A SHORT EXPLANATION OF RETROSPECTIVE EXPOSURE ASSESSMENT AND ITS USE IN TOXIC TORT LITIGATION

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In most toxic tort exposure cases, actual exposure levels for the substance/toxin at issue are not available for the majority of people who claim exposure. This fact does not preclude an estimation of exposure performed with an acceptable degree of scientific probability. This practice, known as retrospective exposure assessment (also known as dose reconstruction) relies on details of the workplace, the substance/chemical/mineral for which exposure is claimed, characteristics of the release from the substance/chemical/mineral, use of engineering controls, product usage rates, and information concerning duration and frequency of work practices. Recently, aggressive plaintiff lawyers have been seeking to preclude retrospective exposure assessments offered by defendants, arguing that retrospective exposure assessment constitutes “junk science.” Accordingly, the intent of this article is to provide a very brief overview of retrospective exposure assessments.

Retrospective exposure assessment is a methodology that calculates past exposures to various agents. The scientific principles underlying it have been well described in the published scientific literature for decades. For example, the National Research Council in 1983 defined exposure assessment as:

...the process of measuring or estimating the intensity, frequency and duration of human exposures to an agent currently present in the environment or of estimating hypothetical exposures that might arise from the release of new chemicals into the environment. In its most complete form, it describes the magnitude, duration, schedule, and route of exposure; the size, nature and classes of the human populations exposed; and the uncertainties in all estimates.


As is self-evident from the use of the word “retrospective,” this methodology has been used to estimate historical exposures in the past, as well as to extrapolate possible future exposures. See, e.g., Mulhausen and Damiano: A Strategy for Assessing and Managing Occupational Exposure 68 (AIHA Press, Second Edition 1988). The same authors have also stated that exposure assessment is the “heart” of industrial hygiene, from which an analyses of hazards, risk communication, epidemiology, surveillance, safety, and controls all follow. Mulhausen and Damiano, “Comprehensive Exposure Assessment,” in The Occupational Environment: Its Evaluation, Control and Management 104, Fig. 6.1 (Diniardi ed., AIHA Press). A handy summary of the history of exposure assessment methodology can be found in Paustenbach; “The Practice of Exposure Assessment: A State of the Art Review;” Journal of Toxicology and Environmental Health 179-291(2000). Another handy reference is Rice; Retrospective Exposure Assessment: A Review of Approaches and Directions for the Future, in Exposure Assessment for Epidemiology and Hazard Control (Rappaport and Smith eds., 1991).


Numerous government agencies have used and accepted retrospective exposure assessment. The Environmental Protection Agency published in the Federal Register broad guidelines concerning the proper use of exposure assessment, Environmental Protection Agency, Guidelines for Exposure Assessment, 57 Federal Register 22888-22938 (May 29, 1992). [These guidelines establish a broad framework for Agency exposure assessments by describing the general concepts of exposure assessment including definitions and associated units, and by providing guidance on the planning and conducting of an exposure assessment. Guidance is also provided on presenting the results of the exposure assessment and characterizing uncertainty.]. In July 2002, the Centers for Disease Control and Prevention published Exposure Assessment Methods: Research Needs and Priorities, Department of Health and Human Services, Centers for Disease Control and Prevention, National
Institute of Occupational Safety and Health. ["Exposure assessment is a rapidly evolving, multidisciplinary research activity ... In the past 15-20 years, the scope of exposure assessment has broadened considerably as a result of changes in technology and increased attention to non-industrial work settings."] OSHA's asbestos exposure assessment guidelines can be found at Occupational Exposure to Asbestos, 59 Federal Register 40964-41162 (August 10, 1994). The Department of Health and Human Services has also published Methods for Radiation Dose Reconstruction Under the Energy Employees Occupational Illness Compensation Program Act of 2000, which can be found at 42 CFR Part 82. Exposure assessment is simply not novel, despite claims to the contrary. Retrospective exposure assessment is even referenced in Reference Manual on Scientific Evidence, Second Edition: Evidence of exposure is essential in determining the effects of harmful substances. Basically, potential human exposure is measured in one of three ways. First, when direct measurements cannot be made, exposure can be measured by mathematical modeling, in which one uses a variety of physical factors to estimate the transport of the pollutant from the source to the receptor.


As any toxic tort lawyer knows, dose is the fundamental cornerstone of the case, which is acknowledged by the Reference Manual on Scientific Evidence and cases too numerous to cite herein. Thus, the data garnered by retrospective exposure assessment is critical to a complete understanding of the case, particularly from the defense viewpoint. The data might be used to demonstrate that the exposure to the substance in question is non-existent, or below prior permissible exposure limits/threshold limit values, below background levels for a particular substance, or below the minimum threshold level for the dose/response relationship between the substance and the disease process. Retrospective exposure assessment can also be used to compare exposures, such as in asbestos litigation, where low dose exposures are compared to high dose exposures, with the argument being that the low dose exposures were not substantial contributing factors.

A frequent tripping point is the failure to understand that retrospective exposure assessment cannot provide a precise number for any particular plaintiff. In fact, attempting to provide a precise number raises substantial issues as to the appropriate use of retrospective exposure assessment under Frye or Daubert methodology. Correct application of retrospective exposure methodology results in a range of exposures.

There is certainly literature, primarily older, making statements such as "reconstruction of past exposures is impossible." See, e.g., Balzer and Cooper, "The Work Environment of Insulating Workers," American Industrial Hygiene Association Journal (1968). However, retrospective exposure assessment has come a long way since the 1960's and early 1970's, with increasing use and increasing certainty. Indeed, "the difference between assessments performed in the 1950's and 1960's and those performed in the 1980's and 1990's is that dose extrapolation models, quantitative exposure assessments, and quantitative descriptions of uncertainty have been added to the process. By 1990, because of increased understanding of many relevant issues, the availability of desktop computers, and better quantitative methods for predicting the low-dose response (such as physiologically based pharmacokinetic models), risk assessments conducted today provide more accurate risk assessments than in the past." Paustenbach, supra., at page 180.

The fundamental defense in a toxic tort case remains dose, recognized no less than Paracelsus in the Sixteenth Century, well known to every toxic tort practitioner: "What is it that is not poison? All things are poison and nothing is without poison. It is the dose only that makes a thing not a poison." Proper application of retrospective exposure assessment, and the methodology for same, is a fundamental basis of the defense, and challenges to it must be responded to by acknowledging the lengthy history of retrospective exposure assessment in the scientific community and by the United States Government.

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