

calculation of MOEs in this assessment. The actual values of the MOEs derived must be viewed with caution, however, due to the differences in kinetics between humans and rodents. The range of MOEs in the preliminary assessment encompasses some values that would indicate potential concern and other values that would indicate a low level of concern. Due to the uncertainties in the assessment, and the possibility that the additional information discussed in this notice might reduce those uncertainties, the Agency has not attempted further interpretation of these MOEs at this time. The interpretation of the significance of the MOEs for ascertaining potential levels of concern will necessitate a better understanding of the appropriate dose metric in rats, and the relationship of the dose metric to the human serum levels.

As this priority review of PFOA progresses, EPA will continue to develop the characterization of hazard and potential risk associated with exposure to PFOA. Because the scientific interpretation issues in this case are particularly complex, given the unusual properties and behavior of PFOA and the absence of data on exposure pathways and levels, EPA anticipates that a more comprehensive risk analysis will be taken to the Agency's Science Advisory Board for review and comment in fall 2003. The preliminary risk assessment described in this notice has not been formally peer reviewed, but has gone through internal review by multiple EPA offices, including ORD, the Office of Science Coordination and Policy (OSCP), the Office of Pesticide Programs (OPP), and the Office of Policy, Economics, and Innovation (OPEI). The preliminary risk assessment has also been the subject of an external letter peer review.

D. Uncertainties and Data Needs

Although EPA has concerns with respect to the potential nationwide presence of PFOA in blood and with the potential for developmental and other effects suggested by animal studies, there are significant uncertainties in the Agency's quantitative assessment of the risks of PFOA. In addition, the uncertainties discussed in this unit with respect to the identification of the pathway or pathways that result in human exposure to PFOA (air, water, food, etc.), and the uncertainties associated with how PFOA gets into those pathways (including the products or processes that are responsible for the presence of PFOA in the environment) make it difficult to determine what, if any, particular risk mitigation measures would be appropriate. The Agency

believes that the additional information identified in this notice would better inform this priority review and Agency decisionmaking with respect to PFOA.

The sources of PFOA in the environment, as described in Unit II.A., are not fully defined or understood. Historically, direct PFOA releases during the manufacture of PFOA and its use in the manufacture and processing of fluoropolymers and fluoroelastomers have been quantified at some sites. Industry has identified and implemented voluntary control technologies to reduce releases, as well as to improve PFOA recovery for recycling or destruction, as described in Unit II.E. The effectiveness of these programs could be assessed, possibly through the ECA process described in Unit V., by monitoring PFOA levels at the respective facilities and determining if the release reduction and waste management programs are reducing the PFOA levels in the media surrounding the affected facilities. PFOA exposures and releases to the environment may also come from the distribution of PFOA in aqueous dispersions of fluoropolymers used by processors to apply coatings to metals and textiles, a topic which industry is also attempting to resolve.

In addition, the question of the potential contribution to PFOA levels from telomer manufacture and from telomer product degradation remains. The universe of specific telomer chemicals that may ultimately degrade or metabolize to PFOA has not been fully defined. Preliminary data suggest that only higher perfluorinated homologues (chemicals with carbon chain lengths of eight and higher) would be converted into PFOA via normal environmental pathways. The 8-2 telomer alcohol has been shown to biodegrade and metabolize to form PFOA, but other telomer chemicals, including telomer iodides and telomer-derived polymers, have not yet been tested. Determining possible telomer product sources of PFOA may be particularly difficult because these fluorochemicals are typically used in products in very low concentrations, indicating that any individual source contribution by specific products could be very small, widely distributed, and difficult to detect. For example, products contaminated with volatile, unreacted telomer alcohol residuals could potentially release those residuals into the environment where they could be subject to biodegradation.

The exposure routes leading to the presence of PFOA in human blood are not known. The nationwide presence of PFOA in human blood, contrasted with

the limited geographic locations of fluorochemical plants making or using the chemical, suggests that there must be additional sources of PFOA in the environment, and exposures beyond those attributable to direct releases from industrial facilities. But whether these exposures are due to PFOA in the air, the water, on dusts or sediments, in dietary sources, or through some combination of routes is currently unknown. Data evaluating the environmental presence of PFOA in water are very limited and site-specific. Data on the presence of PFOA in air or soil are not currently available. Data on the presence of PFOA in wildlife suggest that animals are not as likely as humans to have PFOA in their blood, and that PFOA is not found as widely in animals as PFOS. Whether these differences may be due to different exposure pathways or to differences in how the chemicals are processed or retained by animals and humans is unknown. The technical difficulties of detecting and accurately measuring the chemical in all these various media, particularly in the low concentrations that EPA would anticipate, are considerable.

The preliminary risk assessment on potential developmental toxicity was based on a comparison of serum levels in the 2-generation rat reproductive study with those found in the human population. However, there are considerable species differences in the kinetics of PFOA. Interpretation of the significance of the MOEs for ascertaining potential levels of concern will necessitate a better understanding of the appropriate dose metric in rats, and the relationship of the dose metric to the human serum levels.

Finally, there are some uncertainties regarding the use of the human biomonitoring data. Although the available data include a range of populations with various demographics in many States and all geographic areas of the country, there may be some populations that are not represented. Because it is unknown how the human exposures are occurring, proximity to a manufacturing facility may or may not be a factor in exposure. However, populations living near these facilities were not sampled. Therefore, it is possible that PFOA serum levels may be underestimated for certain portions of the U.S. population. The children's sample was derived from blood collected in 1994/1995; therefore, it may not reflect the current status of PFOA in children's blood.

Voluntary activities by industry are underway as described in Unit II.E. to help address some of these uncertainties