Critical Evaluation of Thresholds for Respiratory Effects of Toluene Diisocyanate

In 2016, the American Conference of Governmental Industrial Hygienists lowered the 8-hr Threshold Limit Value - time-weighted average (TLV-TWA) for toluene diisocyanate (TDI) from 5 ppb to 1 ppb, and the 15-minute short-term exposure limit (STEL) from 20 ppb to 5 ppb, to protect against respiratory effects. However, the human evidence indicates that maintenance of 8-hr average TLV-TWA concentrations less than or equal to 5 ppb and peaks less than 20 ppb (i.e., the previous 8-hr TLV-TWA and 15-minute STEL) is protective of occupational asthma (OA) in most workers, and is also protective of lung function decrements and other respiratory effects. Some of the available studies that suggest occupational asthma cases at TWA concentrations less than 5 ppb were likely affected by very high peak exposures, well above 20 ppb. Advances in industrial hygiene measures have reduced peak exposures and the incidence of upset conditions such as spills and accidents, so these high peak exposures are unlikely to occur in modern TDI manufacturing facilities. The animal literature supports the human evidence and indicates that TDI-induced asthma is a threshold phenomenon. The evidence does not indicate that the lower TDI TLVs will result in a lower incidence of respiratory effects, including OA.