December 2020
Issue 111

Army Industrial Hygiene News and Regulatory Summary

Hazardous Substances

Green Chemistry Creates Coatings From Nature

Special Interest Articles:

Organic chemists from the University of Groningen and the Dutch multinational company AkzoNobel, a major global producer of paints and coatings, developed a process that allows them to turn biomass into a high-quality coating using light, oxygen and UV light. This process combines a renewable source with green chemistry and could replace petrochemical-based monomers such as acrylates, which are currently used as building blocks for coatings, resins and paints. A paper on the new process was published in the journal *Science Advances* on 16 December.

Coatings are everywhere, from the paint on your house to a protective layer on the screen of your smartphone. They protect surfaces from scratches, influences of the weather or everyday wear. Most coatings are made up of polymers based on acrylate monomers, with the global production of acrylate exceeding 3.5 million tonnes a year, all produced from fossil oil.

Read more:
https://www.sciencedaily.com/search/?keyword=hazardous+substance#gsc.tab=0&gsc.q=chemical&gsc.sort=date&gsc.page=4

Contents:

Tiny Drone 'Smellicopter' Uses Moth Antenna to Smell Targeted Chemicals

The University of Washington (UW) developed a tiny drone through the use of a moth's biology inventing a new technology called the "Smellicopter". Instead of trying to amplify what human beings' capacities are, the approach was to take the capacity of a moth and use a live moth antenna and incorporate it into the tiny drone to function as a smell sensor.

According to an article by TechCrunch, Mounted on a particularly tiny drone platform along with collision avoidance as well as other logical built in features, the device is said to be a new prototype of a potentially promising fusion of both artificial and natural ingenuity. According to an UW grad student known as Melanie Anderson, Nature is really able to blow the human-made odor sensors straight out of the water.

Read more:
https://www.techtimes.com/articles/254810/20201207/tiny-drone-smellicopter-use-moth-antenna-smell-targeted-chemicals.htm

Lung Transplants Increasing for Work-related Diseases

Lung transplants for work-related lung diseases are increasing, highlighting the need for prevention among high-risk workers, according to research published in the journal Occupational and Environmental Medicine.

Work-related lung diseases can be severe and life-threatening and can progress even in the absence of additional exposure. They are also entirely preventable. These lung diseases are caused by inhaling harmful substances, such as coal mine dust, which causes black lung disease, also called coal workers' pneumoconiosis. Other work-related lung diseases include silicosis from silica dust, asbestosis from asbestos fibers, hard metal pneumoconiosis from metal particles, and ongoing beryllium disease from beryllium and its compounds.

Read more:
https://www.cdc.gov/niosh/enews/enewsv18n8.html#research-in

Evaluation Of Decontamination Efficacy of Four Antineoplastics (Ifosfamide, 5-Fluorouracil, Irinotecan, And Methotrexate) After Deliberate Contamination

The main objective was to determine the decontamination efficacy of quaternary ammonium, 0.1% sodium hypochlorite, and water after deliberate contamination with four antineoplastics (ifosfamide, 5-fluorouracil, irinotecan, methotrexate). A stainless-steel surface was deliberately contaminated with ifosfamide (15 µg), 5-fluorouracil (10 µg), irinotecan (1 µg), and methotrexate (1 µg). First, a single decontamination step with either water, quaternary ammonium, or 0.1% sodium hypochlorite was tested. Then, the effect of up to four successive decontamination steps with either quaternary ammonium or 0.1% sodium hypochlorite was tested. Commercial wipes consisting of two layers of non-woven microfibers with an inner layer of highly absorbent viscose fibers were used. Triplicate surface samples were obtained and tested by ultra-performance liquid chromatography tandem mass spectrometry. The limits of detection were 0.004 ng/cm^2 for ifosfamide,

0.040 ng/cm^2 for 5-fluorouracil, 0.003 ng/cm^2 for irinotecan, and 0.002 ng/cm^2 for methotrexate. After a single decontamination step, the 0.1% sodium hypochlorite eliminated 100% of contamination with 5-fluorouracil, irinotecan, and methotrexate and 99.6 ± 0.5% of ifosfamide contamination. Quaternary ammonium and water also removed 100% of the 5-fluorouracil, and 99.5% to 99.9% of the other three antineoplastics. For ifosfamide, irinotecan, and methotrexate, the decontamination

efficacy increased with successive decontamination steps with quaternary ammonium. 5-fluorouracil was undetectable after a single decontamination step. Methotrexate was the only drug for which decontamination efficacy was less than 100% after four decontamination steps. 100% decontamination efficacy was achieved from the decontamination step with 0.1% sodium hypochlorite for 5-fluorouracil, irinotecan, and methotrexate. For ifosfamide, 100% efficacy was achieved only after the third decontamination step. It was possible to make all traces of antineoplastic undetectable after deliberate contamination with 5-fluorouracil, irinotecan, and methotrexate with a 0.1% chlorine solution; up to three decontamination steps were needed to make ifosfamide undetectable. Water or quaternary ammonium removed more than 99.5% of deliberate contamination. In several scenarios, it was necessary to repeat the decontamination to eliminate residual traces. More work is needed to identify the optimal decontamination approach for all of the antineoplastic drugs used.

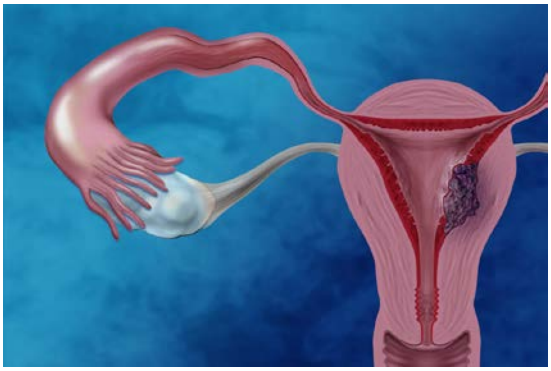
Read more: Journal of Occupational and Environmental Hygiene, Published online: 26 Dec 2020(Available with AIHA membership)

Low-Dose Bisphenol A in a Rat Model of Endometrial Cancer: A CLARITY-BPA Study

Background:
Bisphenol A (BPA) is known to be biologically active in experimental models even at low levels of exposure. However, its impact on endometrial cancer remains unclear.

Objectives:
This study aimed to investigate whether lifelong exposure to different doses of BPA induced uterine abnormalities and molecular changes in a rat model.

