The Industrial Hygiene

Monitor

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Certification—Closer Look

The field Industrial Hygiene network staff is relatively young in Monsanto compared with other professional disciplines. With this in mind, J. T. Garrett, Industrial Hygiene Director, has explored in a two part article the subject of professional certification and its impact on industrial hygienists and hygiene chemists.

It is important for a Professional Industrial Hygienist or Hygiene Chemist to be certified by the American Board of Industrial Hygiene (ABIH). In the eyes of others in the public health field, this signifies that the hygienist or hygiene chemist has acquired the training and skills to be called a true professional. In addition to this obvious benefit, there are several other benefits that accrue to Monsanto and to the hygienist or hygiene chemist who reaches this plateau in his or her professional development. These are in part:

OSHA and NIOSH Relations: It is abundantly obvious that governmental agency representatives, including inspectors, are impressed with the certification status of an individual and consider the programs that include certified professionalism as an important element superior to those that don't. In addition, both OSHA and NIOSH encourage certification within their own hygiene staff and hygiene chemists and these agencies pay the necessary expenses as a part of doing business in this field.

Professional Testimony: Governmental agencies routinely determine the technical qualifications of witnesses and other professionals in this field through their certification status. In many cases the first question asked of a witness is whether he or she is certified and in what speciality. Certification is, therefore, important to Monsanto not only as a symbol of achievement in the profession but also a symbol of quality in its Industrial Hygiene Program.

Program Recognition within the Profession: Programs are invariably judged by industrial health professionals in all disciplines by the degree of certification

achieved by the program participants. This is true in occupational medicine as well as industrial hygiene and will soon be true in the case of toxicology. Certification of laboratories by the American Industrial Hygiene Association (AIHA) requires certification of certain of the laboratory professionals before it is granted. Certification in the field has, in fact, become essential to program recognition.

Advancement in the Field: Virtually all industrial hygiene programs have certification as one of the requirements for advancement. This is, for example, true in the DMEH Industrial Hygiene Section. It is equally true in published job offers. There are very few such offers that do not require certification or in-training status. This is true of OSHA and NIOSH offers in advanced civil service grades as well.

For the above reasons and many others certification for industrial hygienists and industrial hygiene chemists is an intelligent move.

Asbestos and Monsanto

The following is in answer to a question posed by J. T. Roberts, hygienist at the Greenwood, NC location. The question concerned the Monsanto policy on asbestos use and possible inconsistencies between Monsanto policy and CED specifications for the material on certain projects.

DMEH has found no formal, written Monsanto "policy" for asbestos although there is a relatively long standing corporate "guideline" which recommends that substitute materials be used where they are available and meet the requirements for the application. For some years now, Monsanto has made a conscious effort to remove asbestos from the existing workplace and prevent its use to the greatest degree possible for new installations. Under this informal guideline, a substitute material should be used whenever risks and cost are reasonable and process considerations are not jeopardized. Experience has shown that substitute materials have been used in the vast majority of cases, although there are some applications, even today, where a suitable substitute has not been found and asbestos must be used. Plant and CED design engineers are aware of this guideline and its intent and are routinely using asbestos substitutes where available and applicable. In addition, during the LPEC&E review process, DMEH normally checks this requirement for acceptability.

In our view, the spirit of the guideline is being honored through the corporate system in essentially all cases. If you are aware of a particular situation which appears to be inconsistent, make your concerns known to plant or CED project management and your DMEH industrial hygienist.

Ceiling Values—An Overview

Recently, R. A. Baxter, Manager Industrial Hygiene/Europe, posed concern over the seemingly inconsistent definition being used in the field for ceiling concentrations, and suggested some light be shed on the subject.

