

PNWIS 2022

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Thursday's Abstracts

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Session VII

Track 1

“Improving Aldehydes and Acrolein Measurement Accuracy in Industrial Emission Testing” Sucha Parmar (Atmospheric Consulting)

Determination of aldehydes in ambient air as well as industrial stacks is receiving increased attention because of the critical role these compounds play in tropospheric organic chemistry; including ozone formation and photochemical smog. Aldehydes and ketones are sampled using DNPH derivatization methods (EPA 0011, TO-11A, and CARB 430) as well as water impinger methods (NCASI 99.02). The acrolein chemistry associated with derivatization is complex because of the tautomerization of its hydrazone in acidified DNPH solution. In this investigation, the problems associated with the unsaturated carbonyls, i.e. acrolein, sampling and analysis are addressed in terms of equilibrium chemistry and instability of its DNPH derivative. However, the addition of extraction solvent (toluene) during sampling improved the recovery of acrolein. This study was further extended to validate water impinger sampling methods (NCASI 99.02) for carbonyls, and our lab experiments show that carbonyls, including acrolein, show excellent recovery.

“Case-Study: Naturally Occurring Radioactive Materials Waste Management in Oregon” Melody Kienecker (Farrallon Consulting) [YP]

A case study highlighting an Oregon foundry and its navigation of changing regulations, waste sampling, determination, and profiling for Naturally Occurring Radioactive Materials (NORM) at the site. We will delve into NORM regulations, specifically the Pathway Exemption process

led by the Department of Energy, other regulations managed by the Oregon Health Authority, and the site’s options for an operational path forward.

“Permitting of Prototypes”
Wess Safford (SWCAA)

New Source Review programs generally require preconstruction approval of air pollution sources. A central element of New Source Review is technical analysis of potential air emissions from proposed operations and applicable pollution control measures. The results of the analysis form the basis of emission limits and operational requirements incorporated into the final air permit. Emission estimates and control measures are fairly straightforward for common source categories, but how are air emissions determined for one-of-kind equipment or processes that are not quite "finished"? What is BACT for a process that can change at any time?

And initial permitting is only the beginning. Once operation begins, there a host of potential issues to consider. Will actual emissions be verified? Is the facility required to test for unknowns? What to do if actual emissions do not meet expectation? What happens when the process gets tweaked? When is repermitting required? How does the Agency handle exceedance of applicable emission standards due to new emissions data? Lots of questions, not many good answers.

Track 2

“NPDES Permit Origins, Implementation, and Current Challenges”
Nathan Soccorsy (Anchor QEA)

Compliance with federally promulgated National Pollutant Discharge Elimination Program, (NPDES) that implemented under the Clean Water Act (CWA), is a challenging prospect for any regulated entity. Under the CWA, no entity can discharge pollutants to waters of the United States without first obtaining an NPDES permit. The terms “waters of the United States” and “pollutants” have been very controversial of the years. As such, NPDES permits have been applied to wide array of contexts from municipal, industrial, agricultural, and maritime applications. In addition, the CWA allows for “citizen suits” to be brought in lieu of state or federal oversight and regulation. This presentation will provide an overview of the NPDES origins, break down implementation throughout, evaluate framework for citizen suites, and explore recent topic including recent scientific discoveries around 6PPD-quinone that has been determined to be toxic to one of the Pacific Northwest most important species, Coho Salmon and other emerging contaminants.

“Industrial Stormwater Management in Oregon”
Parker Emahiser (Farallon Consulting) [YP]

A stormwater retention system at a wood products facility in Oregon was designed so that coverage from a stormwater permit was not required. The presentation will detail a drone survey conducted to understand drainage patterns and existing stormwater retention capacity, and the design and construction of a new stormwater retention system capable of managing at least a 100-year, 24-hour storm event. This discussion highlights how the complementary use of a

cutting-edge technology and existing historical features resulted in a cost-effective fix that kept a business in operation.

“Feasibility of Continuous Production of SCOBY Membranes for Air and Water Filtration”¹ Ben Schreiber (Montana Tech) [Student]

Bacterial cellulose membranes (BCM) have been considered as a cost-effective alternative to petroleum-based commercial polymeric membranes for air and water purification. This natural biomaterial can be synthesized in growth solution using a symbiotic culture of bacteria and yeast (SCOBY). However, frequently employed cultivation methods under static and/or agitated growth conditions limit the mass production of BCM with large surface area. Accordingly, a rotating disk reactor system, for continuous membrane production with increased surface area, was developed and microscopic analysis was conducted to investigate the impact of various growth conditions (e.g., medium composition, disk surface, temperature, rotating rpm). The reactor operation produced promising results in their membrane production capacity. It is also anticipated that after harvesting BCM from the surface of the disks, enough bacteria are left on the surface present in a thin film to eliminate the need for inoculating for new growth solutions. Given the optimum reactor operating conditions identified in the current study, continuation of this research will see the employment of a conveyor belt reactor system to grow larger SCOBY mats.