Methods:
Sprague-Dawley rats were exposed to 5 doses of BPA [0, 25, 250, 2,500, or 25,000μg/kg 25,000µg/kg body weight



(BW)/d] or 2 doses of 17α−ethynylestradiol 17α−ethynylestradiol (EE2) (0.05 and 0.5μg/kg 0.5µg/kg BW/d) starting from gestational day 6 up to 1 y old according to the CLARITY-BPA consortium protocol. The BW, uterus weight, and histopathology end points of the uteri were analyzed at

postnatal (PND) day 21, 90, and 365. Estrous cycling status was evaluated in PND90 and PND365 rats. Transcriptomic analyses of estrus stage uteri were conducted on PND365 rats.

Results:
Based on the analysis of the combined effects of all testing outcomes (including immunohistological, morphological, and estrous cycle data) in a semiblinded fashion, using statistical models, 25μg/kg 25µg/kg BW/d BPA [BPA(25)], or 250μg/kg 250µg/kg BW/d BPA [BPA(250)] exerted effects similar to that of EE2 at 0.5μg/kg 0.5µg/kg BW/d in 1-y-old rats.

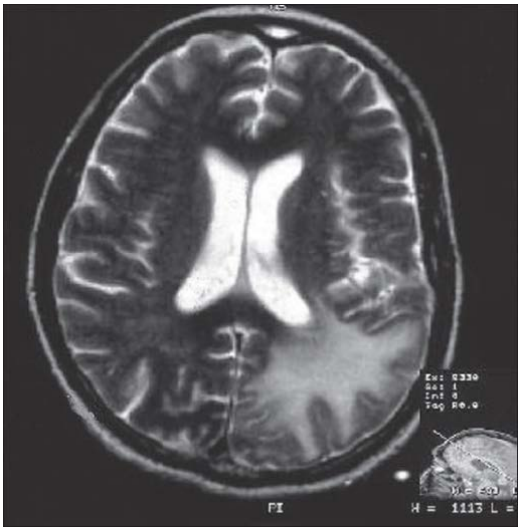
Read more:
https://ehp.niehs.nih.gov/doi/10.1289/EHP6875

Urinary Arsenic and Cadmium Associations with Findings from Cranial MRI in American Indians: Data from the Strong Heart Study

Background:
Arsenic and cadmium are known cardiovascular toxicants that pose disproportionate risk to rural communities where environmental exposures are high. American Indians have high vascular risk, which may be attributable in part to these exposures.

Objective:
We examined urine metal concentrations in association with magnetic resonance imaging findings of vascular brain injury or cerebral atrophy in adult American Indians.

Methods:
We measured arsenic and cadmium in American Indian participants from the Strong Heart Study (1989–1991) and evaluated these associations with later (2010–2013) measures of infarct, hemorrhage, white matter hyperintensity (WMH) grade, brain and hippocampal



volume, and sulcal and ventricle atrophy using nested multivariate regression analyses.

Read more:
https://ehp.niehs.nih.gov/doi/10.1289/EHP6930

Wildfire Smoke's Microbial Content Can Cause Infectious Diseases

Wildfire smoke contains microbes, a fact that's often ignored, but one that may have important health repercussions.
In an article published Dec. 18 in *Science*, Leda Kobziar and George Thompson called the attention of the scientific community to the health impacts of wildfire smoke's microbial content.

Smoky skies caused by wildland fires are becoming seasonal norms, especially in some parts of the United States and Australia. In 2020, raging wildfires in the Western U.S. have set new records and led to extremely unhealthy or hazardous air quality levels for many weeks in a row.

Read more: https://www.news-medical.net/news/20201218/Wildfire-smokes-microbial-content-can-cause-infectious-diseases.aspx

Radiation

Comparison between EPA UV Index App and UV Monitor to Assess Risk for Solar Ultraviolet Radiation Exposure in Agricultural Settings in Eastern North Carolina

UV Index

Exposure Category	UV Range
Low	< 2
Moderate	3 to 5
High	6 to 7
Very High	8 to 10
Extreme	11 +

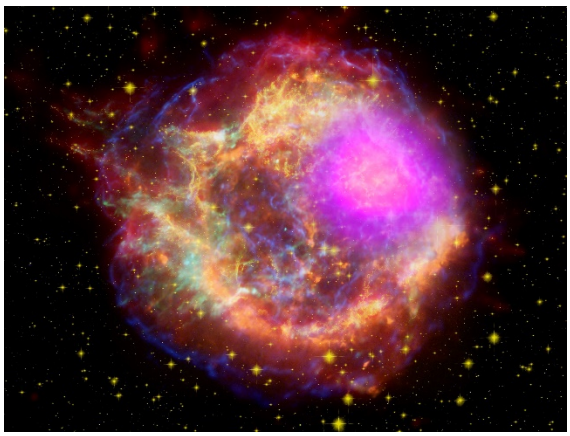
Agricultural workers are exposed to solar ultraviolet (UV) radiation due to the significant amount of time spent working outdoors. Risk information on UV exposure from the EPA SunWise UV Index mobile app is conveniently available for timely advice on risk management, but its reliability is unknown. The purpose of this study was to determine the reliability of the EPA UV Index app in providing accurate risk

information to reduce UV exposure and prevent related illnesses among agricultural workers in eastern North Carolina. UV radiation effective irradiance (UV $_{eff}$) indices were datalogged at two agricultural sites using radiometers from April–August 2019 and were assigned to risk levels (low, moderate, high, very high, extreme) based on the ACGIH® Threshold Limit Values (TLVs®). The UV index (UV$_{app}$) and its corresponding risk level were obtained using the app. Hourly UV$_{app}$-based risk level assignments were time-matched to their corresponding UV$_{eff}$/TLV-based risk level assignments (871 pairs) and analyzed using cross tabulation by determining the percentage of hourly UV$_{eff}$/TLV-based risk levels ("gold standard") with the same hourly UV$_{app}$-based risk levels, with a larger percentage indicating higher app reliability. Results showed that the app correctly identified 100% of low risk conditions, but its reliability decreased as the UV risk condition became more severe. The app correctly identified 0% of moderate, high and very high risk conditions but instead assigned 100% of them to lower risk levels (30–100% as low risk, 5–70% as moderate risk), indicating that the app was less protective in assessing UV risk. The app correctly identified 0.6% of extreme risk conditions but assigned 99.4% of them to lower risk levels (9.4% as low, 29.7% as moderate, 24.6% as high, 35.8% as very high). It is concluded that the performance of the EPA UV Index app in assessing occupational UV risk is not protective of workers particularly for high risk conditions, and that the use of the app for the assessment of risk to UV exposure in agricultural settings is not recommended.

Read more: Journal of Occupational and Environmental Hygiene, Published online: 07 Dec 2020(Available with AIHA membership)

A Hint of New Physics in Polarized Radiation from the Early Universe

Using Planck data from the cosmic microwave background radiation, an international team of researchers has observed a hint of new physics. The team developed a new method to measure the polarization angle of the ancient light by calibrating it with dust emission from our own Milky Way.



