



REM NEWS

A publication by Purdue University Radiological and Environmental Management

August 2001

Inspections Result in No Violations

By Dr. Jim Schweitzer

On March 21, we survived another successful Environmental Protection Agency (EPA) inspection. We would like to thank all of the campus hazardous waste generators for their compliance efforts. A special thanks goes to the Civil Engineering, Chemical Engineering, and the Chemistry departments. The EPA selected these departments at random for inspection. REM personnel accompanied the EPA who inspected laboratories in these areas. No violations were found and each Purdue

employee we encountered was knowledgeable about their personal requirements under the hazardous waste regulations.

The Nuclear Regulatory Commission (NRC) conducted an unannounced periodic inspection on June 12-13. The inspector visited numerous laboratories and use areas to conduct a "performance based" inspection of our activities. Overall the inspection went well and no violation of regulations were identified. The inspector urged us to keep up the good work but noted several

areas for improvement. These included lab housekeeping, such as regular changes of absorbent paper and improvement in survey recordkeeping in the laboratories.

This success could not be achieved without personal responsibility for safe work practices and environmental compliance. We ask that you continue to work with your departmental safety committees to proactively identify problems and solutions to safety and environmental compliance issues. Thanks again for your help!

Motor Vehicle Seat Belts and Shoulder Harnesses Policy

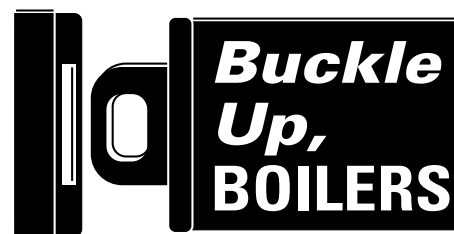
As a matter of safety and concern, our Motor Vehicle Seat Belts and Shoulder Harnesses Policy is reprinted for you.

Drivers and passengers in University vehicles or personal vehicles with a "UV" (University Vehicle) permit being used for University business, shall wear seat belts and shoulder harnesses, if

provided, whenever the vehicle is in motion.

Seat belts, shoulder harnesses or other safety restraints shall not be removed from University vehicles or made otherwise inoperative, except when changing the vehicle to non-passenger use. Maintenance of seat belts should be a normal part of vehicle maintenance.

Supervisors are responsible for ensuring that employees under their supervision comply with this policy. As with any policy regarding personal protective equipment, violators will be subject to progressive disciplinary action.



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Proper Safety Disposal of Smoke Detectors

By Jim Vetzel

Smoke detectors — it's convenient to live with them and it could be downright dangerous to live without them.

Did you know that almost all smoke detectors contain a small amount of a radioactive substance known as Americium -241 (Am-241), used to detect minute smoke particles in the air?

Am-241 is a decay product of Plutonium-241 (Pu-241) which has a half-life of 14 years. A simple explanation of a half life is if you start with 100 units of a certain item, then after one half life has been completed, only 50 units of that item is left due to this decay cycle. Am-241 has a half-life of 432 years.

The Am-241 is used in ionization type smoke detectors. The Am-241 emits alpha particles and low energy gamma rays. The alpha particles are absorbed within the detector, as are most of the gamma rays.



The Am-241 is used in "Ion-Chamber" type smoke detectors such as the one pictured here.

The alpha particle emitted by the Am-241 collides with the oxygen and nitrogen in the air within the detector's ionization chamber to produce charged particles called ions. When smoke enters the chamber, the alpha radiation is absorbed by the smoke particles. This causes the rate of ionization of the air to fall, which sets off the alarm.

The alpha particles from the detector do not in themselves pose a health hazard, as they are absorbed in a few centimeters of air or by the structure of the detector. Am-241 is, however, a potentially dangerous material if it is inhaled or ingested.

Purdue University uses hundreds of these smoke detectors containing Am-241 throughout the campus. When they are removed and/or replaced, care should be taken not to destroy or break the smoke detector housing or its internal components. Large quantity users of this type of detector should take care to return the detector to its manufacturer or to a qualified entity that meets the safe disposal requirements.

