8.2.10 Guidance values for use in emergencies

Short-term exposure guidance values can be derived for any substances that are used in significant quantities and are frequently involved in an emergency as a consequence of spills, usually to surface water sources. JMPR has provided guidance on the setting of acute reference doses (ARfDs) for pesticides (Solecki et al., 2005). These ARfDs can be used as a basis for deriving short-term guidance values for pesticides in drinking-water, and the general guidance can also be applied to derive ARfDs for other chemicals.

For our purposes, ARfD is defined as the amount of a chemical in drinking-water, normally expressed on a body weight basis, that can be ingested in a period of 24 h or less without appreciable health risk to the consumer. Most of the scientific concepts applying to the setting of ADIs (which are guidance values for chronic toxicity) apply equally to the setting of ARfDs. The toxicological end-points most relevant for a single or 1-day exposure should be selected. For ARfDs for pesticides, possible relevant end-points include haematotoxicity (including methaemoglobin formation), immunotoxicity, acute neurotoxicity, liver and kidney toxicity (observed in single-dose studies or early in repeated-dose studies), endocrine effects and developmental effects. The most relevant or adequate study in which these end-points have been determined (in the most sensitive species or most vulnerable subgroup) is selected, and NOAELs are established. The more relevant end-point providing the lowest NOAEL is then used in the derivation of the ARfD. Uncertainty factors are used to extrapolate from animal data to the average human and to allow for variation in sensitivity within the human population. An ARfD derived in such a manner can then be used to establish a guidance value in the normal manner by allocating 100% of the ARfD to drinking-water.

Currently available data sets often do not allow the accurate evaluation of the acute toxicity of compounds. If appropriate single-dose or short-term data are lacking, an end-point from a repeated-dose toxicity study can be used. This is likely to be a more conservative approach, and this should be clearly stated in the guidance value derivation.

Further information on the derivation of ARfDs can be found in Solecki et al. (2005).

In a number of instances when a substance has been spilt into a drinking-water source, contamination may be present for a longer period than 24 h, but not usually longer than a few days. Under these circumstances, the use of data from repeated-dose toxicity studies is appropriate, but the period of exposure used in these studies will often be much longer than a few days, and this, too, is likely to give rise to a conservative approach.

Guidelines for acute and short-term exposure provide a basis for deciding when water can continue to be supplied without serious risk to consumers in such an emergency situation. However, it is important to seek to minimize exposure wherever practical. In each set of circumstances, it is recognized that losing a water supply carries risks to public health and is a major challenge to maintaining proper hygiene as well as ensuring the availability of microbiologically safe drinking-water. The acute and short-term guidance values assist in determining the balance of risks in such emergencies.

Where there is a need for a rapid response and suitable data are not available to establish an ARfD but a guideline value is available for the chemical of concern, a simple pragmatic approach would be to allocate a higher proportion of the ADI or TDI to drinking-water. Since the ADI/TDI is intended to be protective of lifetime exposure, small exceedances of the ADI/TDI for short periods will not be of significant concern for health, but this is likely to be a very conservative approach. It would therefore be possible
to allow 100% of the ADI/TDI to come from drinking-water for a short period (see also section 8.6.5). However, the same constraints apply as outlined above with regard to the importance of water supply and the health risks of losing the supply altogether.

Reference to be added to Annex 1: