

not increase and urine lead levels decreased. Some details of the study were presented by Martha McLaughlin of DuPont's Haskell Laboratory for Toxicology and Industrial Medicine (Wilmington, Del. 19898) at the American Academy of Occupational Medicine's annual meeting in New Orleans, Feb. 5-7:

Selected for the study were personnel from 23 DuPont plants in widely separated geographical locations ranging from semi-rural to large metropolitan areas. None of the operations of any plant involved known occupational lead exposures. Any trends in lead levels in the group studied would be expected to be similar to those of the general U.S. population. To maintain the original sample size, it became necessary at the beginning of the third year to add replacements at each location to make up for subjects lost due to transfers and early retirements.

Annually, a urine specimen was collected from each subject and blood specimens were collected from 10% of the subjects. All specimens were sent to the Medical Laboratory for lead analysis. The first set of statistical analyses utilized data from subjects with five years of blood lead or urine lead values. The second set of analyses included data from all subjects involved during the study. Yearly mean blood lead values for both sets of data were similar. Yearly mean urine lead values for all subjects were similar to the mean values for the subjects with data for all five years.

Although the analysis of variance for subjects with five years of data indicated significant differences between years for both blood lead and urine lead, there was no apparent time trend in the mean blood lead values, but the mean urine lead values decreased throughout the course of the study. Analysis of quality control data for the urine lead measurement, selection of data for statistical treatment, and seasonal effects did not provide an explanation for the downward trend in urine lead levels.

UTILIZATION OF SURFACE REFLECTIVITY FOR OPTIMUM LIGHTING

The reflectivity of a factory's ceiling, walls, and floor contributes to the utilization of the lighting system, it was pointed out by Gordon D. Rowe of General Electric Company (Nela Park, Cleveland, Ohio 44112) at the 24th Plant Engineering and Maintenance Conference in Chicago, March 12-15. He gave the following as recommended minimum reflectances of surfaces:

Ceiling (all area above fixture line).....	80 to 90% reflectance
Walls.....	40 to 60% reflectance
Desk and Bench Tops, Machines and Equipment.....	25 to 45% reflectance
Floors.....	Not less than 20% reflectance

The effect of proper room-surface finish on the amount of light that a specific lighting system delivers can be evaluated by inspecting a luminaire's "coefficient-of-utilization" table which gives percentages of useful light reaching the work plane for a typical 400-watt Lucalox fixture. Where the respective ceiling, wall reflectances are 80 and 50%, the utilization will be 23 to 27% higher than if these reflectances were 10 and 10% -- a condition that can exist in a poorly maintained factory space. Illumination levels are directly proportional to the utilization factors, according to Mr. Rowe, thus, for a specific number of fixtures, proper room reflectances will increase the illumination or fewer fixtures will be required for a specific lighting level. Room colors should be selected for optimum light utilization and environmental acceptability, he added.

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For the first time, the capability for at least semiquantitative correlation of CO body burden with industrial exposure in the TLV range has become available. Therefore, in future surveys, CO analysis of breath samples collected at the end of the four-hour sampling period can provide correlation with the time weighted average dose inhaled by the employee during the time spent in his workplace. The most significant feature of this type of monitoring is the capability for instantaneous read-out. At any time the accumulated dose can be quickly estimated from the 1, 2, 3 and 4-hour calibration charts. Contact with a pocket of high CO concentration would immediately turn the entire tube from amber to black to give the wearer ample warning to immediately leave the area.

DESIGN, INSTALLATION, AND PROVE-IN OF PLATER FUME SCRUBBING SYSTEM

To meet the need for exhausting and fume scrubbing 250,000 cfm of air at the plating operations of Western Electric Company's Oklahoma City Works, a unique system was designed and installed which has produced encouraging results based on limited testing to date. Some considerations in the selection of the equipment and the problems encountered in proving in the equipment were outlined by A. E. Jamison at the 24th Plant Engineering and Maintenance Conference in Chicago, March 12-15:

On the basis of efficiencies, versatility and total cost, the extended surface scrubber and the vertical packed tower scrubber were selected. Extended surface scrubbers are very attractive because of the low water flow, and the once-through-the-unit features which eliminates the need for recirculating equipment. Ten single-stage units of this type with capacities ranging from 8,000 cfm to 25,000 cfm of air were eventually installed. By the time the last of the scrubbers was ordered, the suppliers of the extended surface scrubber had changed the design to utilize an in-line centaxial fan which is cheaper and less expensive to install. The vertical packed tower scrubber has great versatility in that the packing depth can be varied to improve the efficiency, and chemicals can be added to the recirculating tank to support the removal of special contaminants. Four packed tower scrubbers, utilizing conventional centrifugal fans, were installed.

