

# Phoenix Area Chapter Semiconductor Safety Association Newsletter

Committed to  
Safety First

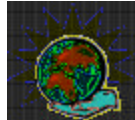
Volume 1, Issue 2,  
September, 2000

## Environmental

### Introduction to Hazardous Gas Monitoring

Logan T. White

Codes require that dangerous concentrations of hazardous gases be contained in closed systems. In addition, air in areas that use, handle or store hazardous gases must be monitored for dangerous concentrations of these gases. Because many of the gases used in the semiconductor industry have very poor physiological warning properties (odor thresholds) relative to their dangerous concentrations, monitoring systems are necessary. In addition to monitoring and alarming for dangerous concentrations, codes also include requirements for containment and shutting off the



flow of the detected gas. Requirements for hazardous gas monitoring can vary throughout jurisdictions (city or county building or fire departments). Each jurisdiction adopts a model code and may include amendments that revise the model code. In the Maricopa County area, jurisdictions have historically adopted the Uniform Fire Code (UFC). That may change in the future

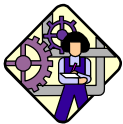
because a new model code, the 2000 International Fire Code, has been published. Hazardous gas monitoring requirements are contained in two articles of the 1997 UFC. Article 51 is devoted to semiconductor fabrication facilities. Article 80 applies to all hazardous materials, including those materials

*(Continued on page 2)*

## Safety

### What's New In Ergonomics Regulations

Christine A. Poupard



Many of you are aware of OSHA's proposal for an ergonomics standard. I wonder if you are aware of the standard's projected economic impact? Employers who need to correct ergonomic issues would spend an average of \$150 per workstation per year. The total cost to employers would equal \$4.2 billion each year. However, the expected savings would be \$9 billion and 300,000 injuries.

What does the proposed ergonomics standard expect of employers? The basic ergonomics program would include assigning a responsible person to manage the program, providing hazard information to employees, and establishing a system for employees to report signs and symptoms. A full ergonomics program would be required if one or more work related musculoskeletal disorder (MSD) occurs. The full

*(Continued on page 2)*

## Industrial Hygiene

### Electrical Hypersensitivity

Dr. Thomas Windham

#### What is Electrical Hypersensitivity?

Electrical hypersensitivity is known by a variety of terms such as electromagnetic hypersensitivity, electrical sensitivity, electro sensitivity, and electromagnetic sensitivity syndrome (ES), among others. In the past ES was known as radiowave illness, RF flu, or microwave sickness, but these are actually a more severe form of ES, now known as *Non-Ionizing Radiation Sickness*. ES is an environmentally triggered illness that produces a physiological disorder in which neurological and allergic-type symptoms are caused by exposure to electromagnetic fields (EMF).

#### Causes of Electrical Hypersensitivity

EMFs are the invisible fields of electric and magnetic energy radiating from conductors whenever electric current is flowing through them. Sources of EMF on our planet, in this 21<sup>st</sup> century, are too numerous to list. The major sources of EMF in the semiconductor manufacturing workplace include computers, fluorescent lights (particularly energy-efficient lighting), cell phones, pagers, hand held radios (typically used by ERTs), high voltage wires supplying power to the building, and the RF and microwave generators used with the semiconductor device fabrication tools. In addition, on our way to and from work, most of us encounter high voltage power lines erected along roadsides, towers loaded with transmitting antennas for cell phones, microwave links, TV and radio broadcasting, etc., and a continuous bombardment of EMF from the



*(Continued on page 2)*

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### Next Meeting

Meeting Announcement to Follow

### Calendar of Events

- TECHCON 2000 at the Pointe Hilton at Tapatio Cliffs on September 21 - 23, 2000.
- 2<sup>nd</sup> annual Mini-Conference on Emerging EHS Technologies; September 25<sup>th</sup> - 26<sup>th</sup> at the Wyndham Buttes Resort in Tempe. Topics in this year's program include developments and advancements in fire safe plastics, gas distribution technology, ventilation optimization, fluorine detection, parts cleaning, and web-based training. There is still space available, please contact SSA at (703) 790-1745 to register!

