GEN 55 REV. 2 (5/74)

Interoffice Memorandum

TO (Name and Location)	DATE
E. J. Heinz	Nov. 19, 1980
FROM (Name and Location)	REFERENCE NO.
N. Flaten and J. H. Pritchard	NF-6-80/JHP-15-80

EVALUATION OF THE INTRODUCTORY INDUSTRIAL HYGIENE COURSE

The November 11-13, 1980, course presented an overview of industrial hygiene. James T. Schirripa from Industrial Hygienics, Inc., and his associate, explained how to set up, implement and maintain an industrial hygiene program, with emphasis on the recognition, evaluation and control of industrial hygiene problems. This included such areas as identification and types of occupational diseases, how hazardous material exposure limits are determined, personnel monitoring and analytical techniques, ventilation engineering and protective equipment evaluation and use. On the last day, Mark Stenzel and Grover Vos, Celanese Chemical Company's industrial hygienists, outlined Celanese's industrial hygiene program. They described the methods and techniques used by Celanese for the recognition, evaluation and control of industrial hygiene problems, particularly with regard to the computer assisted Health Surveillance Program. They also made a plant-by-plant breakdown of hazardous materials exposure problems. Throughout the seminar, emphasis was placed on the importance and benefits that a good industrial hygiene program has for the company, employees and community.

The course was educational for people with or without experience in industrial hygiene because it provided a good overview of industrial hygiene and it also involved looking at several aspects in detail. Industrial Hygienics' presentation was especially beneficial because they not only covered the problems on the whole, but they also addressed problems specific to Celanese. The Celanese Chemical Company industrial hygienist's course wrap-up was also beneficial because they detailed the scope of Celanese's industrial hygiene problems and defined Celanese's industrial hygiene program. The course was helpful because it organized the elements of industrial hygiene to make for a better understanding of the field and, in turn, better problem solving.

After participating in the course, we recommend that others participate, particularly if Industrial Hygienics, Inc., personnel give their presentation.

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cc: E. Munoz
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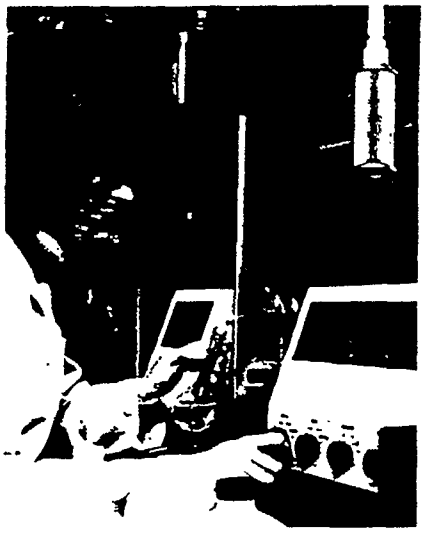
002396

PLAINTIFF'S EXHIBIT
tabbies
CEL-217

Another advance from Foxboro Analytical

MIRAN-801

Multi-station, Multi-component Ambient Air Monitoring System



Featuring time-weighted averages for cost-effective compliance with OSHA reporting requirements for toxic gases.

The MIRAN-801 system — a major advance in toxic gas monitoring.

The MIRAN-801 system is a significant advance in ambient air monitoring. It provides a cost-effective means of complying with OSHA requirements for reporting the concentrations of toxic gases in areas where your personnel are exposed. It reduces the need for costly personnel monitors. When an alarm condition is sensed the operator is notified immediately and workers can be alerted. Convenient, time-weighted averages show, at a glance, the average concentration of as many as 10 toxic gases at up to 24 locations. This information is available in printout form by the shift and by the month.

There are three other reasons why the MIRAN-801 system is a major advance in ambient air monitoring. They are:

Up to ten toxic gases can be monitored simultaneously, unattended, at up to 12 or 24 locations. Previously, only *one* toxic substance could be monitored.

The system provides a convenient printed record which will substantiate your company's compliance with OSHA limits for toxic gas concentrations in ambient air. The printout, which can also be used as a management guide for safety planning, records concentrations in parts per million, with each monitored location identified by number. Time of sampling and any alarms given are also noted on this printout.

