ion polls and asking community members if a certain noise is annoying are others Noises can be reproduced in the laboratory and subjects asked to rate them according to annoyance However, none of these methods is really satisfactory even though in general higher intensity, higher frequency (above 1500 Hz), and intermittency tend to increase annoyance, there are large individual differences in reaction to it Annoyance in itself is not a health hazard and the fact that a noise is annoying does not necessarily establish it as a damage risk

Efficiency. A third nonauditory effect of noise-exposure is possible loss of efficiency Efficiency in performing mental and motor tasks under various conditions of noise-exposure has been studied in detail because of its practical importance A major weakness in the design of experiments is the failure to control changes in the nonnoise-related environment Frequently when the noise environment changes it is because there has been a move to a new building or a change in process accompanied by other changes such as work tasks, temperature, and lighting Changes in efficiency are known to be caused by any one of these nonnoise changes in environment

Other difficulties with industrial tests of efficiency are that the number of employees participating in the studies have been too small to average out the effects of individual differences or even to allow a statistical estimate of what effect these differences might have on the results Further, a psychological factor enters here It has been found that the performance made on first encounters with a test seems to persist even though the environment changes if an employee did poorly on a test given first in a noisy environment, he would tend to do poorly on subsequent administrations of the test, even when in quiet—and vice versa

The conclusions drawn from the most reliable tests of efficiency in industrial noise are that unfamiliar noise temporarily reduces efficiency, but that when an employee becomes accustomed to the noise his efficiency returns to a nonnoise performance level

Physiological changes Certain temporary physiological changes also occur in the human body as a direct result of noise-exposure The usual emergency reactions of the body occur in response to sudden sharp sounds, such as gun fire There may be a sharp muscle contraction over the entire body, breathing and heart rates may increase, blood pressure rises, and sweating increases It is possible that frequent recurrence of these changes might impair health but such an inference has no valid support up to the present Fortunately the magnitude of these physiological responses wears off rapidly with repetition of the noise-exposure

Summary The nonauditory effects of noise can be summarized as follows

1 The interference of noise with speech communication under a variety of conditions is well understood and can be predicted from measurements of the sound pressure level in certain octave bands of the noise

2 Annoyance caused by noise is a highly individual phenomenon and is not easily predicted or measured, but the fact that a noise produces annoyance does not necessarily mean that it is bad for health

3 Efficiency in the performance of mental and motor tasks in industrial settings is only temporarily affected by exposure to unfamiliar or intermittent noises

4 Physiological changes resulting from noise-exposure lessen with repetition of the exposure At typical industrial noise levels it appears that no unhealthy physiological reaction results even from prolonged exposures

Auditory effects

Temporary hearing loss. Studies of the temporary auditory threshold shift caused by noise-exposure have revealed several important facts related to both temporary threshold shifts and permanent threshold shifts

1 The temporary elevation of auditory threshold which results from one day's exposure to noise levels of 100 dB or more may vary from no shift to as much as a 40 dB shift

2 Exposure to typical industrial noises pro-