Valero (formerly Chevron) operates a number of fuel storage terminals in the UK. These are high hazard sites storing gasoline, kerosene and fuel oils, operating as ‘top tier’ or ‘lower tier’ under the UK COMAH regulations.

Like all oil companies, Valero is required to demonstrate that ‘all measures necessary’ have been taken to prevent and mitigate major accidents on the site with potential to harm people or the environment. To comply with UK HSE requirements they must also carry out a risk assessment for the occupants of buildings on the site in accordance with relevant good practice.

Valero had previously carried out occupied building risk assessments but there was a requirement for these to be updated for changes that had occurred on the site and updated industry guidance. Jetty Huts occupied during ship offloading operations had been screened from the original assessments for low overall occupancy, but this approach was considered by Valero to be in need of re-assessment.

ABB were asked to update the occupied building risk assessments for five fuel storage terminals operated by Valero in the UK. Valero stressed the importance of consistency with an update to the COMAH safety report predictive section that was being carried out in parallel.

**Solution**

Valero operates fuel storage terminals in the UK at Kingsbury, Cardiff, Plymouth, Avonmouth and Brighton. These receive petroleum products including gasoline, kerosene and fuel oil from ship or pipeline into large storage tanks and transfer fuel into road tankers at loading gantries for export to fuel stations in the local area. The scope of this work included all five sites and an assessment of the risks to occupants of buildings from fires and explosions related to the transfer and storage operations. The overall objective was to follow guidance in the 2010 CIA guidance to show that suitable mitigation measures had been taken to reduce the risks to building occupants to as low as reasonably practicable.
The first stage of the work involved site visits to discuss details with local Valero staff and gather the data required for the assessment. ABB minimised the time commitment for these busy operations staff with a focused meeting, having extracted relevant data from the existing assessments and COMAH safety reports. A tour of each site was undertaken to identify all permanent and temporary locations where people could be present and record occupancy levels based on discussions with local staff. The buildings were photographed and details gathered including construction type, means of escape and any existing mitigation measures.

Based on the occupancy data gathered during the site visits a list of buildings defined as ‘occupied’ was produced using published criteria. This allowed many low occupancy buildings such as workshops, stores, substations and laboratories to be screened from further assessment, allowing efforts to be focused on buildings with significant occupancy.

Hazardous events with the potential for significant fires and explosions were obtained from the safety report predictive sections that were being updated for the two ‘top tier’ sites. It was important to Valero to maintain consistency. ABB added value by relating these scenarios and event hazard ranges to the three ‘lower tier’ sites using data on the equipment design, types of operation and site layout. The approach taken for explosion events was consistent with the recommendations in the Process Safety Leadership Group (PSLG) standard for fuel storage terminals, giving blast overpressure levels at various distances.

Hazard ranges to published criteria were used to screen any occupied buildings from further assessment based on their location and distance from the hazard source. For any occupied buildings within range the scale of hazard at the building was estimated in order to determine the level of damage and harm to building occupants.

A hazard based approach was used for fires, with extra mitigation considered for higher levels of thermal radiation. The basic approach was to ensure that safe escape could be made from all parts of the building, with recommendations to improve emergency escape routes where required. Further protection was considered at windows where higher levels of radiation could occur.

A risk based approach was used for explosion events including a vapour cloud explosion. Whilst the risk was shown to be very low for this type of event, reasonably practicable additional precautions were recommended such as improving the ‘blast resistant’ films applied to windows, to allow for any less serious explosion events.

**Benefits**

- Reduced risk to site personnel
- Compliance with regulator requirement for routinely updating the risk assessments for occupants of buildings on high hazard sites
- Met CIA best practice
- New standards regarding potential for vapour cloud explosion met
- Consistency between occupied building assessment and predictive aspects of COMAH safety report
- Minimal time required from operations staff