The system's built-in microprocessor makes possible the summarization of data for convenient analysis and record storage. This summary printout of time-weighted average concentrations measured can be made for each shift, both daily and monthly. The data provided includes monitoring station number, average concentration for each gas under study, the number of readings taken, the number of times an alarm level was exceeded, and the highest reading.

The MIRAN-801 system is an accurate, dependable means for monitoring and recording ambient air quality in manufacturing areas, labs, machine shops, paint spray booths, storage areas, quality control facilities, chemical processing lines, exhaust air ducts, test areas and other locations as far as 1,000 feet from the unit's central control cabinet.

Microprocessor control enables multi-component monitoring.

Microprocessor control makes possible the simultaneous sample collection, multi-component analysis, data reduction, and the printouts and alarm signals necessary for monitoring up to 10 potentially toxic vapors around the clock.

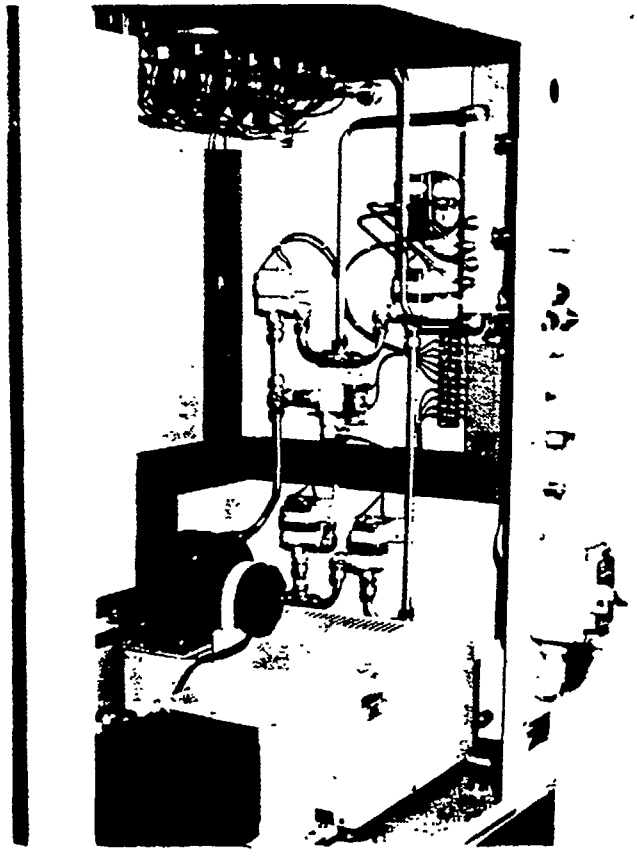
One significant advantage of the MIRAN-801 system resulting from full microprocessor control is its ability to be programmed to monitor any desired selection of (up to 10) individual gases and later to be reprogrammed to monitor a different selection of gases. Or, initially, it can monitor less than 10 gases with others added at a later date.

Built to last under rugged plant operating conditions.

The MIRAN-801 system's heavy duty construction and all solid-state electronics on plug-in boards assure long service life, with ease of service and minimal downtime.

Principle of operation:

The operating principle of the MIRAN-801 is straightforward and uncomplicated. An ambient air sample is collected at one of the remote sampling points and is pumped into the sample cell of the system's single-beam infrared analyzer. The analyzer then passes an infrared



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MIRAN-801
8-HOUR SHIFT SUMMARY
16:00:00 ; 7/19/78 — TIME AT END OF SHIFT AND DATE

MIRAN-801 SAMPLE PRINTOUT

8-HOUR TIME WEIGHTED AVERAGE (PPM)

