February 4, 2002

Public Information and Records Integrity Branch (PIRIB),
Information Resources and Services Division (7502C),
Office of Pesticide Programs (OPP),
Environmental Protection Agency,
Ariel Rios Bldg., 1200 Pennsylvania Ave., NW.,
Washington, DC 20460.

Docket control number OPP-00756

Re: **Comments on the preliminary Cumulative Risk Assessment of the Organophosphorus Pesticides, released December 3, 2001**

Submitted by the Natural Resources Defense Council

These comments are submitted in writing to the above address, electronically to: opp-docket@epa.gov and, presented orally to the Scientific Advisory Panel, meeting of February 5-8, 2002 – Organophosphate Pesticides: Preliminary OP Cumulative Risk Assessment

Federal Register: January 15, 2002 (Volume 67, Number 10)] Page 1973-1975

Dear Sir or Madam:

We submit the following comments on behalf of the Natural Resources Defense Council (NRDC). NRDC uses law, science, and the support of more than 500,000 members nationwide to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things. NRDC has no direct or indirect financial or fiduciary interest in the manufacture or sale of organophosphate pesticides.

Unless otherwise noted or referenced, all page number references in the text of these comments refer to the preliminary Cumulative Risk Assessment (CRA) of the Organophosphorus Pesticides, released December 3, 2001.

SUMMARY

NRDC requests that SAP make the following recommendations to EPA, to improve the scientific credibility of the CRA, and to more adequately protect fetuses, infants, and children, the intended targets of the FQPA:

To more adequately consider children as an especially vulnerable group, and apply an FQPA factor of at least 10-fold:

- because all toxicology data is derived from studies on adult animals, not fetuses or juveniles
- because DNT testing is still outstanding for many OP's, and because some OP's have been shown to be fetotoxic in DNT testing
- because the Agency has not considered data on regional brain effects, behavioral studies, learning and memory studies, etc.

To consider all age groups, including 0-12 mos, and 7-19 yrs

To amend the CRA where exposure has been systematically underestimated, NRDC recommends the following amendments:

- considering toxic degradates
- including violative residues, both those which are illegal because no tolerances exist, and those which exceed allowable limits
- including some OP's, and some OP uses, where uses may be of significant dose or frequency to pose health risks
- assessing water exposure scenarios, not by considering typical use rates and use patterns, but rather by assessing peak exposure scenarios, which are likely of significant risk to exposed populations

To amend the CRA where vulnerable populations have been ignored, NRDC recommends the following amendments:

- using the BMD_{01}, rather than the less protective BMD_{10}
- considering not only the magnitude, but also the duration, of cholinesterase inhibition
- considering farm children as a high-exposure population, deserving special consideration
- regulating to protect all fetuses, infants, and children, setting policy at greater than 99.9^{th} percentile
- correlating peak exposure times with eating patterns, so that risk of eating fruit or vegetables with high residue levels is modeled, and these consumers are protected
- accounting for "leftover" scenarios, where a high residue food is consumed for an extended period of time

To use at least two models, where at least one is a non-proprietary model, for all assessments,

- so that model variability, and model biases are identified
- so that an adequate margin of safety can be better determined

I. CHILDREN ARE INADEQUATELY CONSIDERED

NRDC requests that the Scientific Advisory Panel (SAP) recommend an FQPA factor of at least 10-fold be applied to account for the absence of proper developmental testing, and for demonstrated developmental neurotoxic effects in developmental neurotoxicity tests (DNT) where such tests have been done.

I.A All toxicology data is derived from adult animals: this data cannot be extrapolated to fetuses, neonates, and juveniles

It is an extremely serious omission in this CRA that all toxicological assessments, including dose-response determinations, are based solely on adult animals (cholinesterase inhibition in female rat brain), with no experimental data from fetuses, neonates, or juveniles. Considering the impetus of the CRA is the FQPA, which mandates the re-evaluation of pesticide exposure with specific attention to the effects on fetuses, infants, and children, it is an obvious, egregious omission to disregard these life stages from the toxicology assessment. The magnitude of this omission, especially in light of the fact that less than half the OP's have undergone developmental neurotoxicity testing (DNT), as required by the Agency, is pervasive throughout the CRA, and is therefore discussed throughout these comments.

