

DAVID PLUMB & CO LTD

Autumn 2007

# The risks of RG22

**Are you aware of the risks of the ubiquitous resin generated (RG) foam that is now used almost universally on fuel sites? Is the assumption that it is risk free putting people in danger? We and our Devon based colleagues LCM Environmental look at this controversial issue.**

We are not saying the supporters of RG foam are all wrong, or that there is no place for it on fuel sites, but we are saying that it is not risk free, and that those risks should be recognised and the appropriate action taken.

RG foam comes in three main forms – RG22, RG8 and RG30. RG30 is used to encase fuel tanks for extra safety and contamination protection. RG8 is used for filling de-gassed tanks on a very temporary basis, as it is claimed that it can be completely broken down with water. RG22 is the most prevalent, as it is widely used for the 'permanent' filling of tanks.

RG22 was developed when the solid fill material of choice was a 20:1 sand/cement slurry. To fill every part of the tank with this, contractors needed to open the top of the tank, pour in the slurry and agitate it; otherwise it would settle as a cone with space all around. Sometimes part of the forecourt had to be dug up if the manhole had been put in the wrong position.

The advantages of RG22 were that it was said to be environmentally friendly, safe and could be pumped through an existing pipe or a flange

on the manhole lid. This made it popular with petroleum officers and oil companies, some of which began to insist on it. It was also claimed to be cheaper than slurry and lighter, making the eventual excavation of the tank easier and less expensive, as there was no need to hire a crane, a standard excavator could be used.

The introduction of foamed concrete has eroded some of these advantages, as it is much lighter than its predecessor and has good flowing properties. This means that, for most fuel site uses, there is now a viable alternative to RG22 that meets the requirements of oil companies and petroleum officers.

The main reason that we need an alternative is that RG foams contain formaldehyde – a probable human carcinogen. In 2002, formaldehyde was placed on the US Report on Carcinogens 11<sup>th</sup> edition, compiled by the US Department of Health and Human Services, Public Health Service and the National Toxicology Program.

In Canada urea-formaldehyde foam, which also uses formaldehyde as a curing aid, was used to insulate homes, particularly timber framed houses, but this has now been banned there, after occupants began to complain of runny noses and sore eyes.

Because formaldehyde is used as a curing agent, while RG22 needs to be handled with care at all times, the highest health risk does not occur when the foam is



*Formaldehyde is released when tanks are opened*

**INSIDE:**

**Our RG22 foam special.**

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# A problem waiting underground

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pumped in, in its liquid state, but when the so called 'permanently' filled tanks have to be excavated and removed, to allow a site to be decommissioned.

This is why companies such as us, which specialise in the excavation of disused fuel tanks, are fighting to get the safety issues around RG foams taken seriously.

Our concerns are two-fold, handling the foam itself, and exposure to the formaldehyde gas that is given off when the tanks are excavated and cut up for disposal.

Says David Plumb director Nigel Plumb: "Because of its alleged properties, we were as interested in using RG22 as anyone when it first came out. Our doubts began when we started excavating tanks that had been filled with the foam and we discovered how difficult and expensive it was to dispose of.

"We began to discover that RG22 can shrink, letting air get back into the tank, which reduces its safety properties and speeds up corrosion. We later also discovered that it gave formaldehyde gas a place to gather.

"We have excavated tanks less than three months after they had been filled with RG22 and the foam had already shrunk considerably. On the other hand, we have excavated tanks that were filled with RG22 two years previously and found that some of the foam was still in a liquid form.

"When our people opened the tanks they found the fumes were often overpowering and anyone who touched the stuff received an unpleasant skin rash. We now use protective all-over bodysuits and breathing apparatus."

The lightness of the foam was supposed to

make excavation easier, allowing tanks containing the foam to be lifted straight from the ground and onto the back of a lorry.

