PNWIS 2022
October 11-13, Coeur d'Alene, Idaho

Wednesday's Abstracts

Contents

Session III

Track 1

"Smoke from 2017 Eagle Creek Fire and Projections of Future Smoke"
Darold Ward (Enviropyronics)

On Sept. 3, 2017 fireworks ignited the 19,267 ha Eagle Creek Fire (ECF). Sept. of 1902 teenagers burning a bees nest started the 200,000 ha Yacolt Burn. Both of these fires started along Eagle Creek near Cascade Locks, OR. Both spotted across the Columbia River. The ECF burned primarily in OR and the Yacolt Fire burned mostly in WA.. We did an estimate of smoke production on a daily basis for the ECF by using burned area by day, estimating fuel consumption of 50 t/ha and applying emission factors for WA and OR logging slash. These emission factors, assume a combustion efficiency of 84% and express emissions per unit of fuel consumed; CO2, 1.5434; CO, 0.1325; CH4, 0.0063; NMHC, 0.0002; PM, 0.0171; and PM2.5, 0.0112. Estimates of smoke (PM2.5) from the ECF exceed 10,853 t with most of that occurring during a period of major fire activity on Sept. 4 and 5 of 6,400 t. The crisscrossing of multiple tree boles and the remaining standing snags may contribute to the difficulty of control, intensity of burn and potentially to the fire return interval. Of note, the Tillamook Fires of 1934, 1939,

1945, and 1951 had a fire return interval of about 6 years. The ECF may be expected to have a similar fire return interval and major smoke episode(s) in the next few years. About 90% of the ECF burned within the Mark O. Hatfield Wilderness Area and within the Columbia River Gorge National Scenic Area.

"An Oregonian Experience to Yet Another Challenging Wildfire Season"
Merlyn Hough (Ret LRCAA)

As Oregonian's experience yet another challenging wildfire season, join us for a presentation on smoke impacts and how Oregon's air regulators respond to wildfire smoke. This presentation will recap monitoring, modeling, and reporting of smoke impacts during the record-breaking September 2020 wildfire smoke events. Presenter will explain the USEPA, ODEQ, LRAPA and other tools and resources available and how communication plays a key role in building smoke-ready communities.

"2021 Western Wildfire Smoke Air Quality Assessment"
Matthew Mavko (Air Science)

This presentation will provide an assessment of the extent of impacts from wildfire smoke on regulatory air quality monitors throughout the Western United States in 2021. Regulatory implications related to the Exceptional Events Rule, a lowered PM2.5 standard, and increases in prescribed burning will be discussed. Analytical methods using publicly-available satellite and monitoring data streams will be demonstrated.

Track 2

"The New Generation of User-friendly, High-precision Instruments for Continuous Monitoring of Hazardous Air Pollutants"
Milos Markovic (Picarro Inc.)

While current EPA methods such as TO-11A have been utilized for air quality monitoring for decades, they only provide time-averaged exposure estimates (typically 8 or 24-hour), require timely and tedious offline extractions and analyses at third-party labs, and continue to experience suspected bias effects from water vapor and volatile organic compounds. Because values are reported significantly post-hoc, collected data cannot be integrated into air quality monitoring forecasts. Additionally, time-averaged values can greatly limit the ability of regulators to correlate emission source regions with real-time meteorological data.

To address these challenges and the needs of the Air Quality (AQ) monitoring community, Picarro Inc. has developed a new generation of user-friendly instruments for selective and continuous monitoring of hazardous air pollutants (HAPS). Based on the robust Cavity Ring-Down Spectroscopy (CRDS) technology, these instruments provide interference-free measurements of specific HAPS down to part-per-billion (ppb) and even part-per-trillion (ppt) concentration levels.

