New FDA Sunscreen Labeling Rules in Effect

By Dorothy Strauss

The Food and Drug Administration’s (FDA) new sunscreen labeling rules aim to clarify the level of protection consumers can expect from over-the-counter sunscreen products.

Sunbathers should look for products labeled “broad spectrum” with an SPF (sun protection factor) value of 15 to 50. “Broad spectrum” products must protect against both ultraviolet A radiation (UVA) and ultraviolet B radiation (UVB). While both UVA and UVB can cause sunburn, skin cancer, and premature skin aging, UVB is the primary culprit in sunburns. Higher SPF values indicate higher levels of overall protection, up to an SPF of 50. Products with an SPF greater than 50 have not demonstrated that they protect any better than products with SPF 50.

Any sunscreen not labeled as “broad spectrum” or that has an SPF value between 2 and 14 will only prevent sunburn and will carry a warning such as “Skin Cancer/Skin Aging Alert: Spending time in the sun increases your risk of skin cancer and early skin aging. This product has been shown only to help prevent sunburn, not skin cancer or early skin aging.”

Manufacturers cannot, without supporting data and FDA approval, claim their products are “sunblocks,” “waterproof,” or “sweat proof.” They also cannot claim immediate protection upon application or suggest that their product’s protection will last for more than two hours without reapplication. Claims of water resistance must specify how much time a user can expect to get the declared SPF levels of protection while swimming or sweating, with the limit being either 40 or 80 minutes.

The FDA has requested additional data to establish the effectiveness of sprays since they are applied differently than lotions, oils, creams, gels, and other traditional forms of sunscreen. They are also determining if unintentional inhalation of spray sunscreen poses a safety risk.

Consumers with concerns about chemical exposure may prefer products made with titanium dioxide, zinc oxide, avobenzone, or octinoxate (octyl methoxycinnmate), which, according to the Environmental Working Group, have lower levels of skin penetration. Oxybenzone, another common ingredient, has higher levels of skin penetration.

For the best protection, use a broad spectrum sunscreen with SPF 15 to 50 and reapply as directed, especially if you are sweating or in and out of the water. You can further reduce your risk by covering up with clothing and hats and limiting time in the sun, especially between 10 a.m. and 2 p.m.
**Personnel Update to ESH&S Team**

Jason Nilon joined the Site Protection Division in August as an Emergency Services Officer.

Jason is an active reserve member of the 369th Engineering Battalion of the United States Army, serving as an Urban Search & Rescue Technician, an Airport Fire Fighter and a Structural Fire Fighter at the Norristown, Pennsylvania base.

Jason lives in Lanoka Harbor, NJ. He has been assigned to ESU Platoon B, working with Captain Kevin Rhoades.

Please join us in welcoming Jason to the Division and to the Laboratory!

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**Safety Contest**

Tell us what you would do to improve safety for these workers for a chance to win a $20 gift certificate to the PPPL Plasma Hutch!

The Safety Division will judge the entries and the winner will be announced via email and in the next ESH&S Newsletter. Submit your specific safety improvements to dstrauss@pppl.gov by Friday, September 13. Safety Division members are not eligible.

Congratulations to Gerrit Kramer, who won the April 2013 ESH&S Newsletter safety contest!
Permit Required – LASERS

By Bill Slavin

A recent audit found that laser safety requirements were not consistently being met with regard to training, signage, procedures, and practices. To correct this, a new laser operating permit system has been instituted. You must have a permit to operate all Class 3b and Class 4 lasers (typically more than 5 milliwatts of power for visible lasers). The permit will address elements of the Laser Safety Program, including an up-to-date Laser Safe Operating Procedure (LSOP), current training for all operators, proper signs on the doors, testing of any interlock systems, and more. Laser permits will be valid for a maximum of one year, after which they will need to be reviewed and renewed to ensure requirements are still being met. In addition, supervisors and department heads will receive a copy of the permit and will be required to periodically verify that any laser operators working for them are maintaining appropriate laser operating practices.

