Chart 3 indicates that higher total oxides of nitrogen and nitrogen dioxide are produced by bare electrode welding. The amounts of NO_2 are also a larger proportion of the total oxides (80 to 90 per cent, compared with 30 to 40 per cent for coated rods). Here again NO_2 concentrations parallel the iron fume decrease. Decrease in total oxides may be due to loss in NO_2. In this case also the amounts of iron fume present after filtration vary from 5 to 15 mg. per cubic meter, which is sufficient to react with some of the available nitrogen oxides. The amounts of total nitrate formed in the runs presented in charts 2 and 3 with filtration in each case are comparable. There is apparently insufficient time for reaction of the oxides and the iron fume as they pass through the exhauster, since the rate of oxide production appears unaffected by the number and the type of electrodes used.

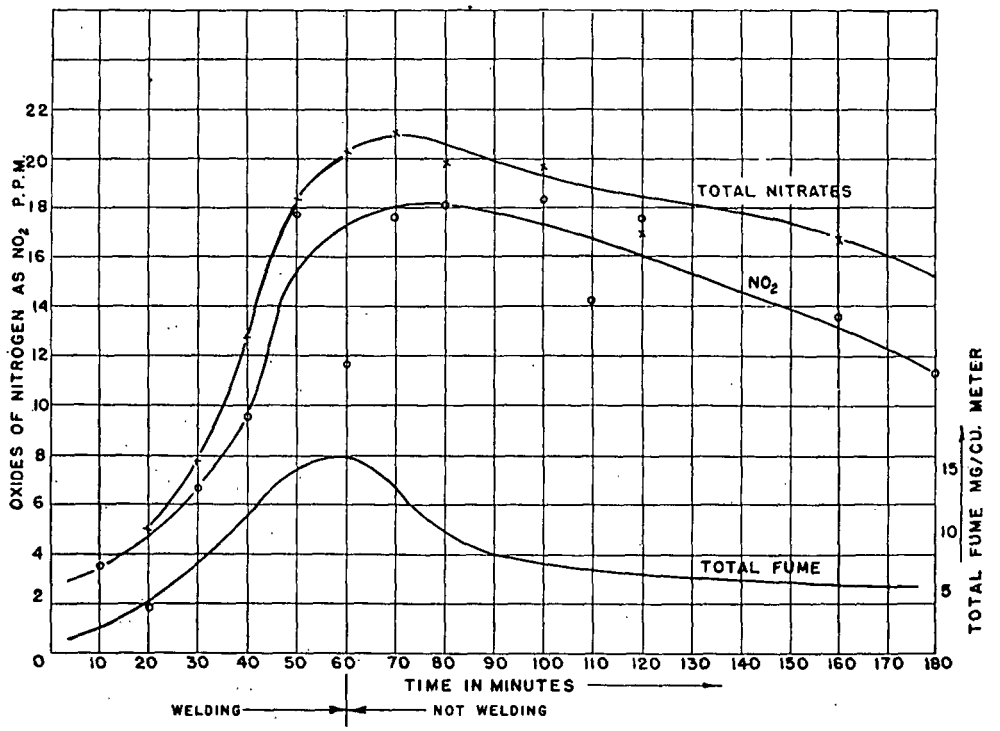

Chart 3.—Total oxides, nitrogen dioxide and total fume concentrations during and after arc welding with bare electrodes. Fumes filtered and cabinet air recirculated 0 to 60 minutes.

Charts 4, 5 and 6 present some insight into possible reactions taking place during the arc welding process, since in these runs NO was determined by direct analysis. In all three runs an excess welding current was used to increase the amounts of oxide formed.

The three runs all show similar trends in total oxide curves. As previously observed, more NO_2 is formed in bare rod welding (chart 5), but in this case, because of different current conditions, this oxide is less than half of the total, compared with a much higher percentage above (chart 3).

In charts 4 through 6 the concentrations of NO, NO_2, total oxides and total fume determined directly are plotted. In addition, the sum of NO_2+NO and the difference of total oxides less this sum, which is designated as NO_3; i.e. (total nitrates — [NO_2+NO]) are plotted. The latter value indicates the proportion of the