

Weekly NEWS



An Information Service for Alberta's Environment Industry

The Week Ending September 6th, 2019



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Comments & submissions are welcome!

Please submit your announcement via e-mail to:
weeklynews@esaa.org



RemTech 2019
October 16-18, 2019
Fairmont Banff Springs

Starts in 6 Weeks – Register Now

115 Delegate Passes Remaining

RemTech 2019 starts in just 6 weeks. There are only 115 delegate passes remaining. The program features **80** technical presentations, and four amazing keynotes and two networking receptions.

Topic Areas include: Sulfolane Remediation, Digital Technology Innovations, Legal/Regulatory Updates, Phytoremediation, Brownfields, Northern and Unique Locations, Risk Based Closure - Fact or Fairy Tale, In-Situ, Land Stewardship and much more.

RemTech 2019 Keynotes:

- Opening Keynote: **Saskatchewan's Uranium Mining Legacy** - Ian Wilson, Remediation Manager, Saskatchewan Research Council
- Thursday Keynote: **The Ripple Effect** - Annie Griffiths, Photographer, Founder and Executive Director of Ripple Effect Image
- Friday Breakfast Keynote (new addition): **One Giant Leap: The Impossible Mission that Flew Us to the Moon**, Charles Fishman, Author, Journalist
- Closing Keynote: **The World Beneath our Feet**, Robbie Shone, Photographer, Cave Explorer, Visual Story Teller

You can check out full program at: www.esaa.org/remtech/agenda/



ESAA is pleased to announce that *RemTech 2019* is bullfrog powered with 100% green energy. This means that Bullfrog Power's generators put 100% green energy onto the grid to match the amount of conventional energy the event uses, displacing energy from polluting sources.

RemTech Sponsors.

Platinum: Trace Associates

Gold: CHEMCO Inc * ClearStream Energy Services * Ecoventure * Ernco Environmental * Great Excavations * JSK Consulting * KBL Environmental * Nelson Environmental Group * North Shore Environmental Consultants * Proactive Environmental Rentals * Remote Helicopters * Ridgeline Greenfill * SECURE Energy Services * TerraStryke * Veolia * Waste Management

Silver: Alberta Society of Professional Biologists * Bionera * Earthmaster Environmental Strategies * ECO Canada * EnviroSearch * Geosyntec Consultants * In-Situ, Inc. * Iron Creek Group * McLennan Ross LLP * Milestone Environmental Contracting * Mud Bay Drilling * Precision Liability * Rice Resource Technology * Solstice Canada * Summit, an Earth Services Company * Terralogix Solutions * Tervita Corporation * Thurber Engineering

Bronze: Bureau Veritas * ERIS * Ivey International * Pro-Source Insurance & Risk Management * Willms & Shier Environmental Lawyers LLP

Opening Reception: Beaver Municipal Solutions

Lanyards: Ivey International

Room Keys: Sublatus Earthworks and Environmental

Opening Keynote Breakfast: TRIUM Environmental

Charging Station: JSK Consulting

Conference App: Willms & Shier Environmental Lawyers LLP

Thursday Keynote Luncheon: Matrix Solutions

Friday Keynote Luncheon: Waste Connections of Canada

Silent Auction: ClearStream Energy Services

Reception Drink Tickets: Proactive Environmental Rentals

Artworks Reception: Intrinsic * JSK Consulting * THINK Envirotechnical * Trace Associates

Photo Booth Wednesday: Trace Associates

Photo Booth Thursday: SECURE Energy Services

Course Partners: Aquatic Life and Midwest GeoSciences Group

Course Sponsor: AGAT Laboratories

Full details available online at: www.esaa.org/remtech/

2019 ESAA PHOTO CONTEST - HELP US CHOOSE THE WINNERS!

ESAA has selected six finalists for the ESAA Photo Contest but we need your help selecting the 1st, 2nd and 3rd place winners!