Starting NOW, you must have a current permit to operate all class 3b and 4 laser systems. Contact the Laser Safety Officer (LSO), Bill Slavin, at x2533 or bslavin@pppl.gov to obtain a laser permit.

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PPPL Laser Operations Permit

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<thead>
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<td>Jones, John</td>
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<th>Additional Permit Requirements &amp; Comments</th>
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<td>Must ensure flashing light is working</td>
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I have reviewed the above laser system and grant permission for the system to be operated as long as all listed conditions are met. I agree that this permit is accurate and should any of the conditions change, this permit is void and the laser will not be operated.

Laser Safety Officer: 5/28/2013
Principal Authorized Laser Operator: 5/28/2014
Compressed Gas Cylinder Refresher

By Marissa Schaefer

A recent audit of compressed gas cylinder usage identified deficiencies throughout the Laboratory. Most deficiencies involved the securing of compressed gas cylinders but some deficiencies also related to the improper storage and labeling of cylinders. The auditors recommended that employees whose work involves compressed gas cylinders take the Compressed Gases/Cryogenic Liquids training as a refresher course on a periodic basis, rather than the current one-time-only basis.

It seems we could use some brushing up on safe practices for compressed gas cylinders. Here's a short refresher on securing, storing, and labeling cylinders. More information can be found on the SafetyWiki under “Compressed Gas.”

Labeling:

- Compressed gas cylinders MUST have a label.
  - The label must contain:
    - The chemical’s name,
    - A hazard warning,
    - The manufacturer’s name.
  - The label may also contain:
    - A diamond symbol,
    - The UN (United Nations) number.
- Check the label first before use to make sure you know what is inside the cylinder. The paint color of a cylinder is not a proper indication of what is inside.
- If a cylinder is unmarked or difficult to read, that cylinder should NOT BE USED. Notify Material Services for large cylinders and Hazardous Waste for small lecture bottles.
- Workers should store and use cylinders in a position with the label showing.

Storage:

- Cylinders in storage are not connected for use and are not in transit.
- Cylinders should be grouped by the type of gas and the groups should be arranged to take into account the type of gas contained in the cylinders.
- Store flammables (like fuel gas) 20 feet from oxidizers (like oxygen) or separate them by a noncombustible barrier at least five feet high with a fire-resistance rating of one half hour.
- Charged and empty cylinders must be stored separately and have their valves closed.
- Never store cylinders near highly flammable or combustible substances or where they can be exposed to flames or sparks.
- Never store (or use) a cylinder where it can become a conductor for electric current.
- Cylinders CANNOT be stored on two- or three-wheeled carts.
- Four-wheeled carts may be used to store cylinders if the cart is in a stable position with all wheels on the ground.

Read and understand the information on cylinder labels

Securing:

- Secure cylinders to fixed structures or to movable carts.
- Secure cylinders by the body, at about two-thirds of the height of the cylinder, not by the valve.
- Small lecture bottles may also be stowed in a partitioned box.
- Cylinders shall be secured by one of the following methods, depending on their size and use:
  - Safety chain secured with a hook that will prevent the accidental release of cylinder.
  - Nylon strap and buckle assembly with attachment fixture.
  - A cradle with indentations designed to accommodate gas cylinders in a horizontal position.
  - Rope is NOT an acceptable method to secure cylinders.

Handling:

Although the handling of compressed gas cylinders was not identified as a deficiency in the audit, handling cylinders safely is still important. The most common injuries related to cylinder handling are broken foot bones and back strains and sprains. These injuries result from the cylinder falling on the foot or from employees trying to catch a falling cylinder. Here are a few handling tips that will prevent such injuries:

- Cylinders should be transported by suitable hand trucks or rolled on the bottom edge.
- A cylinder must have a steel cap installed unless it is “connected for use.”
- Anyone transporting gas cylinders should wear safety shoes!
Sampling Science: An Intern Learns Health Physics’ Role in Fusion Research

By Dorothy Strauss

For Ryan Fregosi, a Princeton native entering his senior year at the University of New Haven (Conn.), an internship in the Health Physics (HP) Division at PPPL has been an interesting fit with his double major in chemistry and forensic science with a chemistry focus. Analyzing different sources of information and assembling them to form a cohesive picture was a process already familiar to Fregosi, in part from previous experience at PPPL.