Purdue University's Radiological and Environmental Management (REM) department is the centralized collection point for the proper disposal of these radioactive materials. An "intact" detector, meaning a complete, unbroken housing with undisturbed internal components, is easily returned to the manufacturer at a minimal cost to the University.

Broken or damaged detectors are disposed at a much greater cost to the University and take much longer to find a vendor or broker willing to accept them.

In conclusion, it is important that care should be used to not damage the detector when removing or replacing the unit.

Linseed Oil... A Spontaneous Combustion Hazard

By John Breiner



A rag (cotton T-shirt) that spontaneously combusted when crumpled and soaked with linseed oil.

I recently purchased outdoor furniture with a natural wood finish that requires periodic reapplication of linseed oil. The furniture manufacturer specified that the linseed oil be applied with a rag. Following this advice I applied the linseed oil as directed and placed the linseed oil soaked rag on top of the can in the garage. Two hours later I noticed the smell of linseed oil was very strong in the garage and noticed smoke billowing from the oil soaked rag. I removed the rag and placed it outside. I consulted the label on the linseed oil can and discovered that linseed oil oxidizes as it cures and produces heat which can result in fire. The directions on the can instruct the user to spread the oil soaked cloth outside on the ground so that it will more readily dissipate the heat before placing it in the trash.

To Burn Or Not To Burn?

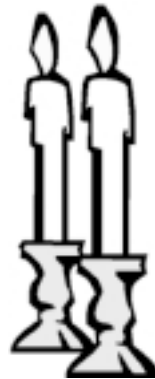
By Dr. Lila Albin

Candles are often used to create a relaxed atmosphere in the home and this is probably the intent behind bringing them into the office environment. However, bringing candles into work is not a good idea for two reasons. The first reason is the fire hazard that candles present. The second reason is the chemical exposures presented by candles both when burning and with a non-burning scented candle.

Indiana Fire Code is restrictive in its allowance of lit candles and open flame decorative devices. The University's Fire Protection Engineer states that no candles or other open flame device be burned in campus buildings, especially in offices because of the extreme fire hazard that is presented by these devices. If a burning candle is noticed by REM staff or by staff from Fire Protection and Special Services, they will request the flame be extinguished immediately.

Yes, the "innocent" candle does contribute to indoor air quality (IAQ) situations. The scented, non-burning candle and the unscented and scented burning candles will contribute volatile organic compounds (VOCs) in the air and polyaromatic hydrocarbons (PAHs) as well as metal fumes, depending on the wick. Metal core containing wicks may pose a health hazard from the vaporized metal used in the core. The metal of most concern is lead. Studies have been conducted on lead-core wick candles and air emissions have been found to range from 0.2-54.0 mg/m³ in the room air over 24 hours. This exceeds the US Environmental Protection Agency's (EPA) recommended threshold level of 1.5 mg/m³ over 24 hours. The EPA released a report in January 2001 entitled "Candles and Incense As Potential Sources of Indoor Air Pollution: Market Analysis and Literature Review," which is available from the National Technical Information Service office. The Consumer Product Safety Commission, (CPSC) is working to ban lead-core wicks in candles.

Aside from the potential lead poisoning from the lead-core wicks, especially in small children, there is also the possibility of irritation and asthmatic responses to the VOCs emitted from candles. The VOCs are present in scented candles because of the fragrances and essential oils added to produce the scent. These VOCs give off gas even when the candle is not burning which is why one can still smell them. When the candle is burned, the essential oils are released into the air along with particulates and other combustion by-products. Example VOCs associated with candles and candle emissions are acetone, benzene, acetaldehyde, acrolein, formaldehyde, naphthalene, and xylene, just to name a few. As with any incomplete combustion source, carbon monoxide is also produced.



The small sized particulate matter generated from burning candles can contribute to lung irritation especially for asthmatics and people with chronic bronchitis. Fragrances are often reported to cause asthmatics to have an asthmatic attack or to worsen an existing asthma episode and by non-asthmatics to cause eye, nose, and throat irritation. Studies have been conducted on asthmatics' respiratory responses to fragrances and decreased lung function has been noted in some of the test subjects. Examples of fragrances tested were the perfumes Red and Charlie.