"Unfortunately," says Nigel, "we discovered there are only one or two disposal sites that will accept the RG22 foam still in the tank. Even then, they will only accept small tanks, and only when they can be placed in a deep part of the landfill. We will only attempt the all-in-one approach when our client insists, as we prefer the more environmentally friendly approach of sending the metal of the tank for recycling. This means that once it has been removed from the ground, the excavated tank has to be cut away, with the metal taken to one site and the RG22 to another – usually a hazardous waste site."

Derran Williams, of LCM Environmental has similar concerns. Derran began his career with LCM in 1997 by excavating tanks, which is when he became concerned about RG foams. He has since become LCM's health and safety manager, but his interest in the safety of RG foam has remained.

Says Derran: "RG foam is fine if the tank is never going to be opened again; the problem is that, these days, eventually, many tanks will need to be removed, if the site is to be sold on for development.

"My concern is, when we open the tanks there is a pungent smell of formaldehyde and often an irritated feeling in the throat and eyes. We now use a different technique where we use machinery to open the tanks, keeping personnel away from the excavation.

"The problem is that, during curing, the foam emits a fair amount of formaldehyde gas, which is trapped in the tank and released when it is cut open. Our workforce also initially noticed some irritation through exposure to the foam and, indeed, the manufacturers' data sheet says it is a 'light irritant'."

LCM believes another problem is that, as well as being an irritant, the material is light and friable, so, if precautions are not taken, it can get under clothing or even be breathed in.

"However," says Derran, "this part of the problem can be dealt with if contractors are properly forewarned. Like any other risk, they can deal with it, if they know exactly what they are facing, by elimination in the first instance and, where not possible, control techniques such as wearing protective clothing, gloves, masks, eye protection etc.

"A bigger problem is that fuel sites undergoing decommissioning are normally bounded by roads and

■ RG8 and RG30 also use formaldehyde, so there could be similar problems with these. Let us know if you have had any experience with them.



"Fuel sites undergoing decommissioning are normally bounded by roads and pavements"

pavements, often in built up areas, so there is a danger that the light friable foam can easily be blown off the site. These days we don't remove these foams on a day when there is any wind at all.

"However, our real concern is the formaldehyde gas that is given off when the tanks are cut into, as they must be when a site is decommissioned."

Experience has shown both companies that, even with RG22, air pockets occur, where the gas tends to concentrate, leading to a burst of gas being released when these pockets are breached.

"Proximity is the real problem," says Derran. "Once formaldehyde gas is vented to atmosphere it will disburse to a harmless level, but if you are close to the tank when it is cut it is more worrying."

LCM has carried out environmental and personal monitoring, looking at the level of concentration of formaldehyde gas on fuel sites being decommissioned when tanks are cut open.

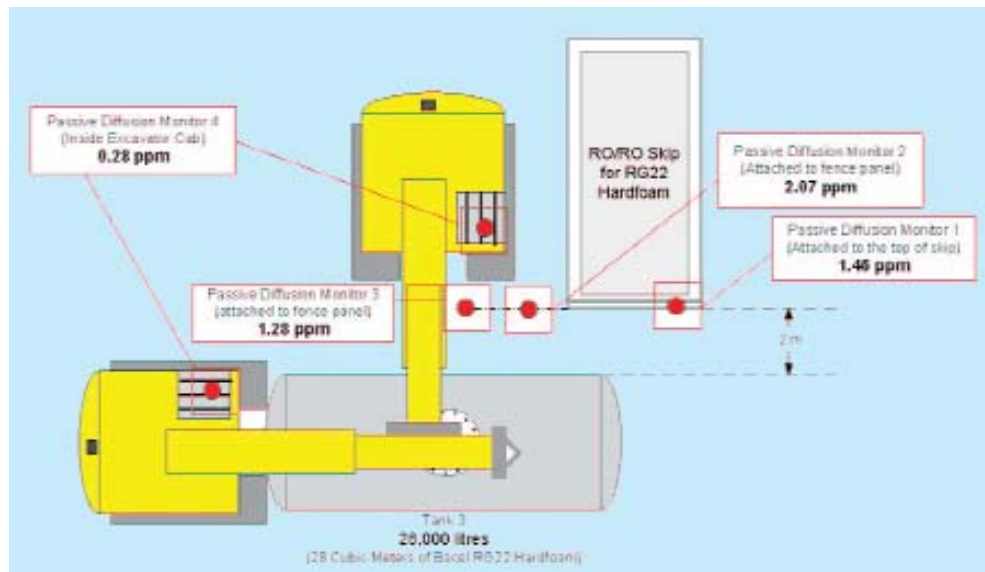
In one of these tests, formaldehyde sensors were placed at four strategic points on the site. Three produced results under the recommended level of 2 parts per million, but the nearest sensor, located 3m from the tank, registered 2.07 parts per million, which exceeds the UK workplace exposure limits (WEL) of 2 parts per million.

