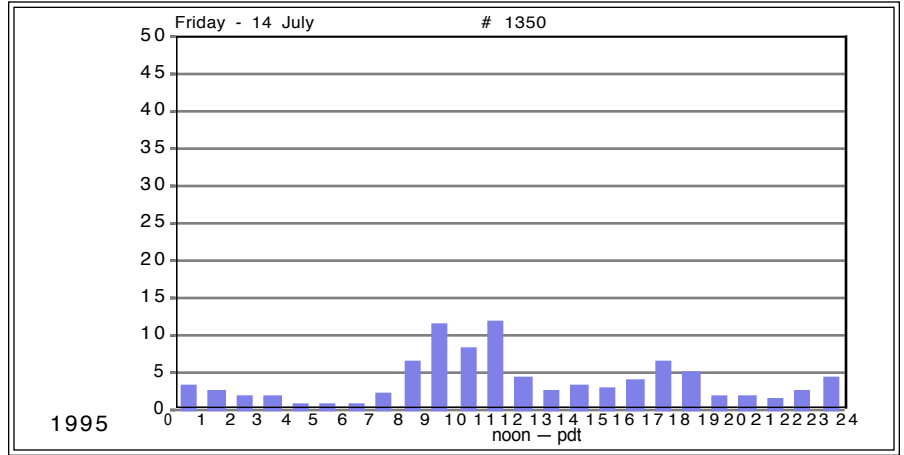


CO (carbon monoxide), plotted as hourly averages of parts per million, data were collected in the same auto repair shop. By using the same scales, the improvements in auto-emission control technology, over five years in California, are clearly demonstrated.



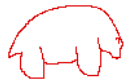
Automobiles Inside Garages

Bear Facts -- #60

**CO measurements reveal the presence of automobiles.
The measurements shown here were gathered in repair and parking garages.
Sometimes the results are surprising.**



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the DataBear

Bear Facts are published to provide useful insights into the operation and applications for the DataBear™ Measurer and associated complete instruments.

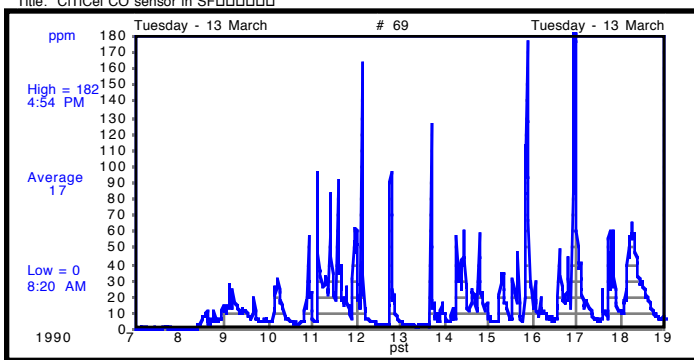
Carbon monoxide (CO) is the one stable gas emitted by automobiles. It is indicative of the degree of emission control— less is better. And, because it is slow to convert in ambient chemical reactions, it is an excellent tracer or indicator of an operating vehicle's presence.

In California, CO measurements on and about the State freeways show a rather dramatic reduction over the past decade*. This is confirmed and independently verified by measurements, separated by five years, taken in an automobile repair shop. The selected days were random examples of operations by a well-established, independent repair establishment. Two separate days of measurements, from 1990 and 1995, show that daily operations now result in significantly lower CO levels. The open space, located in downtown San Francisco, is well ventilated with warehouse-high ceilings and open entrances.

An example of CO monitoring to show activity in a private business-building parking facility reflects activity at unusual hours. Vehicles arrived or left in the middle of the night— either early to work and staying late! These could also have been unauthorized users. This was a twenty-car facility; the levels in a home garage increase greatly, so keep the outside door open.

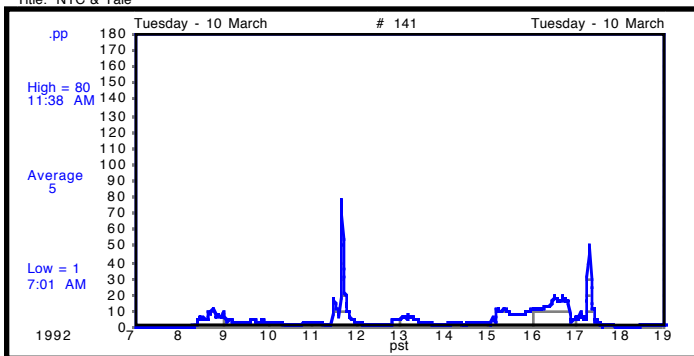
Some consultants have used the new high resolution available with Langan CO instruments to correlate activity in a garage with CO seepage into living/working quarters within the building. Data can give confidence there is no problem or caution that ventilation must be improved. In either event, the data are gathered easily and quickly.

Title: CITiceL CO sensor in SF000000

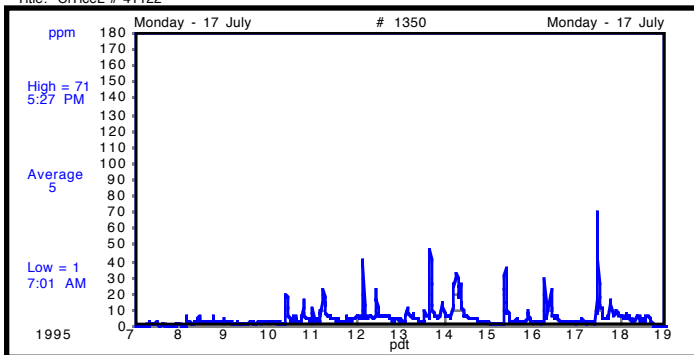


Twelve-hour days are common in this repair shop. The minute-by-minute data from 1990 (above) are compared to 1992 (just below) and 1995. The dampened 1992 response was measured inside a container in the vehicle during maintenance. In the 1990 and 1995 the days are from data taken over a full week, at two interior locations.

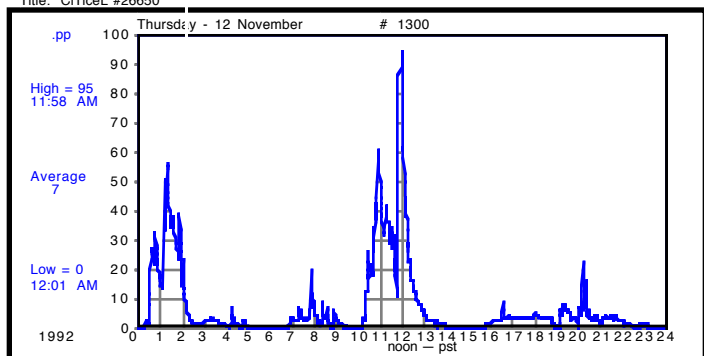
Title: NYC & Yale



Title: CITiceL # 41122



Title: CITiceL #26650



A 20-car private garage, which services a small office and retail space, was monitored for a week. This day shows late-night traffic (after a theater evening?), morning arrivals, mid-day business activity and evening departures. Any vehicle operation could be sensed.

* Ott, W., Switzer, P., and Willits, N. (1993) "Trends of In-Vehicle CO Exposure on a California Arterial Highway Over One Decade," Paper No. 93-RP-116B.04 presented at 86th Annual meeting of the Air & Waste Management Association, Denver, CO.

Langan Portable CO Measurers allow the observation of this odorless, invisible, toxic gas in an easy and consistent manner. We are often surprised at the results: the numbers may be less than that anticipated. Then, when CO levels are high this may be unsuspected too!