In this work we present results from multiple deployments of Picarro CRDS instruments for the following AQ monitoring applications: ground-based ambient level monitoring in urban and rural sites (formaldehyde, EtO), mobile measurements in industrial and residential areas (formaldehyde, EtO, methane), stationary fence line emission monitoring near industrial facilities (HF, formaldehyde, H2S, EtO), industrial stack emissions monitoring to comply with regulations and emissions (HF, formaldehyde, H2S, EtO), and others. We also present results from a formaldehyde measurement intercomparison (R2 =0.96) study between Picarro CRDS and TO-11A (2,4-DNPH) methods, from a deployment at a PAMS site in New York State. In this work we also describe a novel surrogate gas field validation method, developed to eliminate a need for use of certified high-concentration standards of extremely toxic gases such as formaldehyde , EtO, HF and others.

"Two RNG Projects in Richland, Washington"
Robin Priddy (BCAA)

A landfill in Benton County recently became part of the Air Operating Permit Program as a result of increased capacity. At the time the NOC was written, 2019, it included as a potential BACT the addition of a facility to recover the methane for beneficial use. There is now a contractor in place to recover the methane and prepare it to be injected into a nearby natural gas pipeline; work on that NOC has been completed and construction is anticipated to start soon. As this project was developed the contractor became aware of a nearby food processing wastewater treatment plant that was flaring their biogas. We are now working with that facility and the RNG contractor to apply the same process and recover for beneficial use the biogas from the WWTP.

"Use of Acetic Acid as an Anti-Biofouling Post Treatment for SCOBY Filtration Membranes"[1]
Matthew Fronk (Montana Tech) [Student]

The ability of Symbiotic Culture of Bacteria and Yeast (SCOBY) to produce a bacterial cellulose membrane(BCM) has created a viability for their use in filtration capacities. Like most filtration devices, SCOBY membranes are susceptible to microbial biofouling. This study investigates the use of acetic acid, a natural byproduct of SCOBY BCM formation, as a post filtration anti-biofouling treatment. SCOBY BCM has a natural acetic acid resistance much higher than most microbes. The results of this initial study concluded that SCOBY BCM could survive submersion in up to 8% acetic acid concentrations for 10 minutes with agitation. The ability to withstand concentrations of acetic acid up to 8%, make acetic acid a viable anti-biofouling treatment for BCM in service. As acetic acid is toxic to most biofouling coliforms and other microbes, thus acetic acid treatment will keep BCM from bio-fouling.

[1] "This research was sponsored by the Combat Capabilities Development Command Army Research Laboratory and was accomplished under Cooperative Agreement Number W911NF-20-2-0163. The views and conclusions contained in this document are those of the authors, and should not be interpreted as representing the official policies, either expressed or implied, of the Combat Capabilities Development Command Army Research Laboratory or the U.S. Government. The U.S. Government is authorized to reproduce and distribute reprints for Government purposes notwithstanding any copyright notation herein."

Track 3

"WA Cap-and-Invest Program 101"
Eric Albright (Landau Assoc)

Washington's Climate Commitment Act (CCA), which was signed by the governor in May 2021, establishes a "cap-and-invest" program which seeks to cap the amount of greenhouse gases (GHGs) that can be emitted in Washington and to auction off emission allowances to emitting entities. Over time, the GHG emission cap will be reduced until statewide GHG emissions have achieved target levels set by the Washington Legislature. Emitting entities that do not reduce GHG emissions as the cap decreases, will be required to obtain allowances to cover excess emissions.
The start of the cap-and-invest program is approaching (January 1, 2023), and, as of this writing, the rules implementing the program have not been promulgated. Nevertheless, the Washington State Department of Ecology provided a draft version of the rule (173-446 WAC) on May 16, 2022 for public review and comment. This presentation will provide an overview of the cap-and-invest program and its components as presented in the current draft rule, as well as its relationship with associated rules (i.e., Criteria for EITE Industries, Reporting of Emissions of GHGs).