In summary, scented candles cause respiratory and eye problems for some individuals, maybe your own officemate or next-door office neighbor. It is best to not have scented candles, especially multiple scents, in the office environment. If you have to have a candle in your office, make it an unscented one and don't burn it.

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2001 Midwest College/ University Environmental Health & Safety and Big Ten Radiation Safety Officers Conference September 10-12, 2001 Purdue University West Lafayette, Indiana

Purdue University is proud to host this year's Midwest College/University Environmental Health and Safety and Big Ten Radiation Safety Officers Joint Conference. We hope to have several programs that interest all EH&S professionals. Please visit our web site for more information and to obtain a registration form.

<http://www.purdue.edu/rem>

Purdue's Injury & Workman's Comp Costs/Rates Drop

Purdue has experienced a significant decrease in both workman's compensation costs and injuries since the introduction of the Integrated Safety Plan (ISP). The ISP has worked toward creating a more safe and healthful Purdue by increasing individual participation in safety. Over the past three fiscal years Purdue's injury rate has dropped from 4.61 to 3.95 injuries per one hundred employees, which is a 14% decrease. In addition, Purdue's workman's compensation costs have dropped nearly 48% during the same timeframe.

Through increased departmental participation in the ISP, Purdue's injury rates could fall below the national average of 3.1% and workman's compensation costs could continue their downward trend.

Fatality Due To Acute Hydrofluoric Acid Exposure

Reprinted from CSHEMA, Campus Safety
Division of the National Safety Council

Adapted from: *Universities Safety Assn. Digest*, Vol. 59, April 1997 by Bob Kell,
Durham University, U.K.

A fatal accident occurred in a palynological (the study of pollen and spores) laboratory in Australia, resulting in the death of a technician. The following factors may have contributed to its occurrence.

A standard geology technique, which involved the dissolving of sedimentary rock with mineral acids (hydrochloric and hydrofluoric acid), was being undertaken in a fume cupboard. The technician involved was believed to be seated when he knocked over a small quantity (between 100 - 230ml) of hydrofluoric acid (HF) onto his lap, splashing both thighs. The only personal protective equipment worn was two pairs of wrist length rubber gloves and a pair of polyvinyl chloride sleeve protectors. As a result of the fact that the technician was working alone, it is unclear whether the spill was from the digestion cup or the 2-1 bulk acid container. The technician sustained burns to 9% of his body surface area, despite washing his legs with water from a makeshift plumbing arrangement that supplied

water at 6 litres/min. No calcium gluconate gel was applied to the affected area and contaminated clothing was not removed during the flushing with water. Following flushing, the technician, who appeared to be in severe pain and shock, immersed himself in a chlorinated swimming pool at the rear of the workplace, where he remained for approximately 35-40 minutes before ambulance help arrived.

The injured man was hypothermic and hypocalcaemic on admission to an intensive care unit at a nearby hospital, and soon became unconscious. His condition continued to deteriorate despite, subcutaneous injections of calcium gluconate and administration of intravenous calcium and magnesium. His right leg was amputated 7 days after the incident.

He subsequently died from multi-organ failure 15 days after the hydrofluoric acid spill.

POINTS FROM ACCIDENT INVESTIGATION

Investigation showed that this death could have been prevented if adequate personal protective equipment had been worn during the handling of concentrated hydrofluoric acid. Full length

PVC coveralls with sleeves to the wrist or a full-length PVC apron with sleeve protectors, a face shield, rubber boots, safety goggles and mid-arm length PVC gloves should have been worn by the deceased when HF was being used in the fume cupboard.

The deceased did not have access to an emergency shower to remove the HF, instead the skin was washed from a hose that provided water at a very low flow rate. Because of the low flow rate, the volume of water may have spread the HF onto other parts of the skin.

No calcium gluconate gel was applied following dermal exposure. Inhalation may also have been another route of exposure due to the relatively high vapour pressure of HF acid.

Overall, it was noted that the laboratory did not comply with requirements of national standards in the areas of emergency procedures, safe handling and disposal of the chemical and laboratory design.

For more details concerning the ergonomics assessment of the work station, visit this web site: <http://www.cshema.lab.safety.umaryland.edu/articles/incident%20reports/hf%20incident.htm>

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