It is well established in the scientific literature that the body is extremely vulnerable to chemical assault during development of target organs and systems. During neural development the nervous system is acutely vulnerable to neurotoxic assault, and exposures result in long-term or permanent destruction or dysfunction. This is equally true for the developing immune system, endocrine system, and reproductive system. Data from adult animals cannot adequately describe the risk to fetuses, infants, and children without the application of an uncertainty factor to provide a margin of safety to protect people during these especially vulnerable developmental stages.

I.B. Developmental toxicity testing (DNT) is still outstanding for most of the OP's: this critical data gap makes it impossible to assess the neurotoxic effects to fetuses, infants, and children

Studies show that developmental neurotoxicity (DNT) testing is more sensitive, and therefore more appropriate for protecting children's health. DNT testing is essential for pesticides, not only as a measure of toxicity to the developing brain and nervous system, but also as an often more sensitive measure of developmental and reproductive effects generally. EPA's 10X Task Force recommended that "developmental neurotoxicity testing be included as part of the minimum core toxicology data set for all chemical food-use pesticides for which a tolerance would be set[1]. Former Assistant Administrator Lynn Goldman, M.D., highlighted this recommendation in presenting the Task Force report to the SAP in December 1998.

In its draft Policy on *Determination of the Appropriate FQPA Safety Factor(s) for Use in the Tolerance-Setting Process,* issued May 10, 1999, the Office of Pesticide Programs acknowledges that "the developmental neurotoxicity study, in particular, is capable of identifying adverse effects not evaluated in other test systems and that the data might lead to lower NOAELS and RfDs." Based on this important knowledge, OPP further acknowledged in this policy document

[1] USEPA, Toxicology Data Requirements for Assessing Risks of Pesticide Exposure to Children's Health (draft), 10X Task Force, 11/30/98, p. 11

its intent to add several additional toxicity studies to its core or Tier 1 toxicology requirements for registering new pesticides, including the developmental neurotoxicity study (as well as the acute neurotoxicity study in adult rats and two immunotoxicity studies). EPA also vowed to make good on this intent by including such studies in soon-to-be anticipated revisions to 40 CFR Part 158.

On August 6, 1999, EPA announced its intent to "call in" data from acute, subchronic, and developmental neurotoxicity studies from the registrants of 140 already-registered neurotoxic pesticides[2]. Individual registrants will be issued Data Call-In Notices in phases, with registrants expected to submit the studies within 2 years of the DCI. To our knowledge, only the first phase of the DCI has been carried out, which on September 10, 1999 called in data for 34 cholinesterase-inhibiting organophosphate insecticides.

I.C. All OP's must be assumed to be developmentally neurotoxic chemicals

NRDC believes that the Agency must presume that the developing nervous system is more vulnerable than the adult to neurotoxic insult. NRDC requests that the SAP recommend that a 10-fold FQPA factor be applied to each OP, to adequately protect fetuses, infants, and children from these neurotoxic chemicals.

Presuming all OP's to be developmentally neurotoxic is consistent with current scientific understanding of neurobiology, embryology, and neurotoxicology. A number of individual OP chemicals have been shown to be especially harmful to fetuses, infants, and children, even at low doses. This is expected, given that the OP's are designed specifically to disrupt cholinesterase levels, thereby affecting synaptogenesis, neurite outgrowth (axonal and dendritic), arborization, and kindling. Functionally, this has been demonstrated to result in permanent disruptions in learning, memory formation, cognitive ability, and behavior.

For chlorpyrifos, DNT results demonstrated evidence of neuropathology and increased vulnerability of fetuses when exposed to chlorpyrifos (Chlorpyrifos IRED p. 16; Makris et al.[3]). Most concerning, in these experiments neuropathology was seen in the neonates at the lowest dose tested, these studies were unable to identify an offspring NOAEL in the DNT (Chlorpyrifos IRED p. 16-17). In that study, structural alterations in brain development, which would result in permanent brain dysfunction, were seen at the lowest doses tested. Similar increased sensitivity of young animals, compared with adults, has been demonstrated with malathion in studies performed by the registrant.

The organophosphate pesticides are a common-mechanism group, they target a common enzyme, they induce a common set of effects, and therefore, by all scientific criteria, if any are shown to be fetotoxic, then all should be presumed to be fetotoxic. Clearly, the OP's which were rigorously tested, using appropriate study designs (such as DNT studies) were shown to be especially harmful to the developing nervous system. The OP's must all be considered to be developmentally toxic, both the parent compound, and the toxic metabolites. NRDC believes that any other conclusion is not supported by the scientific evidence of fetotoxicity demonstrated in DNT studies, and will not adequately protect fetuses, infants, and children.

