

Appendix C. Preliminary and Final Pesticide Screening Levels

1/6/00 DRAFT - Phase II Reference Exposure Levels (RELs) merged list

Pesticide	Noncancer-chronic exposures ¹			Noncancer-subchronic exposures ²			1E-6 risk ³	
	RfD* Chronic (mg/kg/d)	Adult** Ref air level (mg/m ³)	Child*** Ref air level (mg/m ³)	RfD* Subchronic (mg/kg/d)	Adult** Ref air level (mg/m ³)	Child*** Ref air level (mg/m ³)	Cancer Slope factor 1/(mg/kg/d)	(Lifetime risk) Ref air level (mg/m ³)
acephate	0.0012	0.0084	0.0039	0.0012	0.0042	0.0020	8.70E-03	0.00080
	0.00005	0.00035	0.00016	0.0009	0.0032	0.0015		
methamidophos(pr.)								
" "	0.0001	0.0007	0.00033	(alt. RfD)				
anilazine	0.0004	0.0028	0.0013	not listed				
benomyl	0.05	0.35	0.16	not listed			4.20E-03	0.0017
chlorothalonil	0.02	0.14	0.066	0.015	0.053	0.025	3.10E-03	0.0023
chlorpyrifos	0.0003	0.0021	0.0010	0.003	0.011	0.0049		
chlorthal-di. (dacthal)	0.01	0.07	0.033	0.01	0.035	0.016	1.49E-03	0.0047
cycloate	0.005	0.035	0.016	not listed				
diazinon	0.00009	0.00063	0.00030	0.0009	0.0032	0.0015		
dicloran (DCNA)	0.025	0.18	0.082	not listed				
dicofol	0.0012	0.0084	0.0039	not listed			no SF	
dimethoate	0.0002	0.0014	0.00066	0.0002	0.00070	0.00033		
" "				0.011	0.039	0.018	(alt RfD)	
disulfoton	0.00004	0.00028	0.00013	0.00004	0.00014	0.000066		
" "	0.00013	0.00091	0.00043	(alt. RfD)	0.003	0.011	(alt RfD)	
EPTC	0.025	0.18	0.082	0.025	0.088	0.041		
ethalfluralin	0.04	0.28	0.13	not listed			8.90E-02	0.000079
fonofos	0.002	0.014	0.0066	not listed				
fosetyl-al	3	21.0	9.9	not listed				
glyphosate, isopro.	0.1	0.7	0.3	not listed				
iprodione	0.04	0.28	0.13	not listed			4.39E-02	0.00016
malathion	0.02	0.14	0.066	0.02	0.070	0.033	1.52E-03	0.0046
mancozeb	0.003	0.021	0.010	0.03	0.11	0.049	4.50E-02	0.00016
maneb	0.005	0.035	0.016	0.05	0.18	0.082	4.50E-02	0.00016
ETU (product)	0.00008	0.00056	0.00026	0.00008	0.00028	0.00013	4.50E-02	0.00016
mefenoxam/metalaxyl	0.06	0.42	0.20	not listed				
methomyl	0.008	0.056	0.026	0.025	0.088	0.041		

metolachlor	0.1	0.70	0.33	0.15	0.53	0.25		
naled	0.002	0.014	0.0066	0.005	0.018	0.0082		
dichlorvos (product)	0.00014	0.0010	0.00046	0.0008	0.003	0.0013	2.90E-01	0.000024
oxamyl	0.0002	0.0014	0.00066	not listed				
oxydemeton-methyl	0.000125	0.00088	0.00041	not listed				
PCNB	0.003	0.021	0.0099	0.003	0.011	0.0049	2.60E-01	0.000027
permethrin	0.05	0.35	0.16	not listed			1.84E-02	0.00038
propyzamide	0.08	0.56	0.26	0.075	0.26	0.12	1.54E-02	0.00045
simazine	0.005	0.035	0.016	0.005	0.018	0.0082	1.20E-01	0.000058
sulfur	not listed			not listed				
sulfuryl fluoride	not listed			not listed				
thiodicarb	0.03	0.21	0.099	not listed			1.88E-02	0.00037
thiophanate-methyl	0.08	0.56	0.26	not listed			2.08E-03	0.0034
trifluralin	0.0075	0.053	0.025	0.0075	0.026	0.012	7.70E-03	0.00091

Note: Reference air levels are a guide for evaluating sample detection limits, and are **not intended as a risk assessment**. The assumption of six months/yr chronic exposure is unlikely for most of these pesticides.