All voters will be entered into a draw to receive a canvas print of the 1st place member photo! You do not need to be an ESAA member to vote, so pass the link on to your friends and family.



All three winners will receive a canvas print of their photo and their photo will be displayed at *RemTech* 2019. Additional copies will be made and auctioned off at *RemTech* 2019 with all proceeds going to charity.

VOTING WILL CLOSE ON SEPTEMBER 13th at 5:00PM.

[VOTE NOW](#)

AER: NEW WELL APPLICATIONS MOVING INTO ONESTOP

The Alberta Energy Regulator is hosting information sessions in Calgary to inform licensees and service providers about changes being made to the process for submitting well licence applications.

Sessions will cover the process for submitting new well licence applications through OneStop. The presentation will include the following:

- Automation of well licence application submissions
- Automation of low-risk well licences
- Applying for multiple well licences in a single submission
- Simplified well classification system and confidentiality

Sessions will begin with a presentation followed by an open question and answer period. A video of the presentation will be posted on the AER's YouTube channel after September 26, 2019.

The target audience is licensees who hold or intend to apply for any type of well licence, including third-party service providers and industry associations. Attendees should be familiar with the Integrated Decision Approach and the OneStop tool.

Register

- To register and for more information about these sessions, please visit our [Events Page](#).
- If you have questions about the information sessions, contact IDA-Engagement@aer.ca.

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PROVINCE SLAMS FEDS FOR 'HYPOCRISY' ON MINE CLEANUP FUNDING

(Source: Saskatoon StarPhoenix) The Saskatchewan government blasted Ottawa's "egregious" decision to spend billions of dollars to clean up abandoned mines in the far north while providing only \$12.3 million for a similar project in northern Saskatchewan.

Federal Northern Affairs Minister Carolyn Bennett was in Yellowknife, NWT last month to re-announce the Liberals' 2019 budget promise to spend \$2.2 billion over 15 years on eight contaminated former mine sites in the Northwest Territories and the Yukon.

That did not sit well with Saskatchewan Premier Scott Moe, who said Monday that [he agrees the Northern Abandoned Mine Reclamation Program would create economic opportunities for Indigenous people, and questioned why it does not cover the Gunnar uranium mine](#).

The federal and provincial governments have for years been [at odds over who should foot the bill for the largest environmental remediation effort in Saskatchewan history, the total cost of which is now estimated to be \\$280 million](#) — up from the \$25.6 million estimate made in 2006.

Speaking to reporters in Saskatoon on Tuesday, Bennett described a “very different reality” in the north with multiple “significant long-term projects” that led the territorial governments to ask Ottawa for a different approach to funding their remediation.

Those projects include the Giant mine just outside Yellowknife, which sits atop 237,000 tonnes of arsenic trioxide, and the Faro mine in the Yukon, which covers 25 square kilometres and was once the largest lead-zinc mine in the world.

“In the south, these mines are owned by the province and we will help in whatever way we can. But there is no question that in the north those mines that were abandoned by mining companies are a distinct federal responsibility,” Bennett said.

Bennett said it will take “at least” another 10 years to finish rehabilitating the northern mines. The Saskatchewan Research Council began remediation work at the Gunnar site in 2010, and expects the final phase of the cleanup to be finished by 2024.

Saskatchewan Energy and Resources Minister Bronwyn Eyre dismissed that argument, saying Ottawa should not apply different standards. She questioned why the federal government would not invest in Indigenous communities and the environment in Saskatchewan.

“The hypocrisy is impossible to ignore,” Eyre said before restating the province’s position that it is stuck between a federal regulator ordering work to proceed on pain of financial penalties and a federal ministry that won’t spend more than its original commitment on the over-budget project.

While the Saskatchewan Party government has [occasionally faced criticism for campaigning against Ottawa](#) — a proven political strategy in the west — its push for cost-sharing on the Gunnar remediation project is unlikely to find much opposition at home.