While the signal is not detected with enough precision to draw definite conclusions, it may suggest that dark matter

or dark energy causes a violation of the so-called "parity symmetry."

The laws of physics governing the Universe are thought not to change when flipped around in a mirror. For example, electromagnetism works the same regardless of whether you are in the original system, or in a mirrored system in which all spatial coordinates have been flipped.

Read more:
https://www.sciencedaily.com/releases/2020/12/201202114515.htm

Ventilation

Hospital Air Frequently Contaminated With COVID-19, Study Finds

A study of hospital air contamination in *JAMA Network Open* last week found that 17.4% of air samples from environments near COVID-19 patients were positive for SARS-CoV-2 RNA, the virus that causes COVID-19, but only 8.6% contained viable virus.

Researchers reviewed 24 observational studies of air contamination in hospital settings from Jan 1 to Oct 27 with data on SARS-CoV-2 viral RNA positivity rates detected by reverse-transcription polymerase chain reaction (RT-PCR), viral culture, air ventilation systems, and distance from patients.

Overall, 82 of 471 air samples (17.4%) from close patient environments (within 5 meters) were positive for SARS-CoV-2 RNA, with no significant difference associated with distance from patients. The positivity rate in intensive care settings was 25.2% (27 of 107 samples) compared with 10.7% (39 of 364 samples) for non-intensive care units ($P < .001$).

Read more:
https://www.cidrap.umn.edu/news-perspective/2020/12/news-scan-dec-28-2020

PPE

Speech Intelligibility Test Methodology Applied to Powered Air-Purifying Respirators Used In Healthcare

Powered air-purifying respirators (PAPRs) are worn to protect workers from hazardous respiratory exposures in a wide range of workplaces, including healthcare. However, PAPRs may diminish the ability of wearers to correctly hear words spoken by others, potentially interfering with safe performance of healthcare duties. Accordingly, the impact of PAPRs during healthcare use on speech intelligibility (SI) and consequently on user safety, usability, and patient care is not well studied. The objectives of this study were to (1) determine a listener's ability to comprehend single-syllable words spoken by a PAPR wearer; (2) determine a PAPR wearer's ability to intelligibly hear and identify single-syllable words spoken by a PAPR wearer; (3) to assess the variability between speakers, listeners, and PAPR models; (4) to investigate the effects of PAPR design features on SI; and (5) inform a SI requirement for certifying future PAPRs for use in healthcare. This study utilized a Modified Rhyme Test to assess SI for PAPRs.

The current National Institute for Occupational Safety and Health (NIOSH) methods for assessing SI are limited to the recently introduced PAPR100 respirator class and the class of respirators claiming chemical, biological, radiological, and nuclear (CBRN) protections. Four NIOSH-

approved PAPRs were evaluated using four human subjects. Four experimental conditions were examined:(1) Speaker and Listener with no PAPR; (2) Speaker and Listener both wearing PAPRs; (3) Speaker with a PAPR, Listener without a PAPR; and (4) Speaker without a PAPR, Listener with a PAPR resulted in a total of 144 experiments. Statistical analysis showed that the SI performance ratings were not significantly different among the PAPR models, but experimental conditions had significant impact on SI. The pattern of SI across the conditions of the experiment also showed a significant difference depending on PAPR model. The SI performance rating for all PAPRs could meet the current NIOSH CBRN certification requirement for speech intelligibility.

Read more: Journal of Occupational and Environmental Hygiene, Published online: 07 Dec 2020(Available with AIHA membership)

Investigation of the Protection Efficacy of Face Shields against Aerosol Cough Droplets

Simple plastic face shields have numerous practical advantages over regular surgical masks. In light of the spreading COVID-19 pandemic, the potential of face shields as a substitution for surgical masks was investigated. In order to determine the efficacy of the protective equipment we used a cough simulator. The protective equipment considered was placed on a manikin head that simulated human breathing. Concentration and size distribution of small particles that reached the manikin respiration pathways during the few tens of seconds following the cough event were monitored. Additionally, water sensitive papers were taped on the tested protective equipment and the manikin face. In the case of frontal exposure, for droplet diameter larger than 3 µm, the shield efficiency in blocking cough droplets was found to be comparable to that of regular surgical masks, with enhanced protection for portions of the face that the mask does not cover. Additionally, for finer particles, down to 0.3 µm diameter, a shield blocked about 10 times more fine particles than the surgical mask. When exposure from the side was considered, the performance of the shield was found to depend dramatically on its geometry. While a narrow shield allowed more droplets and aerosol to penetrate in comparison to a mask under the same configuration, a slightly wider shield significantly improved the performance. The source control potential of shields was also investigated. A shield, and alternatively, a surgical mask, were placed on the cough simulator, while the breathing simulator, situated 60 cm away in the jet direction, remained totally exposed. In both cases, no droplets or particles were found in the vicinity of the breathing simulator. Conducted experiments were limited to short time periods after expiratory events, and do not include longer time ranges associated with exposure to suspended aerosol. Thus, additional evidence regarding the risk posed by floating aerosol is needed to establish practical conclusions regarding

actual transmittance reduction potential of face shields and surgical face masks.

Read more: Journal of Occupational and Environmental Hygiene, Published online: 14 Dec 2020(Available with AIHA membership)

Noise

New Study Evaluates How Different Face Masks Affect the Acoustics of Speech

Researcher Ryan Corey recently heard from a friend who teaches at a school where some of the students have hearing loss. The friend wanted to know if he had any ideas to help her communicate with these students while wearing a mask to slow the spread of COVID-19. Corey, who also has hearing loss, did not know what to tell her. So, he headed to the Illinois Augmented Listening Laboratory to look for solutions.

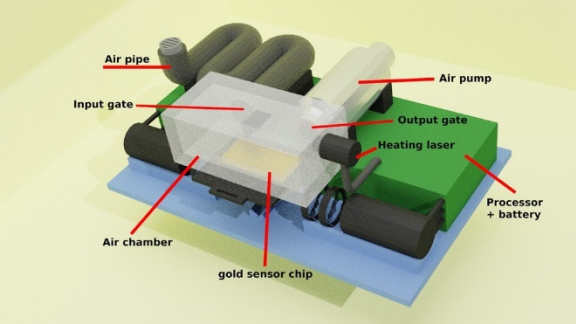
Corey, an electrical and computer engineering postdoctoral researcher under professor Andrew Singer at the University of Illinois Urbana-Champaign, leads a team that studies audio signal processing, especially for listening devices like hearing aids. The results of the team's new study evaluating the acoustic effects of face

masks on speech are published in *The Journal of the Acoustical Society of America*.

