

AGAT Laboratories 

tech talks 2021

ENVIRONMENTAL SCIENCE AND TECHNOLOGY

virtual event

march 1 to 12

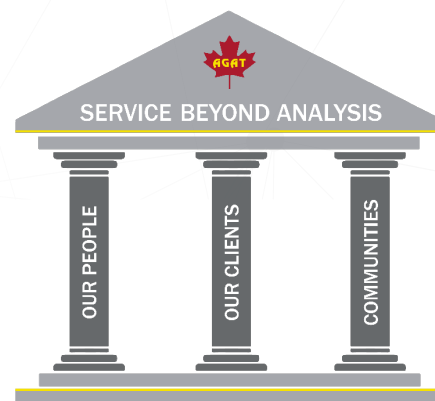
Welcome to the 2021 AGAT Science and Technology Talks!

As Chief Executive Officer of AGAT Laboratories, it is once again my distinct pleasure to welcome you all to the 2021 edition of our Science and Technology Talks. This year we are focused on celebrating innovation, advancements in science and environmental successes coast to coast to coast.

These sessions are hosted each year as they align with our company purpose “Service Beyond Analysis”. For us our purpose means that we are more than just analytical data, beyond the analysis we provide our ultimate goal is to serve. In that respect, our purpose is upheld by the three pillars critical to our business: Our People, Our Clients and the communities that surround us. Being able to host these technical sessions for you all allows us to showcase our commitment to serving you, our valued clients, while also providing us a chance to highlight the incredible work going on in our communities.

Throughout the year we will continue to stand behind our purpose and prove to you all what an important part of our company you play within our structure. The support that you continue to provide us gives us the stability to remain strengthened and resilient across all operations.

We look forward to this year’s sessions as they are filled with insight from industry leaders looking to share their knowledge and passion. I am delighted that you have chosen to partake in these sessions and to support one another in furthering our professional development.



To our distinguished speakers, please accept a very sincere thank you on behalf of all of us at AGAT as well as our attendees. Without your involvement and support these events would not be possible, and for that we are truly appreciative.

Sincerely,

Marissa Reckmann
Chief Executive Officer

Program

week one

March 1

8:20 AM	Introduction and Welcome Marissa Reckmann, CEO <i>AGAT Laboratories</i>
8:30 AM	Applying Environmental Risk Intelligence and Data-Driven Solutions to Make Complex Site Closure Simple Andrea Bullinger, Strategy Manager, Environmental, and Brandon Smith, Senior Risk Assessor <i>360 Energy Liability Management</i>
TBD	Waterloo Membrane Sampler: Passive Sampling in Remediation Projects; Soil Gas, Outdoor Air and Implications for Vapor Intrusion Studies Brent G. Pautler, Chemistry Services Manager <i>SiREM</i>

March 2

8:25 AM	Good Morning /Welcome Kelly Howard, Director of Marketing <i>AGAT Laboratories</i>
8:30 AM	Integrating New Employees in the Age of Remote Working Kirk Elliot, Senior Environmental Scientist and Partner, and Connor Frizzley, Environmental Scientist <i>Trace Associates</i>
TBD	2021 Update from the Orphan Well Association Lars DePauw, Executive Director <i>Orphan Well Association</i>

March 3

8:25 AM	Good Morning /Welcome Kelly Howard, Director of Marketing <i>AGAT Laboratories</i>
8:30 AM	Project 24th Street SE Stormwater Pond and Ogden Landfill Remediation Thomas Jacklin, Principal Consultant <i>Advisian</i>
TBD	Covid's Effect on Mental Health Dr. Elsa Wagdy, Change Leader, PMO Strategist, Psychotherapist, Neuropsychology <i>Dr. Elsa Wagdy</i>

Program

week one

March 4

8:25 AM

Good Morning /Welcome

Kelly Howard, Director of Marketing
AGAT Laboratories

8:30 AM

Balancing Technical Requirements and Property Owner Business Objectives During Sub-Slab Depressurization System Installation

Albert Ho, Senior Director, Environmental Programs, and Paul Nicholson, Remediation Engineer
First Capital and Geosyntec

TBD

Mycoremediation Is Ready to Be the New Bioremediation Tool

Dennis Owens, Senior Microbiologist, Chemist
Sustainable Water Technology (SWT Consulting)

March 5

8:25 AM

Good Morning /Welcome

Kelly Howard, Director of Marketing
AGAT Laboratories

8:30 AM

Emissions Reduction Projects and ESG Strategies

Jackson Hegland, President
Modern West Advisory

TBD

PFAS Leachability and Landfills - What Have We Learned and why Is it Important?

Blake Hamer, Principal Hydrogeologist, and Lisa Neville, Director of Technical Sciences
Matrix Solutions and AGAT Laboratories

*All presented times are in MST.

Program

week two

March 8

8:20 AM **Introduction and Welcome**
Kelly Howard, Director of Marketing
AGAT Laboratories

8:30 AM **Case Studies in Anaerobic Bioremediation: A Sustainable and Cost Effective Alternative**
Ryan Riess, Environmental Lead
PINTER & Associates Ltd.

TBD **An exploration of the existence of a “glass-ceiling” for women in leadership positions: a study of Calgary, Alberta, Canada**
Dr. Elsa Wagdy, Change Leader, PMO Strategist, Psychotherapist, Neuropsychology
Dr. Elsa Wagdy

March 9

8:25 AM **Good Morning /Welcome**
Kelly Howard, Director of Marketing
AGAT Laboratories

8:30 AM **Oh, the Samples You’ll Run and Things you will See GCxGC Analysis is Definitely for me!**
Court Sandau, Principal Scientist
Chemistry Matters

TBD **Waste and Dangerous Goods Tracking and Compliance Management System**
Amit Bhargava, Co-Founder
EnviroApps

March 10

8:25 AM **Good Morning /Welcome**
Kelly Howard, Director of Marketing
AGAT Laboratories

8:30 AM **Surfactant Enhanced Extraction (SEE) at LNAPL and DNAPL Impacted Sites Pilot to Full Scale Applications**
George (Bud) Ivey, President and Senior Remediation Specialist
Ivey International

TBD **Reclamation across our Nation - the Canadian Land Reclamation Association (CLRA)**
Andrea McEachern, National President
Canadian Land Reclamation Association

Program

week two

March 11

8:25 AM

Good Morning /Welcome

Kelly Howard, Director of Marketing
AGAT Laboratories

8:30 AM

PFAS Risk Considerations for the Oil and Gas Industry

Samantha Murphy, Water Resources Professional
Cenovus

TBD

Determination of Contaminated Sludge Thickness in a Former Tidal Estuary

Ben Sweet, Technical Lead
SCG Industries

March 12

8:25 AM

Good Morning /Welcome

Kelly Howard, Director of Marketing
AGAT Laboratories

8:30 AM

Why Should We Care about Wetlands?

