thumb and neck of the bottle and the net-covered bulb is filled with air by pressing the uncovered bulb with the hand; the thumb is then released and the inrushing air replaces the air originally in the bottle. This operation is repeated three times, after which the tube is removed and the bottle is tightly sealed with a rubber stopper. An analysis of the sample is then made with a Peterson-Palmquist air-analysis instrument, the result being given in parts of CO_2 per 10,000 parts of air.

In the chart in Fig. 60 is shown how the air supply may be determined from the CO_2 readings. Suppose an analysis of the air sample taken in the room shows that the average CO_2 content is 7 parts per 10,000. Then if the outdoor air contains 4 parts per 10,000, the difference is 3 parts. Locate the 3 on the horizontal scale of the chart, and pass vertically up to the curve; from the point of intersection with the curve tranverse to the vertical scale which will show that 2,000 cu. ft. of air per hr. per person is being supplied to the room.

Distribution.—The distribution of the air in a room shall be determined from the CO_2 readings taken in the various parts of the room. The following example illustrates the method of calculating the result. Assume four samples taken resulting in the following analysis:

Station	*Parts of CO_2 per* 10,000
1	6.4
2	7.4
3	9.2
4	5.0
	Average 7.0

The variation at the various stations above or below the average is as follows:

Station	
1	$7.0 - 6.4 = 0.6$
2	$7.4 - 7.0 = 0.4$
3	$9.2 - 7.0 = 2.2$
4	$7.0 - 5.0 = 2.0$

Then the average variation from the average CO_2 is determined as follows:

$$\frac{0.6 + 0.4 + 2.2 + 2.0}{4} = 1.3$$

The percentage of variation is therefore equal to $1.3 \div 7.0 = 18.6$ per cent. Therefore the percentage distribution $= 100 - 18.6 = 81.4$ per cent.

Other Injurious Substances.—This column is used only in special cases where, owing to the nature of the processes carried on, some particularly injurious substance is being given off to the air. The column is then graduated, consistent with the nature of the substance.

For example, suppose that the contaminating substance is carbon monoxide. Grubner states that symptoms of poisoning are distinct when the air contains 0.02 of one per cent of this gas, and that death ensues in a short time when the air contains 0.05 of one per cent. Whitthaus states that when air containing carbon monoxide is breathed, the body retains about one-half of the gas inhaled. The poison therefore accumulates in the blood, and small amounts in the air may produce death if inhaled over a sufficient period of time. It is apparent therefore for our purpose that the lethal dose of 0.05 of one per cent is too high, and that 0.02 of one per cent, considering the time factor, would be nearer the truth. In arranging our scale in the column headed Other Injurious Substances, we would therefore consider air free from CO as 100 per cent and air containing two parts in 10,000 as 0 per cent, or air containing one part of CO would be 50 per cent, one-half parts, 25 per cent, etc.

For example, if a test is made of the air in a garage or other place where CO is found, and the result shows two parts of CO in 100,000 parts of air, the penalization factor

would be 10 per cent, and this amount would be added to the other minus percentages or penalization factors, and the total substracted from 100 to obtain the final Percentage of Perfect.

The Comfort Chart.—The interrelation of temperature, humidity, and air motion is shown in the lower portion of the chart. The intersection of the Air Motion line and the Physical State line determines the proper wet bulb temperature. This point should be indicated on the chart by a small angle (thus ⏋) the apex of the angle coinciding with the point of intersection of the lines. The observed dry bulb and wet bulb is also indicated by an angle (thus ∟). The difference between the *desirable* wet bulb and the *observed* wet bulb is plotted in the first column of the air chart marked Wet Bulb Difference.

Number and Location of Stations.—The number of stations where samples are to be taken shall be determined from the floor areas in the room. One station should be allowed

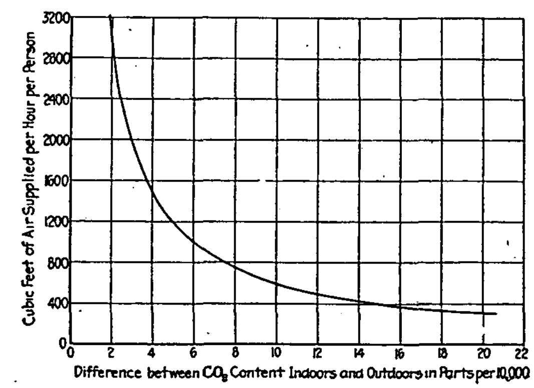

FIG. 60. CURVE TO DETERMINE AIR SUPPLY FROM CO_2 READINGS

for each 200 sq. ft. of floor space. In no case shall less than four samples be taken. The room should be divided equally into imaginary areas and a station located in the center of each area. All samples are to be taken in the breathing zone which is from 2 to 6 ft. from the floor.

RECORDING THE RESULTS

To illustrate the method of determining the Percentage of Perfect Ventilation, consider the results of a test as given below. The average results in a room are found as follows:

Dry Blub temperature	72 deg.
Wet Bulb temperature	58 deg.
Air Motion	20 ft. per min.
Physical State	Light work
Dust	10,000 particles per cu. ft.
Bacteria	10 colonies on a 2-min. plate
Odors	90 per cent free from
CO_2	7 parts per 10,000
Other injurious substances	None
Distribution	81.4