Read more: https://www.news-medical.net/news/20201223/New-study-evaluates-how-different-face-masks-affect-the-acoustics-of-speech.aspx

Preventive Medicine

Texas A&M Students Design Rapid COVID-19 Detection System



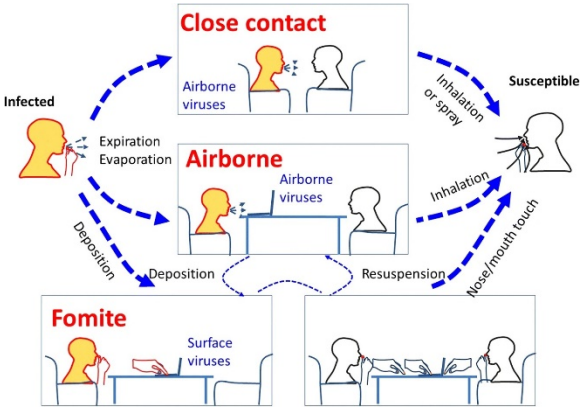
One challenge of the COVID-19 pandemic has been monitoring cases in places with high amounts of foot traffic. A team of students from the Department of Biomedical Engineering at Texas A&M University is working on a biosensor that could quickly diagnose cases and help prevent the spread of the novel coronavirus.

The Aerosol Pathogen Sensor team was selected for the National Science Foundation's I-Corps Site Program at Texas A&M to gain resources and assistance with moving their design past the concept phase. Their biosensor is designed to detect airborne pathogenic particles relating to COVID-19 to help diagnose a case within 20 minutes. Originally, the team felt the project could have applications in a variety of industries, including in grocery stores and health care offices. After completing their interviews, the focus was narrowed to hospitals, private practices and retirement homes.

Read more:
https://today.tamu.edu/2020/12/01/texas-am-students-design-rapid-covid-19-detection-system/

Fomites, Hands, and the Transmission of Respiratory Viruses

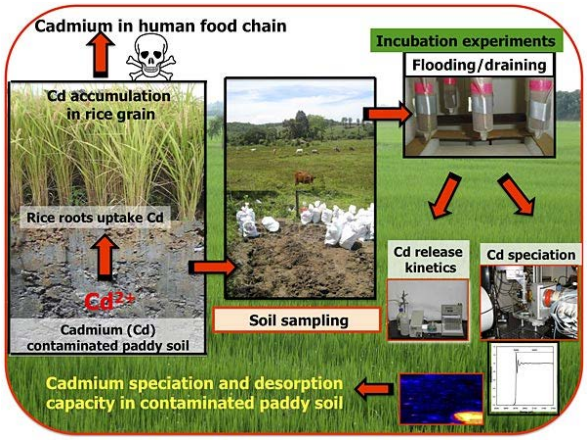
The transmission pathways of respiratory viruses, in particular the demarcation of droplet and airborne transmission and their relative importance, remain intensely debated (Drossinos and Stilianakis 2020). In contrast, a third pathway, indirect contact or fomite transmission, has proven to be far less contentious. Recently, Goldman (2020) has argued that, based on experiments studying virus inactivation on



environmental surfaces, the risk of fomite transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been exaggerated. Goldman maintains that the amounts of viruses deposited on surfaces in real-life situations are most likely much lower than the inocula used in the inactivation experiments. We agree with Goldman's conclusion that fomite transmission is an unlikely transmission route for enveloped respiratory viruses such as SARS-CoV-2 (or influenza), but we argue that virus inactivation on human skin is a more likely bottleneck limiting fomite transmission risk than the quantity of virus deposited on environmental surfaces.

Read more: Journal of Occupational and Environmental Hygiene, Published online: 07 Dec 2020(Available with AIHA membership)

Environmental Cadmium and Mortality from Influenza and Pneumonia in U.S. Adults



Background:
Environmental cadmium exposure is widespread. In humans, cadmium is poorly excreted, triggers pulmonary inflammation, reduces pulmonary function, and enhances lung injury by respiratory syncytial virus.

Objectives:
We examined the association of cadmium burden with mortality related to influenza or pneumonia.

Methods:
This prospective analysis of the National Health and Nutrition Examination Survey (NHANES) included 7,173 and 8,678 participants ≥ 45 ≥ 45 years of age enrolled in NHANES-III and NHANES 1999–2006, respectively. Associations were evaluated between cadmium and mortality from influenza or pneumonia during a median follow-up of 17.3 y (NHANES-III, based on creatinine-corrected urine cadmium) and 11.4 y (NHANES 1999–2006, based on blood cadmium). Survey-weighted Cox proportional hazard models were used to compute hazard ratios (HRs) comparing the mortality of individuals at the 80th vs. the 20th percentile of cadmium concentrations.

Read more:
https://ehp.niehs.nih.gov/doi/10.1289/EHP7598

Interaction between Long-Term Exposure to Fine Particulate Matter and Physical Activity, and Risk of Cardiovascular Disease and Overall Mortality in U.S. Women

Background:
Increased respiration during physical activity may increase air pollution dose, which may attenuate the benefits of physical activity on cardiovascular disease (CVD) risk and overall mortality.

Objectives:
We aimed to examine the multiplicative interaction between long-term ambient residential exposure to fine particulate matter <2.5 microns (PM2.5) and physical activity in the association with CVD risk and overall mortality.

Methods:
We followed 104,990 female participants of the U.S.-based prospective Nurses' Health Study from 1988 to 2008. We used Cox

proportional hazards models to assess the independent associations of 24-months moving average residential PM2.5 exposure and physical activity updated every 4 y and the multiplicative interaction of the two on CVD (myocardial infarction and stroke) risk and overall mortality, after adjusting for demographics and CVD risk factors.

Read more:
https://ehp.niehs.nih.gov/doi/10.1289/EHP7402

Gut Microbiome Snapshot Could Reveal Chemical Exposures in Children

Researchers at Duke University have completed the most comprehensive study to date on how a class of persistent pollutants called semi-volatile organic compounds (SVOCs) are associated with the gut microbiome in human children.

The results show that certain SVOCs are correlated with the abundance of bacterial and fungal species living in the human digestive tract and may affect them differently, providing a potential mechanism for measuring exposure to a wide variety of these substances. The study

also suggests that exposure to toxic halogenated compounds, chemicals containing carbon and a halogen such as chlorine and bromine, may create a niche for bacteria that feed off of them -- bacteria that are not usually found in the human gut.

