5. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

5.1 PRODUCTION

Carbon monoxide is produced by the incomplete combustion of carbon in liquid, solid, and gaseous fuels (George 2001). Commercially, it is produced on an industrial scale by the partial oxidation of hydrocarbon gases from natural gas or by the gasification of coal and coke. Laboratory-scale production of carbon monoxide is accomplished by heating calcium carbonate with zinc dust (O'Neil et al. 2006). Carbon monoxide is also obtained from the dehydration of formic acid (Lewis 2007). The majority of carbon monoxide produced is used immediately downstream and at the plant site for chemical synthesis or steel manufacturing; consequently, quantitative production volumes are not available (George 2001).

Carbon monoxide is a co-product along with hydrogen in syn gas (synthetic gas) production, gases are then separated and purified by pressure swing adsorption and/or cryogenic distillation.

Carbon monoxide is a major air pollutant (Lewis 2007). It is a byproduct of highway vehicle exhaust, of industrial processes and fuel combustion in boilers and incinerators, and of household appliances fueled with gas, oil, kerosene, or wood, and fires. The largest contribution comes from highway motor vehicles. Carbon monoxide exceeds all other atmospheric pollutants, combined with the exception of CO_2 (George 2001).

The major facility within the United States that manufactures or processes carbon monoxide (produced in commercial quantities exceeding 5,000 pounds or $10,000 in value annually) is Air Liquide America L.P. in Freeport, Texas (SRI 2008).

5.2 IMPORT/EXPORT

No data were located on the import or export of carbon monoxide.

5.3 USE

Carbon monoxide is used by the chemical industry for the synthesis of many compounds such as acetic anhydride, polycarbonates, acetic acid, and polyketones (George 2001). It finds application as a reducing agent in metallurgical operations, specifically the Mond process for the recovery of nickel, in the manufacture of metal carbonyls, and in organic synthesis, especially for the Fischer-Tropsch process for

petroleum-related products and in the oxo reaction (O'Neil et al. 2006). Carbon monoxide is also used in the manufacture of zinc white pigments (Lewis 2007).

5.4. DISPOSAL

EPA considers a waste to be hazardous if it exhibits any of the following characteristics: ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR 261.21–261.24. Under the Resource Conservation and Recovery Act (RCRA) (40 USC 6901 et seq.), EPA has specifically listed many chemical wastes as hazardous. Although carbon monoxide is not specifically listed as a hazardous waste under RCRA, EPA requires employers to treat waste as hazardous if it exhibits any of the characteristics discussed above (OSHA 2000).