

## Groundwater trigger levels, minimum reporting values and limits of detection.

### Background

The groundwater directive requires that when an application is made for a landfill site that may release a listed substance to groundwater, a 'prior investigation' must be undertaken. Part of this prior investigation will be a hydrogeological risk assessment (HRA). Any permit issued includes a requirement to monitor groundwater to check that listed substances are being contained in the site.

The landfill directive requires that groundwater be monitored up and down gradient of the site and that limits are imposed in permits (trigger levels), to identify when a 'significant environmental effect' has occurred. To decide which substances to monitor and to set trigger levels for we consider the waste types accepted and the quality of the groundwater around the site. Guidance is provided in, '*Hydrogeological risk assessment for landfill and the derivation of groundwater control and trigger levels*' (LFTGN 01).

Trigger levels are normally based on data provided by the landfill operator in the permit application. At the time of the original application data was not always available on specific substances so interim levels were imposed in permits while additional data was obtained. To ensure that groundwater is protected, interim trigger levels were set using published 'minimum reporting values' (MRV).

Trigger levels are set for indicator substances that are not normally found in groundwater and likely to be present in the waste or have been identified in leachate. Where there is no evidence of an indicator substance up gradient, its presence down gradient provides an indication of a release from the landfill which should be investigated.

Where there is evidence of an indicator substance in background water quality, we decide how to distinguish this from a release of that substance from the site and determine the variability associated with the background concentration for each substance. This allows us to assign an appropriate trigger level for individual substances on a site specific basis. Guidance on how to make this judgement is in LFTGN 01.

## Current Position

Landfill permits with conditions specifying groundwater trigger levels have been issued since 2004. A number of concerns have been expressed by site operators and other interested parties.

### **1. *The MRV (trigger levels) are not achievable by the majority of commercial labs***

We expected that groundwater samples would be 'clean' such that laboratories could analyse them using technology sensitive enough to detect substances at the MRV. Experience has shown that the groundwater sample matrix may not in some situations be suitable for analysis by such sensitive analytical methods. Further, laboratories may prefer to assume that samples are 'dirty' to protect their own equipment from damage.

Limits of detection by less sensitive analytical methods might be 10x higher for samples analysed as dirty so the analytical results will in most cases suggest 'not detected' in comparison with the trigger levels. To apply the MRV as a default trigger level may not be appropriate for sites where the groundwater matrix is contaminated by substances which interfere with the analysis.

### **2. *It is sometimes difficult and thus expensive to prepare samples***

We understand that samples are routinely treated as dirty in order to protect sensitive analytical equipment and thus the trigger levels in the permits cannot be achieved (see 1 above). The cleanup of samples involves a number of steps which can increase costs, delay the reporting of results and raise detection limits.

### **3. *Permits may specify inappropriate substances***

We understand that some permits contain trigger levels for substances other than those proposed in the application. We will confirm whether this is the case by reviewing the original application at the time of the 4-yearly HRA review.

### **4. *The values imposed ignore background concentrations***

We have been advised that some permits contain trigger levels that do not take account of background groundwater quality. Where this is claimed we will review this against the data submitted with the application and any data subsequently submitted.

### **5. *Operators could be penalised financially***

The breach of a limit in a permit must be notified to the Agency. Breaches of permit conditions attract a score under the compliance classification scheme (CCS). These may result in an increased EP OPRA score and thus a higher subsistence charge.

## Way forward

We accept that the MRVs for certain list I substances published in our LFTGN 01 guidance cannot be reasonably achieved by a number of laboratories. We believe that MRVs for the majority of inorganic substances (e.g. metals) can be achieved in samples of clean groundwater.

Where we have yet to vary a permit to the revised template we will not make any changes at this time, but for consistency will manage all permits in the same way. Varied permits will include the limits that were originally imposed. These values will be reviewed at the 4-yearly groundwater review once more data is available.

We will write to all affected operators replacing existing permitted limits with the revised figures in annex 1, pending the 4-yearly groundwater review.

If an operator believes that trigger levels or substances have been set in permits that require review, they should:

- (1) In the case of non-compliance with existing values, describe the reasons on the notification of emissions form in schedule 6 (formerly schedule 1) to the permit, and;
- (2) identify the reason for the non-compliance, and;

For example:

- the substances are inappropriate for the site and wastes accepted; or
- the labs cannot measure to the trigger level as it is below the limit of detection of their analytical technique\*, or
- background concentration has not been taken into account,

- (3) propose and justify alternative values and/ or substances.

Operators will have been gathering groundwater quality data from around their sites at least since the permit was issued. They should therefore have sufficient information available to propose realistic trigger levels with appropriate levels of uncertainty where appropriate. Guidance is available in LFTGN 01 and draft 'MCERTS chemical testing of water'.

We will consider this new information (including monitoring data) on submission of the 4-yearly HRA review. Where the permit has to be varied to implement a change to trigger levels or substances, the relevant charge will be applied. Our guidance on our charging scheme requires a 'simple standard' variation charge for this work.

While the issue is being considered, we will not enter CCS scores on the database. CCS scores will be recorded and may be entered later.

Notifications and 4-yearly groundwater reviews should be sent to our local Area team. Applications to vary permits should be sent to our national permitting service (Sheffield).

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\* We will look favourably on reasonable arguments that matrix effects prevent analysis at published limits of detection. However, operators should provide evidence that they are looking for the most appropriate indicators and that their methods represent best practice. This evidence should not be based solely on cost.

## Annex 1 – Proposed MRV for certain substances in groundwater samples

Parameter	MRV's from LFTGN01 ug/l	Proposed value ug/l
Azinphos-ethyl	0.02	<0.05
Azinphos-methyl	0.001	<0.03
Chlorfenvinphos	0.001	<0.01
Diazinon	0.001	<0.05
Dimethoate	0.01	<0.05
Fenitrothion	0.001	<0.01
Fenthion	0.01	<0.01
Malathion	0.001	<0.03
Mevinphos	0.005	<0.07
Parathion	0.01	<0.06
Parathion methyl	0.015	<0.01
Cis-permethrin	0.001	<0.02
Trans-permethrin	0.001	<0.01
Pentachlorophenol	0.1	<1
Cadmium	0.1	<1
Mercury	0.01	<0.1
Mecoprop	0.04	<0.1