Read more: https://www.sciencedaily.com/releases/2020/12/201203133902.htm

Environmental Health

The Environmental Relative Moldiness Index Reveals Changes in Mold Contamination in United States Homes over Time

The Environmental Relative Moldiness Index (ERMI) is a scale created to compare mold contamination levels in U.S. homes. The ERMI was developed as a result of the Department of Housing and Urban Development's (HUD) first American Healthy Homes Survey (AHHS I), which sampled 1,096 homes selected to be representative of the U.S. housing stock. In AHHS I, a dust sample from each home was analyzed using quantitative PCR assays (qPCR) for 36 common indoor molds: 26 Group 1 molds, which were associated with water damage in homes and 10 Group 2 molds, which primarily enter the home from the outside environment. In 2019, HUD completed AHHS II by sampling 695 homes. Because lead was banned from paint in 1978, a larger proportion of homes selected for AHHS II had been built before 1978 compared to AHHS I. The 36 ERMI molds were analyzed in AHHS II exactly as in AHHS I. For the 36-ERMI molds, the rates of detection, average concentrations, and geometric means were in significant concordance ($p < 0.001$) between AHHS I

and II, indicating that the ERMI methodology was stable over time. However, the average ERMI value in AHHS II homes was greater than in AHHS I. The reason for the difference was investigated by examining the Group 1 and 2 mold populations. The average summed logs of Group 1 molds were significantly greater in homes built before 1978 than the average for homes built later. Conversely, the average summed logs of Group 2 mold populations were the same in homes built before 1978 and homes built later. Since the summed logs of Group 2 mold is subtracted from the summed logs of Group 1 molds in the ERMI calculation, the

average ERMI value was higher in AHHS II homes than AHHS I. In conclusion, by using the ERMI metric, we were able to demonstrate that water damage and mold growth were more likely to occur as homes get older.

Read more: *Journal of Occupational and Environmental Hygiene, Published online: 14 Dec 2020*

Salt-Tolerant Bacteria with an Appetite for Sludge Make Biodegradable Plastics

The United States generates seven million tons of sewage sludge annually, enough to fill 2,500 Olympic-sized swimming pools. While a portion of this waste is repurposed for manure and other land applications, a substantial amount is still disposed of in landfills. In a new study, Texas A&M University researchers have uncovered an efficient way to use leftover sludge to make biodegradable plastics.

In the September issue of the journal *American Chemical Society (ACS) Omega,* the researchers report that the bacterium *Zobellella denitrificans* ZD1, found in mangroves, can consume sludge and wastewater to produce polyhydroxybutyrate, a type of biopolymer that can be used in lieu of petroleum-based plastics. In addition to reducing the burden on landfills and the environment, the researchers said *Zobellella denitrificans* ZD1 offers a way to cut down upstream costs for bioplastics manufacturing, a step toward making them more competitively priced against regular plastics.

Read more:
https://today.tamu.edu/2020/12/14/salt-tolerant-bacteria-with-an-appetite-for-sludge-make-biodegradable-plastics/

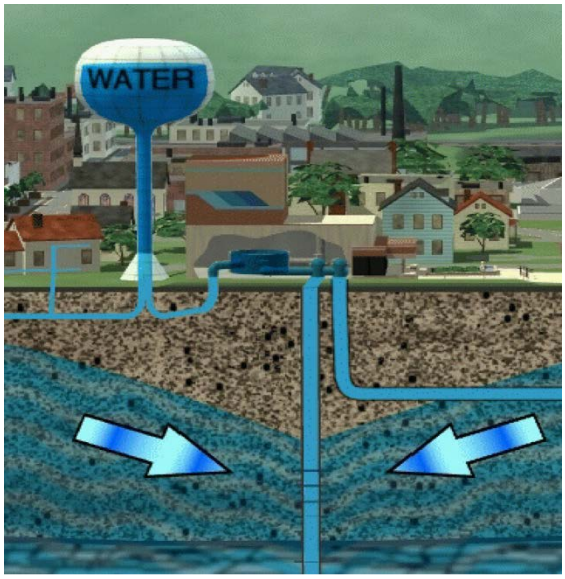
Toward Better Estimates of the Cost of Climate Change

Worldwide, efforts to mitigate climate change through reduction of greenhouse gas emissions are falling short of what is needed to meet ambitious international goals such as the Paris Agreement.[1] Research estimating the health effects of mitigation (HEM) indicates that climate change mitigation activities could have substantial health co-benefits that partially or completely offset the economic costs of mitigation. Yet few HEM findings have been incorporated into cost estimates of

mitigation activities, making the activities appear unacceptably expensive to policymakers.[2] The authors of a recent commentary in *Environmental Health Perspectives* present guidelines for conducting and reporting HEM studies so that the results are comparable and responsive to stakeholder priorities and that health benefits are thus more often considered in cost estimates.[3]

Read more:
https://ehp.niehs.nih.gov/doi/10.1289/EHP8671

Inequalities in Public Water Arsenic Concentrations in Counties and Community Water Systems across the United States, 2006–2011



Background:
In the United States, nationwide estimates of public drinking water arsenic exposure are not readily available. We used the U.S. Environmental Protection Agency's (EPA) Six-Year Review contaminant occurrence data set to estimate public water arsenic exposure. We compared community water system (CWS) arsenic concentrations during 2006–2008 vs. after 2009–2011, the initial monitoring period for compliance with the U.S. EPA's 10 µg/L arsenic maximum contaminant level (MCL).

Objective:
Our objective was to characterize potential inequalities in CWS arsenic exposure over time and across sociodemographic subgroups.

Methods:
We estimated 3-y average arsenic concentrations for 36,406 CWSs (98%) and 2,740 counties (87%) and compared differences in means and quantiles of water arsenic (via quantile regression) between both 3-y periods for U.S. regions and sociodemographic subgroups. We assigned CWSs and counties MCL compliance

categories (High if above the MCL; Low if below) for each 3-y period.

Read more: https://ehp.niehs.nih.gov/doi/10.1289/EHP7313

Ergonomics

This Ergonomic Shower System Uses Modularity to Help Healthcare Workers Provide Care in a Handsfree Manner!

Healthcare workers always have a lot on their plate and, above all else, the year 2020 has revealed that innovative design is essential to keep up with ever-evolving healthcare standards. Cloud, a modular shower system, was designed by Dongje Park for just that, specifically for caregivers who help the elderly population. Providing baths and showers for elderly patients is the responsibility of many healthcare workers and formed the primary inspiration for Cloud, the complete shower system that you can use with one hand. Cloud is a modular, ergonomic shower system constructed using mostly stainless steel, thermoplastic, and silicone, which can be integrated into either your own bathroom at home or community care sites, like nursing homes or hospitals.

Read more: https://www.yankodesign.com/2020/12/28/this-ergonomic-shower-system-uses-modularity-to-help-healthcare-workers-provide-care-in-a-handsfree-manner/

Safety

Novel Color Changing 'Smart Labels' Will Alert Users to Replace Their Face Masks

Technology that will alert users to the need to replace their face mask has been unveiled by smart packaging company, Insignia Technologies.