SAMPLING STATION — NUMBER OF READINGS DURING SHIFT — COMPONENT

	A	B	C	D	E	F	G	H	I	J
	# READS	TIME WEIGHTED AVERAGE CONCENTRATION IN PPM								
1	12	6.4	38	.4	3.4	14	682	14	.3	4.8	12
2	12	2.1	27	.4	2.6	15	704	10	.2	3.2	17
3	12	4.4	22	.4	2.4	18	824	9	.1	3.2	10
4	12	5.8	13	.4	4.8	65	758	12	.1	3.3	11
5	12	5.9	44	.4	7.3	68	652	21	.4	3.0	36
6	12	5.7	15	.5	2.6	74	640	23	.8	7.2	39
7	12	4.4	18	.4	2.8	54	618	26	1.0	6.4	48
8	12	5.2	16	.6	2.2	53	598	13	1.3	6.8	42
9	13	0.6	7	.3	.8	8	560	2	.1	2.0	8
10	13	0.5	6	.2	.6	9	578	1	.2	2.1	10
11	13	0.5	6	.1	.6	10	584	1	.1	1.9	9
12	13	0.6	7	.2	.6	8	564	1	.1	1.9	10
13	12	2.4	18	.4	2.8	29	660	16	1.6	9.4	34
14	12	6.8	38	.4	4.4	40	824	24	.2	4.6	22
15	12	7.1	44	.3	4.2	41	919	38	.4	4.8	18
16	12	8.4	55	1.4	9.4	68	1227	42	2.4	2.4	68
17	12	8.6	57	1.5	8.8	62	1042	39	2.1	2.8	74
18	12	8.3	43	1.8	7.2	58	983	24	2.0	2.7	66
19	12	10.4	47	2.4	3.0	84	1097	22	2.0	2.4	58
20	12	6.4	28	.4	2.9	44	687	13	.3	9.4	17
21	12	6.8	18	.4	2.9	58	643	11	.3	12.8	13
22	12	6.8	15	.5	2.7	18	637	12	.1	16.9	15
23	12	7.3	16	.4	3.1	34	658	12	.8	11.4	21
24	12	5.8	23	.4	3.2	38	604	11	1.2	3.2	12

HIGHEST CONCENTRATION DURING SHIFT (PPM)

SAMPLING STATION — COMPONENT — HIGHEST CONCENTRATION DURING SHIFT IN PPM — TIME OF HIGHEST CONCENTRATION

	A	B	C	D	E	F	G	H	I	J
1	10.8 13:22	74 14:02	0.8	15:47	7.8	13:22	24 11:47	925 11:47	32 15:47	0.7 13:22	9.4 15:47	26 15:47

...eam through the sample and ...easures the amount of light ab...bed at each of a sequence of ...pecific wavelengths.

The amount of infrared light absorbed at these wavelengths by the ...ample is directly related to the concentration of the toxic gases being analyzed within the sample.

When IR absorption has been measured at all programmed wavelengths, the computer calculates the concentration of components in its sample by using stored calibration coefficients.

While the first air sample is being analyzed, the next sample line is purged. When the sample analysis is complete, the gas cell is purged and the next sample is ready for analysis. The purging system in the Wilks MIRAN-801 eliminates any effect of sample line length. Typical cycle time is one to two minutes per sample location. In addition, the system has a "skip" feature which permits skipping to any location.

The concentration of each gas sample in parts per million is then recorded on a paper printout. The printout is your "round-the-clock" record of ambient air conditions throughtout your plant, labs, offices, etc.

Should the concentration of any of the gases being monitored exceed OSHA limits, an alarm is automatically triggered at the unit's control cabinet. Personnel alarms at each monitored station can be fitted to the system. A summary of alarms is included in the printout provided by the system.

8-hour and monthly summaries of time-weighted averages simplify compliance records.

A major feature of the MIRAN-801 system is data summarization, as illustrated by printout photographed below.

As you can see, this single printout sheet contains the data you'll need to substantiate OSHA compliance for an 8 hour shift. A monthly record is also available.