Jacqueline Redburn, Team Lead, Natural Sciences, and Theresa Peters, Terrestrial and Wetland Biologist
Trace Associates

TBD

Updates and Upgrades to Subsoil Salinity Tool (SST) in Version 3.0

Gordon Dinwoodie, Land Reclamation Specialist and Greg Huber, Environmental Scientist
Government of Alberta / Equilibrium

TBD

Closing Remarks

Marissa Reckmann, CEO
AGAT Laboratories

*All presented times are in MST.



AGAT
Laboratories

AGAT
Foundation



**Prostate Cancer
Centre**

Supporting Initiatives that Save Lives

Dear Tech Talks Participant,

Our first-ever series of virtual AGAT Tech Talks is only a few days away and we look forward to it with great anticipation! We are welcoming over 500 registrants to take part in this event.

Our lineup of free webinars was compiled thanks to the collaboration of our accomplished speakers and to the commitment shown by the AGAT Foundation to support science, research, innovation and technology through educational opportunities that transform our future.

In 2021 there are a number of exciting initiatives that the AGAT Foundation will be undertaking to support medical advancements and patient support, including the build out of the AGAT House. The video in the following link will help to showcase the importance of this project in helping future families seeking medical attention within Alberta: https://youtu.be/hPpRTcc_mc0

In celebration of the 2021 Tech Talks the AGAT Foundation has also put forth a matching campaign in support of Prostate Cancer Centre (PCC). In lieu of registration, any donations that are put forward by our attendees will be matched up to \$50,000 dollars. Please consider making a donation to the PCC to make a tangible impact on cancer care in our community <http://weblink.donorperfect.com/AGATTECHTALKS>

The introduction to the Tech Talks next week will take you through a brief welcome introduction from myself that highlights AGAT Labs purpose and how it ties into the Foundation. It also highlights some of the successful collaborations we have together with the PCC including:

- Support of free prostate screening across Alberta with the Man Van
- Utilization of Artificial Intelligence in the treatment of bladder and prostate cancer
- Expansion of cutting edge imaging techniques with prostate-specific membrane antigen (PSMA) using positron emission tomography (PET) to localize prostate cancer recurrence more accurately
- Creation of an interactive Mental Health and Wellness system for patients and families with contributions totally 1.5MM through the support of three prominent partners of the foundation

We thank you for your consideration and hope that we can count on your help to bring many of these ambitious and innovative projects one step closer to fruition.

Best regards,

Marissa Reckmann
CEO | AGAT Laboratories

Applying Environmental Risk Intelligence and Data-Driven Solutions to Make Complex Site Closure Simple

Andrea Bullinger, Strategy Manager, Environmental, and Brandon Smith, Senior Risk Assessor 360 Energy Liability Management

Abstract

Standardized soil and groundwater remediation guidelines were first introduced across Canada in the late 1980s. These initial regulatory tools were prescriptive and generic, limiting the ability of professionals to find site-specific solutions. Fortunately, the regulatory framework has evolved to integrate risk-based metrics, exposure models and independent research in the development of human and ecological health-based guidelines.

Currently, there are many tools and guidance documents that one can leverage to better understand risk-based analysis and site liability. However, environmental risk intelligence and data-driven decision-making is still an elusive concept for many assessors. We continue to see assessment findings compared to generic endpoints and guidelines or, where risk-assessment is considered, its application is excessively conservative. This often leads to prolonged closure (continuous assessment with no clear exit) or unnecessary remediation that can contribute to environmental harm (i.e. excessive disturbance and emissions).

In this presentation we demonstrate the application of environmental risk intelligence, site-specific risk assessment and data science as a mechanism of informing and developing a focused closure plan. The example site is in South Central Alberta and was first assessed in 1991. Since that time over 20 independent

site assessments have been completed by numerous consulting firms. Our innovative and pragmatic approach correlated years of environmental data to effectively assess natural conditions and receptor risk. This 6-week project resulted in an 85% reduction in remedial cost through risk-based refinement of remedial endpoints. The process reduced unnecessary landfilling and associated emissions whilst ensuring the protection of human health and the environment. Data-driven solutions that leverage environmental risk intelligence make closure simple for complex sites.



| Andrea Bullinger

Andrea is the Manager of Environmental Strategy at 360 Energy Liability Management. She has more than 20 years of environmental and regulatory experience in oil and gas. She strengthens business alignment through a highly strategic, collaborative, results-driven approach to environmental management. Andrea specializes in the reduction of oil and gas liabilities through focused, risk-based assessment, remediation, and reclamation of assets and through strategic management of clients regulatory and financial liability obligations. Andrea obtained a Master of Science in soil science from the University of Manitoba before moving to Alberta for work in 2000. In her spare time, she likes to snowshoe and “study” wine and terroir, so much so that she obtained her Level 3 Sommelier (WSET) in 2019.



| Brandon Smith

Brandon is a Senior Risk Assessor with 360. He has over a decade of experience working as both a human and ecological risk assessor and brings with him a strong background in human and environmental toxicology. Most recently, Brandon has focused on environmental liability reduction techniques and strategies in relation to alternative remediation strategies and technologies throughout Western Canada. His experiences include the completion of detailed quantitative risk assessments in Saskatchewan, Alberta, British Columbia, the Northwest Territories and Nunavut. When not working he enjoys spending time with his wife and two small children who are learning to ski and enjoys hiking in the mountains.