[Both the provincial and federal New Democratic Parties have issued similar calls for the cost to be split equally between the two levels of government](#), while a Saskatchewan Environmental Society board member said Ottawa’s position “does not seem reasonable.”

Asked whether the province is attempting to make the project an issue in the upcoming federal election — Desnethé—Missinippi—Churchill River, which encompasses the mine, is one of a handful of ridings thought to be in play — Eyre said it “deserves to be.”

“It’s up to the people of the constituency, of course, to make it a deciding issue (but) I think it’s definitely an issue and should be addressed.”

Gunnar Mining Ltd. operated what was then the world’s largest uranium mine from 1955 to 1963, when the open pit and underground works were flooded with water from nearby Lake Athabasca and the remote site was completely abandoned.

The company — which was subsequently dissolved, with ownership of the site passing to the province — [left behind dozens of buildings, including the headframe and acid plant, as well as millions of tonnes of radioactive tailings and waste rock](#).

In its lawsuit, [Saskatchewan argued that the original cost-sharing agreement struck in 2006 remains operative, and Ottawa is partly responsible for the cleanup cost because it reaped the mine’s rewards due to its monopoly on uranium exports at the time](#).

In its statement of defence filed in June, Natural Resources Canada countered by saying the province is ultimately responsible because it regulated the mine, and that it failed to manage the cleanup effort in a “timely and responsible manner.”

It is not clear when the lawsuit will be heard.

CANADA FUNDS 52 NEW PROJECTS TO PROTECT AND RECOVER SPECIES AT RISK

As human impact on the planet grows, we need to take action to protect the animals, plants, and places we love. This spring, the UN released a scientific report that shows a million species are at risk of extinction, many within decades. Since 2015, the Government of Canada has been working toward doubling the amount of protected nature across our lands and oceans, ensuring we protect the habitats vital to the survival of iconic Canadian species.

Today, the Minister of Environment and Climate Change, Catherine McKenna, announced that, this year, the federal government is investing up to \$7.6 million in 52 projects across the country. Canada is working closely with provinces and territories, Indigenous Peoples, and other partners on a new approach to species conservation. Through partnership, we will achieve long-lasting and sustainable protection and recovery of species at risk.

Funded projects include 15 community-nominated priority places. In each community, multiple partners will take action together to protect and recover species at risk. These projects will complement ongoing species at risk conservation in 11 priority places already identified by federal, provincial, and territorial governments.

One of the projects under the Community-Nominated Priority Places program targets The Land Between bioregion. It covers almost 3 million hectares, from Georgian Bay to the Ottawa Valley. This project (in collaboration with 10 partners) is expected to benefit 57 species at risk, including the little brown bat, the eastern (Algonquin) wolf, and the golden-winged warbler. Details on other projects will be released over the coming months, as agreements with local partners are finalized.

Quick facts

- Through Budget 2018, the Government announced \$1.35 billion for the Nature Legacy initiative. This amount represents the largest investment in nature conservation in Canadian history.
- In June 2018, federal, provincial, and territorial ministers responsible for parks, protected areas, conservation, wildlife, and biodiversity agreed to a new set of principles to guide collaborative work on species at risk.
- Through the Canada Nature Fund, up to \$200 million will be available over five years for various funding initiatives to help with the protection and recovery of species at risk.
- Of the 52 new projects, 15 projects are for community-nominated priority places for species at risk in key areas across Canada. These areas were selected through an open call for applications across Canada under the new Canada Nature Fund.
- A total of 37 projects are in partnership with provinces and territories in 11 priority places: southwest Nova Scotia, Saint John River Valley, Prince Edward Island forested landscapes, Saint Lawrence Lowlands, Ontario's Long Point Walsingham Forest, Manitoba mixed-grass prairie, Saskatchewan south of the divide, Alberta's Saskatchewan River watershed, dry interior of British Columbia, southwest British Columbia, and Yukon's south Beringia.

