

AIR QUALITY ANALYSES FOR THE
PROPOSED MSU CROSS CAMPUS M 43

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MICHIGAN DEPARTMENT OF STATE HIGHWAYS

AIR QUALITY ANALYSES FOR THE
PROPOSED MSU CROSS CAMPUS M 43

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This report presents data showing levels of carbon monoxide, nitrogen dioxide, and hydrocarbons present in the air at selected sampling stations on and near the MSU campus. These data were collected for use at a public hearing on the proposed M 43 cross campus route.

Sampling Stations

Station No. 1. Near the southeast corner of the Grand River Avenue intersection with Abbot Road in East Lansing. Measurements at this site were expected to show air quality in an existing congested traffic area near the campus. It might be assumed that air quality conditions at this site would be improved by the construction of proposed M 43.

Station No. 2. Near the southeast corner of the Farm Lane intersection with North Shaw Lane. Measurements at this site were expected to show air quality in an existing condition created by on-campus traffic. It might be assumed that air quality conditions at this site would not change appreciably after construction of the proposed M 43.

Station No. 3. In the proposed right-of-way area, 15 ft east of Farm Lane. Measurements at this site were expected to show existing air quality conditions in the proposed right-of-way area.

Station No. 4. In the I 496 median, just east of the Red Cedar River overpass. The roadway runs east and west at this site. Measurements at this site were expected to show air quality conditions that could be expected on the proposed M 43 cross campus route. A visual traffic count at 4:10 p. m. on September 24, 1971 near this site showed a combined 3,600 vehicles per hour in both directions.

Sampling and testing were performed during peak traffic hours on September 24, 27, 28, and 29, 1971.

The different sampling procedures required for the pollutants measured result in a variable number of determinations for each site and time period involved. The limited time available for this study indicated that sampling should be conducted during morning and evening peak-traffic hours to determine the highest levels of pollutants to be expected at each location selected.

Nitrogen dioxide determination at low levels requires pumping air through an absorber solution for at least 1/2 hour. It is common air monitoring practice to absorb nitrogen dioxide in the same solution for 24 hours, and report only a 24 hour average value for the air volume sampled. Thus, only

one nitrogen dioxide determination was possible during a peak traffic period lasting about one hour.

Carbon Monoxide determination was carried out by pumping air through a glass tube packed with crystals that change from yellow to green in color when carbon monoxide is absorbed. Low concentrations of carbon monoxide require larger volumes of air to obtain an indication. The time required to pump a larger volume of air resulted in only one determination being made at some locations.

Samples for total hydrocarbons were pumped into plastic bags of approximately one gallon capacity using a small hand pump. The samples were transported to the laboratory for analysis.

Data for each sample station are as follows:

Location	Carbon Dioxide ppm	Nitrogen Dioxide ppm	Total Hydrocarbons, ppm
1. Gd. River & Abbot between 4:00 and 5:10 p. m.	30 avg. 10 to 50 range*	0.03	1.5 avg. 0.2 to 3.4 range
2. Farm Lane & N Shaw Lane between 7:50 and 8:10 a. m.	4.5 avg. 4 to 5 range	0.03	0.3 avg. 0.3 to 0.3 range
between 4:00 and 5:00 p. m.	5 avg. 2 to 8 range	0.02	0.15 avg. 0.1 to 0.2 range
3. Proposed right-of-way, just east of Farm Lane between 8:45 and 9:15 a. m.	2	0.02	0.1
4. I 496, east of Red Cedar River between 7:50 and 8:20 a. m.	1	0.02	0.1 avg.

*Variation in results was attributed to changing traffic and wind conditions. Near 5 p. m. there was heavy traffic and dead calm wind conditions.

For comparison purposes, air quality data obtained near freeways in the Detroit area follow.

Air quality measurements along the Lodge Freeway near Nine Mile Road yielded results as follows:

Carbon Monoxide ppm	Nitrogen Dioxide ppm	Total Hydro- carbons, ppm
1*	0.08	0.3

* When no average is reported a single measurement is indicated.