Designed to encourage safer mask practice while bringing peace of mind to the public, Insignia's smart label changes color to indicate when a disposable face mask has reached the end of its recommended lifespan or when a re-usable mask requires to be changed.

Read more: https://www.news-medical.net/news/20201223/Novel-color-

changing-smart-labels-will-alert-users-to-replace-their-face-masks.aspx

A Case-Crossover Analysis of Indoor Heat Exposure on Mortality and Hospitalizations among the Elderly in Houston, Texas

Background:
Despite the substantial role indoor exposure has played in heat wave–related mortality, few epidemiological studies have examined the health effects of exposure to indoor heat. As a result, knowledge gaps regarding indoor heat–health thresholds, vulnerability, and adaptive capacity persist.

Objective:
We evaluated the role of indoor heat exposure on mortality and morbidity among the elderly (≥65 years of age) in Houston, Texas.

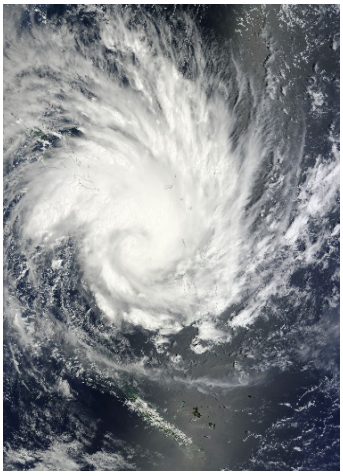
Methods:
Mortality and emergency hospital admission data were obtained through the Texas Department of State Health Services. Summer indoor heat exposure was modeled at the U.S. Census block group (CBG) level using building energy models, outdoor weather data, and building characteristic data. Indoor heat–health associations were examined using time-stratified case-crossover models, controlling

for temporal trends and meteorology, and matching on CBG of residence, year, month, and weekday of the adverse health event. Separate models were fitted for three indoor exposure metrics, for individual lag days 0–6, and for 3-d moving averages (lag 0–2). Effect measure modification was explored via stratification on individual- and area-level vulnerability factors.

Read more:
https://ehp.niehs.nih.gov/doi/10.1289/EHP6340

Tropical Cyclone Exposures and Health: A New Data Set to Assess Associations over Time

When a tropical cyclone strikes a region, some deaths and injuries may be directly tied to the storm. Drownings may be caused by flooding, and crushing injuries can result from high winds. However, disasters may also impact health through less apparent



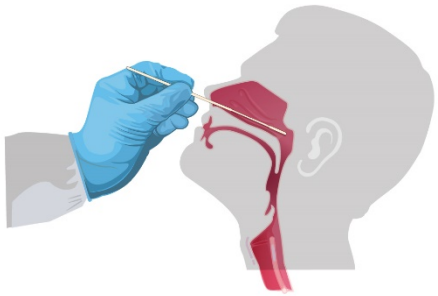
routes. For example, the psychological stress of losing one's home could trigger a heart attack in a person with traditional cardiovascular risk factors, says Brooke Anderson, an associate professor of epidemiology at Colorado State University. In a recent paper published in *Environmental Health Perspectives*, Anderson and colleagues presented an open-source data set to help epidemiologists understand the health risks associated with tropical cyclones across the eastern half of the United States.[1]

Read more: https://ehp.niehs.nih.gov/doi/10.1289/EHP8653

Nasolaryngoscopy Hood Effectively Reduces Aerosol Exposures to Patients

The COVID-19 pandemic has continued to cause dramatic shifts in the practice of otolaryngology. Even with standard precautions such as physical distancing and wearing personal protective equipment, aerosol-generating procedures such as nasolaryngoscopy (a commonly performed in-office procedure in which a soft, flexible fiber-scope is passed through the nose and into the throat) and intranasal instrumentation were determined to carry a risk of potential transmission if not adequately protected.

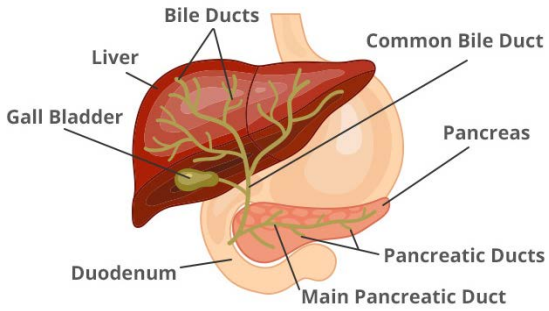
In an effort to mitigate exposure to these airborne particles, researchers from Boston University School of Medicine (BUSM) designed and tested a prototype



nasolaryngoscopy hood, worn by the patient that offers safe and effective protection in reducing aerosols exposures.

Read more: https://www.news-medical.net/news/20201223/Nasolaryngoscopy-hood-effectively-reduces-aerosol-exposures-to-patients.aspx

Study Identifies Biomarker Gene Signature that Indicates Potential Liver Toxicity



When agrochemical and pharmaceutical companies develop new products, they must test extensively for potential toxicity before obtaining regulatory approval. This testing usually involves lengthy and expensive animal studies.

A research team at University of Illinois has developed a gene biomarker identification technique that cuts the testing process down to a few days while maintaining a high level of accuracy.

Normally, companies do this through long-term animal experiments, she adds. They track animals for up to a year to see if they develop liver cancer after exposure to these compounds. The studies require thousands of mice or rats, and a lot of human time taking care of the animals, collecting samples, and analyzing the data.

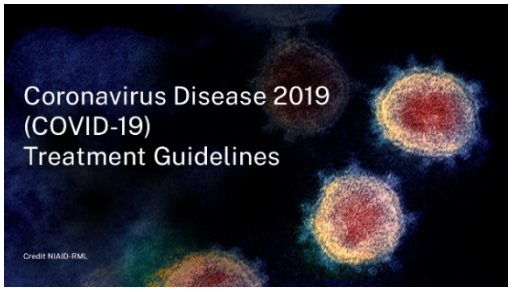
Read more:
https://www.news-medical.net/news/20201218/Study-identifies-biomarker-gene-signature-that-indicates-potential-liver-toxicity.aspx

Emergency Preparedness

Scientists Develop a Real-Time COVID-19 Triage System to Help Contain Its Spread

A year on since the coronavirus disease 2019 (COVID-19) pandemic first emerged, many lessons have been learned about the dynamics of its spread. Immediate isolation and contact tracing has played a pivotal role in containment strategies. Though some countries have efficiently "flattened the curve" and effectively prevented sharp surges of COVID-19 cases, many still grapple with the pandemic. To date, there are more than 76.41 million cases and over 1.68 million deaths worldwide.