“The Role of Mixing Zone Studies in Wastewater Discharge Permitting” Christina Brow (SLR)

A regulatory mixing zone is a limited area or volume of a receiving water where mixing results in dilution of an effluent, and within which water quality criteria may be exceeded. Without a mixing zone, surface water quality criteria need to be met at the point of discharge/end-of-pipe.

Mixing zones in the United States are defined and implemented through the National Pollutant Discharge Elimination System (NPDES) permitting process. To obtain a permit for use of a mixing zone, a discharger needs to demonstrate that water quality standards will be met at the edge of the mixing zone and that designated beneficial uses of the water body as a whole are protected. The tool for this demonstration is a Mixing Zone Study. A similar regulatory landscape exists in Canada with, for example, Initial Dilution Zone (IDZ) Assessments serving the roll of the Mixing Zone Study in BC.

This talk will cover the relationship between water quality standards, technology based effluent limits (TBELs), and water quality-based effluent limits (WQBELS) in NPDES permits and how a Mixing Zone Study fits into the permitting process. The basic components of a Mixing Zone Study, which are largely the same in the States and Provinces, will be discussed, including

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identification of applicable water quality criteria, data requirements for characterizing the effluent and receiving water, what constitutes critical conditions (i.e., reasonable worst-case conditions) for the discharge, and dilution modeling. Other topics include identification of parameters of concern in an effluent through the Reasonable Potential Analysis (RPA) process, use of dye studies to verify mixing behavior, thermal plume analyses, confirmation of whole effluent toxicity test (WET) concentrations, and model-based outfall and diffuser design optimization.

Track 3

[“Using EJ Maps to Prioritize Inspections of Hazardous Waste Sites”](#) Ginger Wireman (Ecology)

The concept of Environmental Justice has been around for some time. It is based on the reality that systemic oppression, zoning patterns and other factors disproportionately expose Black, brown, Indigenous, and low-income people to industrial and other pollution.

In Washington State, the Healthy Environment for All (HEAL) Act passed in 2021 requires seven state agencies to look at cumulative burdens and evaluate where overburdened populations are in relation to environmental cleanup, public health decisions, housing, and more.

We’ll discuss HEAL and learn how the Dept. of Ecology is using tools such as the Washinton Tracking Network, EPA’s EJ Screen, and Justice40 to do our job better. Examples will include how we prioritize inspections of hazardous sites, as well as improve outreach and engagement related to cleanup at the Hanford Nuclear Site. Practical ideas for reaching underserved audiences will also be shared.

[“The Improving Air Quality in Overburdened Communities Initiative”](#) Caroline Mellor and Rylie Ellison (Ecology) [YP]

Washington State’s Department of Ecology has begun to implement a new statewide, air quality initiative aimed at expanding air quality monitoring and developing strategies to reduce criteria air pollution in communities that bear a disproportionate burden of air pollution. This initiative is a key component of the Climate Commitment Act, the 2021 law that establishes a cap-and-invest program to reduce greenhouse gas emissions in Washington and puts environmental justice and equity at the center of climate policy. The first step is a robust public engagement and technical development process to identify the overburdened communities most impacted by air pollution. In this presentation, Ecology will share about the current processes, including in-progress work to identify overburdened communities highly impacted by air pollution, and lessons learned so far in implementation. This will be an interactive session with opportunities to discuss different ways to operationalize environmental justice challenges and opportunities within your work. This session will include the use of live polling and other interactivity tools to create an engaging session.

“Exposure to Power Outages, Extreme Heat, and Wildfire Smoke in Washington State” Claire Richards (WSU)

Power outages, extreme heat, and wildfire smoke are each associated with morbidity and mortality. Studies have consistently reported that low-income communities and communities of color experience more urban heat than wealthy and white communities, potentially exacerbating the risks already faced by communities that have a high burden of respiratory disease. Case reports in areas affected by hurricanes and extreme cold temperatures have found that low-income communities and communities of color are disproportionately impacted by more frequent and longer power outages. However, we still have a poor understanding of what areas are most impacted by the co-occurrence of power outages and extreme heat or wildfire smoke and whether concurrent exposure is associated with demographics of communities. We explored the feasibility of using the PowerOutage.US dataset for identifying geographic areas most impacted by concurrent power outages, extreme heat (Heat Index $\geq 80^{\circ}\text{F}$), and wildfire smoke days in Washington state between May to September of 2018 and 2021. We aggregated power outage data and estimated the daily county power outage burden and average power outage duration on a county level. We evaluated whether the availability of power outage data on a county level was associated with measures of socioeconomic status, electricity dependence and chronic illness. We additionally evaluated whether the power outage burden and power outage duration on days with $T \geq 80^{\circ}\text{F}$, $\geq 90^{\circ}\text{F}$, and $\geq 100^{\circ}\text{F}$ and wildfire smoke days was associated with measures of socioeconomic status, electricity dependence, and respiratory disease.

