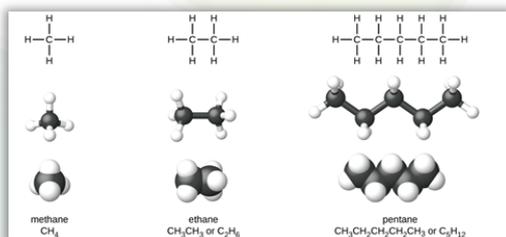


Hydrocarbon Storage

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From the onset of the industrial revolution, hydrocarbons have become closely tied to modern-day living. They account for approximately 85% of energy consumption worldwide and have a myriad of other uses (Fernando, 2020). Hydrocarbons are naturally forming organic, chemical compounds composed primarily of hydrogen and carbon atoms. However, when released unnaturally into the environment,



Source: [BCcampus](#)

hydrocarbons can pose numerous health risks. Their highly combustible nature, toxicity and prevalence as greenhouse gases are a hazard to humans and the environment. It is for these reasons that appropriate storage needs to be considered when dealing with hydrocarbons.

Environmental Risks and Consequences

Many hydrocarbons are recognised for their toxic, mutagenetic and carcinogenic impacts to organisms (Ince & Kaplan Ince, 2019). In many cases, exposure to hydrocarbons at the bottom of the food chain can result in bio-accumulative impacts. This is where the toxic hydrocarbons are stored in the fats of an organism which are then consumed by and accumulate in organisms higher up the food chain. The effects of bio-accumulation become most harmful to top predators, including humans.

The most damaging, immediate impacts of hydrocarbons to the environment are seen in relation to waterways. In extreme cases, such as large oil spills, organisms can become drenched in oil which inhibits their mobility potentially resulting in death. Oil spills that occur in waterways form a membrane on the water's surface, preventing oxygen exchange between water and the environment. A significant depletion in oxygen levels can result in death to aquatic plants and animals (Srivastava, Srivastava, Yadav, & Rawat, 2019).



Photo: Louisiana GOHSEP
Sourced from [Flinders University](#)

Other long-term pollution and contamination impacts include climate change, depletion of environmental health and even property devaluation.

Regulatory Responsibilities

The most common causes of hydrocarbon contamination are from leaks and spills (Srivastava, Srivastava, Yadav, & Rawat, 2019). Leaks and spills, while potentially resulting from circumstance outside of our control, maybe the result of inappropriate storage, failed clean up or negligent actions. The Western Australia *Environmental Protection Act 1986 (EP Act)* makes it an offence to cause pollution or unreasonable emissions and serious environmental harm or damage. The EP Act holds individuals and companies accountable for their actions, be they intentional, negligent or accidental (providing the risk could have been foreseen). Large spills or prolonged leaks that are left incorrectly cleaned up or remediated may result in a site being classified as a contaminated site under the *WA Contaminated Sites Act 2003*.



Summary/Quote



Where hydrocarbons and other chemicals are stored on site, procedures documenting spill responses are required and should be maintained.



Facilities which store, process or use large quantities of hydrocarbons such as fuels, may be classified as a Prescribed Premise and be licensed under the EP Act and thus be operate in accordance with their licensing conditions. Exceedances of emission limits or conditions is an offence un the EP Act.



Consideration should be given to the potential classification of hydrocarbons as dangerous goods under the *WA Dangerous Goods Safety Act 2004 and Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007*. Depending on the type of hydrocarbons it may be classified as either Class 2 (Gasses) or Class 3 (Flammable Liquids) Dangerous Goods or a Combustible Liquid, each with their own specific storage requirements. Care should be taken to ensure the appropriate storage conditions and labelling requirements are adhered to.

Hydrocarbon Storage Solutions

In the 12 months leading up to August 2020, Australia produced a total of approximately 24,970.8ML of fuel (LPG, gasoline, aviation, diesel, oil, other) (Department of Industry, Science, Energy and Resources, 2020), highlighting the importance of appropriate storage options. There are two common options for above ground hydrocarbon storage, **Tank and Bund** and **Double Walled/Skinned Tanks**. Both have certain benefits and shortcomings which are summarised below. Hydrocarbons can be stored in below-ground tanks, this is the topic for another InSight.



