

Storing and Dispensing Fuel in High Risk Areas

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If we look at the progress this industry has made over 100 years then the last 20 years has seen the most remarkable change and I guess much of that change is down to one word “Environment”.

One of my industry friends said that the change happened because the oil companies suddenly “got religion”, but of course we all know that perceptions changed over time and oil and petrol leaks caused other problems than fire and explosion risk and these have been well documented.

During my career as a regulator I was one of those people who helped “push” industry into making the moves to improve the construction of service stations underground and the options industry has now means that leaks involving fuel entering the ground are a thing of the past by using these new designs.

What I want to challenge however is both the Environment Agency policy and its implementation on storing and dispensing of petrol fuel in high risk areas such SPZ1 areas where water extraction takes place or where the fuel tanks are situated in groundwater.

The apparent lack of understanding they have of the progress this industry has made, the development of widely recognised safety and environmental standards, and the fact that they are out of step with what is happening in Europe and the wider world.

Let’s look at the EA Policy

EA Principles of Storage; - Underground Storage P1-7 and PI-8 state-

P1-7 Where we judge that an unacceptable risk is posed to groundwater by storage of pollutants, we will oppose such storage. If other priorities determine that the development should proceed, we expect Best Available Techniques (BAT) to be applied. Elsewhere, established good practice should be followed. We will work with operators of existing storage to assess and if necessary mitigate the risk to groundwater

P1-8 we will object to the underground storage of hazardous substances in SPZ1. On principal and secondary aquifers outside SPZ1 we also object, unless there are genuine and overriding reasons why:

a) The activity cannot take place on unproductive strata, and

b) The storage must be underground (for example public safety), in which case we expect the risks to be appropriately mitigated.

Where such storage already exists we will work with operators to mitigate the risks, with an aim to meet this policy.

It is the interpretation of these principles that has caused regulators and industry problems and it has not been helped by the apparent mixed messages in other codes.

In the DEFRA Groundwater Protection Code it

- Requires “double skin tanks should be installed where groundwater is a resource”
- And also “Above source protection zones major and minor aquifers”
- Also it says “Current good practice would be to utilise double skin pipe work”

I must state that I support a Groundwater Policy and the reason for such a policy has been brought about by the history of problems in the industry over many years from leaking single wall tanks and unprotected steel pipes and but it would seem that its implementation by EA staff is not consistent and varies from region to region. I would also add that much of the pollution was caused by unregulated tanks such as diesel storage where there was no control and petroleum inspectors had no input

We should all be aware that much of the drive for better protection in both safety and environment sectors comes from European Directives which are turned into legislation in all 28 European Countries so in theory the same rule applies to all.

In addition many of the Directives are supported by European Standards and this certainly applies to many of the standards applied to this industry.

Some of the Directives that apply to the industry cover both environmental and safety concerns

- The Water Framework Directive 2000/60/CE (WFD)
- Groundwater Directive 2006/118/EEC
- ATEX 95 *equipment* directive 94/9/EC
- ATEX 137 *workplace* directive 99/92/E

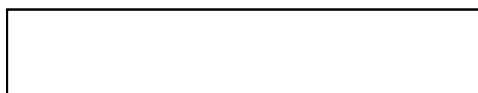
Safety versus Environment?



Traditionally we have installed petrol storage tanks at public filling stations below ground and one of the main reasons for this is to ensure the risk of fire and explosion to members of the public is minimal.

With environmental concerns expressed because of leaking single wall tanks and steel lines there developed a trend in the US in the last 20 years for above ground fuel storage (both oil and petrol) to be used.

The above ground storage of petrol has of course the added danger of fire and explosion. The fire test was actually developed by the Uniform Fire Code (UFC) and the goal was to make an above ground tank as safe as an underground tank and to help ensure that an above ground tank involved in a fire situation would not explode, that standard is UL2085.



The trend for above ground storage has not included public service stations but has only been for private or industrial installations and it has not been a requirement of any regulators but one driven more by

- The banking industry as obtaining bank loans for such storage has made the industry nervous in such cases
- The insurance industry who insure the risk

In both cases the reason being that old single wall tanks/lines leaked into the ground and contaminated land.

It is also interesting to note that many of the UL 2085 tanks used in the US are used for diesel as well as petrol.

Above ground tanks for public filling stations are not new, the first one I recall seeing was 25 years ago in France where the ELF transportable service station was used and had a fire resisting structure of “Durasteel” around the double wall tank, some of the older members of the Association may remember the presentation at our Annual Conference. The reason for its development was not for environmental reasons but to be transportable.



The main problem we have experienced is the fact that a situation has developed when the EA during the planning process have insisted that above ground tanks be installed, they then try and impose other conditions which increases the risk of fire and explosion. The planning authority also has their input making the situation far worse.

You will now see installations with above ground storage at public filling stations with large bunds around the tanks, and some enclosed inside buildings. All these installation have designs which are no longer conducive with the principal of the fire test in UL2085. It would appear that little thought had gone into these installations other than to meet the requirements of the EA and the planners and the designs have increased the fire and explosion risk to the public, at the expense of conforming to EA policy.



In a recent inspection tour of some of these facilities inspectors were asked if they were trained for entry into confined spaces and did they have all the safety equipment to do an inspection. In one facility the deep bund (an EA requirement) surrounding an above ground tank will cause major inspection issues as both inspectors and maintenance engineers try to overcome the Health and Safety issues.



Other Safety Concerns

- Risk of spillage during a pumped delivery process is considered by an Energy Institute risk assessment as being much higher than for underground tanks which use a gravity delivery
- All lines to dispensers from above ground tanks are pressurised.
- Losses can be as much as 200 litre per minute
- Petrol is not just a pollutant it is flammable!