In Search of a Definition

The inconsistencies Richard refers to are probably no more evident than in the OSHA health statutes. When one refers to the 1910.1000 section of the OSH Act, you can find two definitions of ceiling values. If referred to Table Z-1, the definition states you:

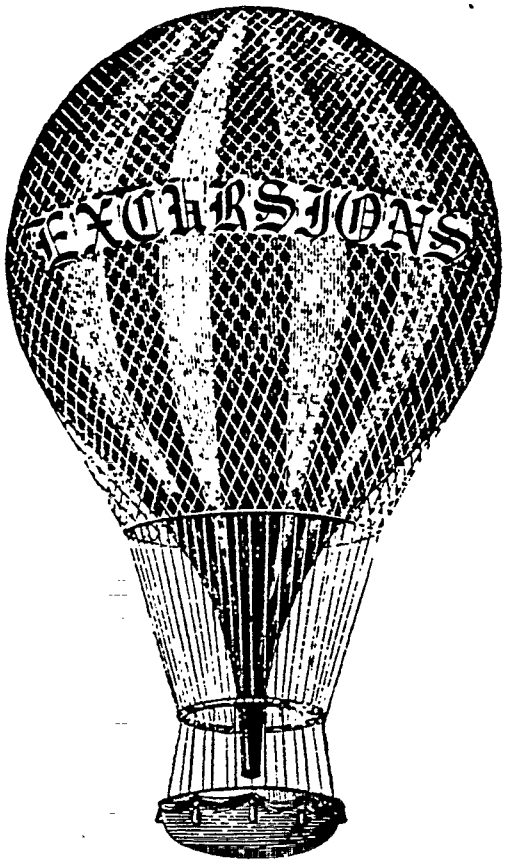
- "...shall at no time exceed the ceiling value given for that material in the table."
- The second definition refers to Table Z-2 where an exception to the above explanation allows an excursion above the ceiling:
- "...up to a concentration not exceeding the maximum duration and concentration allowed in the column under "acceptable maximum peak above the acceptable ceiling concentration for an 8 hour shift"."
- This later definition more closely follows the concept of a STEL described in the ACGIH TLV booklet. The major difference being that most of the values in Table Z-2 don't follow the 15 minute duration criteria used in the STEL definition.

Without belaboring the reader with the other specific OSHA standards, suffice to say that certain standards define ceilings as that concentration which cannot be exceeded as *averaged* over a certain duration of time. In a word, yes, there are inconsistencies in OSHA's definition of ceiling values, and, yes, many definitions exist for the concept of ceiling values.

Richard suggested in his inquiry that to minimize confusion when speaking of ceiling values, mention of the observation time would be appropriate. We at DMEH think this is a step in the right direction. We also felt it appropriate to review the fundamental concept of ceiling values so as to provide guidance and uniformity to its use in the field.

Ceiling Concept

The ACGIH introduces a judgmental approach for the short term exposure



limit (STEL) values by qualifying the conditions they seek to protect against, namely:

- irritation
- chronic or irreversible tissue change
- narcosis of sufficient degree to increase accident proneness, impair self rescue, or materially reduce work efficiency.

This rationale is compatible with DMEH's approach to this subject and should provide guidance in determining ceiling levels for materials with no listing as such. The excursion factor table appearing below is a good source to consult when a question arises in this area.

New TLV's Available

DMEH has received the 1980 TLV booklets. They will be distributed in September. If you don't get one or need more, contact your staff hygienist.

M²COS&H

It's time to mark your 1981 calendar with a few important dates. The Monsanto Management Conference on Occupational Safety and Health will be held March 15-19th here in St. Louis. This will be a joint conference with members present from the Medical, Industrial Hygiene, and Safety & Property Protection functions throughout Monsanto. As usual, we are all looking for interesting, informative, and, yes, even controversial subjects to present at the conference, so call or write your respective contact in DMEH or S&PP and suggest topics you feel would be useful. It's not that far away!