In proving in the extended surface scrubbers, it was found that the Nylon reactions and eliminator pads furnished by the supplier lasted only about three weeks. A change to a rubber-coated hair pad has proved much more satisfactory since its useful life is about three to five months. After approximately six months of operation, the only problem with the packed towers was the appearance of water carryover. A chemical treatment corrected the cause of this -- a foreign growth in the pads on the extended surface scrubbers on cyanide processes. Problems were encountered with the in-line centaxial fans that were installed on the extended surface scrubbers on acid exhaust. Three weeks after installation, it was found that the elastoglass coating had failed due to deterioration of the fan blades attributed to water droplet carryover and to cracks in the coating caused by the intense vibration which allowed the acid to attack the metal. The problem was solved when one supplier agreed to furnish an in-line fan of all fiberglass reinforced plastic. In tests completed on an extended surface scrubber without work on the hydrogen chloride tank, 97% efficiency was attained. With maximum work, efficiency was 94%.

EVALUATION OF AN ENVIRONMENTAL CONTAMINANT: LEAD

In spite of progressively increasing amounts of lead that have been mined and distributed throughout our environment in recent years, it was found in a five-year study of 6,000 DuPont employees non-occupationally exposed to lead that lead levels in blood did

for an appreciable fraction of the smog-potential of the exhaust was described at the Automotive Air Pollution Research Symposium in Washington, D. C. March 7-9. Because wet chemical methods have been widely applied in analysis of exhaust gas, the resulting determinations of carbonyls have been commonly accepted as measurements of "oxygenates," according to R. W. Hurn of the Bureau of Mines' Bartlesville Research Center (Bartlesville, Okla. 74003), who said that this assumption is not justified. This conclusion is based on results of the following studies:

Experiments were made using a 1970 model compact vehicle equipped with a 6-cylinder, 170-CID engine outfitted in each of two configurations: one with standard 1970 model-year engine modifications for emission control, and the other with an oxidation catalyst added in the exhaust system. Secondary air was supplied in the second configuration. The fuels were an unleaded full-boiling range gasoline typical of U.S. summer regular grade plus a series of hydrocarbons that represented the principal hydrocarbon types in a full-boiling range gasoline. Rationale in the choice of the fuel components was to obtain data on oxygenate yields for each of the hydrocarbons. These data then would be combined in a synthesis to predict yields from a composite blend that would approach the characteristics of a full-boiling range gasoline. A variable rate proportional sampler was used to obtain sample upon which measurements were made for hydrocarbon, carbon dioxide, carbon monoxide, and oxygenates.

The following findings are based upon the levels of oxygenates estimated from data obtained in experiments using single component fuels in the vehicle not equipped with an exhaust oxidation catalyst, and upon levels of oxygenates determined directly by analysis of exhausts produced using a full-boiling range fuel in the vehicle equipped with an oxidation catalyst: (1) noncarbonyls may (but not necessarily always) constitute a significant fraction of exhaust oxygenates, and (2) the compositional character and class distribution of oxygenates in the exhaust from catalytic systems may differ significantly from that composition and distribution for oxygenates not subjected to catalytic conversion.

NEW APPROACH TO PERSONNEL MONITORING FOR CARBON MONOXIDE

Because of the deficiencies encountered with the fixed point alarms, grab sampling, and infrared monitoring in determining compliance with the TLV for carbon monoxide within a consolidated warehouse where gasoline-powered forklift trucks are used to store drums within bays and for loading boxcars, a different approach to personnel monitoring was adopted. Adrian L. Lynch of E. I. du Pont de Nemours & Company (Chamber Works, Deepwater, N. J. 08023) discussed the method at the American Academy of Occupational Medicine meeting in New Orleans, Feb. 7-9.