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[2] Federal Register: August 6, 1999,Volume 64, Number 151, page 42945-42947

[3] Makris S, Raffaele K, Sette W, Seed J. A retrospective analysis of twelve developmental neurotoxicity studies submitted to the USEPA Office of Prevention, Pesticides, and Toxic Substances (OPPTS). Draft 11/12/98.

I.D. The CRA failed to consider regional effects, behavioral effects, cognitive effects, learning and memory effects, and others

The endpoint of all toxicological studies used in this CRA was whole brain cholinesterase activity. This approach ignores regional variability in responses within different brain regions, and masks local perturbations which may be very severe. NRDC believes that histopathological examination would reveal regionally affected brain areas. Behavioral and cognitive testing, including learning and memory tests, reflex tests, and others, are key to assessing the true toxic effects of any neurotoxic and fetotoxic chemicals. Most importantly, with any developmental neurotoxic chemical such as the OP's, effects are the result of more than the magnitude of the dose. Rather, the effect is dependent on the dose, the duration of the effect (cholinesterase inhibition), and the stage of development at which the exposure takes place. Exposures during key windows of susceptibility during neural development, even at very low doses, are most likely to have permanent, devastating effects on neural function, including behavior and cognition. This was never examined in the current CRA, and is a very serious gap in the understanding of the toxic effects of OP's. In particular, the effects of OP's on fetuses, infants, and children have not been adequately described.

In addition to paying attention to sensitive biological endpoints, it is also essential to recognize the value of these physiological systems to the complex integrity of a person. For example, neurotoxic damage resulting in the permanent loss of several IQ points in a lab animal may not even be detectable, yet, will severely limit the potential of a person, or exposed population[4]. Inability to pay attention, mood changes, inability to predict consequences of actions, explosive temper-- all results of fetal exposure to alcohol[5]. While these effects might seem subtle, almost negligible, in an animal study measuring crude endpoints such as body weight changes or fetal death, they will cripple the social and emotional potential of an affected human

I.E. The CRA did not consider newborns, young children, and teenagers

NRDC requests of the SAP that it recommend including all age groups in the CRA. The preliminary CRA did not consider people of ages 0-11 months, 6-12 years, and 13-19 years. This is a very serious omission, and makes this preliminary CRA unable to comment on an exposure or risk to these absent age groups. NRDC believes that these omitted age groups are the intended targets of the FQPA, and without consideration of these groups, the requirements of the FQPA have not been met.

II. EXPOSURE HAS BEEN UNDERESTIMATED

NRDC believes that, contrary to the opinion of the EPA, this preliminary CRA is not a public health protective document. Rather, it is evident that in many ways, exposure, and consequent risk, has been underestimated throughout. NRDC details examples below, and requests that the SAP consider this document to be an underestimate of exposure, and recommend that EPA amend the CRA appropriately.

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[4] Shen X, Wu S, Yan C . 2001. Impacts of low-level lead exposure on development of children: recent studies in China.Clin Chim Acta, Nov;313(1-2):217-20

[5] Sood B, Delaney-Black V, Covington C, Nordstrom-Klee B, Ager J, Templin T, Janisse J, Martier S, Sokol RJ. 2001. Prenatal alcohol exposure and childhood behavior at age 6 to 7 years: I. dose-response effect. Pediatrics Aug;108(2):E34.

II.A. The Agency did not consider toxic degradates; this results in an underestimation of exposure

NRDC requests that the SAP recommend using data on toxic degradates where available, such as some water monitoring and food data. Where such data is not available, the EPA should estimate exposure and risk based on chemical structure, mobility, degradation rate, and other known characteristics of the degradates. Though EPA has abundant data for dietary exposure to OP's, its PDP and FDA databases only include monitoring data for residues of the parent compound. Likewise, toxic degradates/metabolites and treatment byproducts were not included in the water assessment. Where metabolites were considered, they were presumed to behave as the parent compound would. This is not scientifically justifiable, and NRDC believes that the omission of proper consideration of degradates results in an underestimation of exposure.