Waterloo Membrane Sampler: Passive Sampling in Remediation Projects; Soil Gas, Outdoor Air and Implications for Vapor Intrusion Studies

Brent G. Pautler, Chemistry Services Manager

SiREM

Abstract

Passive sampling has been growing in popularity for the measurement of volatile organic compounds (VOCs) due to lower costs, simpler sampling protocols and ease of deployment, with applications ranging from indoor/outdoor air quality and soil vapor intrusion assessments. The Waterloo Membrane Sampler™ (WMS™), a passive permeation sampler which incorporates a polydimethylsiloxane membrane across the face of a vial filled with sorbent medium, provides additional advantages such as a high resistance to water vapor and predictable uptake rates for virtually any VOC. It has found use in collecting soil gas, indoor and outdoor air to monitor remediation projects focused on time-weighted average VOC concentration and compound specific isotope analysis (CSIA). This presentation will provide technical information on the WMS™ and provide data on recent sampler developments including:

- Use of WMS™ in soil gas sampling programs in which the design of the sampler was modified to incorporate a thicker membrane, reducing the potential for “starvation”, a common issue when collecting soil gas samples with passive samplers.

- WMS™ design modification to incorporate either a thermally-desorbable sorbent or thin film SPME sorbent for ease of detection/quantitation by TD-gas chromatography-mass spectrometry (TD-GC-MS) and direct comparison with TD tubes and real-time monitoring in outdoor air.

With these modifications, increased sensitivity and correlation to real-time monitoring data, the WMS™ shows potential to be applied to all indoor and outdoor air VOC sampling, including perimeter monitoring of remediation projects such as excavations and long-term monitoring for vapor intrusion work.



| Brent G. Pautler

Brent received his Ph.D. environmental analytical chemistry in 2013 where he gained advanced technical experience in spectroscopy, chromatography, mass spectrometry, passive sampling, and chemistry informatics. Throughout his career, he has worked with scientists, engineers, and consultants, applying his chemistry and information technology expertise to help them solve unique problems in the laboratory and the field. His role includes managing and advancing SiREM's passive sampling portfolio and analytical testing services.

Integrating New Employees in the Age of Remote Working

Kirk Elliot, Senior Environmental Scientist and Partner, and Connor Frizzley, Environmental Scientist Trace Associates

Abstract

From recruiting to training, integrating new employees into the environmental consulting industry in 2020 has been full of challenges. There have also been opportunities to improve the entire process of onboarding and integrating new employees.

Technology has become an even bigger part of our day-to-day lives since the COVID-19 pandemic began, and new hires are no exception. New employees have had to not only learn what is required of them to be a successful consultant, but also how to operate and navigate a variety of software to simply communicate with their colleagues. Finding opportunities for training in the field has been a challenge early in the pandemic as close contact has been limited; however, this challenge has also brought opportunities, such as focusing on office training, increasing junior hires' understanding of the industry prior to starting field work, and brought a few unexpected benefits.

Networking and getting to know new colleagues can be difficult even when you are able to sit around a table to chat. It is even more difficult when you must get to know them through a small box on a screen. This has created several challenges for new hires to be integrated with their coworkers and a company's culture, but it has also created new ways for us to connect.

This presentation will focus on the challenges faced by junior consultants entering the workforce and opportunities for improvement as we continue to navigate an ever-changing world. We will discuss how the onboarding process has looked different, the ways in which training has had to evolve, and the daunting task of becoming a part of a company's culture during a pandemic. This presentation will include the perspective of a recent hire as well as that of a supervisor responsible for ensuring the success of junior consultants in an ever-changing workplace.



| Kirk Elliot

Mr. Kirk Elliott is a Senior Environmental Scientist for Trace Associates Inc. (Trace) with 13 years of experience conducting environmental site assessments, remediation, and reclamation work, primarily in the oil and gas industry. Mr. Elliott grew up on a ranch in southwest Saskatchewan and now resides near Didsbury, Alberta where he lives with his wife and 7-year-old daughter and works out of the Trace Didsbury office. He attended Lethbridge College and graduated in 2007. Kirk is a Partner with Trace and a staff supervisor.



| Connor Frizzley

Mr. Connor Frizzley is an Environmental Scientist for Trace Associates Inc. (Trace) with approximately one year of experience conducting environmental site assessments, remediation, and reclamation work primarily in the oil and gas industry. Mr. Frizzley grew up in Rocky Mountain House, Alberta and now resides in Olds, Alberta where he works out of the Trace Didsbury field office. He attended Lethbridge College and graduated in 2020.

2021 Update from the Orphan Well Association

Lars Depaw, Executive Director

Orphan Well Association

Abstract

The scale and scope of the Orphan Well Association (OWA) was enhanced in 2020 with amendments to provincial legislation. In addition, the continuing economic downturn and pandemic have had an impact on the oil and gas industry and the OWA in turn. Find out how the OWA is evolving and what lies ahead.



| Lars DePauw

Lars has been involved in assessing and managing environmental liabilities in the oil and gas sector for over twenty years. His current focus is leading a diverse group of professionals who are handling the continuing influx of properties being designated as Orphans in Alberta resulting from the ongoing downturn in the oil and gas industry. A large portion of his time is dedicated to managing the evolving scale and scope of the Orphan Well Association (OWA) including the increase in annual expenditures.

Prior to joining the OWA, Lars worked in the environmental consulting field, the oil and gas service sector and with a large producer. His work in all three sectors focused on the decommissioning and reclamation of oil and gas assets including estimating liabilities. He holds a Masters of Science from the University of Guelph and is a Professional Engineer.

Project 24th Street SE Stormwater Pond and Ogden Landfill Remediation

Thomas Jacklin, Principal Consultant
Advisian

Abstract

The City of Calgary is building a new dry storm pond and completing the construction of an embankment that will be part of the corridor for the future Green Line LRT. The pond and embankment are being built on the west half of the former Ogden Dry Waste Management Facility. This is a complex project that required 24/7 activity at the worksite. Most of the work was completed by the end of December 2020 with minor surface works taking place in the spring of 2021. The work has involved the excavation and removal of over 500,000 m³ of waste and a similar volume of overburden. It is one of the largest remediation projects the City has undertaken.



| Thomas Jacklin

Tom Jacklin is a Principal Consultant with Advisian, part of the Worley Group. He has a B.Sc. (Civil Engineering) and M.Eng. (Environmental Engineering) from the University of Alberta. Across 30+ years as a registered Professional Engineer, Mr. Jacklin has compiled a proven technical expertise in the siting, planning, permitting, design, construction, closure, post-closure monitoring, and beneficial end use of waste management facilities and impoundments. His waste stream experience includes municipal waste, hazardous waste, special handled waste, coal combustion residuals, cement kiln dust, process water, stormwater, gas refinery and exploration waste, construction and demolition debris, contaminated soil, and mine tailings.