"Washington's New and Emerging Climate Regulations – Impacts on Industrial Facilities"
Annika Wallendahl (Geosyntec)

Washington State's array of new and emerging climate regulations significantly impact industrial facilities within the state. These regulations include the Climate Commitment Act (WAC 173-446), Clean Fuels Program (WAC 173-424), Clean Vehicles Program (WAC 173-423), Clean Energy Transformation Act (WAC 194-40), Hydrofluorocarbons Rule Update (WAC 173-443) and Greenhouse Gas Assessment for Projects (WAC 173-445). This presentation examines how the array of evolving Washington climate regulations intersect to directly and indirectly impact industrial facilities within the state, with a close look at how facilities classified as energy-intensive trade exposed (EITE) under the Washington State Cap-and-Invest program are impacted.

"Solid Waste Management & the Climate Commitment Act"
Kelle Vigeland (City of Spokane)

In 2021, the Washington State Legislature adopted the Climate Commitment Act, directing the Department of Ecology to establish a Cap & Invest (similar to Cap & Trade) program aimed at reducing greenhouse gas emissions within the state. Only the second such program in the United States, the legislation establishes aggressive timeframes both to implement the program and to achieve emission reductions. Pertaining to solid waste management, the legislation impacts both landfills and Waste to Energy facilities, but in very different ways, leading to disparate and inequitable treatment between the two management approaches. This presentation will summarize the effects on solid waste management, and in particular, focus on the impacts of the Cap & Invest program on the Spokane Waste to Energy Facility and possible ramifications of those impacts.

Session IV

Track 1

"How Smoke Management Works / The Daily Burn Decision"
Paul Rossow (Ecology)

In Eastern Washington, about 100,00 acres of wheat stubble are burned every year. The Department of Ecology is responsible for permitting, managing, enforcing such burning in a total of 17 counties in Eastern and Central Washington. Paul will present a summary of how the daily burn decision is made for agricultural burning in Eastern Washington, including the resources used, and the considerations taken into account.

"Small Sensors and How They are Performing"
Nate May (Ecology)

Abstract #1: Integrating emerging low-cost particulate matter (PM) sensors into existing air monitoring programs has promising applications to resolve monitoring disparity, increase public awareness, and promote environmental justice. This presentation will introduce the design, measurement fundamentals, and use cases of PM sensors in the Washington State Department of Ecology air quality monitoring network. In addition, plans for the expansion of the statewide sensor network will be discussed.

"Smoke Management and Air Quality Data"
Neil Hodgson (Ecology)

Smoke Management and Air Quality Data – This presentation will discuss what the Department of Ecology currently uses for Smoke Management Data. This will be changing with the loss of current monitors to age and the availability / specifications of replacement technology.

Track 2

"Nitrate and Selenate Removal from Mine Impacted Water in Saturated Rock Fills"
Chris Wend (Teck Coal Limited)

The use of saturated rock fills (SRF) to remove nitrate and selenate from mine impacted water in British Columbia will be introduced. At Elkview Mine, phase 2 of a saturated rock fill treatment system started commissioning on 15 FEB 2021. During phase 2, the facility has removed ~ 120,000 kg of nitrate and ~ 1000 kg of selenate. The SRF phase 2 design capacity is 20,000 m3/day. A second SRF is in phase 1 at Fording River Mine with a 30,000 m3/day phase 2 under construction. Ultimate final phase 2 capacity will be 40,000 m3/day.

The conceptual model consists of the waste rock pit which contains the SRF well field where injection of electron donor and nutrients develops a biotreatment zone. Macro, meso, and microscale bioprocesses help describe the reduction and removal from solution of nitrate and

selenate. Extraction wells outside of the biotreatment zone then retrieve treated water to a buffer pond. Water in the buffer pond is tested prior to discharge to the environment.
This presentation will provide an overview of the environmental setting, current operational status, and review of the latest conceptual model along with biofilm modeling of the biotreatment zone.