### Table of Contents:

• Environmental	Pg 1
• Industrial Hygiene	Pg 1
• Next Meeting	Pg 1
• Calendar of Events	Pg 1
• Chapter Officers	Pg 1
• Safety	Pg 1
• Book Review	Pg 2
• Software Review	Pg 3
• Chapter Corner	Pg 3
• Membership Request/ Changeof Address	Pg 4

**Environmental Article (Continued)***(Continued from page 1)*

regulated elsewhere in the UFC, except that when specific requirements are provided in other articles, those specific requirements apply. This newsletter article does not provide sufficient space for an in depth review of all gas monitoring requirements and is not a replacement for review of the full code adopted in the jurisdiction of concern.

In general, hazardous gas monitoring is required in the following locations:

- Fabrication areas where gas is used or stored.
- HPM rooms (gas storage rooms).
- Ozone generator rooms.
- Gas cabinets.
- Any enclosure where there are nonwelded fittings on HPM gas piping.
- Corridors where gas piping is within the corridor.
- Treatment system discharge serving indoor storage rooms containing toxic or highly toxic gases.

In addition, many refrigeration systems utilize refrigerants that are toxic and/or flammable. The Uniform Mechanical Code contains requirements for monitoring the air around large chillers for refrigerant vapor leaks.

The hazardous gas detection system is required to be capable of monitoring the gas at or below the permissible exposure limit (PEL) or ceiling limit (an OSHA term) of the gas, or at vapor concentrations in excess of 20 percent of the lower explosive limit (LEL) for flammable gases.

When a short-term hazard condition is detected, the gas detection system is required to initiate a local alarm and transmit a signal to the emergency control station. The emergency control station is a room that monitors the various alarm and monitoring systems for the entire site including fire alarm, fire sprinkler water flow, smoke detection,

*(Continued on page 3)***Safety Article (Continued)***(Continued from page 1)*

program would include conducting job hazard and analysis; employee ergonomic training; MSD medical management and periodic program evaluation. I get the feeling that many of you would support and agree that these program elements have the potential to effectively reduce MSD's in the workplace. However, you may be concerned about the Medical Removal Protection clause which would obligate employers to 100% pay and benefits for light duty and time off work to recover from injury.

A way around this may be for the Arizona Department of Occupational Safety and Health (ADOSH) to adopt the standard with modification (as long as the modifications protect as well as the federal standard). "We will complete an ergonomics standard this year," says OSHA Chief Jeffress at a recent meeting in New York. Jeffress also said that President Clinton, Vice President Gore, and Secretary of Labor Alexis Herman are all on board and committed to publishing the final requirements before the end of the year.

Additional regulatory news includes Washington state finalizing its own ergonomics rule. The rule requires employers to:

- evaluate jobs to identify potential ergonomic risks such as awkward heavy lifting or highly repetitive motion,
- reduce employee exposure when these jobs are hazardous, and
- provide basic ergonomics education for employees who work in or supervise risky jobs.

You may have noticed that Washington state's rule does not cover medical management. It also does not cover wage protection and time off work, which are the most controversial parts of the federal proposal.

**Industrial Hygiene (Continued)***(Continued from page 1)*

network of satellites now orbiting the Earth. The current estimate is that the density of EMF in which we now live is 100 to 200 million times greater than the natural exposure we receive from the sun.

**Symptoms of ES**

Symptoms of ES are difficult to accurately identify. In many cases symptoms of ES are similar to those produced by multiple chemical sensitivity (MCS) in which the inflicted person has a reaction from exposure to ordinary levels of chemicals in common products such as perfumes, household cleaners, and pesticides. There is also some evidence that persons inflicted with MCS are more susceptible to ES. Both display symptoms associated with the central nervous system and the immune system. The symptoms are too numerous to mention, but a recent survey produced a list of the five most common symptoms of ES. They are 1) skin problems including burning, tingling, itch or rash, 2) poor concentration, confusion, and memory loss, 3) fatigue or weakness, 4) headaches, and 5) chest pain and/or heart problems. Skin problems and memory loss were tied for first place as the most predominant. Some people experience only one symptom, which disappears rapidly when they remove themselves from the proximity of the cause (e.g., leave work), but others may have long-lasting symptoms without even realizing it.

