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Title: High Resolution

Fairbanks, Alaska

DataBear™ Measurer
Langan Products, Inc.

Title: High Resolution

Washington, DC

DataBear™ Measurer
Langan Products, Inc.

Title: CiTiceL # *NOTE: scale is three times that used for other cities*

Vadadora, India

DataBear™ Measurer
Langan Products, Inc.

Title: High Resolution

San Francisco, California

DataBear™ Measurer
Langan Products, Inc.

Four examples of 24-hour data gathered this year at cities thousands of miles apart around the world; they show a time series of carbon monoxide (CO) measurements measured with the Langan Model T15 carried during a variety of activities, inside and out. These are the type of data gathered during the EXPOLIS study in Europe, the results of which are just beginning to be released. (India data courtesy Pawan Maini, a Ph.D. candidate at the University of Colorado)

CO, Exposed Around the World

Bear Facts -- #99

The Langan Enhanced CO Measurer has found acceptance with researchers making human exposure studies in many countries of the world. Here, some insight into some studies big and small, that are in progress.

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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.

Keeping
in
Touch!

This is a replication of the TMAD form used in the EXPOLIS study. Each randomly selected participant was required to indicate what they were doing for a 48-hour period in fifteen-minute segments. More than one activity could be allocated to a single segment. (created using MS-Excel)

Time Microenvironment Activity Diary															
Date		Location										Activities			
Time	briefly describe activity	in transfer					not in transfer					cook	smoking:		
		walk	motor	car	bus	street	home:	work:	other:		self		same		
		bike	cycle	taxi	tram	train	in	out	in	out	in	out			room
8	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	15	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	30	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	45	o	o	o	o	o	o	o	o	o	o	o	o	o	o
9	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	15	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	30	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	45	o	o	o	o	o	o	o	o	o	o	o	o	o	o
10	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	15	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	30	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	45	o	o	o	o	o	o	o	o	o	o	o	o	o	o
11	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	15	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	30	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	45	o	o	o	o	o	o	o	o	o	o	o	o	o	o
12	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	15	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	30	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	45	o	o	o	o	o	o	o	o	o	o	o	o	o	o

continued for as many hours as required

Human exposure to carcinogens is of major concern to health professionals in all countries. They labor under difficult restraints for there are many potential poisons and, of those identified, most are difficult to observe. The transducers require a complex interaction between sampling and analysis. The most simple exception is the Langan CO Measurer. Put it in place, carry it, hide it; it records levels of this toxic gas at a selected sampling rate for subsequent computer retrieval. Its usefulness is confirmed by its rigorous evaluation and inclusion in several important studies.

Human exposure is further complicated by the need to establish procedures where persons can make observations during their daily routine. Not a simple task. The measuring equipment must be as unobtrusive as possible. The selected people must be willing to participate. They must be willing to record their activities. There must be a large enough group to be representative.

An example of a major European study addressing this problem is the EXPOLIS project (Air Pollution Exposure Distributions within Adult Urban Populations in Europe). Field data have been gathered since the Fall 1996, though 1998, in six population centers: Helsinki, Athens, Milan, Basel, Grenoble and Prague. The EXPOLIS

project is coordinated by the Division of Environmental Health (KTL), Kuopio, Finland. The objectives and outline of rigorous procedures were recently published*.

EXPOLIS used randomly selected participants from the citizens living in each city. The Model T15 CO Measurer, VOC collection tubes with sampling pump (to evaluate three-dozen organic compounds) and a mini-PM_{2.5} cyclone to observe particulates were packaged together in a small aluminum briefcase. Each participant maintained observations for contiguous 48-hour periods, usually Monday to Wednesday. At least 50 observers were used in each

city. The results have been entered into a comprehensive data base, and their evaluation is in progress at the participating institutions.

Raw data have not been released from EXPOLIS. The examples shown on the reverse are from other projects, similar in interest but on a much smaller scale. These data are not unlike those data gathered in EXPOLIS. Other studies have been reported in this series, and more are in progress. Measurements have been made on every continent.

In August, 1998, the first preliminary results of the EXPOLIS study** were presented in a paper at the 10th Conference of the International Society for Environmental Epidemiology and the 8th Conference of the International Society of Exposure Analysis in Boston, MA. The abstract reported an analysis of data gathered in Athens, using the TADs for 23 subjects, during commuting with various means of transportation. It was found that personal CO exposure was positively associated with the duration of car or motorcycle use. For other means of transportation (walking, bus transit or underground) the correlation was minimal.

Georgoulis, L; Samoli, E; Vouros, P; Katsouyanni, K; Jantunen, M (1998): *Urban Commuting and CO Exposure: A Preliminary Analysis within the EXPOLIS project*, Paper 259 O, *Epidemiology*, Vol 9, No 4, Supplement, Williams & Wilkins (July).

* Jantunen, Matti J.; Hänninen, Otto; Katsouyanni, Klea; Knöppel, Helmut; Kuenzil, Nino; Lebret, Erik; Maroni, Marco; Saarela, Kristina; Srám, Radim; Zmirou, Denis (1998): *Air Pollution Exposure in European Cities: the "EXPOLIS" Study*, *Journal of Exposure Analysis and Environmental Epidemiology*, Vol. 8, No. 4., Princeton Scientific Publishing Co., Inc. ISSN: 10534245 (December).

The Langan CO Measurer combines a sophisticated accurate electrochemical sensor in a small, tested configuration. These are attached to reliable data acquisition electronics and are retrieved by useful field-evaluated software. This miniature system has allowed researchers to expand their studies in ways not previously practical (or readily affordable!)