At this location the freeway is depressed and surface traffic volumes are light.

Similar data for the area near the intersection of the Lodge Freeway and Seven Mile Road follows:

Location	Carbon Monoxide ppm	Nitrogen Dioxide ppm	Total Hydro- carbons, ppm
On the east service road shoulder at 7 mile road	6 avg. 4-8 range	0.07 avg. 0.04-0.10 range	2.5 avg. 0.9- 4 range
200 ft east of the Lodge on 7 mile road	6 avg. 5-8 range	0.09*	0.4
600 ft east of the Lodge on 7 mile road	4 avg. 3-5 range	0.06 avg. 0.05-0.06 range	1.7 avg. 0.3-2.8 range

* When no average is reported a single measurement is indicated.

In the Lodge-7 mile area the freeway is depressed and surface volumes are heavy. These data tend to show the effects of non-freeway surface traffic on air quality. At a distance of 600 ft from the freeway air pollutants showed only a slight decrease. Measurements at similar distances from a freeway with little or no service road traffic can be expected to be considerably lower at the 600 ft distance.

The following comparison data for carbon monoxide levels were obtained by the Wayne County Department of Health, using a continuous automatic analyzer, at a location between I 75 and Michigan Avenue, at 16th Street, in Detroit. Both of these roadways carry heavy traffic, far exceeding traffic

on the proposed cross campus route. Yet, the data show that Federal air quality standards for carbon monoxide are being met.

Date	Hours sampled	Max. hour	Avg. all hours	Max 8-hr avg.
Sept. 1970	384	11.0	4.2	---
Oct. 1970	360	11.0	3.7	7.5
Nov. 1970	720	8.0	2.9	4.8
Dec. 1970	528	10.5	3.4	6.6
Jan. 1971	744	8.5	2.2	---
Feb. 1971	576	11.0	---	8.1
Mar. 1971	552	6.9	---	5.4

The Federal Air Quality Standards for carbon monoxide along with nitrogen dioxide and hydrocarbons are shown below. These standards appeared in the April 30, 1971 issue of the Federal Register.

Carbon Monoxide:

- a) 9 ppm maximum 8-hr concentration not to be exceeded more than once per year.
- b) 35 ppm maximum 1-hr concentration not to be exceeded more than once per year.

Nitrogen Dioxide: 0.05 ppm, annual arithmetic mean.

Hydrocarbons: 0.24 ppm (not including methane) maximum 3-hr concentration (6:00 to 9:00 a.m.) not to be exceeded more than once per year.

It should be noted that the 9 ppm maximum allowed for carbon monoxide applies to the average of values measured over an 8 hour period. This corresponds to the fifth column of the Wayne County Data which shows a maximum of 8.1 ppm. The 35 ppm standard should be compared with the third column.

Discussion

The very limited number of carbon monoxide and nitrogen dioxide levels measured on and near the MSU campus are within the limits of Federal Air Quality Standards. The comparison data reported for existing freeways in the Detroit area also meets Federal standards for these pollutants. The Federal Air Quality Standards are based on levels of air pollutants which will protect the public welfare from adverse effects associated with the presence of the specified pollutants in ambient air.

We do not have the necessary instrumental accessories for determining methane to correct total hydrocarbon results to the form required for comparison with Federal standards. However it should be noted that existing I 496 and the proposed right-of-way both had total hydrocarbon levels of 0.1 ppm, which is only 42 percent of the allowable maximum.

Existing I 496, west of the campus, and the proposed right-of-way adjacent to Farm Lane have comparable levels of the pollutants measured. This indicates that no significant deterioration of air quality would occur after construction of the proposed M 43. Increasingly stringent Federal regulation of automotive exhaust emissions, already promulgated, could be expected to lower present levels of pollutants as new cars replace present models on the road.