**Treatment for ES**

Before treatment can begin the problem must be identified. Those suffering from environmentally induced dysfunctions (electrical, chemical, sick building, etc.) often find themselves shunned by the

*(Continued on page 3)***Book Reviews**

Hazardous Gas Monitoring: A Guide for Semiconductor and Other Hazardous Occupancies by Logan T. White, fifth edition, copyright 1997 by Logan T. White Engineering, published by Jo Ann Fite, Logan T. White Engineering. ISBN: 0-9653649-6-8.

Reviewed by Steve Marcus

This book provides an excellent overview on the design, selection and implementation of hazardous gas monitors and monitoring systems. The author discusses, in detail, the criteria that define and are associated with hazardous production materials.

National and regional codes and standards are cited and discussed. The author references chapter and paragraph along with helpful explanations and commentary. The Uniform Fire Code (West of the Mississippi), National Fire Code (Northeast) and Standard Fire Prevention Code (Southeast) are each discussed in detail providing the reader valuable information pertinent to their geographic location. The currently adopted and most recently proposed updates are illustrated. Federal regulations, such as OSHA and EPA, are cited as they apply. Sunnyvale, CA, Santa Clara County and Palo Alto CA model ordinances are also cited. The author reminds the reader to work with local authorities to obtain adopted versions of codes and local amendments.

A thorough survey of the available types/designs of monitoring sensors and systems is presented. Typical applications and potential problems involved with each are discussed. Manufacturers and products are cited throughout, yet the author remains objective. The author emphasizes that care should be taken in designing the monitor, alarm and control systems to balance trade-offs between safety,

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## Chapter Corner Letter from the President

Hello all! What a great time to be a professional in the high tech field. New technologies are increasingly amazing and the industry is going strong. We're over half way through our year as a chapter, with two chapter meetings behind us, and the mini-conference and Q4 meeting ahead. In this, my first newsletter message, I briefly want to discuss the purpose and vision of our chapter. In doing so, I pose a couple of legitimate questions many may ask:

**Q:** "Why do we need a local SSA chapter when we already have ASSE, AIHA, and other local chapters for EHS professionals?" or more specifically, "Why should I take the time out of my busy schedule to participate in the local SSA chapter when I have other local organizations available?" or very simply, "What's in it for me?"

**A:** To me, the answer is clear and simple. The SSA -- both local and national -- provides the best industry-specific networking opportunities, knowledge exchange, and cutting edge information available to help EHS professionals in high-tech industries succeed in meeting their goals and objectives. I know that I benefit professionally from the knowledge and information that I gain through chapter participation, as well as from networking with all of you.

A prime example is the upcoming second annual mini-conference on Emerging EHS Technologies on September 25-26 (right around the corner!). We were pleasantly surprised by the turnout last year, so we've made it an annual event, and we expect it to get better every year. What a great forum for discussing and learning about new ideas and technologies and how they affect us in our day-to-day operations.

Let me wrap up by saying that the spirit of democracy is alive and well in this chapter. **THIS IS YOUR CHAPTER.** I'm certainly no expert in running a chapter such as this, and I welcome any suggestions or feedback any of you may have. Please e-mail me at [thad.jones@microchip.com](mailto:thad.jones@microchip.com) with any thoughts on how the chapter can provide more value for you.

See you all at the mini-conference!

Thad

## Software Review

### ErgoEASER Analyze and Solve Ergonomic Hazards

Reviewed by Terry Daniels



ErgoEASER was developed to aid in identifying, evaluating, and preventing work-related musculoskeletal disorders. ErgoEASER was developed for the U.S. Department of Energy, Office of Environment, Safety, and Health by Pacific Northwest National Laboratory in collaboration with the U.S. Department of Defense Environmental Security.

ErgoEASER was designed to require minimal computer skill and expertise in ergonomics. For individuals with ergonomics backgrounds, more detailed information is accessible within the program and alternative methods of interacting with the analysis tools are provided.

The program consists of three interactive components, *Getting Started, Awareness and Reporting, and Analysis*. These three interactive components provide an overview and background on ErgoEASER and occupational ergonomics, examples and photographs to help identify ergonomic hazards in the work place, and an analysis section which uses models of good practice to evaluate VDT workstations and lifting tasks.

A review of the program proved it to be an informative and easy to use tool for evaluation of individual workstations and generates a report with recommendations for ergonomic improvements. The program makes it easy for an individual to conduct their own workstation analysis.