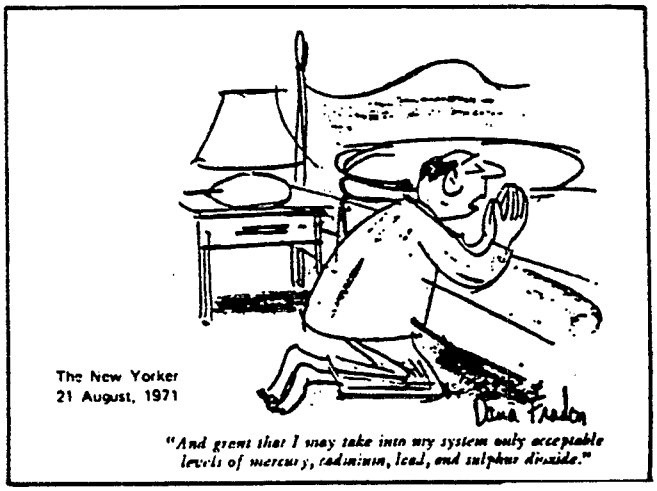
Excursion Factors

For all substances not bearing C notation

		Excursion	
TLV 0-1	(ppm or mg/m).	Factor	= 3
TLV 1-10	"	"	= 2
TLV 10-100	"	"	= 1.5
TLV 100-1000	"	"	= 1.25

The number of times an excursion above the TLV is permitted is governed by conformity with the Time-Weighted Average TLV.

Remembering that STEL's are guidelines, and recognizing that hypersusceptible individuals are present in the workforce, each location should judge acceptable ceiling levels for materials on empirical data as well as consensus guides. When a question occurs in this area, DMEH should be consulted.



The New Yorker
21 August, 1971

"And grant that I may take into my system only acceptable levels of mercury, radmium, lead, and sulphur dioxide."

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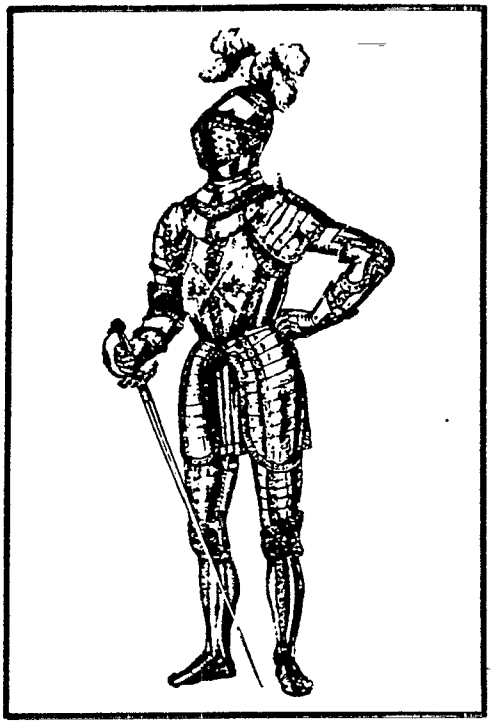


Facts On Fiberglass You're Itching To Know

by Tom Blank

The use of fibrous glass, as a replacement for asbestos in certain applications, has grown in recent years. Along with this increased use stems concern about health effects surrounding the use of fibrous glass. This review should help clear some of the misconceptions and fears.

Glass is one of the oldest and most versatile materials used by man. However it wasn't until 1841 that man developed the technology for spinning glass fibers. The Germans were the first to use fibrous glass for heat insulation. This resulted from a shortage of asbestos during World War I. In the 1930's, two U.S. companies, Owens Illinois Glass Company and Corning Glass Works developed a commercial method of fiberizing glass. Since that time, fibrous glass has been used in over 35,000 individual product applications. Major uses include acoustical and thermal insulation and the reinforcement of plastics. However, an increased number of textile products are now being developed and marketed. The outstanding properties of fibrous glass include: chemical resistivity, heat resistance, non-flammability and resistance to microbial degradation. Since these fibers are made of glass, they have an inherent brittleness that can be reduced through the use of coating agents (4 to 14% by weight), including binders and lubricants.

