APEGS
Association of Professional Engineers & Geoscientists of Saskatchewan

THE PROFESSIONAL EDGE

ISSUE 198 • MAY/JUNE 2022

2022 SALARY SURVEY

2022 Annual Meeting and Professional Development Conference

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A P E G S

Association of Professional Engineers & Geoscientists of Saskatchewan

Regulating the professions. Protecting the public.

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The next issue of *The Professional Edge* will be in December.

APEGS is reducing the number of print issues of *The Professional Edge* from six per year to two and supplementing them with monthly e-newsletters.

The first monthly e-newsletter will be in August. More information on this change was published in the March/April issue of *The Professional Edge*.

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MAY/JUNE 2022

President's Message

John Desjarlais, P.Eng.

I appreciate the opportunity to address you as APEGS' new president. I'm incredibly excited and honoured that my leadership and experience is valued by the association and its members to be able to serve in this capacity and I look forward to the year ahead in this role.

Being sworn in as part of APEGS' new council – and being able to do that in person at this year's annual meeting and professional development conference – was gratifying. This year was the first opportunity we have had in a few years for those involved in APEGS – from members to volunteers to administration – to be able to meet in person and celebrate what we do in our professions.

The whole event was extra special because of that return to being together in person again while also providing an online experience. Hosting a hybrid event allowed for APEGS' membership to be even more engaged in our annual meeting, allowing for online participants to present motions and be part of the proceedings to strengthen our governance.

This evolution to a hybrid event also broadened what was possible for professional development sessions because virtual presenters along with in-person ones could be incorporated in this year's agenda with members choosing to sit in on sessions or join some online.

The sessions were incredibly diverse and comprehensive with a range of amazing topics that included some that were highly technical to those that were more related to social development and engagement around equity, diversity and inclusion.

A highlight of this year's event was the awards ceremony to celebrate the successes of our membership. It is important to celebrate those who deserve to be recognized as considerable contributors to our practice as engineers and geoscientists.

It was an honour to be able to shake people's hands, see their smiles, feel their pride and share in that experience with them in person. It was something that you absolutely couldn't do the last few years, making this year's event that much more special.

As for my year ahead as APEGS president, what I am interested in being known for is stewardship. I want to be a leader that supports the organization through a lot of the changes the association has been going through and will continue to go through as it evolves.

My term will be less about initiating new developments and more about helping to operationalize a lot of the initiatives that have been developed during the ongoing transformation of APEGS.

I'm especially excited about what this opportunity for me to be president means for the Indigenous community. Being the first Indigenous president in the history of APEGS is an incredible and humbling honour.

It really reflects something very special to me in that I have the opportunity to serve the community from that perspective and I'm really excited about what that means. I hope that others from the Indigenous community can identify and relate to what that means and what it could mean for us. This strengthens Indigenous participation in regulatory functions.

I very much appreciate that I have the confidence of our members to be able to serve in this capacity and serve the organization according to its mission, which is to regulate the practice of engineering and geoscience in Saskatchewan for the protection of the public and the environment and the benefit of society.

2022 Annual Meeting and Professional Development Conference

The Engineering and Geoscience Professions Regulatory Bylaws requires that the annual meeting of the Association of Professional Engineers and Geoscientists of Saskatchewan be held in the first six months of each year, so it is customarily held on the first Saturday in May.

After two years of virtual annual meetings, we were delighted to again offer the usual in-person events, which included a professional development conference on Friday (several sessions are featured on pages 7 to 17) and the annual meeting on Saturday morning followed by the APEGS awards banquet that evening (award recipients are on pages 19 to 26). In addition, we offered virtual attendance at select professional development sessions, the annual meeting and the awards ceremony.

This year's conference theme was transformation. APEGS has been on a journey for the past couple of years to transform our governance best practices and business processes. The association is continuing to improve and evolve to best uphold its mandate to regulate the engineering and geoscience professions in the public interest. At the annual meeting, the past year's journey of transformation was reported and this year's professional development opportunities were also about transformation, providing a variety of sessions that explored our changing world and how we can live and work in response.

92nd annual meeting

The 92nd annual meeting was called to order in person and virtually at 9 a.m. Saturday, May 7, 2022 with 140 voting members in attendance. The business of the meeting included:

- Minutes from the May 1, 2021 annual meeting
- Business arising from minutes
- Message from the president
- Reports from executive director and registrar, public appointee, boards/committees
- Bylaw amendment
- Audited financial statements
- New business – motions from the floor
- 2022 election results
- Council induction

APEGS engaged Insightrix Research Inc., an independent third-party research firm, to conduct the 2022 council elections. Insightrix issued ballots on March 14, 2022 and polling day was on April 11, 2022.