“I’ve been coming to Science on Saturdays for years,” Fregosi noted. “I like figuring out how complex things work, and I enjoy math, physics, and chemistry. Physics is applied math. Chemistry is applied physics in the chemical world. Being able to work in those fields while doing some lab work made the opportunity to come here really appealing.”

Fregosi is putting his skills to use in the PPPL Environmental, Analytical, and Radiological Laboratory (PEARL), where he's performing environmental distillations and liquid scintillation counting for rain, surface, and ground water samples. He’s also helping to perform processing of Differential Atmospheric Tritium Sampling (DATS) units, which are used to measure the tiny amounts of tritium released into the air from activities at D-Site both at the release point and at various locations in the environment. The DATS units are changed out periodically and brought to the PEARL where they are processed by Health Physics workers, including Fregosi, using a technique that employs both high temperature ovens and cold liquid nitrogen to determine the levels of tritium released to and appearing in the local environment.

Fregosi already knew he enjoyed hands-on work but his time here has shown him another facet of scientific research. “I’m learning a lot about the business of science and what it takes to keep a facility like this running,” he said. “The safety training here is extensive. So is the application of procedures to the work being done.”

The focus on science at the Laboratory is something else Fregosi appreciates. “The environment [at PPPL] is cool,” he said. “The knowledge and research are cutting-edge but the people are laid-back. They’re professional, efficient, and enjoy their work.”

This enthusiasm for science is something Fregosi tries to convey in his role as a teacher’s assistant in his university’s laboratories. He often encounters non-science majors who aren’t interested in the subject matter and struggle to relate classroom lectures to laboratory work. “I like teaching science because, if you can demonstrate the importance of it and show them that first step, the new territory, the unknown, they might see how interesting science and research can be.”

There is plenty of new territory for Fregosi in the PEARL where he performs daily calibration checks on PEARL equipment including Liquid Scintillation Counters, which measure tritium in the environment, the Sulfur-in-Oil Analyzer, which measures sulfur concentration in fuel oil to ensure it meets regulatory requirements for emissions, and the gamma spectroscopy systems, which measure gamma radiation emissions of activated materials. These activities ensure the integrity of the results from the equipment and are an important first step for analyzation. “Ryan is a bright young man who has made significant contributions to the group this summer,” noted George Ascione, head of the Health Physics Division. “Being new to the health physics field didn't stop him from applying his intelligence and contributing to our workload. It's been refreshing to have a college student come in and make an impact as rapidly as Ryan has.”

“I didn’t know much about health physics when I first started but I like the role it plays in research and safety,” Fregosi said. “It helps keep the Laboratory running and well-oiled. The HP techs don't just take readings; they have to apply their knowledge and figure things out. It's a cool side to the plasma and fusion research.”
Lessons Learned – Battery Explosion during Compressor Startup at Another DOE Facility

By Jerry Levine (Based on DOE Lessons Learned Database)

Lessons Learned Statement:

It’s possible to overcharge a battery and an overcharged battery is a potential hazard. You can also overcharge cordless tools and other rechargeable batteries with equally dangerous results if the charging device is not designed to shut off or reduce the charging rate once the battery is fully charged.

Discussion:

After fueling a portable air compressor outside a building at another DOE facility, a technician pressed the compressor’s starter button and its battery failed and exploded, spraying battery acid. His safety glasses prevented acid from contacting his eyes but it did contact his face and neck.

The technician used water from a faucet at the building to rinse the acid off his face and neck, preventing the burns that could have resulted. He then contacted emergency services at the DOE site, who verified that he was not injured. The technician then secured the area around the compressor and put absorbent on the ground where the acid landed.

Analysis:

This was a routine periodic refueling operation. The technician performed the work correctly per the instructions provided, wore the designated personal protective equipment (PPE) for the work, and responded properly to the incident.