Many of us have experienced the burning, itching, and/or pricking sensation from handling fibrous glass, whether at home or on the job. The resulting dermatitis, generally observed, is caused by the transient mechanical, cutaneous irritation of the skin and the sequelae of scratching. In Scotland, workers accepted this dermatitis as a condition of employment and labeled it the "badge of the trade". This condition results in approximately 10% of new glass workers leaving the job. However, it is not a disabling form of dermatitis. The cutaneous nerve endings mediate both pain and itch, so these modes of sensation are closely related. The stimulation of these nerve endings, following contact with the fibrous glass, result in the discomfort many observe. It is important to note that the larger the fiber the higher the potential for skin irritation. Conjunctival (eye) irritation and nasopharyngitis (upper airway irritation) have also been reported.

Animal studies involving the inhalation of glass fibers have neither demonstrated pulmonary fibrosis nor the presence of pulmonary or mesothelial cancers and resulted in minimal macrophage reaction. Epidemiological studies have not demonstrated an excess in mortality, increased chronic bronchitis, the presence of mesotheliomas or harmful tissue damage. Upper airway irritation appears to be the only respiratory system problem of any consequence.

The body of evidence summarized here has lead the ACGIH to classify fibrous glass a nuisance dust. Following is a list of precautions and recommended safety/industrial hygiene practices:

1) Clothing should be loose-fitting and changed on a daily basis. They should cover the extremities leaving few areas of the skin exposed.

2) Fibers should be washed off with ample amount of lukewarm or cool water. Showering, following a specific task or work shift, is advisable in addition to a fresh change of clothing.

(Continued on page 2)

Quality Control for the Occupational Exposure Module of MEHI

by Paul Easterday

As part of any computer data collection system it is essential that the data entering the system is accurate. The saying "garbage in, garbage out" is appropriate for computer systems where no provisions have been made to verify the accuracy of the data generated. With the exponential growth of data in MEHI, a need was identified to verify the accuracy of the data. Based on this need DMEH has developed a program designed to ensure data entering the MEHI system is accurate.

The MEHI quality assurance program has been implemented to determine the accuracy of the MEHI header, work, and industrial hygiene records. This program has been designed to provide the plant immediate feedback concerning the quality of the data in their master files. This will provide an error rate for the records that were entered during the previous calendar quarter, and will allow the plant to observe the types of errors, if any, that may be unique to that location. Both direction in correcting errors and information on how effective the program is in collecting accurate work history and industrial hygiene data will be returned to the plant.

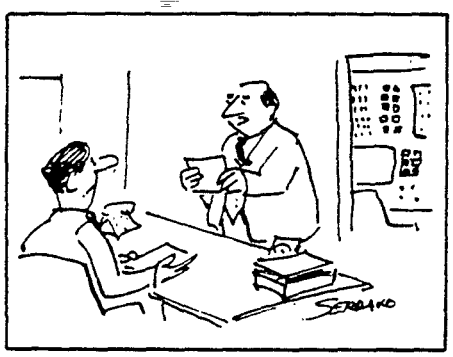
Each quarter the plant will be sent an evaluation report based upon MEHI records that were entered during the previous quarter. The report will contain up to five computer printouts:

1. all new header records for hourly employees.
2. all new header records for salary employees.
3. a random sample of work records for hourly employees.
4. a random sample of work records for salary employees.
5. a random sample of industrial hygiene records.

The number of printouts that each plant will receive will depend on whether header, work, or industrial hygiene records were entered during the previous quarter.

As part of the MEHI quality assurance program, it will be the plant's responsibility to compare MEHI records on the computer printouts with plant records that document all work history changes for each employee. The records may be personnel records, payroll records, and/or departmental logs, as long as they are an original, accurate source of information (not the MEHI keypunch schedules). For industrial hygiene data, compare the MEHI records on the computer printout with the original monitoring forms (this is not the 10, 20, 30 record layouts) at each of your locations. Whatever the source of information, the objective will be to determine the accuracy of the MEHI with respect to the plant records.