The Executive Director and Registrar reported that the total number of votes cast was 1,986 (1913 electronic, 73 mail) being 13.56 per cent of the 14,650 total ballots sent out. There were no spoiled ballots.

President (1-year term). . . . . John W. Desjarlais, P.Eng.

President-Elect (1-year term). . Greg F. Vogelsang, P.Eng., ... P.Geo., FEC, FGC

Vice-President (1-year term). . Erin A. Moss Tressel, P.Eng., ... P.Geo., FEC, FGC

Past President (1-year term) . . Kristen J. Darr, P.Geo. . . . . FGC, FEC (Hon.)

Councillors (3-year term)

Carolyn M. Emperingham, P.Eng. (2nd year)
Ian G. Farthing, P.Eng. (3rd year)
Gavin K.S. Jensen, P.Geo. (2nd year of 2nd term)
Danae N.T. Lemieux, P.Eng. (1st year of 2nd term)
Patricia D. Lung, P.Eng. (3rd year)
Trent M. Nelson, P.Eng. (2nd year)
Kevin L. Ness, P.Eng., FEC (1st year)
Aaron V. Phoenix, PhD, P.Eng., FEC (3rd year)
Ashok N. Thakkar, P.Eng., FEC (2nd year)

Public Appointees . . . . . Larry Doke

Appointments to National Organizations

Kevin M. Ansdell, P.Geo., FEC (Hon.), FGC
Ernest M. Barber P.Eng., FEC, FGC (Hon.)

New Council

The president, president-elect, immediate past president and vice-president hold office for a term of one year after having served as a council member for at least a three-year term. All other councillors hold office for a three-year term with the ability to run for a second three-year term.

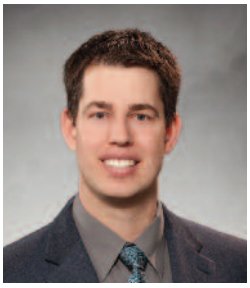
John W. Desjarlais, P.Eng.
PRESIDENT (1-YEAR TERM)

Greg F. Vogelsang, P.Eng., P.Geo., FEC, FGC
PRESIDENT-ELECT (1-YEAR TERM)

Erin A. Moss Tressel, P.Eng., P.Geo., FEC, FGC
VICE-PRESIDENT (1-YEAR TERM)

Kristen J. Darr, P.Geo., FGC, FEC (Hon.)
PAST PRESIDENT (1-YEAR TERM)

Carolyn M. Emperingham, P.Eng.
(2ND YEAR)



Ian G. Farthing, P.Eng.
(3RD YEAR)

Gavin K.S. Jensen, P.Geo.
(2ND YEAR OF 2ND TERM)

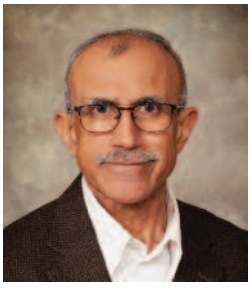
Danae N.T. Lemieux, P.Eng.
(1ST YEAR OF 2ND TERM)

Patricia D. Lung, P.Eng.
(3RD YEAR)

Trent M. Nelson, P.Eng.
(2ND YEAR)

Kevin L. Ness, P.Eng., FEC
(1ST YEAR)

Aaron V. Phoenix, PhD, P.Eng., FEC
(3RD YEAR)