The most likely cause of the explosion was hydrogen buildup inside the battery. If the battery had been connected to just the compressor, it is unlikely that a hydrogen buildup great enough to cause this explosion would have occurred during the 18 months this battery was in place. However, hydrogen buildup is possible if the battery is overcharged. Overcharging can cause battery fluids to overheat and evaporate, thus degrading the battery’s performance and even causing it to explode.

This battery was charged by a Schauer 4-amp Charge Master battery charger lacking an automatic shutoff or an automatic reset to a trickle charge after the battery is fully charged. Either feature would likely have prevented overcharging, the suspected hydrogen buildup, and the explosion. There is no documentation of the time the battery spent connected to this charger. It is not known whether the charger was connected to the battery when the compressor was started. It is known that the charger being connected to the overcharged battery during startup is not necessarily a precursor to an explosion. An extent of condition evaluation identified this compressor and one other compressor as the only equipment at the site that used a battery charger lacking one of these features. The unlatched compressor door offered a barrier that limited dispersal of the acid. It is believed the acid would not have contacted the technician and its dispersal to the environment would have been significantly limited if the door had been latched. However, the instructions said nothing about latching the door shut before startup and the technician noted that this latch was not functioning.

The final barrier between the acid and the technician was his clothing and safety glasses. Although his safety glasses prevented the acid from contacting his eyes, neither his safety glasses nor his clothing were designed to protect him from such a splash.

After the battery exploded, the technician acted to effectively mitigate personal and environmental injury by quickly rinsing the acid off his face and neck and securing the area and promptly placing absorbent on the ground where the acid landed.

continued on page 7
Actions:

- The DOE facility purchased and installed battery chargers that prevent overcharging on the equipment identified by its extent of condition evaluation.
- The DOE facility added portable equipment, such as the two compressors identified by the extent of condition, to the preventive maintenance database.
- The DOE facility added instructions to verify battery fluid levels before attempting to start the equipment for maintenance or regular operational use. This helps verify the battery condition and releases accumulated hydrogen.
- The DOE facility added instructions directing the user to ensure that all doors and access portals that can be closed and secured and still allow safe equipment startup and operation are closed and secured before any attempt to start such equipment. The latch on this compressor was repaired.

Note that safety requirements for working with rechargeable storage battery banks at PPPL are included in ESHD 5008 Section 2, Chapter 14, “Battery Banks” (http://bp.pppl.gov/ESHD_MANUAL/safety/es14.0.pdf).

Lessons Learned

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Be Safe in the Summer Heat — Avoid Heat Stress Illnesses

By Samantha Burrows

It’s that time of year again – summer! With the summer months come sizzling summer temperatures and humidity that seems to increase with each passing day. Excessively hot conditions place the body under a lot of stress and physical activity during such conditions multiples that stress, which can lead to problems such as a loss of fluids, fatigue, and heat-related illnesses and injuries and even death in extreme circumstances.

Some factors leading to heat-related illnesses and injuries include increased temperatures and humidity, a lack of air circulation, excess clothing, and physical activity.

There are various types of heat-related injuries and illnesses that one should be aware of, especially if working in hot conditions:

Heat Rash, also referred to as prickly heat, is a skin rash occurring in hot and humid environments in which sweat doesn’t evaporate.

Heat Cramps are painful muscle cramps caused by a loss of body salts due to excessive sweating. This usually occurs when workers drink large quantities of water but fail to replace the lost salt content. Tired muscles (those used for performing the work) are usually the ones most susceptible to cramps.

Heat Syncope occurs when someone faints suddenly due to a reduction of blood flow to the head. Symptoms include cool and moist skin and a weakened pulse.

Heat Exhaustion occurs when the body’s heat control mechanism is overactive and a person does not drink enough fluids or have enough salt. The victim may suffer from a headache, dizziness, blurred vision, light-headedness, nausea/vomiting, or heat cramps and could even progress to a heat stroke in severe cases.

Heat Stroke is a medical emergency considered a catastrophic illness with a high death rate. Heat stroke occurs when the body’s cooling mechanism has shut down due to excessive fluid loss. Victims experience increased body temperature, hot dry skin with no sweating, weakness, and possible seizures.

