

June/July 2016

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"Safety Comes First" Case Western Reserve University Environmental Health and Safety

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What happens in an EPA Inspection – Part IV

Closing Conference

The EPA inspectors will answer questions, fill in any information gaps, and may identify potential deficiencies in the field. The inspectors will complete an inspection checklist, but are not required to provide it to the facility owner or operator. Though EPA inspectors do not typically provide a compliance determination during the closing conference, they may provide compliance assistance as allowed by EPA policy. Reporting results of a process-based investigation generally follow the same basic rules for reporting of "regulatory-based" investigation results. No single reporting format will satisfy the needs of all agencies conducting various types of process-based investigations (compliance monitoring/compliance assistance, etc.). However, the following two points are emphasized to avoid report problems:

1. As with all investigation reports, the principles of clear presentation apply. This is especially important because process descriptions can be very complex, and the information may not be "usable" if the presentation is not "reader friendly." The process presentation should start at the beginning of the process (usually receipt/handling of raw materials) and work systematically toward the end (product). Figures/flow diagrams are extremely helpful and can eliminate (or supplement) the need for complicated narrative and should be included wherever possible. Because the objective of including a process description in the report is to provide a clear foundation for identify-ing/discussing facility problems/issues, the description should be of sufficient detail to enable the reader to understand facility operations associated with the identified issues/problems. The narrative should identify all significant wastestreams, their point of generation, and disposition, especially those wastestreams that are associated with follow-up issues (noncompliance, pollution prevention, compliance assistance, etc.).

2. Confidential business information should be avoided in reports, if at all possible, because of the resulting restrictions on subsequent use and distribution. A separate "confidential" report, containing the process information claimed confidential may be appropriate and would allow the nonconfidential information (usually the bulk of the findings) to be used without constraint.

Ultraviolet Radiation: How it Affects Life on Earth



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The sun radiates energy in a wide range of wavelengths, most of which are invisible to human eyes. The shorter the wavelength, the more energetic the radiation, and the greater the potential for harm. Ultraviolet (UV) radiation that reaches the Earth's surface is in wavelengths between 290 and 400 nm (nanometers, or billionths of a



People and plants are living with both helpful and harmful effects of ultraviolet (UV) radiation from the sun. (Photograph courtesy Jeannie Allen)

meter). This is shorter than wavelengths of visible light, which are 400 to 700 nm.

UV radiation from the sun has always played important roles in our environment, and affects nearly all living organisms. **Biological** actions of many kinds have evolved to deal with it. Yet UV radiation at different wavelengths differs in its effects, and we have to live with the harmful effects as well as the helpful ones. Radiation at the longer UV wavelengths of 320-400 nm, called UV-A, plays a helpful and essential role in formation of Vitamin D by the skin, and plays a harmful role in that it causes

sunburn on human skin and cataracts in our eyes. The incoming radiation at shorter wavelengths, 290-320 nm, falls within the UV-B part of the electromagnetic spectrum. (UV-B includes light with wavelengths down to 280 nm, but little to no radiation below 290 nm reaches the Earth's surface). UV-B causes damage at the

X-rays	Ultraviolet	VISIBLE	Infrared	molecular level
←	C B A		\rightarrow	to the
	/ _/ /	+ + + +		fundamental
0.1			1.0	building block
	Wavelength (µ	ım)		of life—
El		<u> </u>		deoxyribonucleic
Electromagnetic radiation exists in a range of wavelengths, which			acid (DNA).	
are delineated int	o major divisions for a	our convenienc	e.	DNA readily
Ultraviolet B radi	ation, harmful to livin	g organisms, r	epresents a	absorbs UV-B
small portion of the	ne spectrum, from 290	to 320 nanom	eter	radiation, which
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Ultraviolet Radiation: How it Affects Life on Earth, cont.

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shape of the molecule in one of several ways. The illustration below illustrates one such change in shape due to exposure to UV-B radiation. Changes in the DNA molecule often mean that protein-building enzymes cannot "read" the DNA code at that point on the molecule. As a result, distorted proteins can be made, or cells can die. But living cells are "smart." Over millions of years of evolving in the presence of UV-B radiation, cells have developed the ability to repair DNA. A special enzyme



Ultraviolet (UV) photons harm the DNA molecules of living organisms in different ways. In one common damage event, adjacent bases bond with each other, instead of across the "ladder." This makes a bulge, and the distorted DNA molecule does not function properly. (Illustration by David Herring)

arrives at the damage site, removes the damaged section of DNA, and replaces it with the proper components (based on information elsewhere on the DNA molecule). This makes DNA somewhat resilient to damage by UV-B.

In addition to their own resiliency, living things and the cells they are made of are protected from excessive amounts of UV radiation by a chemical called ozone. A layer of ozone in the upper atmosphere absorbs UV radiation and prevents most of it from reaching the Earth. Yet since the mid-1970s, human activities have been changing the chemistry of the atmosphere in a way that reduces the amount of ozone in the stratosphere (the layer of

atmosphere ranging from about 11 to 50 km in altitude). This means that more ultraviolet radiation can pass through the atmosphere to the Earth's surface, particularly at the poles and nearby regions during certain times of the year.

Without the layer of ozone in the stratosphere to protect us from excessive amounts of UV-B radiation, life as we know it would not exist. Scientific concern over ozone depletion in the upper atmosphere has prompted extensive efforts to assess the potential damage to life on Earth due to increased levels of UV-B radiation. Some effects have been studied, but much remains to be learned.

Next issue: Effects on the Biosphere

Source: NASA

"A layer of ozone in the upper atmosphere absorbs UV radiation..."



