extremely small amounts. With one car, about 0.023% of the tetraethyllead burned was found as organic lead in the exhaust gas under conditions in which about 1.7% of the fuel was exhausted unburned. Therefore, it would appear that tetraethyllead decomposes much more readily in the engine and exhaust system than do some of the constituents of the gasoline. The percentage of the lead, burned by the car, which is discharged in the exhaust gas depends on the conditions under which the car is driven and also on the prior driving history of the car. During operation under a test cycle of moderate speeds similar to city type driving, 3 cars exhausted from 28% to 45% of the lead being burned in the fuel, based on average values computed from many individual tests. When exhaust systems were fairly free of deposits, the emissions of lead were in the 20%-25% range, but, after the cars had been operated for several thousands of miles at moderate speeds, emissions increased into the 35%-55% range. Individual tests showed wide variations which indicate that a random factor, probably deposit flaking in the exhaust system, is involved in the process of exhausting lead. Operation at high speeds, and particularly full-throttle acceleration at high speeds, may discharge several times as much lead as is being burned. However, continued operation of this type causes lead emissions to decrease, probably because exhaust system deposits are gradually partially expelled. This treatment returns the exhaust system to a condition where it again accumulates lead deposits and exhausts less lead in subsequent driving at moderate speeds. The particulate lead compounds in exhaust gas cover a broad range of sizes, from as small as 0.01 micron to several millimeters in diameter. About one half to two thirds of the lead exhausted in city type driving is in particles 5 microns in diameter and smaller. From about 4% to 12% of the exhausted lead is in particles 1 micron and smaller. High-speed accelerations discharge a lesser percentage of the exhausted lead in these fine-particle sizes. -- Authors' summary

499 Atmospheric Monitoring of Toxic Levels of Missile Propellants.
J. T. Nakamura and K. E. Ball.
Am. Ind. Hyg. Assn. J. 25, 77-80 (Jan.-Feb. 1964).

The Chemical and Materials Section of the Rocket Research Laboratories at Edwards Air Force Base has been responsible for hazard appraisal of various storable liquid propellants. Evaluating the toxic hazards posed by spills or inadvertant releases was curtailed by a lack of suitable instrumentation and by the shortcomings of applying laboratory wet chemical techniques to field experiments. Under contract to Edwards Air Force Base, Mine Safety Appliances Company developed an instrument suitable for continuous monitoring for toxic levels of NO_2, UDMH, B_5H_9, N_2H_4, F_2, and ClF_3. Based on spill test data from Edwards Air Force Base, realistic performance specifications are suggested for any continuous toxic hazard monitoring equipment for missile facilities. --Authors' abst.

500 Monitoring of Trace Constituents in Simulated Manned Spacecraft. T. B. Weber, et al.
Aerospace Med. 35, 148-152 (Feb. 1964).

Innovations in instrumentation and cryogenics have been employed in the isolation and detection of microconstituents in a manned spacecraft simulator. Since the isolation of materials is a tedious and time consuming procedure, specialized units were constructed for the collection of the trace constituents and also to occlude extraneous contaminants from entering the system. Gas chromatography was employed for broad spectrum analysis of compounds and sample separation. Infrared spectrophotometry served as a parallel detection system. During normal operations, 3 to 7 constituents consisting of nitrogen, oxygen, carbon dioxide, carbon monoxide, acetylene, acetone, and methane were normally found. A fire in the space cabin resulted in numerous compounds being liberated, several of which were tentatively identified. Many of these were probably pyrolysis products from the construction components aboard. -- Authors' summary