We evaluated the reliability of validity of the PowerOutage.US dataset to ascertain power outages on county and smaller subdivisions. We classified exposure to high temperature as county heat index $\geq 80^{\circ}\text{F}$, $\geq 90^{\circ}\text{F}$, and $\geq 100^{\circ}\text{F}$. We classified exposure to a ‘wildfire smoke day’ based on definitions for which data has shown to accurately differentiate smoke days from non-smoke days in WA State. We were required to aggregate power outage data on a county level due to changes in subdivisions over time and a lack of data on subdivision level. Although it is feasible to evaluate concurrent heat and power outages on a county level (and analysis is ongoing), the lack of geographic granularity poses a major limitation. Policy makers and regulators should require utilities to share power outage data in a standardized format, at minimum on a census tract level, to allow for ongoing public health surveillance, and planning by community organizations, emergency planners, local officials, and public health departments.

“One-size Doesn’t Fit All: Scoping Environmental Justice Frameworks” Meghan Conway (Ramboll) [YP]

At the national, state, and local levels, discussion of reparations and approaches to environmental justice (EJ) is an emerging concern. Important nuances and exceptionality related to EJ permeate all levels of government and a broad range of communities. To address these widespread concerns, newly developed EJ task forces, federal, state- or city-level EJ screening tools, and a variety of EJ guidance documents are rapidly being developed as part of the broader environmental sustainability movement. With a lack of coordination across geographies and industries, it is easy to be intimidated by the variety of options at your fingertips.

Track 4

“Environmental Management: Fundamentals in Industry”

Janna Loeppky (Avista)

A typical career in the environmental field is oftentimes considered far from average. Disciplines encompass a variety of focus areas such as water quality, air quality, restoration, and waste disposal. Environmental management applies strategies for addressing these potential ecological issues while still complying with applicable regulations. State and federal green policy associated with these issues, is rapidly progressing, meaning advancements in how we utilize tools to hit these moving targets, is more crucial than ever. In a continuously evolving world, creative and innovative problem-solving is at the forefront of this green industry, especially as it relates to something as simple as keeping the lights on. By understanding each resource and the pollution associated with their use, we can create methods to implement better alternatives for the future.

“Credentials for Environmental Professionals”

Kristina Schafer (Montrose)

There is no shortage of professional qualifications available, but what qualifications do Environmental Professionals actually need? Come learn about some of the common certifications that professionals in the industry value, how to get them, and how to keep them.

“Public Speaking”

Agata McIntyre (NWCAA)

Public speaking doesn’t come naturally to many of us. The web is filled with confusing advice on both presentation content and how to overcome our jitters. I’ll distill it down to what’s worked, and what hasn’t, for one self-acknowledge fraidy cat. I hope you’ll come away with some ideas to try the next time you’re faced with your own public speaking gig.

“Do I Really Need to Network?”

Beth Fifield Hodgson (Spring Environmental)

I can do my school work or job from my computer at home; why do I need to network with other professionals? I’m not an extravert; how can I network? I don’t have any time to network? Come and learn why networking is important to you and how to customize your efforts based on your skills and interests.

Session VIII

Track 1

“Adventures in Asphalt Plant Testing”

Joe Southwell (SRCAA)

Two experiences/issues regarding asphalt plant testing in SRCAA’s jurisdiction will be shared. One scenario involves a plant’s changing VOC emissions over time and refining the VOC testing approach used. The second scenario involves trouble shooting the cause of a plant’s testing failure for PM and finding an unusual explanation for the failure.

“Lowering PM 2.5 Emissions from "Wet" Stacks”

James Guenthoer (Clean Air Engineering)

This presentation looks at the continuing attempts to differentiate filterable particulate matter greater than and less than PM_{2.5} in stacks containing water droplets. The history behind this methodology is discussed as well as more current failed attempts to develop this sampling approach. Finally a successful approach to doing wet PM_{2.5} is presented.

“Condensable PM Test Method Comparisons – Evolution & Appropriate Uses”

Steve VanSlyke (PSCAA)

Various condensable particulate matter test methods have been identified for regulatory purposes over time. Those methods will be highlighted along with the regulatory use and purpose associated with the method identification. Technical limitations and legal implications related to method substitution will be discussed.