None of the available colorimetric or instrumental methods could be adapted to personnel monitoring, therefore, the Kitagawa CO Detector Tube was recalibrated for four hour continuous sampling. Although the best accuracy that could be attained lay in the $\pm 25\%$ range of the true value, the method sufficed to determine compliance with the TLV (0.5, 1 and 2 times 50 ppm). On the other hand, certain limitations must be observed. The flow rate is critical and must be maintained at 8.0 ± 1.2 ml/min and the useful range is limited to 30 to 100 ppm. The second generation instrument will include a microrotameter which will permit precise control of flow rate and thereby compensate for the variability in pressure drop from tube to tube which should improve the accuracy. With sampling rates in the 6.5 to 10 ml/min range, the response of the reagent stain is not proportional to CO concentrations below 30 ppm. Calibration must be carried out with CO standards made up in air, not in nitrogen.

ndustrial hygiene **news report**

Reporting on new developments in industrial hygiene, air pollution control and environmental health. Annual subscription: \$15.00. Published monthly by Flourney & Associates, 1845 W. Morse, Chicago, Ill. 60626.

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Volume 16

April, 1973

Number 4

THINGS TO COME: EPA's NEW SOURCE PERFORMANCE STANDARDS

The Environmental Protection Agency has ready for proposal a new group of New Source Performance Standards that cover facilities in seven categories, it was reported by Donald F. Walters of the Office of Air Quality Planning and Standards (Research Triangle Park, N. C. 27711), at the annual meeting of the Technical Association of the Pulp and Paper Industry in Chicago, March 5-7. He listed the following sources, pollutants of concern and affected facilities:

<u>Source</u>	<u>Affected Facility</u>	<u>Pollutant</u>
Asphalt concrete plants	Dryer; hot aggregate elevator screening equipment; hot aggregate weighing equipment; mineral filler loading, transfer and storage	Particulates
Petroleum refineries	Process gas burned in process heaters, boilers and waste gas disposal systems Catalyst regenerators	Sulfur dioxide Particulates Carbon monoxide
Gasoline, crude oil and petroleum distillate storage tanks	Storage vessel of more than 65,000 gallon capacity	Hydrocarbons
Iron and steel mills	Basic oxygen furnaces	Particulates
Sewage treatment plants	Sludge incinerators	Particulates
Secondary brass or bronze refining facilities	Reverberatory furnaces	Particulates
Secondary lead smelters and refineries	Blast and reverberatory furnaces	Particulates

Mr. Walters also mentioned that development of standards is well advanced for copper, lead and zinc smelters, with reference to particulates and sulfur dioxide. Other industrial categories that are candidates for proposed New Source Performance Standards about August, 1973, and the pollutants of concern are aluminum reduction plants (fluorides); ferro-alloy plants (particulates); coal cleaning plants (particulates); kraft pulp mills (total reduced sulfur); iron and steel mills (particulates and carbon monoxide); phosphate fertilizer plants (fluorides); and gas turbines (particulates, nitrogen oxides, and sulfur oxides).

METHODOLOGY FOR MEASUREMENT OF OXYGENATES IN AUTO EXHAUST GAS

A method for measuring oxygenates, a class of partly-burned hydrocarbons, which under certain circumstances can be produced in auto exhaust gas in sufficient quantity to account

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Title Reference:	Enclosed is a copy of our current issue which contains a report on a paper you recently presented -- one we believe our readers will find most interesting.					
Primary Author Last Name:	Flournoy	First Name, Middle Initial:	Doris			
Secondary Authors:	Industrial Hygiene News Report	Publication:				
Primary Recipient (s):	Martha McLaughlin					
CC's:						
Names Stated:	Chicago, Illinois, Flournoy & Associates, Haskell Laboratory, DuPont, Wilmington, Delaware					
Doc Problems:						
Case Produced In:	Steven Thomas	Produced By:	DPT	Source:	Responsive to Plaintiff's 1st Request for Production	
Dup/Cross Ref #s:						
Doc Control Comments:	Disk, Box 1, January 2002, SH001001 - SH001002					
Obj. Coder Nam	D. Green	Obj. Data Entry Nam	D. Green	ObjDataDate	9/4/2002	

N 27016.01

MR 901

Published by FLOURNOY & ASSOCIATES



Industrial hygiene news report

1845 WEST MORSE AVENUE, CHICAGO, ILLINOIS 60626

April 12, 1973

Martha McLaughlin, B.A., Physiologist
Haskell Laboratory for Toxicology & Industrial Medicine
E. I. du Pont de Nemours & Co.
Wilmington, Del. 19898

Dear Ms. McLaughlin:

Enclosed is a copy of our current issue which contains a report on a paper you recently presented -- one we believe our readers will find most interesting.

We hope that our write-up meets with your approval. Thank you for the privilege of reporting on your work.

Sincerely yours,

Doris Flourney
Doris Flourney, M.S.
Managing Editor

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