Many pesticides, including organophosphate insecticides, have toxicologically significant metabolites and stereoisomers. For example, malaoxon — the bioactivated form of malathion — inhibits acetylcholinesterase about 1,000–fold more strongly than does malathion.[6] Similarly, EPA acknowledges that dimethoxon, a significant metabolite of dimethoate, is 75-100 times more potent than dimethoate in inhibiting acetylcholinesterase. Moreover, this metabolite is found under field conditions on food crops. The primary degradate of ethyl parathion, paraoxon, is five times more easily absorbed than parathion and 40 to 50 times more toxic. One of the chief metabolites of chlorpyrifos, chlorpyrifos oxon, inhibits cholinesterase more strongly than the parent compound, but appears to be very short-lived. It breaks down to TCP, a metabolite that is much more persistent in blood, and based on a limited sample may be found in the urine of up to 92 percent of children, as was documented in EPA's recently released chlorpyrifos preliminary risk assessment. Compared with chlorpyrifos, TCP is stated to be "more mobile and significantly more persistent in many soils, especially under anaerobic conditions" (chlorpyrifos IRED p.20). Further, the Agency states that, "upper-bound estimated environmental concentrations of TCP exceeded chronic DWLOCs for children" (chlorpyrifos IRED p. 16). This is especially disconcerting, given the "evidence of increased susceptibility of rabbit fetuses relative to dams", demonstrating increased susceptibility of fetuses, compared with adults (IRED p.16).

The impact of these OP metabolites on developing animals – where even short-lived compounds could conceivably have irreversible effects on the nervous system – heightens the need for prudence in carrying out cumulative assessments. EPA appears to have no requirement for chemical-specific pharmacokinetic studies in fetal animals that would aid in discerning the contribution of toxic metabolites, to children's risk. This likely results in a great underestimation of exposure risk in the CRA.

II.B. The Agency did not consider "violative" residues, which may underestimate exposure

NRDC requests of the SAP that they recommend including data on violative residues in the CRA. This data is available to the EPA, and should be incorporated appropriately. Violative residues may be either residues detected on food for which no tolerance is issued, or which exceed the tolerance. In either case, these are extremely important, and may indicate a widespread and very dangerous problem. If residues are routinely, seasonally, or even occasionally exceeding the allowable tolerance level, then the public has a right to know, and the CRA must consider these

[6] Rodriguez OP, Muth GW, Merkman CE, Kim K, Thompson CM, "Inhibition of Various Cholinesterases with the Enantiomers of Malaoxon," *Bull. Environ. Contam. Toxicol.* 58:171-176 (1997).

"real world" residues. It is unacceptable for the Agency to disregard these data, based on actual monitoring, as "outliers" without providing evidence that they are flatly incorrect or of inconsequential health impact.. Further, if these "violative" residues are the result of spray drift, of illegal applications, of machinery residues, etc., then, again, they must be considered indicative of widespread exposure and a contributor to cumulative OP risk.. In any case, the Agency must provide data as to the frequency, spatial and temporal pattern (if any exists), and magnitude of the "violations". NRDC considers the absence of these monitoring data in this CRA to be a considerable data gap, which likely results in an underestimate of exposure.

II.C. The Agency did not include some OP's

NRDC requests of the SAP that omissions of OP's and OP uses be considered to underestimate exposure in the CRA, and that, in the absence of data demonstrating otherwise, an additional safety factor be applied to adjust for this omission. In this preliminary CRA the Agency has excluded from consideration all chemicals, and all chemical uses, which have been cancelled, voluntarily withdrawn, or phased out. In addition, chemicals which only have public health uses have been excluded, and chemicals that don't have any detectable residues have been excluded. NRDC is concerned that the phase-out period, which is already several years, may be extended, thus extending exposure to these "excluded" OP's. Further, NRDC is concerned that emergency and public health uses may be of sufficient frequency and dose to pose significant risk to exposed populations.