¹ Chronic equation: Reference air level (mg/m³) = (RfD x BW x AT) / (IR x ET)

*RfD-Reference dose (mg/kg/day); BW=body weight (kg); AT=averaging time (12 months/yr); IR=inhalation rate (m³/day); ET=exposure time (months/yr). Chronic exposures conservatively assume 6 months exposure per year.

² Subchronic equation as in (1), except exposure time=averaging time (at least 2 weeks as defined by US EPA)

³ Cancer equation: Air level associated with 1-in-a-million lifetime risk (mg/m³) = (1E-6 x BW x AT) / (Q* x IR x ET).

definitions as above; Q* = cancer slope factor; ET = 6 mo/yr; BW = 70 kg; IR = 20 m³/day (lifetime exposure assumed).

** Adult: body weight - 70 kg; inhalation rate - 20 m³/day.

***Child (less than 3 years old): body weight - 11 kg; inhalation rate - 6.7 m³/day.

Sources: OPP RfD Tracking Record, Q* list, OP REDs; IRIS; HEAST; ATSDR Tox Profiles; OEHHA Q* list

Acute RELS (mg/m³/xhrs)

dichlorvos - **0.018 mg/m³/24 hrs**

12/14/99 DRAFT - Phase II Reference Exposure Levels (RELs)

Pesticide	Noncancer-chronic exposures ¹			Noncancer-subchronic exposures ²			Cancer Slope factor 1/(mg/kg/d)	1E-6 risk ³ (Lifetime risk) Ref air level (mg/m ³)
	RfD* Chronic (mg/kg/d)	Adult** Ref air level (mg/m ³)	Child*** Ref air level (mg/m ³)	RfD* Subchronic (mg/kg/d)	Adult** Ref air level (mg/m ³)	Child*** Ref air level (mg/m ³)		
bentazone	0.03	0.21	0.10	not listed				
cryolite	not listed			not listed				
cycloate	0.005	0.035	0.016	not listed				
dichlorvos	0.00014	0.0010	0.0005	0.0008	0.0028	0.0013	2.90E-01	0.00002
dicofol	0.0012	0.0084	0.0039	not listed			no SF	
EPTC	0.025	0.18	0.082	0.025	0.088	0.041		
esfenvalerate	0.02	0.14	0.066	not listed				
ethephon	0.018	0.13	0.059	not listed				
gibberellins	not listed			not listed				
imidacloprid	0.057	0.40	0.19	not listed				
linuron	0.008	0.056	0.026	0.002	0.007	0.0033	no SF	
mefenoxam/metalaxyl	0.074	0.52	0.24	not listed				
methamidophos	0.00005	0.00035	0.00016	see note*	0.01	0.01		
metolachlor	0.1	0.70	0.33	0.15	0.53	0.25		
myclobutanil	0.025	0.18	0.082	not listed				
naled	0.002	0.014	0.0066	see note*	0.0023	0.0023		
paraquat	0.0045	0.032	0.015	not listed				
PCNB	0.003	0.021	0.0099	0.003	0.011	0.0049	2.60E-01	0.00003
propiconazole	0.013	0.091	0.043	not listed			1.79E-02	0.00039
spinosad	0.03	0.21	0.099	not listed				
sulfuryl fluoride	not listed			not listed				
thiodicarb	0.03	0.21	0.099	not listed			1.88E-02	0.00037
thiophanate-methyl	0.08	0.56	0.26	not listed			2.08E-03	0.0034
trifluralin	0.024	0.17	0.079	0.0075	0.026	0.012	7.70E-03	0.00091

Note: Reference air levels are a guide for evaluating sample detection limits, and are **not intended as a risk assessment**. The assumption of six months/yr chronic exposure is unlikely for most of these pesticides.