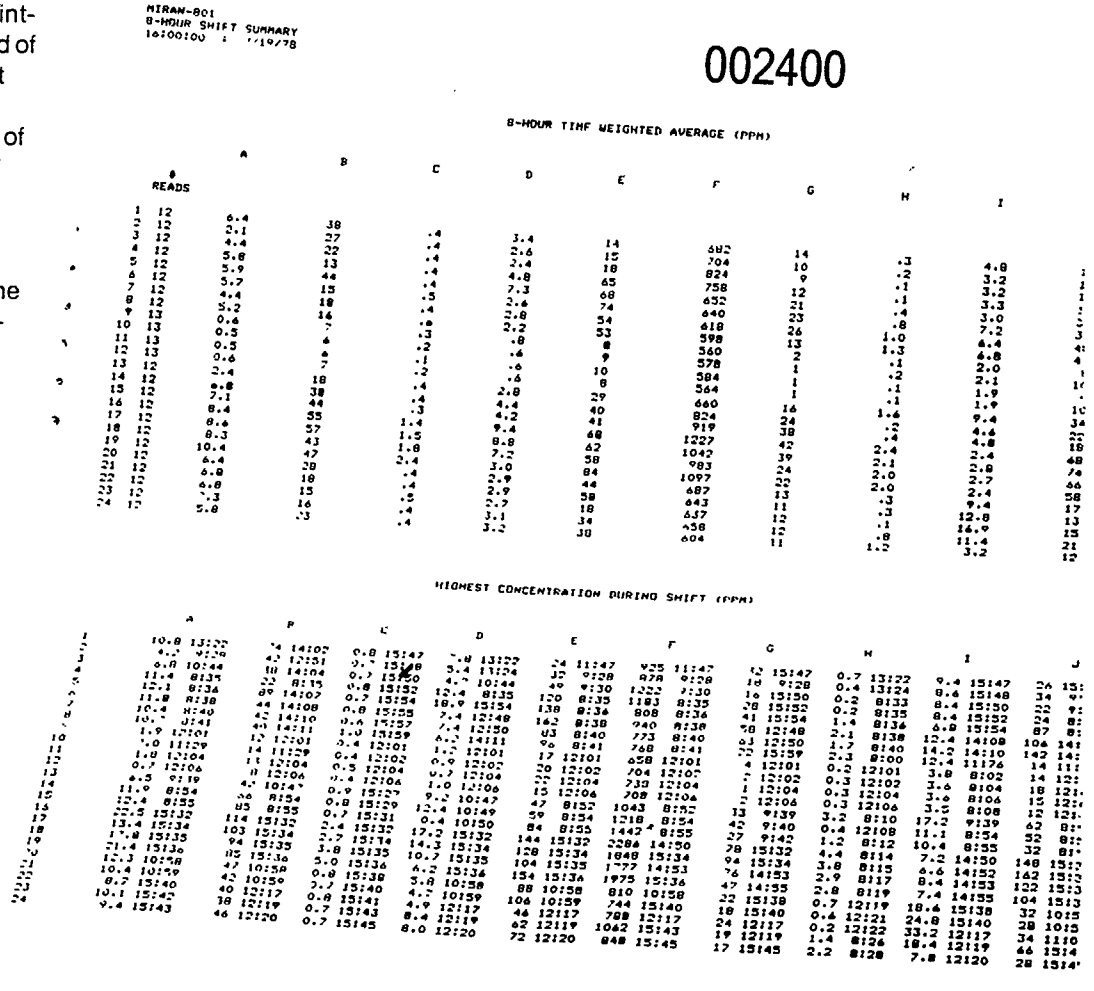
Data for each gas monitored is provided by sampling location and includes the number of readings, average concentration, maximum concentration and times of day these levels were reached, and number of alarms.

High concentration alarms, as well as loss of flow and system malfunction alarms, are also clearly indicated on the printout.

No other ambient air monitoring system provides such a concise, accurate and comprehensive record for OSHA-compliance verification and for management or plant safety planning.

Typical applications

- Area monitoring
- OSHA compliance testing of toxic vapors and gases
- Leak detection
- Warning of chemical spills
- Checking ventilation system efficiency
- Use anywhere that continuous, unattended, multi-point, multi-component monitoring is required.



MIRAN-801
System Specifications

Principle of measurement:
Programmable wavelength infrared analyzer.

Gases monitored:
Up to 10 infrared absorbing toxic substances can be monitored. This includes more than 200 of the 400-odd gases declared hazardous by OSHA.