Having a cost-effective method of triaging patients and identifying possible cases is crucial in fighting against the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19.
A team of US-based researchers at Stanford University and Contra Costa Health Services have developed an artificial intelligence (AI)-based system that can identify and triage handwritten faxed COVID-19 forms in real-time.



Read more: https://www.news-medical.net/news/20201221/Scientists-develop-a-real-time-COVID-19-triage-system-to-help-contain-its-spread.aspx

Deployment Health

Tenant Satisfaction Survey Now Underway

The Army has begun its annual Tenant Satisfaction Survey to gather feedback about living in Army housing.

An online survey link was emailed Wednesday from CEL & Associates Inc., an independent, third-party group, to more than 110,000 tenants living in privatized, government-owned and government-leased housing across the globe. Tenants are asked to add ArmyHousingSurvey@celassociates.com to their allowed senders to prevent filtering by any anti-spam software of their email. Completing the survey takes about 10 minutes. Tenants have 45 days to complete the confidential survey, which ends Jan. 15.

Read more:
https://www.army.mil/article/241360/tenant_satisfaction_survey_now_underway

Nanotechnology

Nanoparticle Tracking Could Improve Our Understanding of Plastic Pollution

A ground-breaking method to label and track manufactured nano-plastics could signal a paradigm shift in how we understand and care for environments, finds a new study.

Nano-plastics are particles of at least one dimension below one µm. While there has been growing awareness of the dangers of visible plastic pollution to marine life, nano-plastics are thought to be even more dangerous as unseen, smaller animals and fish can ingest them.

Read more: https://phys.org/news/2020-12-nanoparticle-tracking-plastic-pollution.html

Regulatory Research & Industrial Hygiene Professional News

NFPA

NFPA Fact Sheet Outlines Steps for Safe Use of Outdoor Heaters

A new fact sheet from the National Fire Protection Association promotes the safe use of portable outdoor heaters – a popular appliance among restaurants, schools and other businesses with outdoor settings during the COVID-19 pandemic and as temperatures drop.
"Outdoor Heater Safety" outlines steps employers using propane and electric

heaters should take in accordance with NFPA 1 Fire Code (2018 edition).
In general, NFPA recommends turning off all portable heaters when the area in which they're being used isn't occupied or being monitored closely, and keeping any flammable material at least 3 feet away from a heating element.

Read more: https://www.safetyandhealthmagazine.com/articles/20607-nfpa-fact-sheet-outlines-steps-for-safe-use-of-outdoor-heaters

FDA

Coronavirus (COVID-19) Update: FDA Authorizes Antigen Test as First Over-the-Counter Fully At-Home Diagnostic Test for COVID-19

Today, the U.S. Food and Drug Administration issued an emergency use authorization (EUA) for the first over-the-counter (OTC) fully at-home diagnostic test for COVID-19. The Ellume COVID-19 Home Test is a rapid, lateral flow antigen test, a type of test that runs a liquid sample along a surface with reactive molecules. The test detects fragments of proteins of the SARS-CoV-2 virus from a nasal swab sample from any individual 2 years of age or older.

Read more: https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-antigen-test-first-over-counter-fully-home-diagnostic

NIOSH

NIOSH Approves First Elastomeric Half-Mask Respirator without an Exhalation Valve

NIOSH has approved – for both personal protection and source control – the first elastomeric half-mask respirator without an exhalation valve.

In a Nov. 16 agency news brief, NIOSH acknowledges concerns that filtering facepiece respirators and EHMRs with exhalation valves "may allow unfiltered exhaled air to escape into the environment," compromising the equipment's effectiveness to protect others if the wearer has COVID-19.
NIOSH notes that exhalation in EHMRs without exhalation valves is possible because the equipment's particulate filters meet agency requirements, "thereby allowing it to also serve as a means of source control since it will maintain the high level of filtration upon exhalation."

Read more:
https://www.safetyandhealthmagazine.com/articles/20577-niosh-approves-first-elastomeric-half-mask-respirator-without-an-exhalation-valve

OSHA

OSHA Announces New Collection Initiative for Citation Penalties

OSHA announced a new initiative that is designed to better collect citation penalties on December 22.

OSHA will implement a series of three penalty payment letters. The letters will be sent at seven, 30 and 60 days after a business fails to pay a penalty in a timely manner. OSHA will also contact establishments via phone 14 days after the payment is due.

Read more:
https://ohsonline.com/articles/2020/12/30/osha-announces-new-collection-initiative-for-citation-penalties.aspx

OSHA Publishes Guidelines on Facial Coverings for Workers in Hot, Humid Conditions

A pair of new guidance documents from OSHA outline measures employers should take to help prevent the spread of COVID-19 and reduce the risk of heat-related illness among workers wearing cloth facial coverings in hot and humid conditions or performing strenuous tasks.

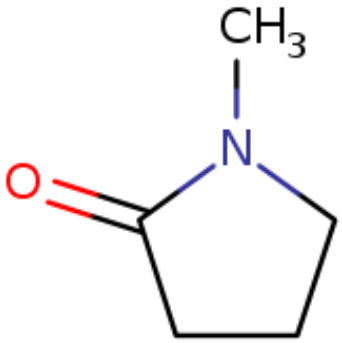
Workers in outdoor environments who might experience issues include those in construction, landscaping, delivery services, and oil and gas activities. Indoor workers in bakeries, kitchens, mills, foundries, laundries, electric utilities, fire services, manufacturing and warehousing are likely to face these conditions as well.

Read more:
https://www.safetyandhealthmagazine.com/articles/20591-osha-publishes-guidelines-on-facial-coverings-for-workers-in-hot-humid-conditions

EPA

EPA Releases Final Chemical Risk Evaluation for NMP

On December 23, 2020, the U.S. Environmental Protection Agency (EPA) released the final risk evaluation for N-methylpyrrolidone (NMP). Of the 37 conditions of use that EPA reviewed, EPA found that 26 present unreasonable risks to workers and consumers. These uses include an unreasonable risk to workers when domestically manufacturing or importing NMP, processing NMP for a variety of uses, and when used in a variety of industrial and



commercial conditions of use. These uses also include an unreasonable risk to consumers from one consumer use. EPA found that NMP does not pose an unreasonable risk when distributed in commerce or in a variety of industrial and commercial and consumer applications. EPA also determined that NMP does not present an unreasonable risk to the environment and the general population.

