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Abstract

DEMOLITION WORKER LEAD EXPOSURES:
A PREDICTIVE MODEL USING WORKPLACE VARIABLES

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Determinants of airborne lead concentrations during building demolition have not been identified adequately for purposes of protecting workers from excessive exposures near OSHA's Permissible Exposure Limit. To quantify the effects of several potential determinants, we collected 98 personal air lead samples and results for several hundred associated bulk lead samples at several demolition sites. We analyzed the data to assess worker exposures and to identify associations between exposures and several independent variables including bulk lead concentration; time of work shift; number, proximity, and activity of coworkers; worker activity; substrate material; air supply; surface areas of demolished substrate; and condition of lead-containing paint on substrate. The first four of these independent variables were strongly associated with air lead concentration, in order of importance. These have been included in a predictive multiple regression model that explains 61% of observed air lead concentration variation and appears stable. Based on prediction of a split of the study data set and an arbitrarily chosen safety factor, the model appears to be sensitive enough to predict all excessive exposures with a specificity and positive predictive value of 68% and 50%, respectively. This model's predictions will be evaluated further through comparing them to independent air lead concentration measurements collected during a second phase of research.