed on all Class I and Class II product tanks.

The MBT review identified further gaps in the system. SAPREF had Enraf Servo type level gauges fitted to most tanks. These tank gauges which are electro-mechanical instruments, had a high incidence of failure in spite of frequent testing which is intended to safeguard against failure. Thus, additional measures were required to mitigate against an overfill scenario.

SCOPE



The recommendation for remediation on the tanks that were found to have gaps to tolerability, was to install independent radar level instruments on these tanks to meet tolerability for the overfill scenario.

The MBT scope included the upgrade of some of the primary level indication, with a fit for purpose level detection system that is compliant with SHELL best practices and API Standards, in addition to adding an independent secondary instrument.

These tanks were then configured with a high-level alarm (HLA) on the primary instrument and a high-high level alarm (HHLA) on the independent secondary instrument.

The scope was implemented in a phased approach as the tanks were taken out for Maintenance.