Mr. Jacklin has delivered solutions to over 100 waste facilities across Canada, Kuwait, Philippines, and Indonesia, and has developed a reputation for delivering technical solutions that are defensible, constructible, and aligned with client objectives. He serves as one of the firm's subject matter experts in industrial waste management applications.

Covid's Effect on Mental Health

**Dr. Elsa Wagdy, Change Leader, PMO Strategist, Psychotherapist,
Neuropsychology Dr. Elsa Wagdy**

Abstract

The presentation sheds the most recent and up-to-date scientifically validated information on how the mind and brain function with touchpoints on many commonly held beliefs that are now disproven.

The synopsis is two-fold: to provide the data on mental health before and after Covid; to provide a basic insight into how the mind functions to understand human mental health outputs better. Discussions surrounding depression and anxiety are touched upon as they are the primary mental health concerns in Canada, with options and solutions that aid in their resolution, including suggestions for maintaining a healthy mental state.



| Dr. Elsa Wagdy

Dr. Elsa Wagdy has over 20 years in various therapies, psychologies, sociologies, psychotherapies, quantum physics, neuroscience, epigenetics, neuropsychology, neuroendocrinology, psychoneuroimmunology, personal training, nutrition and business/change/program/project management. Her approach to therapy is unique and utilizes several treatments and counselling methods, grounded in scientifically validated tools.

Balancing Technical Requirements and Property Owner Business Objectives During Sub-Slab Depressurization System Installation

Albert Ho, Senior Director, Environmental Programs, and Paul Nicholson, Remediation Engineer First Capital and Geosyntec

Abstract

Background:

The design and installation of sub-slab depressurization systems to prevent the subsurface to indoor air pathway of contaminated vapours requires the understanding of contaminant distribution, subsurface permeability and preferential pathways through the slab. However, the mitigation system design must also incorporate the current and future use of the building. Therefore, during mitigation design, the technical requirements of a mitigation system must consider the business objectives of the property owner including being balanced with the current and future tenant use of buildings, while providing a cost-effective system which is protective of human health.

Approach:

The radius of influence (ROI) of vacuum propagation is the primary factor in determining the spacing of extraction points in a mitigation system design. Typically, the ROI is based on a measured vacuum (e.g. 6 pascals) at some distance from an extraction point. This “design ROI” value is then used to determine the layout of the system extraction points to maximize coverage of the footprint of the building, or area of elevated contaminated vapour concentrations.

However, the design ROI, may not be practical within the existing layout of the building, internal use, or future use of space. Owners of properties want to maximize the available rental space for tenant use and minimize the number of extraction points and associated piping so as not to restrict occupant activities. Trying to space extraction points along existing internal walls may work; however, in properties with multi-tenant spaces, internal walls may move over time as tenant use changes to meet various users.

New approaches are being used to determine an alternative design ROI based on mass flux, extraction velocity and subsurface travel time (McAlary, 2020), which often result in a larger design ROI (i.e., fewer extraction points) while still being protective of human health.

Lessons Learned:

The presentation will be co-presented by Albert and Paul and will review methods for developing an alternative design ROI, while providing case study examples of how the design of a mitigation system must balance the technical requirements of a mitigation system (Paul) and owner/tenant business and use requirements (Albert).



| Albert Ho

Albert is the Senior Director of Environmental Programs with First Capital REIT. First Capital is a leading developer, owner and manager of mixed-use real estate located in Canada's most densely populated cities. At First Capital, Albert provides direction and leadership to manage environmental risk nationally. He has over 20 years of experience in the field of environmental risk management, investigation and remediation.



| Paul Nicholson

Paul is a Senior Engineer with Geosyntec Consultants based in Guelph, Ontario and has over 15 years of experience with the evaluation and mitigation of the vapour intrusion pathway. He has been integral in the development and implementation of many innovative assessment tools, such as high-volume sampling, building pressure cycling and mass flux evaluation.

Mycoremediation Is Ready to Be the New Bioremediation Tool

Dennis Owens, Senior Microbiologist, Chemist

Sustainable Water Technology (SWT Consulting)

Abstract

The use of Mycoremediation in remediation is a rapidly evolving technology. It is the bioremediation technique that employs fungi in the removal of toxic compounds. Both filamentous microfungi (mold) and macrofungi (mushrooms). The fungi classes possess enzymes for the degradation of a large variety of pollutants and have the ability to colonize a wide range of heterogeneous environments and they have ability to adapt to the complex soil matrices and extreme environmental conditions, and can decompose organic matter and easily colonize both biotic and abiotic surfaces.

Filamentous microfungi have some peculiar characteristics that make them more advisable in soil bioremediation than bacteria. These fungi develop a multicellular mycelial network suited to soil colonization and translocation of nutrients and water. The production of many bioactive compounds and extracellular enzymes have the unique capability to co-metabolize many environmental chemicals. Mycoremediation is a biological tool to degrade, transform, or immobilize environmental contaminants.

The fungi to be used in soil remediation are basidiomycetes and the ecological groups of saprotrophic and biotrophic fungi.

Macrofungi basidiomycetes (mushrooms) are advantageous to use in remediation because the soil is enriched with organic matter and nutrients. These mushrooms are potent degraders due to the secretion of the same non-specific enzymes (UP, MNP, and lactose) described for the saprotrophic degrading fungi. Further, mushrooms biomass can be applied in biosorption treatment because of its ability to accumulate ions and xenobiotics from contaminated soils.

This presentation will include some Mycoremediation projects, their timeline and ultimate success as well as the methodology, types of fungi to use.



| Dennis Owens

Dennis is a Principal, as well as the Senior Microbiologist/Chemist for Sustainable Water Technology, www.sustainablewatertech.com. He has over 40 years of experience in remediation product development and remediation of soil and water. He has worked in North and South America, Africa and the Middle East. He has specialized in bioremediation, chemical oxidation and formulated activated carbon remediation. His current work has expanded to involve mycoremediation and the use of mushrooms and other fungi for economical and efficient remediation of wastewater and soil.

Emissions Reduction Projects and ESG Strategies

Jackson Hegland, President

Modern West Advisory

Abstract

Emissions reduction projects not only support a company's regulatory compliance activities, but can generate revenue and support an organization's ESG ambitions. Modern West will discuss common emissions reduction project types and how companies can maximize the benefit of those initiatives by building a strong ESG platform.



