

a level not to be exceeded during any part of the working day), coupled with an effective Product Stewardship program, would help companies maintain exposure to their workers as low as reasonably achievable. He suggests that a Product Stewardship program focused on: (1) Training material on how nPB can be handled and used safely; (2) conducting industrial hygiene evaluations as a service to customers, to develop actual exposure level information for a variety of end uses under varying circumstances; and (3) monitoring the health (including reproductive parameters) of workers would, over time, aid in assessing the validity of the occupational exposure limit selected. He also states that through the Product Stewardship program and the regulatory reporting requirements of the Toxic Substances Control Act (TSCA), Section 8, corrective actions could be taken if necessary.

While we do not agree with the AELs derived by Rozman and Doull or by SLR, EPA agrees that producers and formulators of nPB should engage in responsible Product Stewardship programs. Albemarle Corporation has been conducting an extensive stewardship program for nPB involving air sampling and workplace practice evaluation for customers to help ensure exposures below 25 ppm. We also note that, in order to verify if exposure levels are below a ceiling value, it would be necessary to monitor workplace exposure continuously. Periodic evaluations of exposure levels would be sufficient for determining long-term exposure to workers. EPA recommends that workplace exposures should be controlled to levels at or below the AEL in order to avoid risk of adverse health effects.

e. Feasibility of meeting the AEL for nPB in each industrial sector. Each of the three sectors EPA is considering in today's proposal could potentially expose workers to nPB in different ways. Therefore, we considered separately whether it is feasible to meet the AEL in each of the three sectors. If EPA becomes aware of further information showing that nPB use is likely to pose unacceptable risks to human health in particular applications or end uses, we will find nPB unacceptable in those applications or end uses.

Solvents cleaning. When using industrial cleaning equipment, workers are likely to be exposed to solvent vapors continually over the course of a workday. However, users can control nPB emissions from vapor degreasers by changes to the equipment, as well as

changes in operating practice. For example, a user can install an additional set of condensation coils to prevent vapor from leaving the vapor degreaser or defluxer. An operator can tilt pieces to be cleaned to allow the solvent to drain off inside the vapor degreaser instead of evaporating outside of the degreaser where workers will breathe the vapors.

Exposure data on nPB used in vapor degreasers indicate that it is possible to maintain exposure levels from 2 to 24 ppm over an 8-hour average, as measured using personal samplers (Albemarle, 1997). In 1998, Albemarle Corporation also collected workplace monitoring data from metal cleaning operations. Many, although not all, of the samples collected showed concentrations that, extrapolated to an 8-hour period, would remain under 25 ppm. In addition, another manufacturer and distributor of nPB-based solvents stated that, "For a properly designed, installed, operated, and maintained traditional open-top vapor degreaser, experience has shown that eight-hour time weighted operator exposure levels will be < 20 ppm. For enclosed and automated degreasers, lower exposures can be achieved" (Amity UK Ltd, 2001).

EPA has only one set of direct exposure data for equipment that cleans using nPB below its boiling point ("cold cleaning"). These data are from a NIOSH Health Hazard Evaluation for a company that produces instrumentation and components for radio and microwave frequency communications. In this study, NIOSH measured exposures to nPB from a cold batch cleaner that was in a special enclosed room with a local exhaust ventilation system. The highest exposure level was 8.4 ppm (NIOSH, 2000b). However, the type of enclosure and ventilation used at this site is not typical of most facilities using cold cleaning equipment.

In general, it is expected that it will be more difficult to control emissions from cold cleaning equipment than from vapor degreasers. The design of vapor degreasers reduces emissions from the equipment by boiling the solvent and then causing it to condense, rather than allowing solvent vapors to be emitted. Because cold cleaning equipment may expose workers to high levels of nPB, we recommend that nPB not be used in cold cleaning equipment unless additional engineering controls are instituted to keep worker exposure to levels below the recommended AEL of 25 ppm.

The limited data available on manual cleaning indicate that it may be difficult to attain exposures less than 50 ppm when wiping with nPB by hand

(Albemarle, 2001). The SNAP program currently does not regulate manual cleaning with solvents. However, we recommend that nPB not be used for manual cleaning because of the likelihood of high exposures.

Aerosol Solvents. Only limited data are available on exposure levels to nPB from aerosol solvent usage. Four measurements on a single user showed exposures to nPB that ranged from 5 to 14 ppm over an 8-hour time-weighted average (Albemarle, 2001). Since the user was cleaning brakes on public works equipment, it is possible that the mechanic was working outdoors, or in an area that was only partially enclosed. EPA expects that these data are not representative of the diverse conditions under which aerosol solvents are used. Confidential data from another facility revealed that exposures vary greatly and in some instances can be higher than 200 ppm. In contrast to vapor degreasers, aerosol solvents tend to be used intermittently for short periods of 1–2 minutes. In some cases, aerosols containing nPB are used in confined spaces without ventilation ducts and fans where workers could be exposed to high levels over a short time. Emissions from aerosols are typically not controlled with equipment that captures the nPB vapor, although aerosol users can improve ventilation and reduce exposure levels through a variety of approaches (e.g., fume hoods). Given this information, EPA requests further workplace exposure data on nPB's use as an aerosol solvent. In addition, we request comment on whether nPB should be acceptable for use as an aerosol solvent, or if its use should be limited in this end use (e.g., use limit restricting nPB only to applications with ventilation equipment).

EPA believes that users should adhere to a short-term exposure limit (time weighted average over 15 minutes) of three times the AEL. We recommend this short-term exposure limit, which would equal 75 ppm over 15 minutes, in addition to the 8-hour time weighted average of 25 ppm. We believe that limiting short-term exposure to 75 ppm in a 15 minute period of exposure is feasible with proper ventilation and/or low use volumes. We also recommend only using aerosols containing nPB in open or well-ventilated areas. This procedure is recommended for use of any aerosol solvent, compared to use in enclosed, unventilated areas.

Adhesives. In adhesives applications, exposures are expected to vary depending upon the particular kind of application. For example, in the foam-fabrication industry, workers generally are exposed to evaporating solvents on