The analysis tool for lifting tasks was equally comprehensive and includes the NIOSH lift equation. ErgoEASER is available for PC-compatible computers running Microsoft Windows. The version of ErgoEASER reviewed may be downloaded at no charge at [www.tis.eh.doe.gov/others/ergoeaser/download.html](http://www.tis.eh.doe.gov/others/ergoeaser/download.html). Federal Agencies and their contractors may obtain a Government Licensed version of ErgoEASER 2.0 from the U. S. Dept. of Energy's centralized software management facility (Energy Science and Technology Software Center <http://www.osti.gov/html/osti/estsc/estsc.html>). This version contains a Computer Based Training component in addition to the three components described above.

## Environmental Article (Continued)

(Continued from page 2)

emergency power system, emergency alarm (chemical spill alarm), and hazardous gas detection.

In addition to initiating alarms, the hazardous gas detection system is required to automatically close the shutoff valve of the gas detected. The gas valve nearest and upstream of the gas detection location is the valve to be closed.

While toxic and flammable gases receive the most attention, inert gases can also pose a danger. Gases in sufficient concentrations can displace oxygen to the point that the atmosphere in the room is unsafe. Many facilities monitor inert gas storage rooms and Dewar fill stations for oxygen depletion. If the oxygen concentration falls below 19.5 percent, local alarms should be initiated inside and outside the room and at the emergency control station.

Hazardous gas monitoring systems detect the presence of gas at hazardous concentrations, initiate local and remote alarms and close shutoff valves of detected gases. These systems are complex to begin with, and the nature of the semiconductor business imposes additional complexities due to the constantly changing processes and tool sets and the desire not to interrupt production due to false alarms.

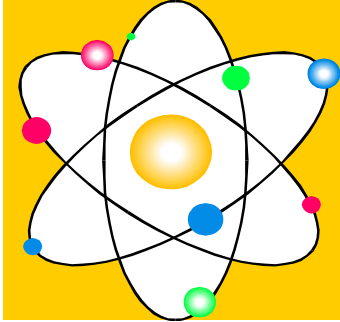
## Industrial Hygiene (Continued)

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mainstream medical establishment, and referred to a specialist for neuropsychiatric evaluation. The number of people suffering from ES and receiving psychiatric treatment is unknown, but is suspected to be substantial. An even larger number of people with minor ES afflictions have most likely chosen to go without treatment because of the negative stigma attached to psychiatric evaluation.

Mainstream medical treatments for ES have included vitamin and mineral supplements, chiropractic treatment, acupuncture, homeopathy, and others with varying degrees of relief reported by the recipients. The best treatment for ES is complete avoidance of EMF. However, with the proliferation of wireless communication, it is impossible to find a place on the planet that is completely free of EMF. The second best option is to implement engineering controls in the workplace. Make sure your building wiring meets or exceeds code (especially the ground connections). Never allow anyone to operate a RF generator without all the proper shielding and ground connections in place. A semiconductor fab contains a wealth of potentially harmful sources of EM radiation. But, a well-designed tool, when operated properly, should pose little or no threat to even the most ES sensitive people. Have your facility regularly tested for EMF by a reputable firm, or by your own team of qualified personnel.

**Semiconductor Safety Association  
Phoenix Area Chapter  
1829 W. Drake Dr., Suite 103  
Tempe, AZ 85283**



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**Book Review**  
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reliability, cost effectiveness and flexibility. Again, the author references adopted codes and accepted safety practices. Overall, I believe that the book is an excellent reference and guide for first time as well as experienced facilities, safety and process personnel involved in the design and application of monitoring hazardous gases. The book provides valuable information to make good decisions. The book is written specifically to deal with semiconductor industry issues, however, is written such that it can be used in any situation involving the use of hazardous production materials.

**MEMBERSHIP REQUEST/CHANGE OF ADDRESS REQUEST**

Name: \_\_\_\_\_  
Professional Certifications: \_\_\_\_\_  
\_\_\_\_\_  
Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Business Address: • or Home Address: • PHX Section Member Since: \_\_\_\_\_  
Daytime Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
Member National SSA • yes • no Membership Number: \_\_\_\_\_  
Other Professional Organizations: \_\_\_\_\_  
\_\_\_\_\_  
E-Mail Address \_\_\_\_\_

Please mail or fax this form to the secretary @ (480) 345-6477. Application forms are also available at the Phoenix Chapter meetings.