CANADA INVESTS IN GREEN COAL MINE RECLAMATION PROJECT IN ALBERTA

(Source: BusinessInsider.com) OTTAWA, Aug. 30, 2019 /CNW/ - Canada's mining and minerals industry is important to our economy and to communities across the country. Developing Canada's natural resources in cleaner, more sustainable ways will create good, middle-class jobs, increase competitiveness and reduce pollution as we move toward a clean energy future.

The Honourable Amarjeet Sohi, Canada's Minister of Natural Resources, today announced \$3.8 million in funding to the BIOSALIX program, a renewable energy coal mine reclamation project near Forestburg, Alberta.

A collaborative effort led by environmental consulting firm Sylvis, the project uses municipal organic waste as an additive to generate the conditions to grow a willow crop on the reclaimed land. The willow is then harvested to create a woody biomass that can be used to produce renewable heat, energy and other products. Overall, this project will help municipalities manage their organic waste, grow a renewable feedstock to produce bioenergy, reclaim expired mine land and create new opportunities for communities affected by coal mine closures.

Federal funding for the project will be provided through Natural Resource Canada's Clean Growth Program. Further funding in the amounts of \$1.5 and \$2 million will be provided respectively by Alberta Innovates and Emission Reductions Alberta. Natural Resource Canada's Canadian Forest Service will also lend its biomass research and expertise to the project.

The Clean Growth Program is a \$155-million investment fund that helps emerging clean technologies further reduce their impacts on air, land and water while enhancing competitiveness and creating jobs.

Canada's climate plan includes measures to protect the environment and leave a healthier planet for future generations, including actions to protect our oceans, phase out coal-fired electricity, invest in renewables and public transit and reduce plastic pollution. Green infrastructure and renewable energy technologies are a key part of Canada's plan to combat climate change while growing the economy.

Quick Facts

- For this project, EPCOR Water Services will supply the municipal biosolids; Westmoreland Mining will provide the reclamation ground, as well as part of the workforce; and Bionera Resources will develop the willow plantation.
- The Clean Growth Program includes federal laboratory support for innovators. This project falls within the Science and Technology Assistance for Cleantech (STAC) component of the program, intended to help bring Canadian clean technologies to market by providing federal research expertise, facilities and equipment.

REMEDIAION TECHNOLOGY NEWS AND RESOURCES

(The following are selected items from the US EPA's Tech Direct - <http://clu-in.org/techdirect/>)

Upcoming Live Internet Seminars

Characterization and Remediation of Contaminated Groundwater in Fractured Rock with US EPA & USGS ? September 11 & 12, 2019, 11:30AM-7:30PM EDT (15:30-23:30 GMT). Contaminated groundwater in fractured rock at Superfund sites poses unique challenges due to the geologically complex nature of such sites. Technological advances have led to the development of tools that aid in gaining a more robust understanding of contaminated fractured rock systems. The Technology Innovation and Field Services Division (TIFSD) in EPA Headquarters has collaborated with the U.S. Geological Survey (USGS) to develop an EPA-specific training course that provides a state-of-the-practice overview of the characterization and remediation of contaminated groundwater in fractured rock. This training course will improve national consistency for these complex sites and drive the development of effective characterization and remediation techniques required for their restoration. For more information and to register, see <https://clu-in.org/live>.

ITRC TPH Risk Evaluation at Petroleum-Contaminated Sites - September 12, 2019, 1:00PM-3:15PM EDT (17:00-19:15 GMT). The basis for this training course is the ITRC guidance: TPH Risk Evaluation at Petroleum-Contaminated Sites (TPHRisk-1, 2018). The guidance builds on long-standing and current research and experience, and presents the current science for evaluating TPH risk at petroleum-contaminated sites. As a participant in this training you should learn to: recognize the ITRC document as a go-to resource for evaluating TPH risk at petroleum-contaminated sites, recognize how TPH-impacted media interacts with the environment and changes over time, select appropriate analytic method(s) to match site objectives, and apply the decision framework to determine when a site-specific target level may be more appropriate than a generic screening level for TPH. For more information and to register, see <https://www.itrcweb.org> or <https://clu-in.org/live>.

