PO 126-4 Exposure Reconstruction in Occupational Human Health Risk Assessment: Current Methods and a Recommended Framework. *J. Sahmel, K. Devlin, ChemRisk, Inc., Boulder, CO; D. Paustenbach, D. Hollins, S. Gaffney, ChemRisk, Inc., San Francisco, CA.*

Objective: Exposure reconstruction for substances of interest to human health is a process that has been used as far back as the 1930s. The importance of robust and high-quality exposure reconstruction has been recognized by many researchers. It has been noted that misclassification of reconstructed exposures is relatively common and can result in potentially significant effects on the conclusions of a human health risk assessment or epidemiology study. In this analysis, a review of the key exposure reconstruction approaches described in the peer-reviewed literature is presented along with a recommended framework for future exposure reconstruction studies.

Methods: Over 400 peer-reviewed papers were reviewed to determine the approaches used for exposure reconstruction. These approaches were critically evaluated and classified according to quantitative, semiquantitative, and qualitative approaches. Based on this review, a recommended framework for future studies was developed.

Results: Results of the review demonstrated that a number of specific types of approaches were commonly used for exposure reconstruction. Based on the strengths and weaknesses of these approaches, seven steps for conducting future exposure reconstruction studies were developed: identifying the goals of the reconstruction, organizing and ranking the available data, identifying key data gaps, selecting the best information sources and methodology, incorporating probabilistic methods, conducting an uncertainty analysis, and validating the results of the reconstruction. Influential emerging techniques, such as Bayesian data analysis, are highlighted.

Conclusions: Our analysis indicated that much can be done to improve the overall quality and consistency of exposure reconstructions and that a systematic framework would help to standardize the exposure reconstruction process in the future. Important issues that will likely influence the conduct of exposure reconstruction into the future include improving statistical analysis methods, addressing the issue of chemical mixtures, evaluating aggregate exposures, and ensuring transparency with respect to variability and uncertainty in the reconstruction effort.