"Water Quality Management Improvements at Coeur's Silvertip Mine"
Erin Hallenburg (Coeur Mining)

The Coeur Silvertip Mine is remotely located on the border of British Columbia and the Yukon. Coeur Mining, Inc. (Coeur) was established in 1928 at the Coeur d' Alene Galena Mine. Today, Coeur is one of the premier U.S. based mining companies, with mines in Nevada, South Dakota, Alaska, Palmarejo, and British Columbia. Each year, the Silvertip Mine is subjected to extreme cold temperatures and significant snowfall, along with scant daylight in the winter months, and dynamic Spring runoff.

With some of the most stringent water quality regulations in North American, operating remotely while faced with such adverse weather conditions has been challenging; nonetheless, continual improvement of environmental performance is fundamental to the Silvertip Mine's operating philosophy. Through operating enhancements and additional controls, environmental risk mitigation is a core value that not only protects the environment, but also improves regulatory and community confidence while building trust. Becoming better stewards of the land was the defined result. A new environmental and permitting team was formed in 2020 and this group, along with management, defined objectives and pathways to meet these to improve performance and to Pursue a Higher Standard.

By using a combination of training, winterization preparations, sensible operations, and improvements in sediment & erosion controls; this presentation shows how steadfast and defined objectives can lead to top-tier environmental stewardship. This presentation will highlight recent improvements and the continuous improvement process made by Coeur and the on-site environmental team.

"Seasonal Contaminant Transport Trends in a Mercury Mine Impacted Watershed"
Steve Dent (CDM Smith)

Fate and transport of contaminated sediment and surface water can be dramatically altered through seasonal changes in the annual hydrologic cycle as well as during event-specific storm hydrographs. During periods of elevated discharge, either during seasons where there are increased periods of precipitation and/or snowmelt (wet seasons), or during a specific storm discharge events, contaminant transport can be increased by orders of magnitude in comparison to periods of base flow. When designing a sampling program to evaluate contaminant loading through a watershed, timing of sampling is a critical consideration for when to sample during the year and when to sample during specific high discharge events.
The Black Butte Mine Superfund Site is a historic mercury mine that has impacted a watershed of the Coast Fork Willamette River with mine-related mercury contamination. The site has over a decade worth of discharge and water chemistry data from drainages around the mine site as

well for as the downstream watershed. Extensive data collection has been conducted throughout multiple storm hydrographs, measuring baseflow, rising limb, peak, and falling limb conditions on multiple site drainages. This presentation will demonstrate the significant variations in discharge and contaminant fate and transport that can occur during different conditions by using examples from an actual site investigation, when sampling within different seasons and specific timing within a particular storm hydrograph, and the potential bias that can result. The results from this investigation can be leveraged to create an educational tool to help site investigators design appropriate and cost-effective sampling plans when trying to quantify contaminant loading within a watershed.

Track 3

"Estimating Construction Greenhouse Gas Emissions for Projects – Exploring Washington's GREET Model"
Christopher Lovett, Rachel Kane, Annika Wallendahl (Geosyntec)

The Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) Model is a tool developed by the Argonne National Laboratory (ANL) that is used to examine the life-cycle impacts of vehicle fuels, technologies, products and energy systems. Through the GREET platform, total energy consumption (renewable and non-renewable), air pollutant emissions, greenhouse gas emissions and water balance can be calculated. The WA-GREET Model was released by the Washington State Department of Ecology in 2022 and is based on the National ANL GREET Model and the California GREET Model (CA-GREET3.0) developed by the California Air Resources Board, and is consistent with the Oregon Department of Environmental Quality's OR-GREET Model. Some key differences in the WA-GREET model compared with other GREET models include the use of a Washington state average crude carbon intensity, Washington average electricity mix, and emission factors derived from WA-GREET. The Washington State Clean Fuels Program Rule (WAC 173-424) requires Well-To-Wheel (WTW) carbon intensity calculations for life-cycle analyses of fuels. This presentation will examine how the WA-GREET model can be used to estimate greenhouse gas emissions (GHG) associated with the construction phase of projects in Washington State.

