were made from later motor vehicle levels, this was in 1959, I believe. I will ask Mr. Griswold to give you more details since he was involved in this.

Based on the population at that later time and the existing levels of carbon monoxide, projections then were made back to the period when carbon monoxide was believed not to be a factor, nor eye irritation to be a factor.

Mr. CARPENTER. What was the factor in carbon monoxide effect? This is what I haven't been able to ascertain.

Dr. MIDDLETON. You mean the adverse effect?

Mr. CARPENTER. They have no adverse effect.

Dr. MIDDLETON. Well, adverse, in this sense, as damage to plants and destruction of property or impairment of visibility.

Mr. CARPENTER. Carbon monoxide does damage plants?

Dr. MIDDLETON. No, it doesn't damage plants. I am saying the word "adverse"—

Mr. CARPENTER. So it is not applicable to carbon monoxide?

Dr. MIDDLETON. It was believed not applicable to carbon monoxide, because it had no physiological function at that level. We are mixed up now in using California's terms of three categories as contrasted to one criteria.

Mr. CARPENTER. Their footnote, which I would assume is essentially their criterion here, says:

> Given certain assumptions concerning ventilatory rates, acute sickness might result from a carbon monoxide level of 240 parts per million for 1 hour in sensitive groups because of inactivation of 10 percent of the body's hemoglobin. In any event, it is clear that when a population exposure limit has been set for carbon monoxide, because of exposures from other sources, community pollution standards should be based on some fraction of this limit.

So I assume they took this 240 acute response in sensitive groups, divided it by two for their 1 hour exposure, and by eight for their 8-hour exposure, to get this fraction of safety?

Dr. MIDDLETON. I would have to do an awful lot of recalling to get the old numbers back.

Mr. GRISWOLD. You recall, John, when we were all discussing the criteria out there, and also the motor vehicle standards? There were two major theories involved: One was the rollback theory, the one Dr. Middleton mentioned, to an air quality existent prior to popular reaction in the early 1940's. So a calculation was made based on 1956 or 1957 vehicles of how much carbon monoxide was being put out by those vehicles registered and operating in 1940.

Mr. CARPENTER. Just as a tonnage.

Mr. GRISWOLD. On a total tonnage basis. Then the degree of control required by California in its original motor vehicle emission standards for carbon monoxide was related to that percentage of control that would result in the estimated number of motor vehicles registered in 1970, not putting out any greater tonnage of carbon monoxide than those that were registered in the early 1940's.

That was true on hydrocarbons, too. However, in the meantime, the State Department of Health was developing these standards and, realistically it seemed that in the calculations which resulted in the standards which you have just read—they fitted in beautifully with the 1940 rollback system.