ITRC Groundwater Statistics for Environmental Project Managers - September 19, 2019, 1:00PM-3:15PM EDT (17:00-19:15 GMT). Statistical techniques may be used throughout the process of cleaning up contaminated groundwater. It is challenging for practitioners, who are not experts in statistics, to interpret, and use statistical techniques. ITRC developed the Technical and Regulatory Web-based Guidance on Groundwater Statistics and Monitoring Compliance (GSMC-1, 2013) and this associated training specifically for environmental project managers who review or use statistical calculations for reports, who make recommendations or decisions based on statistics, or who need to demonstrate compliance for groundwater projects. The training class will encourage and support project managers and others who are not statisticians to: use the ITRC Technical and Regulatory Web-based Guidance on Groundwater Statistics and Monitoring Compliance (GSMC-1, 2013) to make better decisions for projects; apply key aspects of the statistical approach to groundwater data; and answer common questions on background, compliance, trend analysis, and monitoring optimization. ITRC's Technical and Regulatory Web-based Guidance on Groundwater Statistics and Monitoring Compliance (GSMC-1, 2013) and this associated training bring clarity to the planning, implementation, and communication of groundwater statistical methods and should lead to greater confidence and transparency in the use of groundwater statistics for site management. For more information and to register, see <http://www.itrcweb.org> or <https://clu-in.org/live>.

FRTR Presents... Per- and Polyfluoroalkyl Substances (PFAS) Emerging Characterization and Remedial Technologies, Session 2 - September 26, 2019, 1:00PM-2:30PM EDT (17:00-18:30 GMT). This is part of a webinar series featuring presentations delivered at the Fall 2018 FRTR Meeting and related material. The meeting's objective was to identify and discuss the emerging science behind PFAS characterization and remedial technologies. This session will include presentations on

Perfluoroalkyl Substances (PFAS)-Insights on the Collection and Analysis of Environmental Samples and PFAS Site Characterization. An archive of Session 1 is available at https://clu-in.org/conf/tio/FRTRPresents5_062019/. For more information and to register, see <https://clu-in.org/live>.

Bioremediation - Expanding the Toolbox - September 30, October 3, 11, 2019. This series will emphasize new approaches to elucidate mechanisms responsible for bioremediation. The series will feature innovative molecular, biochemical, cellular, and/or engineering tools to advance our understanding of the structural and functional properties of microorganisms or plants involved in the bioremediation of hazardous substances. The first session "Bioremediation ? Expanding the Toolbox: The Microbiome?" on September 30 will serve as an introduction to the series and will touch on opportunities to build linkages with other microbiome fields of study, such as the human microbiome. For more information and to register, see <https://clu-in.org/live>.

New Documents and Web Resources

Technology Innovation News Survey Corner. The Technology Innovation News Survey contains market/commercialization information; reports on demonstrations, feasibility studies and research; and other news relevant to the hazardous waste community interested in technology development. Recent issues, complete archives, and subscription information is available at <https://clu-in.org/products/tins/>. The following resources were included in recent issues:

- Performance Evaluation of USAID'S Environmental Remediation at Danang Airport
- Sandia National Laboratories, New Mexico: Environmental Restoration Operations, Consolidated Quarterly Report, April-June, 2018
- 2017 Groundwater Assessment Report, Idaho Pole Company Site, Bozeman, Montana
- Self-Sustaining Treatment for Active Remediation (STAR) Pre-Design Evaluation (PDE) Report, Quendall Terminals, Renton, Washington
- Passive Sampling for Contaminated Sediment Sites
- The Groundwater Spatiotemporal Data Analysis Tool (GWSDAT) for Groundwater Quality Analyses
- Tools for Estimating Contaminant Mass-in-Place, Mass Discharge, and Remediation Timeframes
- A Novel Reactive Electrochemical Membrane System for Treatment of Mixed Contaminants
- Synergistic Reductive Dechlorination of 1,1,1-Trichloroethane and Trichloroethene and Aerobic Biodegradation of 1,4-Dioxane
- Validation of Biotechnology for Quantifying the Abundance and Activity of Vinyl-Chloride Oxidizers in Contaminated Groundwater
- EPA Tools and Resources Webinar: Treating Contaminants of Emerging Concern