“Low Level TNMNEHC Emission Measurements from Stationary Sources”

Sucha Parmar (Atmospheric Consulting)

A large variety of VOCs are emitted from stationary sources linked with gas to energy production, turbines, oxidation, manufacturing and flares. Hydrocarbons (polar and nonpolar) are carcinogens and are known to be precursors of photochemical smog and ozone. There are several methods (EPA 25, SCAQMD 25.3/25.1) available to sample and analyze Total Non methane Non ethane hydrocarbons (TNMNEHC). Some of these methods suffer from interferences or do not work for low ppmv detection needed for new regulatory emission limits set for turbines. In this presentation we bring a new procedure for low level sampling and analysis of TNMNEHC based on SCAQMD method 25.3.

Track 2

“Arsenic in Ground Water in Bangladesh and Its Possible Impacts on Human Health”

Mohammed Islam (Palouse Environmental)

In order to determine the potential impacts of arsenic contaminated ground water on human health, surface water, agricultural soil, vegetables, meats, and fish samples were collected from Bangladesh. This is because arsenic contaminated groundwater is widely used for drinking and irrigation purposes in Bangladesh. Groundwater, surface water, vegetables, soil, meats, and fish samples were analyzed for arsenic. Analytical results indicate that groundwater samples were highly contaminated with As in almost all regions. River water samples were largely arsenic-free, but agricultural top soils were significantly contaminated with concentrations decreasing with increasing depth indicating influence of irrigation by arsenic contaminated groundwater. High concentrations of arsenic were found in Moia fish, beef kidney, Kalmi shak, and Taro root from almost all regions. Muscles and fat collected from cattle, goat and chicken were low in As content while liver and kidney were in high in As in arsenic affected regions. The high As concentrations in liver and kidney from livestock, as well as in fish, vegetables, soil, and drinking water is indicative of the need for complete scientific studies covering all food items of local origin and water. This would better demonstrate impacts of using As-laden groundwater in all purposes in Bangladesh including irrigation and identify potential routes of human exposure.

“Industrial Wastewater Reuse” Stacy Lamer (Carollo)

The history of wastewater treatment “reuse” by land application dates to the 1870’s in the United States. The nutrient-packed wastewater proves beneficial to crop growth and thus, if well-managed, can be both effective and profitable. Unfortunately, treatment by land application fell out of favor with system failures due to overloading, pressures for alternative land uses, and a focus shift to “modern methods of sewage treatment” including trickling filters, activated sludge, and disinfection. But, sparked by the 1972 Clean Water Act, regulations proposed a “zero discharge” goal and encouraged a reuse and recovery philosophy which led to the development of criteria for reliable and cost-effective design, construction, and operation of land application systems. Idaho was instrumental in this 1970’s research effort with industrial facilities in Buhl and Aberdeen effectively land applying 1.5 MGD of pretreated corn and potato processing wastewater.

The Idaho Department of Environmental Quality continues to set the standard in providing exceptional guidance for agricultural land application of industrial wastewater and this presentation will chronical the permitting, design, construction, operation, and management of land application reuse of industrial wastewater from an agricultural seed processing facility in Parma, Idaho.

“Navigating Washington Water Quality Standards in the Spokane River” Doug Krapas (Inland Empire Paper)

Inland Empire Paper Company (IEP) has been manufacturing high quality paper products in the Spokane Valley since 1911, making it one of the oldest manufacturing facilities remaining in WA. Although 111 years old, IEP is one of the most modern facilities of its kind in the world due to significant reinvestment into nearly every process within the mill using state-of-the-art technologies.

Being a natural resource dependent company, IEP takes great pride in its environmental stewardship with the management of its forest lands, operation of its paper mill, conservation of

resources and beneficial use of waste materials. IEP manufactures over 60 different grades of paper products from recycled paper collected from distances as far as 1,500 miles from Spokane and residual wood chips sourced from local sawmills. Even waste materials produced from IEP’s processes are beneficially reused to produce energy, compost, cement, and as soil amendments for regional agricultural lands.

As an industry leader in the development of innovative technologies, IEP has set the bar as one of the best performing facilities in energy efficiency and air, water and waste management. Throughout its existence, this pioneering company philosophy has allowed IEP to stay ahead of forthcoming environmental regulations...until now. Recent adoption of federal and state water quality standards are at or exceeding the limits of technology and the Spokane River watershed has become the beta test site for implementation of these new standards. This presentation documents IEP’s journey to navigate these stringent standards and its commitment to develop solutions to what many believe to be an impossible challenge.

Track 3 and 4

“Speed Networking”

Moderated by Betsy Cochran (Spring Environmental)