- OP uses considered negligible, and thus not included in the assessment:
    - Indoor uses of chlorpyrifos, fenitrothion, and trichlorfon in pre-packaged child-resistant bait stations were not included.
    - Public health uses not considered were: chlorpyrifos in fire ant mound treatment and mosquito control; fenthion in mosquito control; naled in mosquito and black fly control; phosmet in fire ant mound treatment
- OP uses not included because insufficient data was available:
    - tetrachlorvinphos (pet shampoos)
    - DDVP (flea collars)
- OP's not included because they are being phased out:
    - ethion
    - ethyl parathion
    - sulfotepp
- OP's not included because they have only public health uses:
    - temephos,
- OP's not included because no residues were detected:
    - cadusafos; 1 tolerance on import bananas
    - fenitrothion; 1 tolerance on wheat gluten
    - temephos; used as a mosquito larvicide
    - propetamphos; 2 tolerances, for animal feed and for processed food
    - coumaphos; 16 tolerances on meat and meat-by-products. Also on honeybees (over 100 current section 18 emergency tolerances)

NRDC is concerned that many of these uses which are being phased-out will remain on the market for many years, and that their phase-out period may be extended. Others, such as tetrachlorvinphos and DDVP, are currently registered for use on pets, and yet were not included in the probabilistic assessment because the Agency did not have sufficient data on exposure. This is an especially egregious omission since the screening-level assessments for these uses indicate risks are of concern. NRDC is also concerned that temporary tolerances granted for emergencies

are not considered in the CRA, and yet pose definite food hazards. For example, coumaphos, an extremely potent OP, is used on honeybees to protect against mites (section 18, emergency). Poor compliance with application procedures by farmers has resulted in coumaphos in honey (CARAT meeting, Jan 16, 2002, discussion with Marcia Mulkey). And, yet, the Agency does not consider coumaphos, in any use at all, anywhere in the CRA. This is clearly an oversight, and underestimates exposure to one of the most potent of OP's.

II.D. The water assessment underestimates exposure by modeling only "typical" exposure scenarios, and ignoring peak exposure scenarios

NRDC requests that SAP recommend to EPA that the water assessment be based on all available data of use rates, use patterns, and monitoring data where available, so that the CRA will adequately capture the population at highest risk. The water model (PRZM/EXAMS) used for the preliminary CRA plots the distribution of daily residues over multiple years, and plots multiple sites rather than high-exposure sites; no point estimates were considered. This is a major departure from the individual risk assessments, where point estimates were used, to capture the 99.9^{th} percentile. Ignoring peak point estimates leads to a very severe underestimation of risk, and ignores the potentially devastating effects of exposures of OP's, even at very low doses, and even for short duration, on the developing nervous system. The CRA further underestimates risk by presuming typical use rates and typical use patterns. This is a departure from the individual risk assessments, which assessed exposure based on maximum allowable label rates and maximum allowable use patterns. This more conservative approach, while still ignoring exposures which exceed allowable limits, at least attempts to protect those people who suffer allowable high-end exposures. This CRA makes no such attempt. The final output of the CRA water assessment reflects the typical, or "average" use pattern, which, although describing the majority of the calendar days, does not describe the majority of the risk.

III. THE CRA IGNORES THE MOST VULNERABLE POPULATIONS: THE EFFECTS OF EXPOSURES WHICH MAY BE OF LOW PROBABILITY, BUT OF HIGH RISK IMPACT ARE EXCLUDED FROM THE CRA

III.A. Use of central estimate (BMD_{10}) will underestimate risk unacceptably: use of a BMD_{01} is more protective, and is supported by the data

NRDC requests that the SAP recommend using the BMD_{01} rather than the BMD_{10}, to more adequately protect all populations. The point of departure (PoD) of each chemical's dose-response curve was determined to be the BMD_{10}, the benchmark dose where cholinesterase activity was reduced by 10%. The use of the BMD_{10}, a central estimate, rather than its lower limit, ignores risk for those who are most sensitive to cholinesterase perturbations, such as fetuses, infants, and children, for whom changes less than 10%, or sustained changes, may induce permanent alterations in cytoarchitecture of the nervous system. The Agency has never performed a proper evaluation of subtle, sustained, or regional neural responses to OP exposure, either in the adult or in the developing nervous system. Thus, NRDC believes that the choice of a central estimate, which the Agency's own data indicates is higher than the NOAEL points for oral, dermal, and inhalation exposure routes, is a potentially large underestimate of risk. In fact, the BMD_{10} is a full three-fold higher than the dermal NOAEL (1.B p. 40). NRDC believes that use of a lower limit estimate, BMD_{01} is a more acceptable estimate of a PoD, and would better reflect the low-dose exposure scenario, and thus be more health protective.