Jackson Hegland

Jackson is the President of Modern West Advisory, a strategic consulting firm working with oil and gas industry, government, and clean technology providers on emission reduction & management activities. He is also Executive Director of the Methane Emissions Leadership Alliance: an industry association composed of methane reduction technology and service providers from throughout Canada and the United States. He is a partner with Carbon Connect International (with offices in Calgary, AB and Fontainebleau, France) and the Director of Aspenwood Innovation in Princeton, NJ. Jackson has over 14 years of experience as an oil and gas professional building carbon management and ESG strategies, collaborating with industry and government on climate change policy design, and evaluating & executing greenhouse gas emission reduction projects throughout Western Canada and the US. He graduated from Princeton University with a degree in Environmental Economics.

PFAS Leachability and Landfills - What Have We Learned and why Is it Important?

Blake Hamer, Principal Hydrogeologist, and Lisa Neville, Director of Technical Sciences Matrix Solutions and AGAT Laboratories

Abstract

PFAS contamination has been identified in many industrial sites, airports and military bases across the US and Canada and is a growing concern for the public and regulatory agencies worldwide. Although a lot of work has been done in recent years to better understand PFAS sources, fate, transport and remediation, many questions remain about its presence and leachability in landfills, which, as the end point for municipal and industrial waste, have a high potential to contain PFAS compounds. Matrix and AGAT Labs will present the results of two studies related to PFAS leachability including an assessment of four municipal landfills in British Columbia that will address some of these questions, including:

- Can we estimate at what concentrations soil would be considered leachate toxic and hazardous?
- How can landfills mitigate the risks of importing PFAS source materials?
- What factors contribute to the presence of PFAS in the leachate and groundwater at municipal landfills?
- If present, what are the environmental risks?



| Blake Hamer

Blake is a Principal Hydrogeologist with Matrix Solutions. He has 16 years of environmental consulting experience in a broad range of projects across Canada. His primary role is hydrogeology technical advisor for contaminated sites projects and Technical Lead for Matrix's Contaminant Hydrogeology and Geochemistry technical discipline. He has been involved in hundreds of contaminated sites projects including spill response, Phase 2 ESAs, remediation, risk assessment and risk management.



| Lisa Neville

Dr. Neville is a micropaleolimnologist with a diverse academic background and is currently AGAT Laboratories' Director of Technical Sciences. Dr. Neville has worked as an invasive species researcher for Fisheries and Oceans Canada and, most recently, as a Senior Environmental Consultant at Enviro-Verse Ltd. Her academic background consists of a B.Sc. Honours in Earth Science and Biology and M.Sc. in Earth Science from Brock University and her Ph.D. in Earth Science from Carleton University. She has also held the position of NSERC Postdoctoral Fellow at the Geological Survey of Canada, characterizing oil and gas potential in arctic formations. Dr. Neville has authored and co-authored over 25 scientific papers in the fields of micropaleontology, biostratigraphy, limnology, tailings pond benthic ecology, natural climate change, and offshore exploration. Dr. Neville is currently an Adjunct Professor at Brock University and the Chair of the Board of Directors for Geology at Mount Royal University.

Case Studies in Anaerobic Bioremediation: A Sustainable and Cost Effective Alternative

Ryan Riess, Environmental Lead

PINTER & Associates Ltd

Abstract

Several recent case studies from Western Canada will be discussed briefly demonstrating the types of sites and issues that can benefit from an anaerobic bioremediation approach. Although the timelines are generally longer than other alternatives, the approach can be very sustainable and cost effective. In general, overall costs to complete remediation can fall in the range of 60-90% less when compared to a simple dig and dump.



| Ryan Riess

Ryan Riess is an environmental engineer currently working at PINTER & Associates Ltd in Saskatoon. He has 15 years of experience in remediation and site assessment. Ryan has been the project lead on multiple anaerobic bioremediation projects which have been recognized with national awards.

An exploration of the existence of a “glass-ceiling” for women in leadership positions: a study of Calgary, Alberta, Canada

Dr. Elsa Wagdy, Change Leader, PMO Strategist, Psychotherapist, Neuropsychology Dr. Elsa Wagdy

Abstract

This presentation’s synopsis utilizes a panel and peer-reviewed research paper to provide insight into the current 2020 leadership gender gap in Calgary, AB. It sheds light upon many commonly held beliefs that are now scientifically disproven yet are still believed and provide psychological and tactical explanations for their past and present existence.

Finally, it offers recommendations at organizational and societal levels that should be taken to reduce Calgary’s leadership gender discrimination.



| Dr. Elsa Wagdy

Dr. Elsa Wagdy has over 20 years in various therapies, psychologies, sociologies, psychotherapies, quantum physics, neuroscience, epigenetics, neuropsychology, neuroendocrinology, psychoneuroimmunology, personal training, nutrition and business/change/program/project management. Her approach to therapy is unique and utilizes several treatments and counselling methods, grounded in scientifically validated tools.

Oh, the Samples You'll Run and Things you will See GCxGC Analysis is Definitely for me!

Court Sandau, Principal Scientist

Chemistry Matter

Abstract

Although multidimensional gas chromatography (GCxGC) is celebrating 30 years of existence, it still has not achieved the role the early adopters had imagined. Change is difficult and there are always things that hold back new technology from full implementation. For GCxGC, those last remaining barriers are being broken down. New applications of GCxGC are being developed regularly in the fields of petroleomics, environmental forensics, aroma profiling, cannabis analysis, breath analysis and metabolomics.

This presentation will cover the fundamentals of GCxGC analysis in how it works and will discuss the more common applications where this technique can be applied both in the literature and in litigious matters. These include petroleomics for oil characterization, petroleum fingerprinting for oil spills and other free product releases, as well as crude oil weathering. The main advantages of this technique will be illustrated with examples to demonstrate the benefits of using this type of analysis. The final barrier of use is how to handle the data that is available with each analysis and how to compare multiple samples. These are the primary areas focused on in current research and will be overcome in short order.