"NW Natural's Low Carbon Pathway: Vision 2050"
Kellye Dundon (NW Natural) [YP]

In existence since 1859, NW Natural is a local distribution company (LDC) that provides natural gas service to roughly 2.5 million people in Oregon and Washington. Throughout the region, our company owns pipelines that carry gas to homes and businesses for water and space heating, cooking, and industrial processes.

NW Natural's core value of environmental stewardship is a driving force behind the business decisions we make every day and the plans we make for our future. NW Natural believes that it has an important role to play in helping our region move to a lowcarbon, renewable-energy future. We're committed to helping achieve deep decarbonization in our region by:

- Lowering energy use through aggressive energy efficiency and decreased consumption
- Reducing the carbon intensity of conventional natural gas across the value chain
- Evolving our supply to include renewables in the pipelines, while encouraging the development of public policies to facilitate the transition to renewables

We believe the gas infrastructure in place today will be an asset in the clean-energy economy, and using the existing pipeline makes the energy transition as affordable as possible for customers. We are working to shape a future in which renewable molecules delivered and stored in the gas system provide our customers with a cost competitive, carbon-neutral energy option.

In this presentation, learn what our local gas utility is doing to help our region move to a low-carbon, renewable-energy future including our goal to achieve a carbon-free energy system by 2050. Walk down NW Natural's low carbon pathway and be introduced to two new technologies that are the key to unlocking a plentiful supply of renewable energy in Oregon and Washington—renewable natural gas and renewable hydrogen.

"Up, Up, and Away! Greenhouse Gases and Into the Future"
Annika Wallendahl (Geosyntec), Christopher Lovett (Geosyntec), Eric Albright (Landau Assoc), Kelle Vigeland (City of Spokane), Kellye Dundon (NW Natural)

Panel Discussion

Session V
Track 1

"Designing a Successful Targeted Air Shed Grant Project - Data-driven Introverts Need Not Apply!"
Dan Smith (IDEQ)

Targeted Airs shed Grants provide significant funding for the most polluted areas in the United States. Grants elements include Wood Stove Changeout Projects, slash reduction, education efforts and other elements designed to reduce particulate pollution.

But What Really Makes a difference??

Dan will use comparisons of two Targetted Air Shed Grants to show that who you have participating is as important as what you do. All Elements depend upon a fully engaged participant. How do you get those participants? Who should be running the program, why choose a local, who do you smooze, and other topics will be explored. While we must have the technical knowledge to back our programs it is often the people skills that get the job through to success.

"Leveraging Low-cost Sensors for Air Monitoring"
Katie Kolesar (Air Science)

Low-cost sensors are omnipresent in the United States. The measurement capabilities of these sensors are expanding and may include PM, NO2, O3, CO, CO2, SO2, VOCs, and even black carbon. Given the wide variety of options and often uncertain quality, how can you choose and then implement these sensors to obtain meaningful measurements? This presentation will cover some of the more popular low cost sensors and how Air Sciences has used them in some specific monitoring scenarios.

"QA for Small Sensors and Nephelometer Data"
Nate May (Ecology)

Ongoing quality assurance for sensor data is needed to ensure that data continue to meet expectations. This presentation will show side-by-side measurements and comparison between reference instruments and particulate matter sensors in the Washington State Department of Ecology air quality monitoring network. Observations of trends in linear regression parameters and sensor bias were used to analyze calibration and other quality assurance techniques. Understanding and improving the quality of data generated from particulate matter (PM) sensors is vital if these sensors are to fill gaps in air quality measurements.