Read more:
https://www.natlawreview.com/article/epa-releases-final-chemical-risk-evaluation-nmp

EPA Update of Lead and Copper Rule Is First Revision in 30 Years

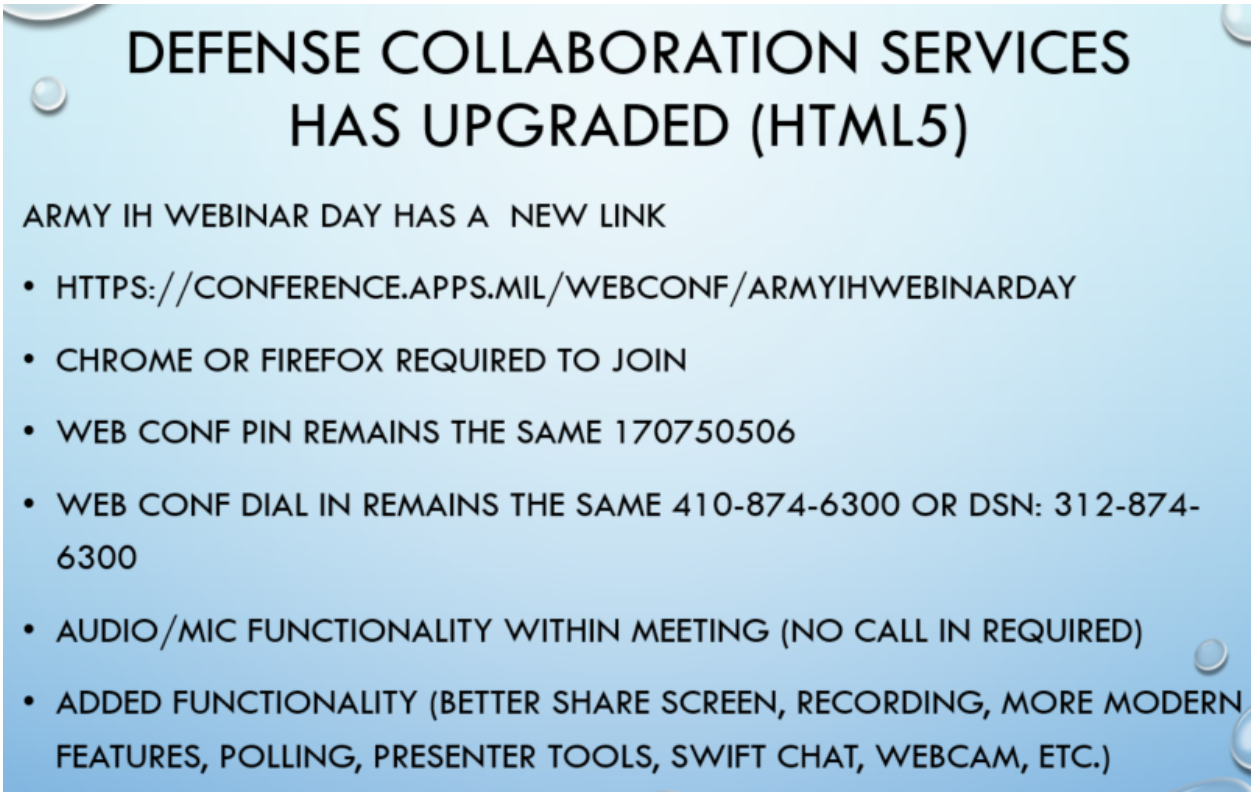
On December 22, 2020, the EPA announced final revisions to the Lead and Copper Rule (LCR). These changes mark the first updates to this rule since it was created in 1991 to control lead and copper in drinking water.

The treatment technique for the LCR requires systems to monitor drinking water at customer taps, according to the EPA. “If lead concentrations exceed an action level of 15 ppb (parts per billion) or copper concentrations exceed an action level of 1.3 ppm (parts per million) in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.”

Read more:
https://ehsdailyadvisor.blr.com/2021/01/epa-update-of-lead-and-copper-rule-is-first-revision-in-30-years/

APHC

Training



2021 QUARTERLY ARMY IH WEBINAR DAY

HTTPS://CONFERENCE.APPS.MIL/WEBCONF/ARMYIHWEBINARDAY

12/2/2020	Monster	Building Downdraft Tables in DOEHRS-IH	Steven
12/2/2020	Leader	Measuring Downdraft Ventilation	Belden
12/2/2020	SME	Downdraft Ventilation Q/A	Belden
12/2/2020	SME	DOEHRS-IH Report Standardization	Delk
12/2/2020	Leader	Compressed Air use with Heavy Metals	Hueth
3/3/2021	**Leader**	**Vehicle Maintenance Shop Design Reviews**	**Parks**
3/3/2021	**Monster**	**Building Vehicle Exhaust in DOEHRS-IH**	**Steven**
3/3/2021	**Leader**	**Measuring Vehicle Exhaust**	**Parks**
3/3/2021	**SME**	**Vehicle Exhaust Q/A**	**Parks**
3/3/2021	**SME**	**Vehicle Exhaust Ototoxins Q/A**	**Merkley**
6/2/2021	Monster	Building Drive-in/Drive-through Paint Booths in DOEHRS-IH	Steven
6/2/2021	Leader	Measuring Drive-in/Drive-through Paint Booths	Belden
6/2/2021	SME	Drive-in/Drive-through Paint Booth Q/A	Belden
6/2/2021	SME	Letterkenny Paint booth incident/accident	Wisniewski
9/1/2021	**Monster**	**Building Dilution Ventilation in DOEHRS-IH**	**Steven**
9/1/2021	**Leader**	**Measuring Dilution Ventilation**	**Parks**
9/1/2021	**SME**	**Dilution Ventilation Q/A**	**Parks**
9/1/2021	**SME**	**Sampling Qualifiers**	**Secrest**

This monthly summary is published by the Industrial Hygiene Program Management Division for the Army Public Health Center.

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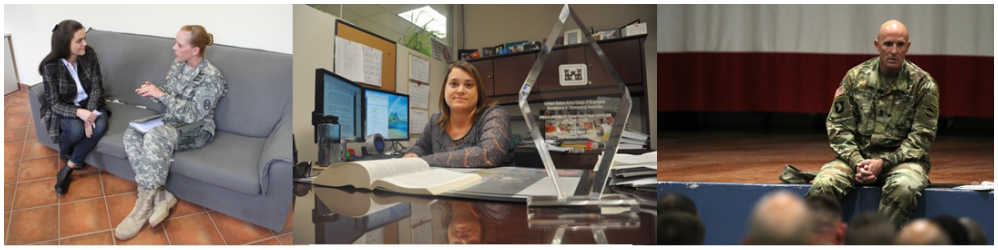

Professional Development and Career Programs

For Army Industrial Hygienists and Industrial Hygiene Technicians, Professional Development is through the Army Safety and Occupational Health (SOH) Career Program, known as Career Program 12 (CP-12).

Career Programs were established to ensure there is an adequate base of qualified and trained professional, technical, and administrative personnel to meet the Army`s current and future needs.

Planned training and development are essential elements to building a successful career.