GCxGC analysis can be used on any complex mixture analysis to help find signal in matrix or resolve all peaks in product samples. It is ideally suited for chemical fingerprinting providing the most information possible from any analysis. GCxGC can be used in place any routine method, providing fully comparable results, but allow the user to explore the untargeted and unmonitored components of the mixtures.



| Court Sandau

Dr. Court D. Sandau is an adjunct professor at Mount Royal University and a principal at Chemistry Matters Inc., a niche chemistry and environmental consulting firm. Chemistry Matters specializes in arson investigations as well as expert consulting for environmental forensics, chemical fingerprinting, fate and transport as well as and human and wildlife biomonitoring litigious matters. Dr. Sandau has been developing and working with advanced analytical methods since 1995. Dr. Sandau has pioneered the use of multidimensional chromatography in litigious matters with its application to environmental forensics and arson case studies and has applied the technique to hundreds of cases. Dr. Sandau provides lectures at universities and international conferences on the use of multidimensional chromatography for environmental litigious matters.

Waste and Dangerous Goods Tracking and Compliance Management System

Amit Bhargava, Co-Founder

EnviroApps

Abstract

While the “digitalization” of oil and gas industry has been talked about for decades, actual adoption of digital technologies in the industry has often lagged other sectors. Given the current challenges of COVID-19 pandemic, a global recession, and a world oil price collapse, increasingly oil and gas companies are now considering digital solutions.

Since January 2015, the Alberta Energy Regulator (AER) has allowed the use of electronic Alberta Oilfield Waste Form to meet the requirement of full cycle tracking of hazardous waste. Most energy companies still use paper-based forms and manual systems to track their hazardous waste despite the inherent risks associated with data integrity and data loss, duplication of effort between field personnel and Environmental Co-ordinators and poor visibility of the information.

Many companies are looking at this crisis as an opportunity to hit the “Reset” button by examining weakness within their current processes, determining where inefficiencies exist and where improvements in cost structures can be made. Some of the process improvements require multi-industry sector collaboration and regulatory change to solve existing challenges.

EnviroApps’ ez2Track solution automates tracking and reporting of hazardous waste and dangerous goods, increasing data accuracy and significantly reducing compliance effort. ez2Track is a cloud-based software Application (App) for field personnel that replaces paper and spreadsheet-based systems and automatically generates the required reports for Regulatory Compliance.

Besides a brief live Demo of the Application, the Presentation will focus on results from a Case Study based on real data from our clients that reveals the low hanging fruits of productivity and transportation cost saving opportunities. We will also share learnings from the TDG Regulatory Sandbox Project as collectively our informal industry collaborative group is first to achieve equivalency for road transportation of dangerous goods.



| Amit Bhargava

Amit Bhargava is a Subject Matter Expert in the field of Environmental and Regulatory Compliance. He has more than 20 years of widely varied experience in a consulting and industry environment. Amit has a successful track record of designing and facilitating implementation of software solutions to manage Environmental and Regulatory Compliance for the Energy Industry. His passion to solve the pain he had to go through dealing with certain archaic processes led him to form EnviroApps. Now he wants the industry to switch to digital solutions to enhance safety, save costs and make their lives easier.

Surfactant Enhanced Extraction (SEE) at LNAPL and DNAPL Impacted Sites Pilot to Full Scale Applications

George (Bud) Ivey, President and Senior Remediation Specialist

Ivey International

Abstract

Background/Objectives:

This applied presentation will explain hydro-geo-chemical fundamentals of hydrophobic organic chemical (HOC) behavior, including petroleum hydrocarbons, chlorinated solvents, PFAS, and Pesticides, in saturated and unsaturated regimes, from their general physical chemistry characteristics to detailed phase partitioning and sorption (i.e. absorb and adsorb), and how this behavior kinetically limits their 'Availability' for remediation, and their root causes of contaminant rebound (a.k.a. back-diffusion). Contaminant sorption and reduced availability can be significantly reduced with integration of surfactant enhanced extraction (SEE), to enhance contaminant phase-desorption (i.e. of vapour, liquids, and solids) and significantly increase their 'Availability' for improved in-situ and ex-situ Physical, Biological and Chemical remediation methodologies.

Approach/Activities:

Three (3) international SEE brownfield remediation site case studies, are presented that each evolved from pilot scale to full scale applications, will be used to provide integration details and the client's evidence based findings and the statistically measurable benefits

realized at each site, using SEE as part of site specific physical (MPE), biological (MNA) and/or chemical (ISCO/ISCR) treatment train strategies that expedited vapour, soil and groundwater remediation to achieve the applicable regulatory and/or risk assessment based clean-up objectives for the sites.

The presentation will be technically underpinned by established scientific principles, well supported by client data and visually driven using figures, charts and three dimensional computer animation models, using adult learning principles, for improved audience interaction.

Results/Lessons Learned:

The three full-scale SEE remedial efforts resulted in the recovery of approximately greater than 99% of the NAPL at each site, prior to on-set of second physical, biological or chemical remediation, with soil groundwater contaminant concentrations in the source areas having been reduced by >90 to 95%. Based on these results, SEE as a combined 2-step remediation strategy was easy to implement, and can resulting in significant project life-cycle cost savings to achieve regulatory or risk based site clean-up objectives.



| George (Bud) Ivey

George (Bud) Ivey is the President and Senior Remediation Specialist with Ivey International Inc. with global headquarters in Vancouver, Canada. He has over twenty-five years of environmental site assessment and remediation experience. He has worked on more than 2500 major environmental projects, taking him to over 50 countries globally. His multi-disciplinary education includes: Synthetic Organic Chemistry, Geological Engineering, and a Master's Certification in Project Management.

His more notable accomplishments include:

- Several International Environmental Remediation Product and Process Patents;
- Recipient of many International Environmental Awards;
- Completed a 'first' remediation project in a developing EU country;

- Developed a PFAS free, biodegradable fire suppression product; and
- Completed an IRONMAN

When he's not busy remediating contaminated sites, he enjoys the outdoors, with a fondness for trail running, multi-day hiking, kayaking, and cooking. He takes great joy pairing good wines and food, while breaking bread with good friends

Reclamation across our Nation - the Canadian Land Reclamation Association (CLRA)

Andrea McEachern, National President
Canadian Land Reclamation Association

Abstract

The Canadian Land Reclamation Association/ Association canadienne de réhabilitation des sites dégradés (CLRA/ACRSR) is a non-profit organization that was incorporated in 1975. The Association encourages personal and corporate involvement where reclamation or rehabilitation of disturbed lands is planned or implemented.