Health evaluations including responding to proposed health regulations, epidemiology (morbidity and mortality) needs, and responding to potential litigation require a data base that is both accurate and verifiable. We believe this program is a first step at answering this expressed need. If you have any questions concerning the program, contact your DMEH industrial



"Mr. Easterday, the computer informs me that you've been kicking it."

Fiberglass (Cont.)

3) It is recommended that workers not use air hoses and/or brooms to clean themselves. Such actions could result in driving the fibers deeper into the skin.

4) The use of personal protective equipment should include some form of gloves for hand protection and the possible use of a dust respirator to reduce the potential of upper airway irritation. A phenomenon known as "hardening" occurs in fibrous glass workers from which they no longer exhibit signs of skin irritation from exposure to the fibers.

5) The laundering of work clothing creates yet a different problem. Family epidemics of itching and irritation have been reported when work clothing has been included with other family laundry in the family washing machine. It is suggested that clothing be washed by itself in a tub or basin. The tub or basin should then be thoroughly rinsed. Additionally, rubber gloves should be worn by the launderer to prevent further incidence of dermatitis.

In conclusion, evidence indicates that fibrous glass causes transient, mechanical, cutaneous irritation of the skin and the sequelae of scratching and in severe instances upper respiratory irritation. Long term effects of fibrous glass exposure have not been reported. Should you have any questions, contact your DMEH industrial hygienist.

OSHA's Position on Sampling When Wearing Air Supplied Hoods

by Joe Wolfsberger

On March 30, 1984 OSHA published a long awaited revision to the Industrial Hygiene Field Operations Manual (FOM). Of particular interest is a change in the requirements for sampling when employees use air supplied hoods. In Chapter II, Section F(3) the manual directs the OSHA industrial hygienist that:

> "In sampling for employee exposure to air contaminants generated during work operations where air-supplied hoods are used (i.e., painters or foundry chippers and grinders), ensure that the filter cassette is located inside the employee's hood."

The FOM also specifies that when sampling for air contaminants generated during burning and welding operations the filter cassette should be located inside the employee's welding hood.

Sampling inside personal protective equipment (PPE) worn by employees can provide useful information regarding the effectiveness of the PPE. This information can be invaluable when showing the effectiveness of PPE versus other control measures. Developing a valid sampling protocol and strategy,

Continued on page 3)

OSHA (Cont.)

however, can be very difficult when dealing with respiratory protection other than air supplied hoods. When these sampling technique problems are overcome, this type of sampling will provide a tool to evaluate the effectiveness of PPE programs. Until it is feasible to perform this type of sampling for all respirators remember the OSHA FOM's Directive for sampling employees wearing air supplied hoods and welding helmets.

Jackie Gaul Promoted

by Steve Paul

Jackie Gaul, the Chocolate Bayou Plant industrial hygienist, was recently promoted to Distribution Operations Superintendent at the Texas City Plant.

In the past, some network industrial hygiene professionals have been concerned with the lack of mobility in the IH area. Jackie's promotion has offered some encouragement that they may be considered for other assignments.

We congratulate Jackie on her promotion and hope that others may be considered for assignments which broaden their experience and improve their organizational mobility if they choose to pursue other career paths.

EPA Chemical Advisory On Used Motor Oil

by Glenn Hachey

A few months back EPA issued one of what it refers to as "Chemical Advisories". These advisories are designed to give individuals and organizations information to make informed decisions on how to safely handle chemicals. The advisory stated that:

> In a laboratory study, mice developed skin cancer after their skin was exposed to used motor oil twice a week without being washed off, for most of their life span. While this one study is not conclusive, substance found to cause cancer in laboratory animals may also cause cancer in humans.