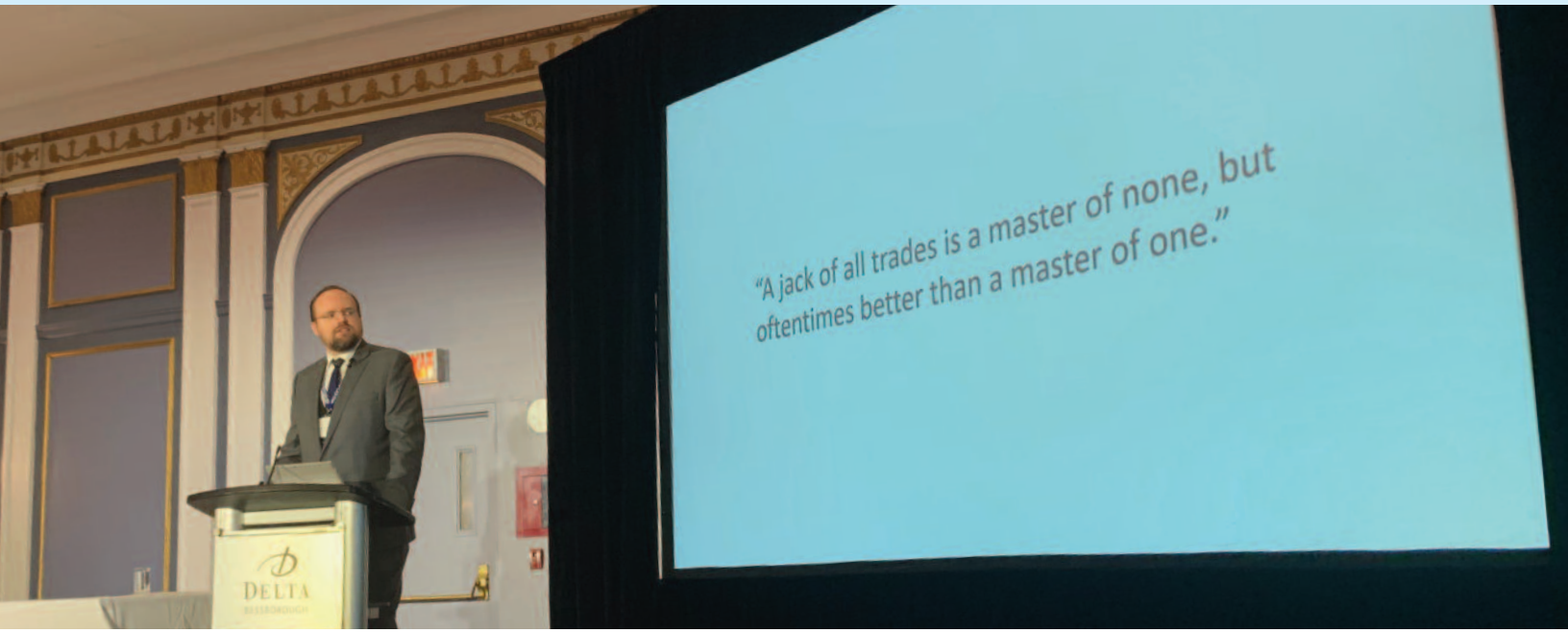


Ashok N. Thakkar, P.Eng., FEC
(2ND YEAR)

Larry Doke
PUBLIC APPOINTEE

Appointments to National Organizations

Kevin M. Ansdell, P.Geo., FEC (Hon.), FGC • Ernest M. Barber P.Eng., FEC, FGC (Hon.)



Dr. Adam McIness was the breakfast plenary speaker at the 2022 Annual Meeting and Professional Development Conference

Interdisciplinary and Experiential Learning Opportunities with Engineering

BY MARTIN CHARLTON COMMUNICATIONS

Space technology as well as organ and tissue regeneration may not seem to have much in common, but they do have a person in common – Dr. Adam McIness.

McIness is a University of Saskatchewan PhD researcher who was awarded a Vanier Scholarship in 2019 to develop scaffolds made of proteins that will promote tissue growth in order to 3D print artificial organs for transplantation.

Those gathered for the Annual Meeting and Professional Development Conference breakfast plenary went on a journey with McIness during his presentation, Interdisciplinary and Experiential Learning Opportunities with Engineering, during which he invited engineers and geoscientists to consider the benefits of interprofessionalism.

McIness opened with a quote.

"A jack of all trades is a master of none, but oftentimes better than a master of one."

What he described of his experiences as a medical student who is now earning a PhD in biomedical engineering illustrated the value he attributes to being a jack of all trades.

He explained how in medical school at the University of Saskatchewan, the importance of interprofessionalism in patient care was stressed. Having several different types of professionals being trained at the same university and learning to collaborate was beneficial, but he thought this collaboration could go further to include law and engineering to achieve even greater results.

McIness explained how he broadened his experiences and skills by joining various student organizations. For example, he joined the University of Saskatchewan Space Design Team (USST) as a medical student, which was a first for the group. While most on the team were engineers, who had impressive theoretical knowledge, McIness brought his years of experience in manufacturing and manual labour from his year before attending university. That experience came in handy during a competition in which the team built and demonstrated a lunar excavator for NASA. Its members needed to think on their feet to address equipment and climate challenges. Finding solutions quickly allowed the team to remain competitive.

The value of collaboration, competition and connections between professions was carried forward to another initiative that McIness founded. He is a leader of MedHack(+), a non-profit organization that organizes hackathons that bring together students, health-care professionals, business leaders and technologists to solve problems in health care.

Bringing together these groups creates an opportunity for those who can develop technology to learn about problems being experienced by health-care professionals and for them to collaborate to devise a solution. Those in business can see what practical solutions the marketplace needs filled and provide financial backing for those solutions to become a reality.

For example, a family physician described the issue of collecting health history information from patients using paper forms. Two students collaborated with the physician to develop an app that would collect the relevant information needed by physicians and translate that patient-supplied data into medical terminology to create a patient record, saving physicians time and effort during their busy days of back-to-back appointments. A sponsor of the event was present to watch this collaboration and is interested in bringing this app to the marketplace.