EUGRIS Corner. New Documents on EUGRIS, the platform for European contaminated soil and water information. More than 17 resources, events, projects and news items were added to EUGRIS in July 2019. These can be viewed at <http://www.eugris.info/whatsnew.asp> . Then select the appropriate month and year for the updates in which you are interested.

New ESAA Member



AGAT LABS APPOINTS BRYAN CHUBB TO THE POSITION OF PRESIDENT AND CHIEF OPERATING OFFICER

We are pleased to announce the appointment of Bryan Chubb as President and Chief Operating Officer.

Bryan is an accomplished, reputable and highly proficient environmental industry executive with over 22 years of business development and operational management experience in the North American analytical laboratory sector.

Bryan holds a B.Sc. Honours in Environmental Chemistry from the University of Guelph and has a designation as a Chartered Chemist through the Association of the Chemical Profession of Ontario. Starting off his career in the environmental consulting realm with roles at AMEC and EXP Services, Bryan was able to foster a solidified understanding of the analytical requirements important to successful project executions. It is this understanding that has allowed Bryan to build



a reputation as a respected industry expert and trusted advisor with his forward approach to solution-based thinking and support in analytical program design. Prior to joining AGAT Laboratories, he held the position of Vice President at one of Canada's largest national analytical laboratory companies, followed by the position of Chief Operating Officer. His visionary insight, leadership flair, and ability to cultivate rising talent were instrumental in expanding the lab's commercial and geographical foothold throughout Canada. During his tenure, he spearheaded the company's successful foray into several new markets and implemented operational optimization processes to drive improvements in customer experience, employee engagement and shareholder value.

Building on AGAT's 40-year history and diversified capabilities, Bryan will work closely with our Chief Executive Officer to fulfill our vision of Service Beyond Analysis. In this role, Bryan will be instrumental in working with our teams to help elevate and strengthen our operations, reinforce customer confidence, instill corporate value, and support our continued growth and expansion plans, setting the stage for a long and prosperous future. As a key member of the senior executive team, Bryan will leverage his in-depth knowledge of the evolving regulatory and competitive landscapes to establish comprehensive solutions that will enhance business productivity, maximize efficiency and support strategic decision-making across the full spectrum of our service offerings.

New ESAA Member

ESAA's Board of Directors and staff would like to welcome the following new member:

Full Member:



GRAYMONT

Graymont

4311 12th St NE

#260

Calgary, AB T2E 4P9

Phone: (403) 462-9909

Website: www.graymont.com

Nikolas Romaniuk, New Products & Applications Specialist

e-mail: nromaniuk@graymont.com

Profile

Graymont is a global leader in lime and limestone solutions. Our products are essential in addressing today's most pressing environmental issues while supporting vital industrial processes and agricultural needs. Graymont's Lime operations are focused on the production of high-calcium and dolomitic lime, and value-added, lime-based products such as hydrated lime as well as pulverized limestone and construction stone. Uses for our products include the purification of air and water, and the production of items essential to a modern economy, such as steel, paper, and metals. Headquartered in Canada, Graymont serves markets throughout North America and Asia-Pacific. Graymont is also the strategic partner of Mexican-based Grupo Calidra, the largest lime producer in Latin America. Professionally managed and family owned, the Company has been in operation for over 70 years. Graymont aims to be the preferred supplier, employer, and partner of choice wherever we operate.