We felt that although there might possibly be some occupational exposure out there to some of our mechanics, there probably was a potentially even larger non-occupational threat from people who handle this material infrequently at home. I know I personally do my own routine maintenance on my vehicles and even my lawnmower (forget the lawnmower - I lied) and I have had a few bouts of dermatitis with certain lubricants. The EPA advice certainly got my attention and I have now saved enough plastic milk jugs to dispose of a year's worth of oil changes and I now take them to the recycling center at my local garage. I have even broken down (with some subliminal encouragement from my wife) and discarded some of my favorite wipe rags that were beyond the laundering stage. I should probably know better anyway from my safety background that oil soaked rags are not good to keep around from a fire risk standpoint, but it's funny how a lot of safety/health professionals do things at home that they wouldn't even consider at work. I guess we shouldn't expect our workers to be much different.

Here are some helpful DO's and DON'T's supplied by EPA for handling used motor oil that you may want to pass along to your maintenance workers and weekend mechanics.

Recommendations

DO's

- DO follow work practices that minimize the amount of skin exposed, and the length of time used oil stays on skin.
- DO thoroughly wash used oil off skin as soon as possible with soap and water. A waterless hand cleaner can be used when soap and water are not available. Always apply skin cream after using waterless hand cleaner.
- DO wash oil-soaked clothing before wearing it again. Discard oil-soaked shoes.
- DO use gloves made from nitrile, Neoprene, Viton or other material that oil cannot penetrate, if practical for your kind of work.

DON'T's

- DON't use kerosene, thinners or solvents to remove used motor oil They remove the skins natural protective oils, and can cause dryness, irritation, and possibly more serious toxic effects.
- DON'T over-use waterless hand cleaners, soaps or detergents. They can remove the skin's natural protective barrier oils.
- DON'T put oily rags in pockets, or tuck them under a belt: this can cause continuous skin contact.
- DON'T pour used engine oil on the ground or down drains and sewers: it is a violation of federal law. EPA encourages collection of used motor oil at collection points in compliance with appropriate state and local ordinances.

A Brief History Of Detector Tubes

by Gerry W. Buttler

One of the most common direct reading tools used by industrial hygienists for the determination of gases and vapors in workplace atmospheres is the detector tube. The impetus for their development first came from the mining industry where the use of animals - usually white mice or canaries was the only means of providing an immediate warning of dangerous carbon monoxide build-up. Most other techniques available prior to 1920 used conventional sampling techniques and subsequent laboratory analyses, often hours or even days later. Even the use of the simpler colorimetric analytical procedures could not yield instantaneous evaluation of the carbon monoxide levels in the mines.

Two Americans, A. B. Lamb and C. R. Hoover, patented a detector tube for measuring carbon monoxide in 1919. It was based on the colorimetric reaction of carbon monoxide with iodine pentoxide and fuming sulfuric acid. Pumice was used as the carrier material and, along with the reagent chemicals, was referred to as "Hoolamite" and packed into thin glass tubes. As air containing carbon monoxide was drawn through the tube by some sort of pumping device, the "Hoolamite" changed color to green. The intensity of the color could then be related to the concentration of carbon monoxide.

Although this was a significant advance in the field of industrial hygiene

Detector Tubes (Cont.)

monitoring, it was not until the mid-1930's that another detector tube emerged, this time for hydrogen sulfide. The major stumbling block in the advance of this monitoring technique was the lack of adequate technology in preparing the colorimetric reactive fillings for the tubes. Many of the common wet-chemical reactions that could be used for gases and vapors could not proceed in a dry-medium such as that in the tubes. Additionally, many reagent mixtures were not stable over a long period of time for them to have the durability and reliability necessary for practical use. Inevitably, these problems were overcome or at least circumvented because of the potential speed, convenience, and simplicity that this technique could provide.

In the early 1950's, more suitable chemical reagents impregnated on granular supports were prepared and new detector tubes for other vapors were developed: alcohol, benzene, and water vapor. In 1952, Grosskopf reported on tubes developed for determining carbon disulfide, chlorine, methyl bromide, nitrous fumes, and sulfur dioxide. Concentrations were indicated in different ways as detector tube technology began to grow. In some instances, color changes were compared directly with charts of color tints; in other cases, the concentration was indicated by the length-of-stain on the indicator gel. Throughout the 1960's and 1970's, the use of this form of monitoring greatly expanded as the number of materials which could be detected increased. Today, over 200 different types of detector tubes have been developed and marketed by such companies as Drager, Matheson-Kitagawa, MSA, and Bendix-Gastec. Both short term tubes for task or STEL sampling and long term tubes for TWA sampling are available. More recently, diffusion detector tubes which require no pumps have come into use, such as the ones Drager makes for ammonia, hydrogen chloride, and hydrogen sulfide.

