

IMAGE: © Christine Balderas

The Role of Environmental Analysis in Land Remediation

– how to ensure your data is fit for purpose

by HAZEL DAVIDSON, Technical Manager, ALcontrol Laboratories, and Vice Chair of EIC Environmental Laboratories Working Group



Environmental laboratories play a major part in any site investigation and subsequent remediation, but the scope and emphasis of the analysis is changing, particularly in line with recent legislation. Consultants and contractors are often faced with a bewildering range of testing, and it can be difficult to identify the most appropriate tests for specific sites or to monitor individual remediation treatments.

It is helpful to highlight some topics/items which a consultant/contractor should be identifying when he/she selects a laboratory or defines a suite of testing. The following are some of the important issues, and some frequently asked questions:

- The laboratory should be accredited to both ISO 17025 and to MCERTS for contaminated-land testing. However, it is important to ensure the scope of testing covers a wide range of parameters – some laboratories are only accredited for a very small number of tests;
- Accredited laboratories all participate in proficiency testing schemes such as Contest and Aquacheck, and the data should be available on request from the laboratory. Again, checking the range of parameters in which the laboratory participates is important, as well as the Z scores – some will not submit data for the more difficult analyses;
- Customer service – does the laboratory provide a

technical-support service, giving advice on which tests are most appropriate, or assisting with the interpretation of the data? This can be very helpful, particularly when consultants/contractors do not have a chemistry background. Does the laboratory provide a staffed switchboard, or do you just get an automated answering message? Can the laboratory provide training for your staff in understanding the data?

- Despite the implementation of MCERTS, it is still possible to send samples to different laboratories and obtain different results, particularly with the less well defined analyses such as TPH (total petroleum hydrocarbons). Is the analysis performed on the 'as received' sample, or is it dried and crushed? Is the sample sieved to remove larger particles? Do you need data on the volatile fraction (C5 – 10) as well as the extractable hydrocarbons (C10 – 40)? Which solvent is used for extraction? Is a clean-up performed on the extract? All of these factors will significantly affect the final result. For example, some laboratories offer TPH, but use pentane as an extraction solvent – this will only pull out the mineral oil (aliphatic fraction), and not most of the aromatic compounds, which are often the most significant components with respect to risk assessment;

- Does the laboratory supply bottles with preservatives already added? Recently published standards on holding times and sample storage (BS 5667 for waters and BS 18152 for soils) emphasise the need for the use of preservatives, particularly for water samples. How does the laboratory monitor holding times? Is the client informed if these are exceeded? This is a requirement of the contract review section of ISO 17025. Does the laboratory have adequate cold storage? Is the temperature of the samples on receipt recorded?

- On a site-specific basis, it is more cost effective to tailor your analysis to meet the requirements of the regulator/planning authority – this is usually linked to the end use of the site. For example, a site may not need 16 speciated PAHs (polyaromatic hydrocarbons) to low LoDs by GCMS – a total of the 16 to a higher LoD by GCFID may be adequate. Can the laboratory provide this (preferably at a lower cost and faster turnaround times)?

- Remediation of a site is often performed on tight time frames involving expensive plant hire, and if stockpiles cannot be moved or re-used until the laboratory data is available, the turnaround times from the laboratory can be vital. Discussions with the laboratory are needed to ensure the consultant/contractor is aware of what is possible, and the samples can

then be processed on a priority basis;

- Due to the recent changes to legislation with respect to landfills, it is now becoming more cost effective to remediate on site, rather than to dispose of material off site. It is then necessary for the consultant/contractor to be able to monitor the progress of the remediation. More basic screening tests are sufficient for this – for example a rapid TPH C6 – 40 screen may be adequate, rather than more expensive full GC options to lower LoDs. The laboratory should be able to provide this on 24 hours or less, as it will be performed on an 'as received' sample;

- Sampling – there are several areas in taking the samples where the consultant/contractor can improve the quality of the data received from the laboratory. Examples of these include always taking separate subsamples for volatiles in 40ml vials (waters) or small jars (soils). These should have no headspace, and should be taken in duplicate. Water samples for BOD analysis should be taken in a separate 250ml bottle with no headspace, in order to maintain the level of dissolved oxygen. Samples should be kept cold, so a plentiful supply of frozen icepacks is essential, and samples should be despatched to the laboratory as soon as possible, and not stockpiled on site. If metals are required on waters, these should be filtered on site through a 0.45 micron filter before being added to preserved bottles;

- Ecotoxicity testing – there are several tests available for monitoring the direct toxicity assessment of a site. These can involve kits based on microbial response, or organisms such as *Daphnia magna*, and provide a more holistic approach in that the response of the organisms is synergistic to the range of contaminants that might be present. There is now MCERTS accreditation for laboratories offering DTA, and this is becoming a more recognised monitoring solution by the regulators. It is still more applicable to waters than soils, but is extending its range of applications, and is very useful if a site has already undergone chemical characterisation, and the contaminants are known, and can therefore be used to monitor the progress of on-site remediation.

The main recommendation for consultants/contractors is to talk to your laboratory – their skillbase and knowledge is extensive, and they can assist in site-specific problems and then suggest the best suite of testing for your needs. Make use of this expertise and ensure the data obtained is both meaningful and value for money.