Its members meet annually for technical discussion, information exchange and personal interaction. Local activities occur in Alberta, Atlantic Canada, Ontario, Québec, and Saskatchewan where there are active provincial chapters. We collaborate with British Columbia, Yukon, Nunavut, NWT and Manitoba groups to provide information to our members when available.

The CLRA/ACRSR provides its members with up-to-date technical information through the publication of its newsletters, the magazine Canadian Reclamation and proceedings of its annual conferences. These publications allow the organization to have an informal, instructional role in the decision-making processes of reclamation/rehabilitation projects and to act as a forum for the dissemination of ideas and information pertinent to reclamation activities.

From the beginning, the original founding members of the CLRA/ACSRD laid the groundwork for the establishment and legitimization of the land reclamation field as a profession in Canada.

We will take you on a journey across Canada with our CLRA chapters to provide you with what the CLRA is working on and how they may be of assistance in your reclamation/ecological restoration projects or search for opportunities.



| Andrea McEachern

Andrea is the President of Aqm Water Ltd., in Calgary, Alberta where the company's main focus is in water treatment and mineral recovery. She has been the National President of the Canadian Land Reclamation Association (CLRA) since 2015.

PFAS Risk Considerations for the Oil and Gas Industry

Samantha Murphy, Water Resources Professional

Cenovus

Abstract

Per- and polyfluoroalkyl substances (PFAS) are a group of emerging contaminants often referred to as “forever chemicals” due to their persistence in the environment. Certain PFAS compounds cause adverse impacts to human and environmental health, and regulatory limits for PFAS in water and soil are being established in Canada at extremely low concentrations (eg. 200 ng/L for PFOA and 600 ng/L for PFOS in drinking water). There are some industries known as significant point sources of PFAS contamination that have been managing environmental impacts for years, including the military and airports that use PFAS-containing aqueous film-forming foam (AFFF) to support firefighting efforts. AFFF is used primarily for emergency response but can also be deployed during training exercises or equipment testing.

Many oil and gas companies rely on AFFF for fire protection. The surfactant and temperature-resistant properties of PFAS make AFFF the quickest and most effective product to fight large hydrocarbon fires, and it is currently trusted more by fire-fighters than alternative, non-fluorinated products. Although AFFF can save lives and reduce asset damage, an unintended and often overlooked consequence of its use is that PFAS compounds are released to the environment. This can occur when AFFF is inadvertently sprayed offsite

or migrates off site in runoff. AFFF releases can lead to extensive PFAS impact that may require significant characterization and remediation.

As PFAS regulations emerge in Canada, it’s critical for the oil and gas industry to understand and mitigate PFAS risk at its facilities. Increased public awareness and media coverage of PFAS puts further pressure on companies to prevent PFAS impacts in order to protect their reputation and social license to operate. This presentation will review ways for oil and gas operators to reduce PFAS risk including: sources of AFFF and migration pathways; mitigation measures; and considerations for characterization and remediation.



| Samantha Murphy

Samantha Murphy is a hydrogeologist with Husky Energy. She is originally from Ontario, where she obtained a B.Sc. from Carleton University and M.Sc. from University of Ottawa in environmental and earth sciences. She worked in the environmental consulting industry for 9 years before coming to work for Husky in 2018 as a member of the Water Team. Samantha is the Chair of Husky's PFAS Steering Committee. She currently lives in Calgary with her partner and two cats.

Determination of Contaminated Sludge Thickness in a Former Tidal Estuary

Ben Sweet, Technical Lead

SCG Industries

Abstract

Background / Objectives:

The remediation and restoration of Boat Harbour (A'se'k) presents significant engineering, environmental, and stakeholder challenges. This 160-hectare former tidal estuary, located less than 1 km south of the Pictou Landing First Nation, has been receiving pulp effluent since it was isolated from the Northumberland Strait and converted into an industrial stabilization basin in 1967. Recently, the Province of Nova Scotia has committed to the remediation and restoration of Boat Harbour to convert the Harbour back to a functional tidal estuary. The specific objective of this phase of work was to accurately measure the in place volume and distribution of contaminated sludge which has accumulated within the Harbour over the last 50 plus years. Accurately understanding the volume and distribution of the contaminated sludge within the Harbour is essential for the design of the remedial dredging and sediment management program to restore Boat Harbour to its natural state.

Approach / Activities:

The approach was to employ corroborating techniques to identify the top and bottom elevations of the contaminated sludge. Both traditional Single Beam Echo Sounder (SBES) and Multi Beam Echo Sounder (MBES) surveys were completed to define the top of the sludge surface. A unique approach employing in-situ Laser Induced Fluorescence (LIF) and Electric Conductivity (EC) profiling was employed to accurately identify the distribution and thickness of contaminated sludge across the Harbour. The real-time high resolution data collected in-situ was coupled with more traditional physical sampling techniques (gravity and percussion coring) to provide further confidence in the in-situ methods. Two (2) mobile barges collected a total of 504 discrete LIF/EC profiles across the Harbour. The collected LIF/EC profiles were corroborated by gravity core and percussion coring methods from 50 duplicate stations and 70 duplicate LIF/EC profiles. The data collection occurred over a two month period in October and November 2019 where weather conditions and the full-scale deployment of a novel characterization approach presented numerous challenges to the expedient collection of high quality, spatially accurate data.



| Ben Sweet

Mr. Sweet is the technical lead for SCG Industry's high-resolution site characterization services. He concurrently plays a lead role in SCG's water treatment, site remediation, and research divisions. His responsibilities include HRSC project design, site data interpretation, remediation project design, remediation and water treatment systems design, and project management.

In these roles he has completed numerous projects across North America, conducting both large and small scale remediation projects and high resolution site characterization investigations. Mr. Sweet strives to ensure SCG's clients are equipped with the latest innovative technologies and strategies to help cost-effectively address their environmental liabilities.

He has completed his Bachelor of Science in Environmental Science from Acadia University and a Masters in Chemical Engineering from the University of New Brunswick. Mr. Sweet has shared his expertise as a member of technical environmental committees and has presented at numerous workshops and conferences across Canada and the US.

Why Should We Care about Wetlands?