About Antimicrobial Resistance



About Resistance

Antibiotic / Antimicrobial resistance is the ability of microbes to resist the effects of drugs – that is, the germs are not killed, and their growth is not stopped. Although some people are at greater risk than others, no one can completely avoid the risk of antibiotic-resistant infections. Infections with resistant organisms are difficult to treat, requiring costly and sometimes toxic alternatives.

Bacteria will inevitably find ways of resisting the antibiotics developed by humans, which is why aggressive action is needed now to keep new resistance from developing and to prevent the resistance that already exists from spreading.

Explanation of Bacteria and Other Microbes

Microbes are organisms too small for the eye to see and are found everywhere on Earth. There are many types of microbes: bacteria, viruses, fungi, and parasites. While most microbes are harmless and even beneficial to living organisms, some can cause disease among humans, other animals, and plants. These diseasecausing microbes are called pathogens; sometimes they are referred to as "germs" or "bugs." All types of microbes have the ability to develop resistance to the drugs created to destroy them, becoming drug-resistant organisms.



"Bacteria will inevitably find ways of resisting the antibiotics ..."

About Antimicrobial Resistance, cont.

(Continued from page 4)

How Resistance Happens and Spreads

The use of antibiotics is the single most important factor leading to antibiotic resistance around the world. Simply using antibiotics creates resistance. These drugs should only be used to manage infections.

Trends in Drug Resistance

- Antibiotics are among the most commonly prescribed drugs used in human medicine and can be lifesaving drugs. However, up to 50% of the time antibiotics are not optimally prescribed, often done so when not needed, incorrect dosing or duration.
- The germs that contaminate food can become resistant because of the use of antibiotics in people and in food animals. For some germs, like the bacteria *Salmonella* and *Campylobacter*, it is primarily the use of antibiotics in food animals that increases resistance. Because of the link the between antibiotic use in food-producing animals and the occurrence of antibiotic-resistant infections in humans, antibiotics that are medically important to treating infections in humans should be used in food-producing animals only under veterinary oversight and only to manage and treat infectious disease, not to promote growth.
- The other major factor in the growth of antibiotic resistance is spread of the resistant strains of bacteria from person to person, or from the non-human sources in the environment.





CENTERS FOR DISEASE CONTROL AND PREVENTION

"The use of antibiotics is the single most important factor leading to antibiotic resistance around the world."



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Eye on Safety

Take precautions to protect your eyes According to The Vision Council, a nonprofit trade association, 90 percent of eye injuries are preventable, and vision loss is among the top 10 disabilities for American adults. The Council identifies four primary causes of eye injuries: 1. **Projectiles** (dust, concrete, metal, wood, and other particles) 2. Chemicals (splashes and fumes) 3. Radiation (especially visible light, ultraviolet (UV) radiation, heat, or infrared 'The first radiation and lasers) line of defense 4. Bloodborne pathogens (hepatitis or human immunodeficiency virus (HIV)) from bodily fluids, including blood The first line of defense against eye hazards is protective eyewear. Choose personal protective equipment (PPE) based on a hazard assessment of each activity. Options include: against 1. Nonprescription and prescription safety glasses. While they may look like regular glasses, safety eyewear features much stronger lenses and frames. Safety eye glasses must meet ANSI standards, indicated by a Z87 mark on the lens or frame. They provide protection for general working conditions where dust, chips, or flying hazards particles may be present. Side shields or wraparound glasses provide additional side protection. Polycarbonate lenses are considered the most protective. is 2. Goggles. Safety goggles protect from impact, dust, and chemical splash. They provide a secure shield around the entire eye and guard against hazards coming protective from any direction. Goggles can be worn over prescription glasses and contact lenses. eyewear." 3. Face shields and helmets. A face shield protects the entire face of a worker exposed to severe chemical hazards, heat, or bloodborne pathogens and is worn over safety glasses or goggles. A helmet is used for welding or working with molten materials. 4. Special protection. Other types of protection, such as helmets or goggles with special filters to protect the eyes from radiation exposure, are used for tasks like welding or when working with lasers. Full-face respirators are ideal for protection from hazards like sanding dust, paint spray, and other respiratory irritants.



NOTE: While contact lenses do not safeguard against hazards (some chemicals can react with the lens material), the improvement in vision they provide can have a positive impact on safety. The American Optometric Association explains, "Contact lenses can't provide significant protection from eye hazards in the workplace. However, there is no evidence that the wearing of contact lenses increases the risk of eye injury." *Source: Safety.BLR*

Chemical Spotlight: Formaldehyde

Formaldehyde is a colorless, flammable gas with a distinct and pungent smell. This chemical is used in the production of fertilizer, paper, plywood, and urea-formaldehyde resins. Typically, formaldehyde breaks down in the air within hours. It dissolves easily in water but does not stay present for a long time. The primary way you can be exposed to formaldehyde is by breathing air containing it.

If formaldehyde in a solution is released into the environment, you should:

- Evacuate the area and eliminate all ignition sources. Keep the chemical out of sewers.
- Absorb all liquids with dry sand, earth, or inert absorbent, and place in containers for disposal.
- Ventilate the area, and wash after clean-up.

If formaldehyde leaks as gas into the environment:

- Eliminate all ignition sources after evacuating the area. Keep the gas out of confined spaces because of the possibility of explosion.
- Ventilate the area to disperse the gas.
- Stop the flow of gas. If the gas is coming from a leaking container, and it cannot be stopped in place, remove the container to a safe place or open air and allow container to empty, or repair the leak.
- You may need to contain and dispose of formaldehyde as a hazardous waste. Check with your state Department of Environmental Protection (DEP) or EPA region for specific recommendations on disposal.

Source: Safety.BLR





"It [formaldehyde] dissolves easily in water but does not stay present for a long time."

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Dr. Mary Ellen

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Mary Ellen questions about chemical fume hoods and hazardous materials shipping.