What is wrong with underground installations?

My concern is those making EA policy do not have enough understanding of the progress industry has made over the last 20 years in altering the way that underground installations are protected from leakage.

Underground tanks are now all double wall tanks with positive leak detection systems and conform to EN 12285-1.

This means that the tank once installed and fitted with the leak detection system will be under test the whole of its working life and should a leak occur in either the inner or outer skin an alarm will sound before any product can reach the environment.

Underground lines which traditionally accounted for 80% of leaks from filling stations are now plastic and conform to the European Standard EN 14125. Where installations are at a higher risk than double wall pipes with leak detection can provide the same security as in tanks.

What about existing filling stations in the Special Protection Zone 1? Well it would appear that the EA policy is different here it states *“We will work with operators of existing storage to assess and if necessary mitigate the risk to groundwater”*

Perhaps again accepting that either the replacement of existing tanks with double wall or the lining of single wall tanks with a double wall lining in accordance with the recognised European Standard EN 13160 – 7 is sufficient will help.

The protection of groundwater is not a problem unique to the UK and the Environment Agency, it is a European and worldwide problem and if we look at the policies around the world it is clear the EA is out of step.

Europe

In Germany the Federal Environment Agency / Umweltbundesamt and in France the French Agency for Environment and Energy Control (ADEME)

These all accept the security of double wall underground storage with class1 leak detection even where drinking water is extracted

The USA

- In California with the most stringent environmental standards in the US they accept double wall underground tanks in sensitive areas
- The US EPA does not insist anywhere on above ground tank storage
- Above ground storage is driven by the insurance industry and used almost exclusively on commercial sites
- Above ground tanks for petrol storage in the US are not used on public filling stations

The EA and DEFRA both mention **Best Available Techniques** and for a high risk installation and they are these

- Double wall underground tanks to recognized standards
- Class 1 pressure leak detection system

- Double wall underground pipes with class 1 leak detection
- Chambers made water & fuel resistant and tested before use

These are high integrity systems using interstitial monitoring

The containment spaces around the pipes and the tanks are maintained at a positive pressure of 300mbar. Any failure of the primary or secondary layers will result in an alarm. The pressure is greater than the internal liquid pressures and will always push air into the fluid rather than allowing it to escape.

Alarms are passed to the Automatic Tank Gauge to ensure they are all handled through the one system

These can also be remotely monitored (perhaps even by the EA themselves?)

London's Experience

Building a filling station in London can bring unusual challenges and they are often built in very high risk areas. Twenty years ago London adopted a policy of accepting only double wall underground tanks and non metallic lines and the success of the policy in London is such that now 65% of the service stations operating have double wall tanks with leak detection. The number of leaks from service stations has as a result of this policy dropped dramatically over that period.

Such installations have been successfully installed and operated even though they are very close to the London Underground railway, cellars and basements, and they pioneered much of what is accepted as good practise.



Perhaps the best demonstration of a successful installation is one that was built and operated until quite recently in the middle of Heathrow Airport, immediately over the concourse to the underground railway serving terminals 1 to 3. The tanks were 6 x 50,000 litres double wall with leak detection, the lines were double wall with leak detection.



A safe high integrity system protected the millions of people who come into Heathrow on the underground railway each year.

This surely must be an example of what is perfectly acceptable to protect the public, but which seems to be unacceptable to the EA to protect groundwater.

So there are no failures?

- There have been a very small number of failures of one wall of the new double wall underground storage tanks but most importantly:-
- There has been no recorded product release from **any** double wall underground tank installed the UK
- Manufacturers and regulators inform me there have been none recorded in Germany and France who have records going back to 1968
- The Steel Tank Institute have also informed me there have been **no** records of product release from double wall tanks in the US.

Although it might appear that I am against above ground petrol storage I am not, it has its place in the system and if you look at its use in Golf Clubs, Car hire installations and the temporary filling stations operated by Sainsbury it works remarkable well and I am sure will continue to provide an option for the industry.





What is happening with the current EA policy is that people are being forced to install above ground tanks in certain areas and by the installation of unnecessary bunds and enclosures producing a hazardous situation which can no longer be acceptable.

It is also the application of this policy that needs the EA attention, someone in the EA has more recently decided that triple wall tanks are now required and they have been asked for on at least two occasions in the southeast of England. There is absolutely no sane reason why this should be made a requirement other than by the whim of some official unless the EA has changed policy without any consultation. I would point out there are no standards for triple wall tanks, there are no benefits from having triple wall tanks and I am unaware of any country that has any requirements for triple wall tanks.

As I write this paper I have also been informed of a failure of a valve in one of the new above ground installations where the “suction” lines became pressure lines because of the fact that the tank was above ground and fuel overflowed out across the dispensing area creating a very hazardous situation, another case of the “environmental” requirements of the EA causing unnecessary environmental and safety hazards.

My message to the EA is

Please urgently review your policy on petrol filling stations, and ensure it is applied uniformly

Understand the massive learning curve the industry went through in 1990 and that both industry and regulators recognised the problems of past poor designs.

Recognise the changes the industry made to ensure product security by installing non metallic pipe and double wall tanks underground.

Accept like other agencies around the world that double wall tanks can be safely used underground even in high risk areas.

The APEA and I am sure the Energy Institute would also be happy to contribute to debate and discussion with the EA over these issues to ensure a more sensible approach to the EA policy, no one in the industry wants leaking tanks and pipes.

The Blue Book which will be published later this year provides better guidance in the area of above ground protected tanks and firmly recommends that double wall tanks should be installed underground.