**Jacqueline Redburn, Team Lead, Natural Sciences, and Theresa Peters,
Terrestrial and Wetland Biologist** Trace Associates

Abstract

In the last 5-10 years there has been a shift in how regulators, industry, and the public view and manage wetlands. The shift has largely been because of the formalization and implementation of the Alberta Wetland Policy. With the introduction of the Policy, regulators and industry have renewed focus on ensuring the Water Act and Policy are followed and impacts to wetlands are avoided or minimized. Regulatory compliance is an important reason to care about the presence, value, and health of wetlands, but why are these regulations and best management practices being implemented? Why is it important that wetlands are avoided during activities and developments? Why are we concerned with wetlands downstream from contamination or releases? Why should wetland replacement be implemented for impacted wetlands? The answers to these questions are based on the hydrological, ecological, economic, and social benefits wetlands provide, and are becoming familiar to most people. So why do we have a hard time keeping these in mind when we are planning projects, completing construction, implementing restoration measures, and monitoring wetlands? We often get wrapped up in the execution of meeting regulations, but keeping in mind why we have to or should follow these regulations will allow us to focus on project-by-project solutions, and ultimately retain, protect, and improve wetlands on the landscape.

The goal of the Policy is to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they provide to the environment, society, and the economy. Wetlands help support biodiversity, provide habitat for wildlife and plants, improve water quality by providing water storage and infiltration, reduce flooding by storing and slowly releasing water volumes, act as recharge zones for groundwater, and provide areas for traditional use, recreation, and harvesting. Keeping these benefits in mind allows us to identify how they might be impacted by proposed projects and activities. For example, if during the planning process a wetland is retained within a proposed development or adjacent to a proposed industrial site, the regulation will be met but there is the potential that the characteristics of that wetland and its function and benefits will change. Will the wetland still provide the same wildlife habitat? Will it collect less or more runoff? Will the change on the landscape gradually change the wetland characteristics? Have we met the intention of the policy at this point? Often these impacts and changes are subtle. There are plenty of examples where years later, a wetland has changed because of surrounding activities even though planning was executed with wetland avoidance and impact reduction in mind. Ultimately, we as industry, consultants, and the public are not just trying to follow the wording of the regulations; we are trying to meet the intention of those regulations to maintain wetlands and their economic, social, and ecological benefits. And that begins with an awareness of the importance, value, and benefits of wetlands.



| Jacqueline Redburn

Ms. Redburn is the Team Lead for Natural Sciences, with Trace Associates Inc.'s Calgary division. Ms. Redburn holds a Bachelor of Science in Botany and a Masters of Environmental Design, both from the University of Calgary. She has over 12 years of experience as a Vegetation Ecologist and Qualified Wetland Practitioner working in Western Canada on wetland assessments, vegetation assessments, rare plant surveys, range and riparian health assessments, and environmental planning for land development, utilities, and upstream oil and gas activities.



| Theresa Peters

Ms. Peters is a Vegetation Ecologist with Trace Associates Inc.'s Calgary division. Ms. Peters holds a Bachelor of Science in Biology from the University of Victoria. She has over 16 years of experience with a focus on managing and delivering biophysical impact assessments for municipal land development and renewable energy projects in Alberta and Saskatchewan. Ms. Peters specializes in vegetation and wetland assessments, ecological restoration planning, constructed wetland design and monitoring, and is a Qualified Wetland Practitioner and Authenticating Professional in Alberta.

Updates and Upgrades to Subsoil Salinity Tool (SST) in Version 3.0

Gordon Dinwoodie, Land Reclamation Specialist and Greg Huber, Environmental Scientist Government of Alberta / Equilibrium

Abstract

Salinity impacts represent one of the largest environmental contaminant footprints from historical oil and gas activities, and ensuring clean-up resources are being utilized efficiently and responsibly is of prime importance. With current socio-economic conditions, minimizing the amount of landfilled soil while simultaneously ensuring the protection of important environmental receptors are key factors for sustainability. The recently-released Version 3.0 update to the Subsoil Salinity Tool (SST) includes a wide range of new features and modeling upgrades which facilitate this and allow optimization of guidelines and minimization of landfill volumes. This presentation discusses these updated features and algorithms, and how they help to produce more robust guidelines with frequently lower remediation volumes compared to the previous Version 2.5.3 of the SST. Some of these updated algorithms include consideration of deeper water-table effects for the root-zone pathway, an enhanced mixing model for dugouts for livestock watering and irrigation, a more complex algorithm for lateral transport toward aquatic receptors, and an enhanced mixing model for the domestic use aquifer (DUA) pathway. A more complex and refined method for deriving drainage rates has also been incorporated, involving the use of additional parameters and influencing a wide range of pathways. These new parameters include the use of hydraulic conductivity

data from either wells or soil cores to refine downward drainage rates. Updated protocols also provide guidance on the use of sulfate depth profiles and potentially water table depth for additional insight into discharge / recharge conditions. In most cases, these updated / enhanced algorithms reduce some of the inherent conservatism from the previous models, thus providing more robust guidelines which are frequently higher than those derived in the previous version.

Several of these algorithm changes for chloride also influence the generation of sodium and SAR (Sodium Adsorption Ratio) guidelines, a key addition to Version 3.0 compared to previous versions. This presentation will also provide an example of SAR and sodium guidelines derived by these updated algorithms and their implications for site remediation. By considering both chloride and SAR/sodium, the use of the updated SST Version 3.0 thus allows sites to be remediated as efficiently as possible, allowing low-risk soils to be kept out of landfills while simultaneously ensuring that all environmental receptors are protected.



| Gordon Dinwoodie

Gordon Dinwoodie is a Land Reclamation Specialist and Professional Agrologist with Alberta Environment and Sustainable Resource Development. He has a B.Sc. (Agronomy) and M.Sc. (Soil Science) from the University of Alberta. Gordon works in the Land Conservation and Reclamation Policy group developing policies for land reclamation and remediation, and land application of industrial and municipal by-products. He is also the chair of the Canadian Council for Ministers of the Contaminated Sites Working Group, which develops contaminated site assessment and remediation guidelines for use across Canada.



| Greg Huber

Greg Huber has a Master of Science from the University of Calgary in Chemical and Petroleum Engineering with a focus on environmental topics. He has worked as a professional engineer and project manager for more than 20 years, and has been working with Equilibrium Environmental since 2005. He has been involved in a wide range of risk assessment, research, guideline development, and remediation projects related to a broad range of soil and groundwater contaminants. He is also involved in transport modeling and protocol and algorithm development for the Subsoil Salinity Tool, and has been teaching the SST course since 2011.

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