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ET=exposure time (months/yr). Chronic exposures conservatively assume 6 months exposure per year.

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definitions as above; Q* = cancer slope factor; ET = 6 mo/yr; BW = 70 kg; IR = 20 m³/day (lifetime exposure assumed).

** Adult: body weight - 70 kg; inhalation rate - 20 m³/day.

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Sources: OPP RfD Tracking Record; IRIS; HEAST; ATSDR Tox Profiles; OEHHA slope factor list

Acute RELs (mg/m³/xhrs)

dichlorvos

0.018 mg/m³/24 hrs

naled

naled has an inhalation NOEL of 0.00023 mg/L for any time period (US EPA hazard ID committee, on the web).

= 0.23 mg/m³ NOEL; divided by UF of 100 results in a naled REL of **0.0023 mg/m³**

methamidophos

methamidophos has an inhalation NOEL of 0.001 mg/L for any time period (US EPA hazard ID committee, on the web).

= 1 mg/m³ NOEL; divided by UF of 100 results in a methamidophos REL of **0.01 mg/m³**

FQPA safety factors have not yet been applied. Dichlorvos has a 3x safety factor.

Methamidaphos has a 3x safety factor.

TO: Madeline Brattesani
Environmental Monitoring and Pest Management Branch, DPR

FROM: Jay Schreider, Ph.D.
Medical Toxicology Branch, DPR
(916) 445-4241

DATE: May 5, 2000

SUBJECT: APPROACH FOR DEVELOPING SCREENING LEVELS FOR PHASE II

As you know, I am coordinating a subgroup of the Technical Advisory Group (TAG) to develop/refine screening levels with which to help evaluate the measured air levels in Phase II. Acute, subchronic, and chronic values will be generated. Values will be developed only for the pesticides that will be monitored in Phase II.

In order to avoid duplication of effort, we will start by collecting existing toxicology values, usually in the form of Reference Doses (RfDs). In addition to making the most efficient use of resources, the use of existing values will generally ensure that the values have had some sort of peer review. The RfDs generated by the U.S. Environmental Protection Agency (USEPA) will be a starting point. The results derived from completed and reviewed Department of Pesticide Regulation (DPR) Risk Characterization Documents (RCDs) will also be used.

The first step will be to collect the existing RfDs in a spreadsheet format. The members of the subgroup are currently working on this step. Also collected for each value will be the source of the value, information on uncertainties, and FIFRA data gaps. After the available RfDs have been collected, the subgroup will determine the best means to fill in the blanks (absences of RfDs).

After the toxicity values have been collected, the subgroup will decide on the algorithm to be used in generating an air level from a RfD. In this step, toxicologists at DPR and the Office of Environmental Health Hazard Assessment who are working in the air toxics programs will assist us. When the screening levels have been developed, a qualitative description of the various sources of uncertainty will be prepared, as will a short description of each study that was used as the basis for the value.

The complete TAG will be kept advised of the progress of this effort. The results of the process will be sent to the complete TAG for its review. This process will be take place in parallel to the air monitoring.

TO: Madeline Brattesani
Environmental Monitoring and Pest Management Branch, DPR

FROM: Jay Schreider
Medical Toxicology Branch, DPR

DATE: June 21, 2000

SUBJECT: REQUESTED CHLORPYRIFOS VALUES FOR LOMPOC SAP

In your memo of June 13, you requested that I supply values for chlorpyrifos to use in the specification of “Range of Possible Values of Parameter of Interest...” as part of the Multiple Pesticide Sampling and Analysis Plan (SAP). The Technical Advisory Group (TAG) toxicologists generated preliminary screening levels to be used in evaluating the proposed limits of detection (Table 3 in SAP). In that table, the chlorpyrifos chronic screening level for children was 0.001 mg/m³, based on a chronic oral RfD of 0.0003 mg/kg, and the chlorpyrifos subchronic screening level for children was 0.0049 mg/m³, based on a subchronic oral RfD of 0.003 mg/kg. These values were taken from U.S. Environmental Protection Agency (U.S. EPA) documents.

