

July 28, 2011

Dow AgroSciences – Brief Review of EPA’s Preliminary Chlorpyrifos Human Health Assessment in Response to Stakeholder Interest

In its upcoming submission to the EPA docket, Dow AgroSciences will be responding in detail to all of the parts of the draft chlorpyrifos human health assessment that the Agency has posted thus far. To this end, our science team is now conducting a thorough evaluation of all of the Agency’s assumptions, assessment methods and conclusions.

As distinct from our yet-to-be submitted technical comments for use by EPA in preparing its revised chlorpyrifos assessment, however, the following is offered as an initial perspective on the materials that the Agency has posted thus far. These perspectives are offered in response to stakeholder interest.

- **Adequacy of the Comment Period:** Dow AgroSciences has asked EPA to extend the public comment period for the preliminary chlorpyrifos human health assessment for an additional 60 days. The assessment contains 1200 pages of detailed scientific information offered in eight different documents and associated appendixes, comprising an end product so complex, voluminous and in some cases potentially precedent setting that it took EPA an additional year just to complete the draft. Sixty days is clearly not adequate time for stakeholder review of this important document, particularly in view of EPA’s professed support for sound science, transparency and increased stakeholder participation. Extending the comment period to 120 days for this *human health* assessment would also be consistent with the extended period allotted for public comment on significant *environmental* assessments in the recent past (e.g., EPA’s evaluations of fomesafen and clomazone). (See Dow AgroSciences letter to EPA <http://www.chlorpyrifos.com/news/>)
- **EPA Drinking Water Assessment:** While EPA’s assessment suggests concerns for projected chlorpyrifos exposure from drinking water, as the assessment itself acknowledges the Agency’s concerns stem not from actual water monitoring data but from mathematical modeling of hypothetical chlorpyrifos use scenarios. In this context it should be noted that in ten years of extensive government- and industry-sponsored water monitoring, chlorpyrifos and its breakdown products have never been detected in drinking water. Consequently, Dow AgroSciences believes that the preliminary concerns that EPA has raised with respect to the results of the Agency’s modeling can and ought to be resolved with better data, and we are prepared to work with the Agency to that end. Significantly, absent EPA concerns related to the modeling of potential drinking water exposures, dietary exposures to chlorpyrifos as assessed by the Agency are very low (i.e., less than ten percent of the risk cup). This is in large measure due to EPA’s reliance on real-world monitoring data in assessing potential exposure from residues on food. A similarly refined approach would seem appropriate in the Agency’s estimates of exposures from drinking water as well.

- **Cholinesterase Inhibition, the Most Sensitive Measure of Exposure:** Dow AgroSciences agrees with EPA's renewed conclusion that inhibition of blood cholinesterase is the most sensitive measure of chlorpyrifos exposure. While academic researchers have speculated in recent years about the possibility of other relevant biological mechanisms, as noted by EPA's own Scientific Advisory Panel no plausible alternate mode of action has been identified despite extensive research. As noted by EPA in its assessment, the effects that have been reported in that body of academic research "*are seen at doses that typically result in the inhibition of ChE [cholinesterase].*" As a consequence, regulatory restrictions protective against cholinesterase inhibition would also be expected to protect against other effects at higher levels of exposure. In reconfirming cholinesterase inhibition as the basis for regulatory endpoints, EPA's draft assessment is also consistent with established scientific precedent and the policies of regulatory authorities in California and around the globe as well as with the World Health Organization.
- **Proposed Reduction of the FQPA Safety Factor:** Related to EPA's conclusion that cholinesterase is the most appropriate point of departure for the regulation of chlorpyrifos, we agree with the Agency's preliminary determination that extensive research, including a recently conducted state-of-the-art, age-related comparative cholinesterase study, has resolved previous regulatory uncertainties for chlorpyrifos sufficient to allow a reduction of the Food Quality Protection Act safety factor to 1X (from the 10X default retained during EPA's 2000 assessment). This approach in using such EPA-approved study protocols to assist in reducing uncertainties in age-related sensitivity appears very consistent with the Agency's FQPA safety factor decisions over the past several years. Other policy determinations that have not yet been made by EPA may bear on this preliminary Agency conclusion for chlorpyrifos. Dow AgroSciences will comment on EPA's positioning when the Agency offers preliminary findings in relevant areas for public comment.
- **Assumptions Concerning Agricultural Use Practices:** EPA's assessments of potential consumer (dietary, drinking water) and farm worker exposures to chlorpyrifos in this draft assessment are based on both extreme worst-case and typical use scenarios. Since assessing all crops and product use scenarios would not have been practical for EPA, the Agency used a few scenarios to represent the entire spectrum of agricultural use. Contained within these scenarios, however, are hidden assumptions related to application rates, numbers of applications, the number of acres treated in a work day and so on. And in some cases, EPA's assessments are not grounded in knowledge of real world agricultural use practices. This is evidenced in one case in EPA's assessment of drinking water exposure resulting from chlorpyrifos use on grapes by the Agency's assumption that growers would apply 33 pounds of active ingredient per acre. In another case, the Agency's assessment is grounded in the assumption that grape growers would make as many as 26 applications of chlorpyrifos per year. Incorrect assumptions about actual agricultural practices can seriously skew regulatory