Being able to recognize the signs of heat-related injuries and illnesses in others is extremely important, since in most cases victims will not realize they are suffering from a heat-related illness themselves. Preventing heat illnesses is achieved by controlling the factors that cause it. Some key steps to prevention include:

- Ensuring sufficient ventilation in the work area to increase airflow.
- Using cooling fans when possible, especially when working indoors.
- Taking frequent rest and water breaks during strenuous activities.
- Wearing lightweight & light-colored clothing, ideally loose cotton material.
- Drinking enough water (and replenishing drinks like Gatorade) to restore lost fluids.

If you do notice a coworker suffering from heat-related illnesses, contact Emergency Services at ext. 3333 and, if possible, remove the victim from the hot environment until help arrives.
Poisonous Plants

By Bill Slavin

There are three native and abundant plants found locally that cause an allergic skin reaction on contact—poison ivy, poison oak, and poison sumac.

All three release an oil, urushiol, when the leaf or other plant parts are bruised, damaged, or burned. When the oil gets on the skin, most people get an allergic reaction resulting in an itchy red rash with bumps or blisters. When exposed to 50 micrograms of urushiol, an amount that is less than one grain of table salt, 80 to 90 percent of adults will develop a rash. The rash, depending upon where it occurs and how broadly it is spread, may significantly impede or prevent a person from working. Although over-the-counter topical medications may relieve symptoms for most people, immediate medical attention may be required for severe reactions, particularly when someone is exposed to the smoke from burning these poisonous plants. Burning these poisonous plants can be very dangerous because the allergens can be inhaled and cause lung irritation.

The old saying "Leaves of three, let it be!" is a helpful reminder for identifying poison ivy and oak, but not poison sumac, which usually has clusters of seven to thirteen leaves.

**Poison Ivy** is typically a hairy, rope-like vine with three shiny green (or red in the fall) leaves budding from one small stem.
POISON OAK is typically a shrub with leaves of three, similar to poison ivy.

POISON SUMAC is a woody shrub that has stems that contain seven to thirteen leaves arranged in pairs.

People may become exposed to urushiol through direct contact with the plant, contact with items that have the oil on them such as tools or gloves, and inhaling or coming into contact with the smoke from burning plants.

Signs or symptoms associated with skin contact with poisonous plants may include a red rash within a few days of contact, bumps or weeping blisters, swelling and itching. Note that the fluid from the blisters is not contagious.

You can prevent contact with poisonous plants by wearing long sleeves, long pants, boots, and gloves. Wash any exposed clothing in hot water with detergent to prevent contact with the oils. Clean tools with rubbing alcohol (isopropanol or isopropyl alcohol) or soap and lots of water. Note that urushiol can remain active on the surface of objects for up to five years.

If you come in contact with poisonous plants, you should immediately rinse your skin with rubbing alcohol, specialized poison plant washes, degreasing soap (such as dishwashing soap) or detergent, and lots of water. If a rash should develop, apply wet compresses, calamine lotion, or hydrocortisone cream to the skin to reduce itching and blistering. An oatmeal bath may also relieve itching. You can also take an antihistamine such as diphenhydramine (Benadryl) to help relieve itching. You should seek professional medical attention for severe rashes and you should call 911 or go to a hospital emergency room immediately if you suffer a severe allergic reaction, such as swelling or difficulty breathing.

(Information from NIOSH. Photos from the US Department of Agriculture)
PPPL Awarded DOE GreenBuy Gold

The DOE has once again recognized PPPL for its outstanding efforts in green purchasing. For the second year in a row, PPPL has received the DOE’s gold GreenBuy award for its leadership in green buying. PPPL uses more than nine green products in five different categories. We would like to highlight key groups for their exemplary involvement in PPPL’s green purchasing program.

Sustainable Layout Design and Graphics: Gregory J. Czechowicz, PPPL Communications

Princeton Plasma Physics Laboratory is a U.S. Department of Energy National Laboratory.