

Chapter 2.0 Dose Response Assessment

The approach used for assessing cumulative risks to OP Pesticides was created by EPA and has been extensively discussed in EPA documents and presentations¹. This approach has been used in this assessment. Cumulative risks are evaluated by converting the residues of individual OP chemicals to equivalent residue amounts of Methamidophos using route-specific relative potency factors (RPF). These factors are based on the route specific measures of relative toxicity and the FQPA factors for the individual pesticides. A detailed description of all aspects of the evaluations and calculations employed by EPA to derive the RPFs for the OP pesticides included in the cumulative risk assessment is available in EPA's June 11, 2002 Revised OP Cumulative Risk Assessment, Section I.B. Table 2.1 presents the values of the route specific RPFs used in this analysis, as calculated by EPA and presented in Table I.B-8 of the June 11 assessment.

Pesticide	Oral	Dermal	Inhalation
Acephate	0.08	0.0025	0.208
Azinphos-methyl	0.1		
Bensulide	0.003	0.0015	
Chlorethoxyfos	0.13		
Chlorpyrifos	0.06		
Chlorpyrifos-methyl	0.005		
Diazinon	0.01		
Dichlorvos	0.03		0.677
Dicrotophos	1.91		

¹ (For a complete listing of these, refer to the EPA website for the Cumulative Risk Assessment at <http://www.epa.gov/pesticides/cumulative/>.)

Dimethoate	0.32		
Disulfoton	1.26	0.47	6.596
Ethoprop	0.06		
Fenamiphos	0.04	1.5	0.315
Fenthion	0.33	0.015	
Fosthiazate	0.07		
Malathion	0.0003	0.015	0.003
Methamidophos	1	1	1
Methidathion	0.32		
Methyl-parathion	0.12		
Mevinphos	0.76		
Naled	0.08	0.075	0.82
Omethoate	0.93		
Oxydemeton-methyl	0.86		
Phorate	0.39		
Phosalone	0.01		
Phosmet	0.02		
Phostebupirim	0.22		
Primiphos-methyl	0.04		
Profenofos	0.004		
Terbufos	0.85		
Tetrachlorvinphos	0.001	0.00075	
Tribufos	0.02		
Trichlorfon	0.003	0.0075	0.087

Application of Relative Potency Factors

The route-specific RPF values for the pesticides were used to convert route-specific residues of the various OP pesticides into the equivalent residues of Methamidophos. The step in the exposure and risk assessment process where this occurs varies for the different routes and sources. In the dietary portion of the OP cumulative assessment, residues of each pesticide are converted to equivalent residue level using the oral relative potency factors. The conversion was performed by EPA and generates a single set of dietary residues. This process is discussed in detail in Chapter 3.0. In the tapwater portion of the assessment, residues of each pesticide are converted to equivalent Methamidophos equivalent residue levels using the oral relative potency factors. These residues were summed to give a total Methamidophos residues for hypothetical reservoirs in seven agricultural regions. This analysis was performed by EPA and results in a single set of Methamidophos equivalent residues for each of seven agricultural regions. This process is discussed in detail in Chapter 4.0.

The application of the route specific RPF to the residential is more complicated since a single use of a pesticide can result in exposures that occur by multiple routes (dermal, oral, and inhalation). The relevant routes will also vary across products. As a result several product-specific approaches have been used. This process is discussed in detail in Chapter 5.0.

Points of Departure

The points of departure used in the determination of the MOEs are:

Oral 0.08 mg/kg

Dermal 2.12 mg/kg

Inhalation 0.39 mg/kg

These values are the same as those used in the prior OP assessment.

In LifeLine™ Version 2.0 the points of departure are entered as the route-specific measures of toxicity for the OP index chemical, Methamidophos. These data are entered into the model using the *Active Ingredient and Product Description (AIPD)* module. This module produces a file that captures the toxicity data called OPcumulative.rkg.

LifeLine™ also allows the assessor to enter the FQPA factors and direct their application to selected ages and gender for use in the development of the MOEs. However, the residue data supplied by EPA for this analysis incorporates the FQPA factor as a component of the relative potency factor (RPF). The RPF for each organophosphorus pesticide is used to convert its residues to Methamidophos-equivalent residues. Therefore the value entered into the LifeLine™ model for the FQPA factor is 1.0. One result of this approach is that the FQPA factor applies to all ages and both genders in the analyses. For additional information on the how the toxicity data is entered into LifeLine™ Version 2.0 see the Technical and Users Manuals.