assessments. Consequently, these assumptions need to be carefully ground-truthed by stakeholders to assist the Agency in developing assumptions reflecting actual use. In this context, a past EPA practice under its old Reregistration program might be worth reinstating under which the Agency would meet with registrants and growers to discuss agricultural uses and practices before assessing crop protection products (i.e., the so-called “SMART” meetings). Certainly, this sort of input could save valuable Agency time in helping to prevent gross overestimates of pesticide use and exposure.

- **Science Policies Still Under Development:** In some areas, EPA has not yet completed its formulation of science policies relevant to this assessment or offered them for stakeholder review and comment. Among these areas are the **use of epidemiology studies in risk assessment , bystander exposure from inhalation, and revised approaches to assessing farm worker exposure**. Dow AgroSciences will comment on EPA’s approach to these areas once the Agency’s positioning is available for review.
 - With regard to the **use of epidemiology studies**, Dow AgroSciences agrees with EPA’s intention, consistent with recommendations of the Agency’s Science Advisory Panel, to conduct a “weight of the evidence” evaluation, considering both the strengths and weaknesses of the epidemiology research available on chlorpyrifos and incorporating this information into a broader context including the extensive, high-quality studies conducted to date characterizing chlorpyrifos in terms of toxicology, metabolism, human exposure and other relevant areas.
 - With regard to **inhalation**, EPA has previously attempted to project outcomes from bystander inhalation in connection with product applications through use of worst-case assumptions extrapolating from the results of oral dosing studies, a methodology which the Agency acknowledges to be imperfect. In the current assessment, EPA has instead relied on a recently completed inhalation study and actual air monitoring data generated by state agencies and activists. While EPA notes preliminary concerns associated with some use scenarios, the Agency has also acknowledged the limitations involved in its current approach, noting that assessing human exposure from air concentrations connected with product application as if the subject were stationary in an open field throughout a 24-hour period lacks realism. EPA is seeking a more refined approach to assessing inhalation exposures to chlorpyrifos, and Dow AgroSciences is prepared to assist the Agency in that effort.
 - EPA’s draft assessment of **farm worker exposure** reported no concerns for most scenarios examined but notes areas of potential concern for several use scenarios that the Agency will be evaluating more closely. EPA also assessed the impact of personal protection and engineering controls on the level of estimated exposure. Dow AgroSciences looks forward to working with EPA in the development of refined farm worker exposure assessments. To this end we will be providing the Agency with recently completed survey data to better

characterize actual farm worker practices. EPA further notes that potential changes to its farm worker exposure assessment methodology announced in 2009 are still being contemplated in some areas (e.g., farmworker aggregate exposure, children's exposure in agriculture fields, etc.), and we look forward to reviewing these details when EPA makes them available.

Chlorpyrifos Continues to Be Supported During Registration Review

EPA's posting of its preliminary chlorpyrifos human health assessment is an interim step in a Registration Review process that all currently registered pest control products must go through. For chlorpyrifos, this is a re-evaluation that is currently scheduled to be completed in 2015.

Dow AgroSciences continues to support chlorpyrifos for agricultural uses. Growers find chlorpyrifos valuable because it is reliable, well-established and controls most insect pests. It is authorized for use on most crops via a wide range of delivery systems. It allows rotation with other products to avoid insect resistance. It does not persist in the environment and is much less detrimental to beneficial insects than many common alternatives.

Since 2000, use of chlorpyrifos in agriculture has been reduced within the U.S. by 40 percent. Also, use directions for chlorpyrifos on a number of crops have been significantly revised during this period to further minimize the potential for residues of the product on food. Uses that remain represent significant needs for certain agricultural stakeholders. Additionally, as a result of EPA's ongoing phase-out of a number of alternative products, many growers now have greater need for continued access to chlorpyrifos as one of the few options still available to them for reliable control of key crop pests.

Dow AgroSciences has cooperated with EPA's review of chlorpyrifos, supplying new data as requested to support the Agency's preliminary assessment. We are confident that issues raised in this EPA draft can be resolved with better data and more refined assessments, consistent with the Agency's commitment to the use of sound science in the regulation of pesticides.