NRDC has concerns regarding use of the "expanded" model by the Agency to model the animal toxicological data. This model was proposed by R. Sielken under contract to the ACPA (American Crop Protection Agency), and presented to the SAP in December 2001 by Sielken. This model uses the BMD10 instead of the slope (m) to "flush out" the low dose end of the curve, and examine whether a "shoulder", i.e. threshold exists at low dose exposures. The Agency demonstrates, using this model, that only eight of the 29 OP's demonstrate a low-dose "shoulder", demonstrating that, for the majority of the OP's there is an effect on cholinesterase activity at the lowest doses tested. This is an important observation, and supports NRDC's position that use of a BMD_{01} is more appropriate than a BMD_{10}, evidenced by effects of OP's at even the very lowest doses.

III.B. The Agency has measured the magnitude, but not the duration, of OP exposure

NRDC requests that the SAP recommend including data on duration of cholinesterase inhibition, in addition to magnitude, to more accurately capture the toxic effect of OP exposure. To measure the full toxic potency of any chemical, including the OP's, it is necessary to measure the effects of sustained duration of exposure. This has not been done in the Agency's model of toxic effects. While the animal toxicology studies considered the magnitude of cholinesterase inhibition at each dose, there was no consideration of the duration of the inhibition. Without any attempt to capture the sustained inhibition of cholinesterase activity, this model is inadequate, and will likely underestimate risk. NRDC encourages the Agency to pursue a truly "expanded" model, which will describe not only the magnitude, but also the duration of enzyme inhibition at each dose. This will surely prove extremely important in evaluating the full toxic effects of OP poisoning, and will be especially important in describing the sensitivity of the developing nervous system to acute and sustained perturbations of cholinesterase activity.

III.C. Farm children are especially vulnerable to pesticide exposure, and are not adequately considered in this CRA

NRDC requests that SAP recommend to EPA that farm children comprise an especially vulnerable population, and their exposure to OP's must be considered in this CRA where data is available. Children who live on or near farms are at risk from airborne pesticide drift when they spend any time outdoors. Fog samples gathered in suburban Maryland and in agricultural regions of California revealed up to 16 different agricultural pesticides. The pesticides detected included organophosphates, triazines, dinitroaniline (pendimethalin), and chloroacetanilides (alachlor, metolachlor). The levels of organophosphates and their oxygen analogues often exceeded 10 μg/liter: two or three orders of magnitude above levels reported in rain. The maximum measured level of the highly toxic parathion oxygen analogue (paraoxon) was 184 μg/liter – a level considered sufficient to cause significant cholinesterase inhibition. In addition, volatile, fat-soluble pesticides were found in fog at concentrations far greater than expected.[7] Pesticides sprayed outdoors may enter houses and concentrate in indoor air. A Minnesota study revealed that an application of two herbicides by ground-broom sprayer 50 meters upwind from a farmhouse resulted in a three- to four-fold elevated concentration of both chemicals in outdoor air adjacent to the farmhouse, and a 50% increase in the concentration of one of the herbicides inside the farmhouse. The herbicide in indoor air was attributed to infiltration of outdoor air.[8] Outdoor air concentrations of pesticides in agricultural regions may be extremely significant from a public health perspective. This is likely particularly true for pesticides applied via fumigation or

[7] Glotfelty D, Seiber J, Liljedahl L. Pesticides in Fog. Nature 1987; 325:602-605.

[8] Camann D, Geno P, Harding H, Giardino N, Bond A, al. e. A Pilot Study of Pesticides in Indoor Air in Relation to Agricultural Applications. Proc Indoor Air 1993; 2:207-212.

broadcast spraying. Children who live in agricultural regions may receive significant airborne pesticide exposures when playing outdoors. Infiltration of homes by outdoor air may also result in airborne exposures inside the home. Protection of children necessitates routine, consistent monitoring of ambient air pesticide levels in agricultural regions. Because overexposures to organophosphates and soil fumigants have been documented, these categories of pesticides should receive particular scrutiny.

