

## OZONE DEPLETING SUBSTANCES

The NCI-Frederick is committed to phasing out Ozone Depleting Substances wherever possible.

The ozone layer is a term for the miles-thick portion of the stratosphere which filters ultra-violet radiation from the sun. It has been shown that increased UV exposure can lead to increased genetic damage in plants and animals. Since the 1970's, atmospheric scientists have linked ozone depletion with certain chemicals and as data the US Congress enacted bans on the commercial use of certain chlorofluorocarbons, or CFCs.

In September 1987, twenty-three countries, including the United States, signed the "Montreal Protocol on Substances that Deplete the Ozone Layer". The Montreal Protocol requires that production and consumption of certain ozone-depleting substances be restricted according to a specified schedule. Two years after this initial agreement, these countries met again to address the additional scientific evidence that the ozone layer was disappearing at a faster rate than previously anticipated. The result of this meeting was an adjustment of the phase-out dates set in the first meeting. The majority of chemicals were phased out on January 1, 1996. The United States Congress passed the Clean Air Act Amendments of 1990, which imposed more stringent requirements on the control of ozone-depleting substances. 40 CFR 82 implements the Montreal Protocol and these subsequent amendments.

A list of the chemical compounds affected by these regulations is printed below and on the back of this Safetygram. If you suspect that a solvent or product that you work with may be affected, please contact EHS (x1451) for assistance in evaluating alternative solvents. Chemical names for CFCs are often shortened to "CFC" or "R" numbers, such as "R-11" for trichlorofluoromethane, a very common refrigerant before the ban.

### I. **Class I Controlled Substances**

(The following chemicals are restricted by 40 CFR 82 and are to be phased out by January 1, 1996, except group VI, which is to be phased out by January 1, 2001.)

#### A. Group I

CFCl<sub>3</sub> - Trichlorofluoromethane (CFC-11)  
CCl<sub>2</sub>F<sub>2</sub> - Dichlorodifluoromethane (CFC-12)  
CCl<sub>2</sub>F-CClF<sub>2</sub> - Trichlorotrifluoroethane (CFC-113)  
CF<sub>2</sub>Cl-CClF<sub>2</sub> - Dichlorotetrafluoroethane (CFC-114)  
CClF<sub>2</sub>-CF<sub>3</sub> - (Mono)chloropentafluoroethane (CFC-115)  
All isomers of the above

#### B. Group II

CF<sub>2</sub>BrCl - Bromochlorodifluoromethane (Halon 1211)  
CF<sub>3</sub>Br - Bromotrifluoromethane (Halon 1301)  
C<sub>2</sub>F<sub>4</sub>Br<sub>2</sub> - Dibromotetrafluoroethane (Halon 2402)  
All isomers of the above

#### C. Group III

CF<sub>3</sub>Cl - Chlorotrifluoromethane (CFC-13)  
C<sub>2</sub>FCl<sub>5</sub> - (CFC-111)

C<sub>2</sub>F<sub>2</sub>Cl<sub>4</sub> - (CFC-112)  
C<sub>3</sub>FC<sub>17</sub> - (CFC-211)  
C<sub>3</sub>F<sub>2</sub>Cl<sub>6</sub> - (CFC-212)  
C<sub>3</sub>F<sub>3</sub>Cl<sub>5</sub> - (CFC-213)  
C<sub>3</sub>F<sub>4</sub>Cl<sub>4</sub> - (CFC-214)  
C<sub>3</sub>F<sub>5</sub>Cl<sub>3</sub> - (CFC-215)  
C<sub>3</sub>F<sub>6</sub>Cl<sub>2</sub> - (CFC-216)  
C<sub>3</sub>F<sub>7</sub>Cl - (CFC-217)  
All isomers of the above

D. Group IV

CCl<sub>4</sub> - Carbon tetrachloride

E. Group V

C<sub>2</sub>H<sub>3</sub>Cl<sub>3</sub> - 1,1,1-Trichloroethane (Methyl chloroform)  
All isomers of the above except 1,1,2-Trichloroethane

F. Group VI

CH<sub>3</sub>Br - Bromomethane (Methyl bromide)

G. Group VII

CHFBR<sub>2</sub>  
CHF<sub>2</sub>Br (HBFC-2201)  
CH<sub>2</sub>FBr  
C<sub>2</sub>HFBr<sub>4</sub>  
C<sub>2</sub>HF<sub>2</sub>Br<sub>3</sub>  
C<sub>2</sub>HF<sub>3</sub>Br<sub>2</sub>  
C<sub>2</sub>HF<sub>4</sub>Br  
C<sub>2</sub>H<sub>2</sub>FBr<sub>3</sub>  
C<sub>2</sub>H<sub>2</sub>F<sub>2</sub>Br<sub>2</sub>  
C<sub>2</sub>H<sub>2</sub>F<sub>3</sub>Br  
C<sub>2</sub>H<sub>2</sub>FBr<sub>2</sub>  
C<sub>2</sub>H<sub>3</sub>F<sub>2</sub>Br  
C<sub>2</sub>H<sub>4</sub>FBr  
C<sub>3</sub>HFBr<sub>6</sub>  
C<sub>3</sub>HF<sub>2</sub>Br<sub>5</sub>  
C<sub>3</sub>HF<sub>3</sub>Br<sub>4</sub>  
C<sub>3</sub>HF<sub>4</sub>Br<sub>3</sub>  
C<sub>3</sub>HF<sub>5</sub>Br<sub>2</sub>  
C<sub>3</sub>HF<sub>6</sub>Br  
C<sub>3</sub>H<sub>2</sub>FBr<sub>5</sub>  
C<sub>3</sub>H<sub>2</sub>F<sub>2</sub>Br<sub>4</sub>  
C<sub>3</sub>H<sub>2</sub>F<sub>3</sub>Br<sub>3</sub>  
C<sub>3</sub>H<sub>2</sub>F<sub>4</sub>Br<sub>2</sub>  
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C<sub>3</sub>H<sub>4</sub>F<sub>3</sub>Br  
C<sub>3</sub>H<sub>5</sub>FBr<sub>2</sub>  
C<sub>3</sub>H<sub>5</sub>F<sub>2</sub>Br  
C<sub>3</sub>H<sub>6</sub>FB

II. **Class II Controlled Substances**

This group of chemicals includes hydrochlorofluorocarbons (HCFCs), which add much less chlorine to the stratosphere than fully halogenated chlorofluorocarbons, but still present some threat to the ozone layer. These chemicals should be avoided unless no other alternative is feasible. However, this class of chemicals will be phased out in 2030, as outlined in the Clean Act Amendments of 1990. A list of these HCFCs can be found in 40 CFR 82, Appendix B to Subpart A. Contact EHS (x1451) if additional information is needed.