Track 2

"PCB Mineralization in Contaminated GW Using UV/AOP"
John Haney (Haley & Aldrich)

In the early 1990s, researchers at the University of Wisconsin conducted bench-scale experiments evaluating the degradation of polychlorinated biphenyl compounds (PCBs) via reaction with hydroxyl radicals (•OH) created from hydrogen peroxide (H2O2) excited by ultraviolet light (UV). This presentation will discuss the reaction mechanisms and present the results from the recent field testing of two UV/H2O2 treatment systems designed to treat PCB-impacted groundwater. One pilot-scale system was constructed using readily available, off-the-shelf parts; the other was custom designed. The studies were performed under a variety of operating conditions including influent PCB concentrations, process flow rates, H2O2 dosing, and system configurations. Influent and effluent samples were analyzed for PCB congeners by EPA Method 1668. Testing data from the field-scale studies indicate that, under certain operating conditions, treatment resulted in greater than 90% PCB destruction and, at times, achieved greater than 98%.

"Determination of PFAS Removal Efficiency by a Non-Destructive Solids Treatment Unit"
Kristina Schafer (Montrose) & Bryan Vining (Ethalpy)

Montrose Air Quality Services (MAQS) and Enthalpy Analytical Laboratories (EAL) were selected to support a demonstration test to determine PFAS removal efficiency by a novel, non-combustion batch process from Aqueous Film Forming Foam (AFFF)-spiked solid material. The process was a volatilization and capture process. The primary objective of the demonstration was

to determine system removal efficiency (SRE) rather than destruction and removal efficiency (DRE) due to the lack of combustion. The SRE % was based on the analysis of PFAS content in the pretreatment solids material and the sampling and analysis of PFAS in the stack gas. In addition, a PFAS material balance around the process was performed by collecting samples of various process streams downstream of the primary treatment component.

Montrose Air Quality Services (MAQS) was contracted due to expertise in sampling for complex compound matrices containing dioxin-like compounds and PFAS using EPA Other Test Method (OTM) 45, and Montrose-own Enthalpy Analytical Laboratories (EAL) for expertise in PFAS analysis and method development in gaseous and process samples. The demonstration test was conducted at a chemical facility in the Central U.S.

This presentation will focus on the objectives and structure of the demonstration test, the PFAS measurements of the stack gas using OTM-45 and MAQS SOP for sampling PFAS in stack gas, and the PFAS analyses of the stack gas and process samples using EAL SOP EU047 that provided challenges of their own. In conclusion, the results of the demonstration test objectives will be discussed, as well the path forward for additional testing of other PFAS treatment facilities.

"AFFF Disposal: A PFAS Soaked Gordian Knot"

Sean Smith (Ecology)

In roughly 350BCE, a story comes to us from ancient Greece about King Gordius of Phrygia in modern Turkey. So the legend goes, King Gordius tied up an ox cart with a knot so tortuously entangled that no one could loosen it. After Gordius' death, the kingdom was without a ruler. An oracle decreed that whoever untied the knot was destined to rule all of Asia. Why the prophet expected Asia's future ruler to rest upon one's untangling skills, the legend doesn't say. However, upon hearing of the challenge, Alexander the Great threw himself upon it with vigor. He spent hours struggling with the chords, but the knot held strong despite his best efforts. In annoyance, Alexander drew his sword and proclaimed, "It makes no difference how they are loosed," and split the rope gnarl in two with a single colossal stroke.

What's the point of my retelling this legend? There is another infinitely more challenging knot that society is struggling to unravel right now, mainly how to safely dispose of PFAS contaminated waste in general and PFAS containing firefighting foam in particular. Whoever figures out how to disentangle this challenge may too change the course of history, this time toward better protecting our health and environment for decades to come.

This presentation will focus on:

- Ecology's history on PFAS and firefighting management
- PFAS and firefighting foam's environmental and public health impacts
- Ecology's firefighting foam environmental impact statement process
- The EIS's proposed disposal options
- and next steps

Track 3

"Development of Emissions Calculations and Permitting Approach for Novel Processes and Greenfield Facilities"
Sam Najmolhoda (Trinity) [YP]

When obtaining an air permit for a new facility, the development of accurate and appropriately conservative emissions calculations is essential to ensure a timely permitting process that meets the needs of both the agency and the individual facility. For established processes, these efforts are made easier by the availability of established and reliable sources of data on the emissions of a given process unit. In the case of novel processes and many greenfield facilities, however, data from representative facilities or processes are often limited if not unavailable altogether. The permitting process therefore requires creative solutions on the part of the facility, the agency, and consultants to meet the needs of all parties.