III.D. Level of regulation must ensure a reasonable certainty of no harm for ALL fetuses, infants, and children: 99.9TH percentile not adequate

NRDC requests that the SAP recommend to EPA that it regulate to protect all fetuses, infants, and children from the harmful, likely permanent, toxic effects of OP exposure. EPA may not sacrifice the hundreds or thousands of children who may exceed the reference dose for a particular OP. Under FQPA, the burden is upon the advocate of a tolerance to prove (and upon EPA to find) that there is a reasonable certainty that no children will be harmed in EPA 's pesticide decisions. Thus, if the best evidence suggests that hundreds or even thousands of children will exceed the reference dose for an OP, EPA is forbidden by statute to find a reasonable certainty of no harm to these particular infants and children, and the Agency should not issue a tolerance at that level. EPA seeks to mask in this approach the fact that even regulation at the 99.9th percentile, for a pesticide commonly used on a ubiquitous children's food, means that 0.1% of all American children under age six (around 24,000 children in all) could exceed the chronic RfD every day, based on the best information available to the agency. Further, a child exposed to multiple organophosphate pesticides may fall within the 99.9th percentile for one, but lie above the safety threshold when cumulative OP risks are calculated. No reading of the statute will support any approach that allows hundreds or thousands of children to exceed the reference dose. Regulating dietary residues of OP's at the 99.9th percentile directly violates the plain statutory language of the FQPA.

III.E. The current CRA model does not account for the "left over" food

NRDC requests that the SAP recommend that the EPA evaluate the overlap of peak residue periods (likely to be seasonal) with peak eating patterns, such as eating fresh fruit shortly after pesticide applications. These data are available to the EPA, and should be considered. These very real exposure patterns are not "random", and are likely to indicate high exposures. Of further concern, they are likely to be of particular concern for young children, whose eating patterns are likely to correlate with seasonal fruit availability.

The concept of the "rolling window" is a reasonable way to adjust for the fact that a person's eating habits, and associated residue exposure, may hold constant for the period that the "market basket" lasts – perhaps seven days. This "left over effect" captures the batch of groceries that may contain elevated residues, and are eaten for several days. This is not captured in the current CRA, and therefore the current assessment underestimates exposure. The rolling window approach allows a better alignment of the toxicology data with the exposure profile.

III.F. The current CRA model does not incorporate peak exposures, and is therefore an underestimate of exposure

NRDC requests that the SAP recommend to the EPA that the CRA be based on periods of known exposure peaks, such as shortly after pesticide application. In the current CRA, these data are not reported, or considered. The current CRA does not focus on the days when the pesticides are actually applied. Since less than 1-2% of homes use certain pesticides and the frequency of use

may be as rare as 2 times a year, the probability of randomly selecting a day when a lawn is treated may be as small as: 0.02 * 2/365 = 0.00011. This would fall at the 99.989%, which is higher than the 99.9 reported by the Agency. Thus, the model design will automatically exclude high exposures that happen on the day of application. However, these low probability events are of high toxic impact, particularly for fetuses, infants, and children. If the model design required the assessment of the exposures on the "day of application" this would not occur.

IV. A NON-PROPRIETARY MODEL SHOULD BE USED ON ALL RISK ASSESSMENTS, NOW, AND IN THE FUTURE

Recognizing the uncertainty and potential for bias inherent in any model, NRDC requests that the SAP recommend that assessments are done with the following safeguards:

1. Each risk assessment should be performed with two or more models, to begin to document model variability and model bias.
2. Each risk assessment should be performed using a non-proprietary model, in addition to any other models.
3. The need for uncertainty factors is required in calculating a margin of safety when a probabilistic risk assessment has been done.

The choice of an exposure model is an important one, as different models may use different assumptions about persons' activities and about the quantity of chemicals to which persons are exposed in varied environments. By accounting for input differently alternate models may produce dramatically different output estimates. Uncertainty arises in all model designs, because study conditions can vary dramatically from actual human environmental exposure. Risk assessments typically require scientists to extrapolate from experimental doses to environmental levels, from one exposure route to another (such as ingestion, inhalation, or dermal exposures), from one exposure pattern to another, and from small samples to large, more heterogeneous populations. Depending on the model chosen, these extrapolations may be made in different fashions, and one model may be much less health-protective than another. As EPA recently observed, "[t]he inherent uncertainty in models invites 'model shopping' and introduces too much uncertainty for use in risk assessments that support public health decisions."[9] Therefore, NRDC makes the aforementioned requests.

Thank you for consideration of these comments,
Respectfully submitted,

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[9] Trichloroethylene Health Risk Assessment, April, 2001, Section 5.1