Tank and Bund. Source: BestBunding.com.au

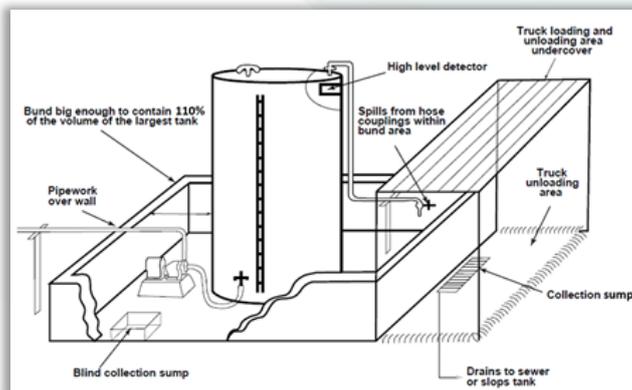


Double Walled Tanks. Source: TankSolutions.com.au

Tank and Bund

Fuel tanks designed to Australian standards can either be single or double skinned; with the main difference being singled-skinned tanks require bunding. A bund is a containment around an area where hazardous liquids are handled, processed or stored. Bunds can be comprised of an embankment or wall of brick, stone, concrete or other impervious material which forms the perimeter and floor of a compound, providing a barrier to retain liquid (EPA, 2016). Bunded compounds should be designed to hold no less than 110% of the largest tank in the system, enabling sufficient storage to fully contain leakage without overtopping the bund (Water and Rivers Commission, 2000).

The advantage of external bunds, you can visually see and clean up leaks from the tank or transfer pumps. A disadvantage of the tank and bund option is the area required for the bund. Depending on the size of the tanks, the bund may take up a substantial area of land. The second is the tanks must stay within the bunds, meaning if they are required to be moved to a new location, new bunding would be required to be constructed.



Bund Requirements. Adapted from South Australian EPA, 2016



Double Walled Tanks

Double-walled tanks are self-bunded they do not share the same requirement as single-skinned tanks, which is to be contained within a bunded compound. This means most double-skinned tanks are mobile and while potentially large can be relocated (approvals may be required or amended to relocate large tanks based on storage volumes).

While both designs are compliant with Australian standards, the external bund (when properly maintained) has the potential to offer broader protection for leaks. While double-skinned tanks are self-bunded many of the fittings are external, and so if not properly maintained or connected, this may result in leaks in which the fluid has no barrier to the environment. It goes without saying all equipment should be regularly inspected and maintained to avoid potential impacts to the environment and the safety of others.

Project Planning

The location of the storage systems should be taken into consideration as early as possible. Effort should be taken to ensure tanks are positioned on high ground away from any water sources, and the appropriate infrastructure is included in bund designs to allow for drainage preventing potential overflow. Permanent or stationary fuelling areas and mobile fuelling areas (where practical to do so) should ensure refuelling takes place within contained areas, where practical on a contained hardstand and which drain towards a collection sump (Water and Rivers Commission, 2000).



There are advantages and disadvantages to both single and double-walled fuel tanks which should be taken into consideration when choosing the design most suitable for your project. Regardless of the design chosen, regular inspections and equipment maintenance is essential to ensure the safety of employees and the environment. Inspections and maintenance should be documented in the sites management system or plan and updated periodically as required. If spills or leaks are detected, they should be contained, communicated to management or owner and clean-up. Dealing with a release on time limits impacts on the environment and can prevent the spread of contamination. Where hydrocarbons and other chemicals are stored on site, procedures documenting spill responses are required and should be maintained.

Here at Integrate Sustainability, we understand that managing safety and environmental issues can be challenging. For assistance with setting up hydrocarbon and chemical storage or developing management plans and procedures, or if you just want to ask some question, please give us a call 08 9468 0338 or email enquiries@integratesustainability.com.au.

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