Once a permit is developed, there is also a need for facilities to demonstrate compliance with the permitted emission rates. In the case of new facilities or novel processes, particularly those that require a more gradual "ramp-up" in production, the emissions profiles of a given unit could potentially change with production scale as well. It is therefore key to develop emission calculations that take into consideration expected changes in production rates. In addition, it is important to develop compliance demonstration requirements in the permit that maximize the facility's operational flexibility while providing the agency with assurance that the local air quality will be sufficiently protected.

Through an examination of individual case studies, this presentation will highlight key lessons learned from the development of permit applications for novel processes and greenfield facilities. The examples will highlight any notable roadblocks and their solutions, key information for the permit applications, and recommendations for how to approach the permit application process as a new facility or as a consultant assisting in the development of the application.

"Developing the Potential to Emit for Joint Base Lewis-McChord, Tacoma Washington"
Diane Roberts (Joint Base Lewis McChord)

CONTENT: In preparation for a permit renewal application to the Puget Sound Clean Air Agency, JBLM developed a base wide potential to emit (PTE) that included a wide variety of emission sources such as boiler plants, engine testing, fire training, corrosion control, wood working etc. This presentation will cover the scope and rationale for this PTE, and the use of the US Air Force Potential to Emit Guidance Document.

"Air Quality Emission Factors – What Do You Mean I Can't Use AP-42?"
Beth Fifield Hodgson (Spring Environmental)

Air quality emission factors are universal. Or are they? What are we expected to use when defining emission factors? Regulatory agencies are generally looking for source specific testing, especially CEMS results. When that is not available, other resources may be considered before going directly to AP-42. Reviewing source testing databases from agencies and manufacturers

has opened options for greater accuracy and expanded toxics to be included in permit application. We will review additional resources and case studies of non-standard AP-42 emission factors utilized for permitting industries such as sawmills, boilers, and agriculture.

EPA published the first edition of "AP-42: Compilation of Emissions Factors" in 1968 and it included emission factors for 10 categories – fuel combustion, refuse incineration, food and agricultural industry, metallurgical industry, mineral products industry, petroleum refinery, pulp and paper industry, solvent evaporation and gasoline marketing, transportation, and ordnance detonation. The fifth edition of AP-42 was initially published in 1995, included the 10 categories above plus evaporation losses, liquid storage tanks, wood products industry, miscellaneous, and greenhouse gas biogenic. Many of the categories have been updated and expanded since original publication and yet the latest edition of common emission factors still include emission factors rated D and E, which are the lowest confidence ratings. Fortunately additional resources are available in many cases

"Why Care About How Your Emissions Are Calculated"
Crystal Rau (NWCAA)

Two example permitting scenarios and proposed permit requirements and limitations will be discussed, resulting from different project emission calculations under Washington's minor New Source Review programs, in accordance with Chapter 173-400 WAC (or local clean air agency equivalent) and Chapter 173-460 WAC:

- Flexible polyurethane foam molding
- Natural gas-fired steam generating boilers and indirect-fired batch lumber drying kilns.

What happens when you use proprietary materials in proprietary processes and EPA has not developed emission factors that accurately account for emissions? What difference does it make?