Data printout:
A permanent paper record is provided by a Digital Equipment Corp. LA 34 DECwriter II. The record includes concentrations of up to 10 different toxic gases measured at up to 24 locations, with each location identified by its assigned number. Also shown on the printout are the time the sample was taken, and an indication of any alarms which occurred as a result of exceeding the set point. System malfunction alarms are also indicated. Printout timing is selectable.

Summarized data printout:
Provision exists for readout of time-weighted average by 8-hour shift and by month. Data provided includes monitoring station number, average concentration for each gas under study, number of readings taken and number of alarms given.

Data transmission:
The system has the capability to transmit data to a central control room via standard serial data link (EIA RS232-C or current loop).

System test:
Alarm and various system tests are automatically carried out.

Alarms:
Dual set point for each component is standard, as is a dual visual indicator. Commutated alarm (optional) for external outputs only. Alarms are: loss of flow alarm (printed with external outputs); system malfunction alarm (printed with external outputs). A single manual acknowledgement switch, located externally, has the ability to be remoted to a control room.

Remote alarms:
Internal relays are provided for each sample point monitored which can be used to actuate alarms at the corresponding remote point being monitored, in order to warn personnel.

Sample inlet ports:
The MIRAN-801 is supplied with twelve 3/8-inch NPT inlet ports. Optionally, an additional twelve ports can be added.

Sample point cycle time:
Adjustable from 30 seconds to 30 minutes.

Sample point interconnections:
Sample test points can be located up to 1,000 feet from the main control console. Samples are drawn through standard 1/2" I.D. nylon tubing (supplied by customer).

Flow indicator:
Built-in analog indicator provides fast visual check of gas flow through the system.

Auto zero
Calibration automatically "zeroed" once every cycle — or less frequently.

Enclosures:
NEMA-4 enclosure; free standing. Internal temperature controlled for operation in ambient air temperatures of 0-40°C.

Hazardous Locations:
The MIRAN-801 is optionally available with a purged enclosure (Type Z) to meet Class I, Division 2, Group D requirements.

Dimensions:
1.88 x 1.07 x 0.51 metres (74 x 42 x 20 inches)

Weight:
770 kg. (350 lbs.)

Power requirement:
115 or 230 V, 50 or 60 Hz, 1,000 W

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002401

FOXBORO®

Test for screening...

ASBESTOS

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health

TEST FOR SCREENING ASBESTOS

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OCTOBER 1979

DHEW (NIOSH) Publication No. 80-110

TEST FOR SCREENING ASBESTOS

I. SCOPE AND APPLICATION

This colorimetric test is applicable to the detection of magnesium (II) and iron (II) from asbestos in bulk samples. These samples include sprayed on asbestos as well as ceiling tiles. The test is simple and can be readily used in the field to screen for the presence or absence of asbestos. The amount of the sample needed for the test is only about the size of a large pea.

II. PRINCIPLE

The test is based upon the formation of color complexes with Mg^{+2} and Fe^{+2} released from asbestos. The Mg^{+2} from chrysotile is complexed with p-nitrophenylazo-α-naphthol. The Fe^{+2} from crocidolite and amosite is complexed with 1, 10-phenanthroline. A positive test is indicated by the formation of colored complex for Mg^{+2} and/or Fe^{+2}, and it indicates possible presence of asbestos.

III. INTERFERENCES

The test is a colorimetric spot test for Mg^{+2} and Fe^{+2}, and is not specific for asbestos.

A bulk sample may contain Mg and Fe compounds other than asbestos. Without treating the sample as in the Procedure, a few drops of color forming reagents are added directly to the sample. If either color forms, an interferring substance is present and the sample must be cleaned before the test is conducted to eliminate the interference. In this cleaning process, plaster, mineral wool, fiberglass, and soluble Mg and Fe compounds are removed before the screening test, preventing their interference.

IV. SENSITIVITY, PRECISION, AND ACCURACY

A sample containing more than 1% asbestos gives a positive color reaction.

A total of 198 various field samples were tested before the Acid Wash steps were added to the Iron Test procedure. Results are listed below:

Results of the screening test without the Acid Wash.

