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Michigan Department of Environmental Quality

The Michigan Department of Environmental Quality (DEQ)
Review of the University of Michigan Dioxin Exposure Study

The University of Michigan Dioxin Exposure Study (UMDES) is a large dioxin exposure study that provides information on blood, soil, and dust concentration of dioxins, furans, and dioxin-like polychlorinated biphenyls (PCBs) for the adult general population in areas of Michigan. The conclusions of the UMDES presented by Dr. David Garabrant suggest that exposures to Dow-related contamination are not currently occurring. The DEQ has concerns with these conclusions based on the study design and data analyses as outlined in part below:

- The study was designed to represent the "adult only" general population and as such has very limited value for remedial decisions necessary to protect more sensitive populations such as children, women of childbearing age, and people with pre-existing medical conditions.
- There were very few participants who lived on property with high soil concentrations or who consumed high levels of contaminated fish, game, or locally raised animal products (eggs, chicken, beef, dairy, etc.). Although geographic areas were represented in the study, the selection of participants in these geographic groups was not based on soil dioxin concentrations, fish consumption behavior, or other participant information that best represents exposure potential. In fact, most of the participants of this study had soil concentrations well below 100 parts per trillion. The evaluation of these exposure parameters included all of the study participants, not individual geographic areas.
- The data evaluation used unequal sample weighting for each of the study groups to represent the overall population in the geographic areas. These unequal weights effectively reduce the influence of participants within geographic areas of interest (i.e., floodplain, near floodplain, or Midland plume). In this case, a participant from the floodplain, near floodplain, and Midland plume groups have over 100 times less influence on the study results than a participant from the Jackson/Calhoun comparison population.
- In addition, some high observations were eliminated if statistical significance was dependant on 3 or fewer observations. We are concerned that these observations were removed from the analysis, especially in combination with the low sampling weights (influence) for these observations and the limited number of participants with potentially high soil concentrations or high intake of contaminated fish, game or animal products.

- The study analyses (regression model) included similar variables (collinear) that resulted in some contradictory conclusions that do not make sense. An example of this is the conclusion that people have a significant exposure from dioxins if they go fishing in the local rivers, but not if they eat the contaminated fish from those rivers.
- The UMDES model results were accepted for publication in the peer reviewed literature; however, the publications do not disclose all of the variables and sampling weights included in the analysis. Without disclosure of this information that influences the analysis, the potential for contradictory results may not be recognized by the readers and peer reviewers of the publication.
- A primary conclusion of the UMDES study is that elevated serum levels identified in study participants from the Midland/Saginaw populations are due to past exposures (1960s and 1970s) that are no longer occurring. This conclusion is based on comparing older participants from Midland/Saginaw (lived there in the 1960s and 1970s) to the participants in Jackson/Calhoun and the participants in Midland/Saginaw (who did not live there in the 1960s and 1970s) who are predominantly younger. Since both older individuals and individuals in Midland/Saginaw have separately demonstrated higher blood levels, it was a foregone conclusion that the older Midland/Saginaw participants would have higher blood levels than this comparison group. The appropriate group for this comparison (those who had moved away from the area after the 1970s) was not part of the study design. The DEQ's statistical expert conducted a mathematical evaluation that showed that the statistical modeling supporting this conclusion is flawed.
- Analyses that the UMDES team conducted at the request of the DEQ during collaborative work sessions indicated that serum levels of short half-life furan congener (TCDF) remain higher in the Midland/Saginaw than in the Jackson/Calhoun area, indicating ongoing and current exposures to this congener related to Dow's releases. This finding is contradictory to the UMDES assertion that the elevated serum dioxin levels in the Midland/Saginaw residents is caused only by historic exposures from the 1960s and 1970s and was not reported in the peer reviewed publications.
- Although the report recommends precautions to control exposures (e.g., recommends following fish consumption advisories), it downplays inconsistencies between different analyses performed (e.g., differences from fishing and fish consumption and other ways fish consumption was evaluated) and creates confusion over important public health messages.

Prior review of the UMDES results by the U.S. EPA, DCH, and DEQ concluded that the UMDES, as designed and implemented to represent the general population in areas of Michigan, is not useful for remedial decision making that requires a more detailed understanding of the exposed rather than general populations. The UMDES results under-represent exposures occurring in the areas of highest contamination and people that consume the most fish, game, or animal products from the contaminated areas.