While detector tubes remain important aids to the industrial hygienist, they are not without their limitations. There are still many materials for which detector tubes are not available or feasible. Also, many of the colorimetric reactions frequently used in the tubes determine only classes of compounds or functional groups and may not provide the specificity desired. Cross-interferences are common, and the hygienist should take care that he doesn't use a particular tube that is affected by nontarget compounds known to be the atmosphere he is monitoring. Deviations in the amount of air drawn through the tubes from that for which they were designed can yield errors. Nevertheless, detector tubes remain a valuable resource for the immediate assessment of air quality as long as their use is supervised and their results are interpreted by trained industrial hygienists.

Field Validation Entries into MEHI

by Paul M. Jeannot

"Field validation" is an integral component of a quality industrial hygiene monitoring program. The scheme(s) provides a means to determine the long-term effectiveness/performance of an entire monitoring method in the actual workplace environment where interfering components may exist. As such, it is equally as important to document into MEHI the levels and recoveries of the field validation sample(s) as it is to document the field data itself. In this regard, a temporary and somewhat unwieldy procedure for inputting field validation data into MEHI, was described by Jeannot, P. M., "Field Validation Into MEHI", *Industrial Hygiene Monitor*, Volume 4, No. 3, March, 1983, p. 3.

This present article will describe a simpler inputting system which will allow both DMEH and the locations greater capabilities to retrieve and evaluate past validation data. This system should be integrated into the plant MEHI program as soon as practicable. The data will be used by DMEH to audit method performance and validation frequency for the purpose of method/validity classifier assignment.

With respect to the "Validation" (V) determination type *only*, data should be entered with the following modifications:

1) Multiple "30" cards on the Data Transmittal Form may be submitted for materials with the *same* CAS No. and the *same* Determination No.

2) In field 34 (L/G) of the "30" card use "B" for background sample(s) and use "S" for spiked (validation) sample(s).

3) Record the appropriate concentration level(s) for the background sample(s) in the "Results" fields using the appropriate unit code, using "B" for background in field "34".

4) Record the calculated theoretical spiked level(s) for the appropriate sampling period in the "Result" fields using the same unit code as the background, using "S" for spike in field "34".

5) Enter the spike recovery for the spiked sample(s) in the "Result" fields using the Percent (PC) unit code, also using "S" for spike in field "34".

6) Note: Sample types for validations must either be Personal (P) or General Area (G) on the "10" card.

Example:

Parallel Background Result - 0.52 ppm
1st Validation Level Spiked - 1.05 ppm
1st Validation Result (Recovery) - 97.05%
General Area Sample - NW Wall of Kettle No. 4
DMEH Method Number - 3081A

CARD NO.	DETERMINATION NO MO	DAY		MONITORING LOCATION OR DESCRIPTION			
16-17	18		23	24		67	68	69
10	10	01	01	NW WALL OF KETTLE NO. 4		G	V	A
10								

CARD NO.	DETERMINATION NO MO	DAY		SUB. CODE NO.	L/G	RESULT	UNIT CODE	DMEH Method No
16-17	18		23	24 32	34	35 40	41-42	43 47
30	10	01	01	00005 0990	B	0.52	PM	3081A
30	10	01	01	00005 0000	S	1.05	PM	3081A
30	10	01	01	00005 0000	S	97.05	PC	3081A

Other information for validation samples should be entered onto the Data Transmittal Form, as appropriate.

Please recall that field recoveries should not be used to correct field data for MEHI