What happens when you are issued an approval-to-construct permit, then two years into construction you request the agency modify your permit in order to accommodate a modification you'd like to make to the original emission unit(s) approved, but there are new emission factors for the process? Under what circumstances do these changes impact the permit decisions and limits established under the original approval-to-construct?
These are just a few of the complications that can occur based on how your emissions are calculated, and they can have significant changes to the outcome of permit decisions. Discover what can be done during the permit writing process to avoid or lessen these complications

Session VI

Track 1

"Ins and Outs of Air Dispersion Modeling. What I Should Know." - Jay McAlpine (EPA R10), Kevin Schilling (IDEQ), Tes Berhane (Ecology)

Panel Discussion

Track 2

"Mechanical and Growing Limitations of SCOBY Membranes"[1]
Ravyn Goodwin (Montana Tech) [Student]

Symbiotic Culture of Bacteria and Yeast (SCOBYs) have many uses in the medical and engineering fields due to their capacity of producing bacterial cellulose membranes (BCM) with unique properties. For example, BCM membrane produced by SCOBYs can be used as probiotics, bandaging, leather, food substitutes, and living filtration. Among many applications of SCOBY membranes, this study focused on their purpose in air and water filtration, where mechanical and structural properties of BC and their restrictions on the use (e.g., flow rate, pressure, target contaminants) have not been clearly defined. Accordingly, this study presents a comparative analysis of BCM synthesized in growth solutions with several different additives in terms of their strength, bacterial growth and structure, and thickness. These factors are compared within the minimum and maximum growth periods (5-10 days). This data analysis of the membrane growth and related properties are demonstrated to evaluate the potential of SCOBY membrane to replace synthetic membranes commercially available in the current market.

"Reducing the Cost of Bacterial Cellulose in Kombucha via Sugar for Industrial Use"[1]
Gavin Rahl (Montana Tech) [Student]

For over a thousand years, different cultures have used bacterial cellulose found in kombucha for a variety of purposes, ranging from medicinal to a drink for the general public. Recently, bacterial cellulose membrane (BCM), a natural biomaterial produced by a symbiotic culture of bacteria and yeast (SCOBY), has been explored in numerous applications including air and water filtration. For air and water filtration, cost-effective membrane production while ensuring acceptable performance of the separation process is an important key to success for the application. This study addresses two aspects of BCM production that currently hinder growing it at an industrial scale: high cost of production, mainly a consequence of high costs of synthetic media for BCM production, and time to achieve acceptable growth to convert a BCM membrane into a filter. Focusing in on the sugar content (key nutrient in the growth medium) needed, results show that even with reduced sugar contents in an industry standard for growth by a factor of 1.7, SCOBY still produces BCM of the same quality within the time frame as those made with the standard, suggesting a significant potential for cost savings.

"Electric Vehicle Trends and Resources"
Merlyn Hough (Ret LRCAA)

Passenger cars and trucks are the largest source of global warming emissions and a major source of air pollutants that contribute to ground level ozone and other air pollution problems adversely impacting public health in the United States. Electric vehicles (EVs) have the potential to dramatically reduce these emissions, especially when charged by low-carbon renewable electricity.

Few areas in the world of clean energy are as dynamic as the electric car market. Sales of EVs doubled in 2021 from the previous year to a new record of 6.6 million. Global sales of electric cars have kept rising strongly in 2022, with 2 million sold in the first quarter, up 75% from the same period in 2021. The success of EVs is being driven by multiple environmental, economic and government policy factors.

A growing number of countries have pledged to phase out internal combustion engines or have ambitious vehicle electrification targets for the coming decades. Meanwhile, many carmakers have plans to electrify their fleets that go further than policy targets. Finally, five times more new EV models were available in 2021 than in 2015, increasing the attractiveness for consumers, and currently there are about 450 EV models available on the market.
The suitable number of chargers per EV will depend on local specifics such as housing stock, typical travel distances, population density and reliance on home charging. Charging at home and workplace are likely to supply much of the demand overall, but the number of public chargers still needs to expand several-fold by 2030 to provide consumers with adequate and convenient coverage.

This presentation summarizes EV trends and provides useful information links for keeping up with these fast-changing EV developments.

Track 3

"Friend or Foe. What to Know When You Hear From A Regulator" - Christopher Kitchen (PSCAA), Ethan Bean (Ecology), Shawn Sweetapple (IDEQ)

Panel Discussion