

This addendum was developed by the Division to supplement and update the HEAC summary dated June 2, 2011.

## MEASUREMENT & IMPLEMENTATION FEASIBILITY

**Usage Summary:** CyHx is used as a nonpolar solvent for the chemical industry, and raw material for the industrial production nylon. CyHx replaced benzene as glue solvent in the shoe, printing and leather factories. It is produced large-scale by reacting benzene with hydrogen. CyHx has been listed as an ingredient in spray adhesive, lacquer thinner, specialty auto product, contact cleaner, degreaser, caulk, spray paint, lab standards, insecticides and plasticizers from 1 to 70 percent. It may be present in gasoline less than one percent. According to the most recently available Cal/EPA California Environmental Reporting System (CERS) data, no more than about 450 businesses in California use reportable quantities of cyclohexane and are therefore likely to be substantially affected by the lowered PEL.

### **Analytical Method:**

NIOSH Method 1500: HYDROCARBONS, BP 36°-216 °C; OSHA Method ORG-07 | May 2000: Organic Vapors

**Instrument/Sampler:** GC/FID; CSC

**Estimated LOD/LOQ:** Limit of detection (LOD) for both methods is approximately 0.006 ppm based on 0.1 microgram per sample. NIOSH Method 1500 was validated at 4-5300 micrograms of cyclohexane per sample which results in an LOQ of 0.232 ppm.

**Measurement Issues (from OSHA 7):** The air volume sampled is limited by the capacity of the charcoal tubes. Exceeding the capacity of the charcoal tube results in loss of sample. The adsorptive capacity is decreased by high humidity. The method is limited by the reproducibility of the pressure drop across the tubes. The pressure drop affects the flow rate causing the air volume to be imprecise. The analyst must work with toxic solvents. When many components are present, elimination of interferences becomes difficult. These issues are common among all organic vapors utilizing these methods, and do not pose any unique concerns.

**Recommended Workplace Controls:** Providing suitable control measures such as ventilation to control exposure can be done using existing equipment as most systems have the ability to control to the proposed levels.

### **Economic Impact Analysis/Assessment:**

The Division has made a determination that this proposal is not anticipated to result in a significant, statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states. This proposal will not have any effect on the creation or elimination of California jobs nor result in the creation or elimination of existing businesses or affect the expansion of existing California businesses. The

Division anticipates that any potential costs will be balanced by avoiding or minimizing the costs inherent in workers' compensation claims, lost work time, and productivity losses that would have been caused by exposure related illness of employees.

The PEL proposed is consistent with recent scientific findings, of which professional health and safety staff and consultants of these employers and others with significantly exposed employees should be aware. Many of these entities already seek to control employee exposures to chemicals to levels below existing PELs in the interest of business continuity and minimization of tort and workers compensation liability. Based upon federal OSHA 1989 estimates of the distribution of costs for businesses adopting new PELs, about 12% (or 54) of the 450 California businesses listed in CERS as cyclohexane users would incur costs of about \$120,000 each, for a total of about \$6.48 million.. Although they did not quantify the benefits, Federal OSHA also estimated that these costs would be more than offset by savings incurred from improved employee health and productivity.

Setting a Permissible Exposure Limit for cyclohexane that is up-to-date and consistent with current scientific information and state policies on risk assessment will send appropriate market signals to employers with respect to the costs of illness and injury which chemicals can impose on workers and their families, the government, and society at large. With appropriate market signals, employers may be better able to choose chemicals for use in the workplace that impose less of a burden on workers and society. There are no anticipated benefits to the state's environment.

The economic benefits from the proposed PEL will result primarily from reduced health risk among exposed workers. Based on the assumptions in the 1989 federal OSHA final rule, the total benefit for the work related illnesses prevented would far exceed the \$6.48 million cost estimated for this proposal.