Subsequent to the development of the preliminary screening levels, the U.S. EPA completed and published its risk assessment on chlorpyrifos. In this assessment, U.S. EPA utilized the same chronic oral RfD of 0.0003 mg/kg. In that same document, U.S. EPA used an acute oral RfD of 0.005 mg/kg. U.S. EPA did not designate or use a subchronic or “intermediate term” oral RfD. U.S. EPA did evaluate “short term” (acute) and intermediate term residential inhalation exposure by applying the results of two 90-day rat inhalation studies. In these studies, rats were exposed to chlorpyrifos concentrations of up to 287 ug/m³, which was the maximum achievable concentration. There were no effects at any dose level, making this a conservative subchronic NOEL. U.S. EPA calculated that this concentration was equivalent to an absorbed dose of 0.1 mg/kg. U.S. EPA used this value for evaluating both short term and intermediate term exposure. While U.S. EPA did not state a RfD for this NOEL, applying an uncertainty factor of 100 to 0.1 mg/kg would result in a RfD of 0.001 mg/kg.

In the table of preliminary screening levels, the TAG used the following equation to derive subchronic preliminary screening levels (reference air levels):

$$\text{Reference air level (mg/m}^3\text{)} = (\text{RfD} \times \text{body weight}) / \text{inhalation rate}$$

For children, a body weight of 11 kg and an inhalation rate of 6.7 m³/day were used. This same equation would apply for acute exposure. For the purposes of the present exercise (delineating a “gray” area) this same equation will be used to derive screening levels; however, it should be noted that the final screening levels may be generated using a different equation or paradigm.

Exposure Scenario	RfD	Reference Air Level (child)
Chronic- preliminary (oral)	0.0003 mg/kg	0.001 mg/m ³
Chronic-U.S. EPA, June 2000	0.0003 mg/kg	0.001 mg/m ³
Subchronic-preliminary (oral)	0.003 mg/kg	0.0049 mg/m ³
Subchronic- June 2000	None	None
Intermediate term inhalation, June 2000, U.S. EPA, from NOEL of 0.1 mg/kg	0.001 mg/kg (calculated by author, not specified by U.S. EPA)	0.0016 mg/m ³
Acute oral, U.S. EPA, June 2000	0.005 mg/kg	0.0082 mg/m ³
Acute (short term) inhalation, U.S.EPA, June 2000, same as Intermediate	0.001 mg/kg (calculated by author, not specified by U.S. EPA)	0.0016 mg/m ³

Using the values from the above tables, one could generate a “gray area” for **acute** exposure ranging from **0.0016 mg/m³** derived from the short term inhalation NOEL to **0.0082 mg/m³** generated from the acute oral RfD. The value generated from the short term NOEL should be viewed as very conservative, since U.S. EPA actually derived the value from a 90-day study in rats rather than an acute study, and there were no effects at any doses.

Using the values from the above tables, one could generate a “gray area” for **subchronic** exposure ranging from **0.0016 mg/m³** derived from the intermediate term inhalation NOEL to **0.0049 mg/m³** from the subchronic preliminary screening value. The value generated from the intermediate term NOEL should be viewed as conservative, since U.S. EPA noted that there were no effects at any doses, so the NOEL could be larger.

I hope that this provides the information you need for the SAP and provides the necessary background for that information. The denoting of a “gray” area may be illustrative for the purposes of the SAP, but it does not seem scientifically useful or a wise use of scientific resources to generate similar values for the other analytes. It should be noted that these calculations are my own and time did not permit circulation to the other toxicologists on the TAG. Therefore, these reference air levels are only intended to be illustrative and can not be interpreted to be the final screening levels. In addition, as with the preliminary screening levels, these values do not incorporate an additional FQPA safety factor.

cc: Sally Powell
James Sanborn
Gary Patterson