	True Positive	False Positive	True Negative	False Negative
No. of Samples	79	50	69	0
% of Total	40	25	35	0

With the Acid Wash, the following results were obtained from 13 samples.

Results of the screening test with the Acid Wash.

	True Positive	False Positive	True Negative	False Negative
No. of Samples	5	0	8	0
% of Total	38	0	62	0

V. APPARATUS

1. Teflon dish or white plastic plate
2. Plastic or glass rod
3. Dropping plastic pipet
4. 15 mL disposable plastic beaker
5. 25 mm size 0.8 µm mixed cellulose ester filter
6. 25 mm size polyvinyl chloride filter
7. 25 mm Swinnex filter holder and gasket
8. 10 mL disposable plastic syringe

VI. REAGENTS (Reagent Grade)

1. Phosphoric acid, concentrated.

2. 10 N sodium hydroxide - Dissolve 40 g of NaOH in 100 mL of water.

3. Mg Reagent - Dissolve 1 mg of p-nitrophenylazo-α-naphthol in 100 mL of 2 N NaOH. Age at least a day. This reagent is stable over a month.

4. Hydrofluoric acid - Dilute 20 mL of HF with 20 mL of water. Add 0.6 mL of concentrated HCl.

5. Fe Reagent - Dissolve 2 g of 1,10-phenanthroline in 50 mL of ethanol. This reagent is stable over a month.

6. Glycerin, reagent grade.

7. Acetic acid, concentrated glacial.

8. Sulfuric acid, concentrated.

9. Double de-ionized water.

VII. PROCEDURE

A. Magnesium Test

1. Add a few drops of Mg Reagent directly to the sample. If blue color appears, wash the sample with glycerin before the test. Any sample containing plaster is also washed with glycerin.

   Glycerin Wash

   a. Place a small portion of sample, about the size of a large pea, in a plastic beaker.

   b. Add 5 drops of glycerin and mix well with a plastic rod or spatula.

   c. Rinse the plastic rod with a small amount of water into the beaker.

   d. Filter the sample through the filtration assembly consisting of a syringe attached to the Swinnex filter holder loaded with a mixed cellulose ester filter and a gasket.

   e. Filter with a minimum of 5 washings or about 50 mL of water.

   f. Transfer the filter to a Teflon dish for the Magnesium test.

2. Add a drop of H_3PO_4 and mix well by grinding the sample with a plastic rod.

3. Add 2 drops of 10 N NaOH and mix well.

4. Add 5 drops of Mg Reagent and stir briefly. Note any color change.

5. Add 5 more drops of Mg Reagent and observe the final color.

6. A blue color indicates that chrysotile may be present.

7. Samples giving a positive test may be sent to a laboratory for confirmation. If the magnesium test is negative, the sample must be tested for iron.

B. Iron Test

1. Add few drops of Fe Reagent directly to the sample. If a red color appears, wash the sample with the acetic--sulfuric acid mixture before the test. Samples containing fiberglass or mineral wool are also washed with the acid mixture.

Acid Wash

1. Place a small portion of the sample, about the size of a large pea, in a plastic beaker.

2. Add 5 drops of concentrated acetic acid.

3. Add 5 drops of concentrated sulfuric acid.

4. Mix well and ultrasonicate if available for 5 minutes.

5. Filter the sample through a polyvinyl chloride filter with a minimum of 5 washings or about 50 mL of water.

6. Transfer the filter to a Teflon dish and proceed with the Iron Test.

2. Add a drop of HF solution and mix well.

3. Add 5 drops of Fe Reagent and observe the development of red color.

4. The red color indicates that amosite or crocidolite may be present.

C. Notes

If both parts of the test give negative responses, there is a low probability that any asbestos is present. Once the presence of magnesium and/or iron is indicated, further analysis, if needed, is done in the laboratory to confirm, identify the type, and quantitate the percentage of asbestos.

VIII. REFERENCE

1. Caution: Asbestos Dust. A scriptographic booklet by Channing L. Bete Co., Inc., Greenfield, Mass. Prepared in cooperation with U.S. DHEW, PHS, CDC, National Institute for Occupational Safety and Health, Cincinnati, Ohio (1973).

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