"This indicates," says Derran, "that steps need to be taken to protect anyone going within that distance. We also believe the 2 parts per million limit itself needs examination, as there is, in my opinion, no real evidence for this level. Much more research is needed."

The message from the two companies to contractors is to be aware of the risks and take the right precautions.

Says Derran: "The main problem is the eyes and respiratory system, so we use a helmet, with a visor and a power assisted respirator."

Their message to petroleum officers and oil companies is to not get seduced by the alleged advantages of RG foam, to look at



*A plan of the formaldehyde gas monitoring carried out by LCM*

where it is appropriate to use it and where it is not and to bear in mind the hierarchy of dealing with any hazards.

Both companies are of the opinion that, while RG foams have their place in the mix, they should not be seen as the first resort.

"The problem is," says Derran, "petroleum officers tend to lose interest when tanks have been safely filled. We would like them to consider the plight of the contractors that have to remove the tanks and set their policy accordingly."

Adds Nigel: "Some petroleum officers are, in our opinion, mistakenly insisting that RG22 is used to temporary fill tanks instead of water or nitro-foam. This is wrong, as it makes the excavation process more difficult and hazardous, without any safety gain."

As far as oil companies are concerned, David Plumb and LCM ask them to re-examine their cost/benefit analysis.

"It may be slightly cheaper to use RG22 to fill the tanks in the first place," says Nigel, "but any savings are outweighed by the extra disposal costs and precautions that have to be put in place."

Let us know what you think

### Hierarchy of dealing with hazards

**Eliminate:** If the job is hazardous, does it really need doing?

**Substitute:** If the job is necessary, can the hazardous material be substituted with something more benign, such as slurry, foamed concrete or polyurethane, which is sold as a substitute in the US.

**Change working methods:** Using more machinery to reduce direct contact. Paying attention to the weather on excavation days.

**Control:** Increased use of personal protection equipment and paying more attention to containment within the site.

# Does anyone have a ladder?

David Plumb & Co were called in to help the London Fire Service keep going, when it needed to replace out-of-date refuelling facilities with a new 23,000ltr combined diesel tank and dispensing pump.

transport to a recycling centre.

Says David Plumb director Nigel Plumb: "The hardest part was removing the unusually tall, 12m high vent pipe. Our guys had to go up in a cherry picker and cut it down in sections.

"I think they thought it was a bit ironic that, for health and safety and other reasons, we had to hire in our own cherry picker at a fire station."



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Before the new above ground tank could be installed, the residual white diesel needed to be pumped out of the old 23,000ltr tank and into a tanker for temporary storage.

The old tank then had to be thoroughly cleaned to remove any contamination and hot cut for

## Spot the difference

Ring round the eight differences between our two pics, cut the form out and send it back to us at the address in the box above by November 12, 2007. The first three correct entries out of the hat will win a bottle of Champagne.



Name .....

Job title .....

Company .....

Address .....

.....

e-mail address .....

Phone number .....