Acute Exposure Guideline Levels for Selected Airborne Chemicals: Volume 8
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34% at 800 ppm, 34% at 900 ppm and 38% at 1000 ppm. After exposure to up to 500 ppm for 60 min, no symptoms were observed. At 600 ppm, 2/9 subjects reported slight frontal headache. At 800 ppm all subjects reported decided frontal headache during 4-8 h. At 900 ppm insomnia and irritability occurred in addition to headache. At 1,000 ppm, irritability, throbbing frontal headache, and at times Cheyne-Stokes breathing were observed. The Romberg test (ability to stand erect with eyes closed) showed a marked loss of equilibrium after a 60-min exposure to 800 ppm or higher.

Haldane (1895) reported on a series of 11 studies in which the author exposed himself to different CO concentrations for different exposure times. The exposure conditions and effects are summarized in the following Table 2-5. The subject breathed the CO atmosphere from a mouthpiece. No mentioning of an analytic measurement of the exposure concentrations used was made. At the end or one or more times during the exposure, the exposure was interrupted and the subject walked in the room or ran up a flight of stairs (once or a few times) to investigate the effect of physical exertion at different COHb levels. The COHb was determined colorimetrically by measuring the amounts of carmine solution that had to be added to the diluted blood sample or to an equal dilution of normal, oxygenated blood to adopt the color of a CO-saturated blood dilution. For COHb <70%, the author found his COHb determinations accurate within a 5% error. Although the exposure measurement of this study does not meet today's standards, the reported COHb values are in fairly well agreement with the values calculated from the given exposure concentration and exposure time using the mathematical model of Coburn, Forster and Kane (see Section 4.4.4) when assuming a resting ventilation rate (see Table B-4 in Appendix B).

Stewart et al. (1970) performed 25 CO inhalation exposure experiments on a total of 18 healthy men (age 24-42). They were exposed and sedentary in a chamber at <1, 25, 50, 100, 200, 500, or 1,000 ppm for periods of 30 min to 24 h. The chamber atmosphere was monitored continuously by infrared spectroscopy and periodically by gas chromatography. The subjects performed the following psychoneurologic tests: hand and foot reaction time in a driving simulator, Crawford collar and pin test, Crawford screw test, hand-steadiness test, Flanagan coordination test, othorator visual test, complete audiogram, resting 12-lead electrocardiogram, standard electroencephalogram, visual-evoked response and time-estimation–hand-reaction-time test. No subjective symptoms or objective signs of illness were noted during or in the 24 h following exposure to CO at 25 ppm for 8 h, 50 ppm for 1, 3, or 8 h, or 100 ppm for 1, 3, or 8 h. There was no detectable change from control values in the clinical tests. A significant relationship between the Crawford collar and pin test and CO concentration was considered a chance finding by the authors. Of 11 subjects exposed to CO at 200 ppm for 4 h, three subjects reported they had developed a "mild sinus" headache in the final hour. In the clinical tests, no detectable statistical change from control values was observed. In the first exposure at 500 ppm for 1.8 h, one of the

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