Upcoming Events

ESAA MEMBER APPRECIATION LUNCH

Come and join us on September 13th for an afternoon of food and networking. This event is free to ESAA members. Please feel free to share this invitation with your colleagues. We hope to see you there.

RSVP by clicking [HERE](#)



ENVIRONMENTAL SERVICES ASSOCIATION OF ALBERTA
ESAA member appreciation

When: Friday, September 13
11:30 am to 1:30 pm

Where: ESAA office parking lot
Suite 102, 2528 Ellwood Drive SW, Edmonton, AB T6X 0A9

What: Lunch! (Food trucks will be dishing out great food for free to ESAA members)

Please RSVP via the link provided below.

ESAA CALGARY MIXER - SEPTEMBER 26TH, 2019

Are you in the Calgary area? Do you have staff or clients in the area? Share the following event information with them!

ESAA invites you to attend an industry mixer at the Barcelona Tavern located in Calgary (501 8 Avenue SW). The mixer is an opportunity to network with other industry professionals, ESAA Staff, and Board of Directors.

Everyone is welcome to join and you do not have to be an ESAA member to attend. If you have staff or offices in the Calgary area, please share this with your colleagues.

There is no cost to attend and ESAA will provide a selection of appetizers and the first beverage from Barcelona Tavern's selection.

Hope to see you there!



BARCELONA TAVERN

ENVIRONMENTAL SERVICES ASSOCIATION OF ALBERTA
ESAA Calgary Mixer

Thursday, September 26, 3 - 6 pm
501 8 Avenue SW, Calgary
www.barcelonatavern.com

Please see link provided to RSVP

[CLICK HERE TO RSVP](#)
PLEASE RSVP BEFORE September 20th!

One-Day Continuing Education Course
featuring
Ioana G. Petrisor, Ph.D.
Editor-in-Chief, Environmental Forensics Journal

Contaminant Fingerprinting Techniques

Principles and Applications for
Environmental Forensics and Remediation

October 16th, 2019
8:30 am to 4:30 pm
Fairmont Banff Springs

Only 60 Spots Available

Register Now

ESAA is pleased to partner with [Aquatic Life](#) and [Midwest GeoSciences Group](#) to bring this course to Canada and **RemTech**.

Course Description and Objectives:

Contaminant Fingerprinting Techniques are critical environmental forensic tools associated with litigation support and complex sites with multiple contaminant plumes in time and space. However, applications of fingerprinting methods outside the court of law are becoming routine environmental work resulting in substantially improved subsurface characterization and efficient remedial solutions.

For example, stable isotopes provide a routinely-accepted and reliable evidence for monitored natural attenuation of chlorinated solvents in subsurface and evaluate its feasibility as remedial alternative. Radioisotopes are becoming more commonly used to evaluate sedimentation patterns in aquatic systems. These are just few examples of more common use of forensic techniques in routine site investigations and remediation design considerations. Other forensic tools have also been successfully used at sites with no litigation or dispute over contamination origin.

Chemical fingerprinting techniques are now being used to expedite remediation at sites with a history of handling and releasing crude oil and petroleum products. Also, tree-core data started being used as sustainable alternatives to invasive drilling, in order to map subsurface contamination at PCE/TCE sites. Evaluation of background values of metals via mineralogical fingerprinting at active industrial sites provides exact means to establish realistic clean-up limits.

Course participants will learn:

- the most common contaminant fingerprinting techniques,
- the principles associated with each technique, as well as
- when and how to apply strategies in common environmental work for more accurate site characterization and efficient remediation.

The ultimate goal of the course is to provide participants with a variety of environmental forensic tools, techniques and strategies to both basic and complex sites. In this respect, the course will conclude with an open forum that may include brainstorming on case studies presented by participants. This course will also include both formal presentations and interactive content (discussions and practical assignments).

For complete course description, course outline, instructor profile, pricing, sponsorship opportunities and registration information, visit: <https://www.esaa.org/remtech/about-remtech/register/#id=188&cid=153&wid=401>