It was his experience in Mozambique as a medical student that got McIness thinking about the capstone projects by fourth-year engineering students. Physicians in that country rely on very basic technology to diagnose and treat patients. Then, there are economic development needs in that nation to which engineers could contribute.

He would like to see more engineering students gain clinical experience so they understand what happens in medicine in order to better know what medicine can accomplish for patients. Few schools in North America offer the opportunity to develop a combination of the skills and knowledge of each profession, but McIness found a couple.

The Carle Illinois College of Medicine at the University of Illinois Urbana-Champaign is one where students are trained in engineering, but earn an MD. EnMed is a program that saw Texas A&M's College of Engineering, College of Medicine and Houston Methodist Hospital collaborate to develop a program for "physicianeers."

McIness himself is combining engineering and medicine in his research into tissue regeneration. His interest was sparked when he was 14 when he saw an image of the Vacanti mouse. It was a lab mouse which appeared to have a human ear growing on its back as a proof of concept that cells could be seeded onto scaffolds to regenerate organs.

While still a medical student, McIness pursued his interest by attending the McGowan Institute for Regenerative Medicine Summer School in Pittsburgh as the first Canadian focused and first non-engineer to participate. It is focused on technology that can address organ and tissue insufficiency. After it ended, he travelled to the Wake Forest Institute for Regenerative Medicine (WFIRM) Summer Scholars Program in Regenerative Medicine in North Carolina, which helped him build knowledge and gain connections.

He is now working on a PhD in biomedical engineering at the University of Saskatchewan. His research involved using a type of 3D printer to create scaffolds and constructs for tissue-engineering experiments. He described the process of turning pig bladders into a "homogenous solution of proteins" which he can use to create the scaffolding. Another natural material he is working with is silk.

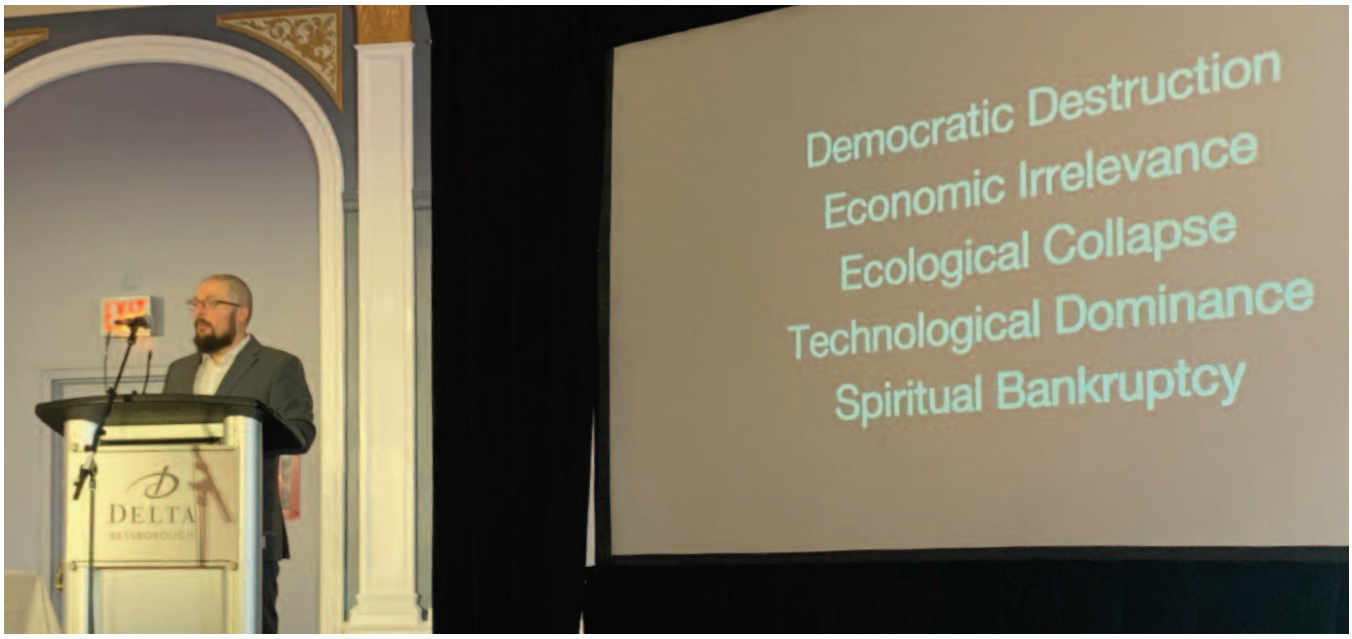
McIness describes himself as an "aspiring polymath" or someone who has knowledge in multiple disciplines to creatively solve problems. He is interested in this, not only for himself, but for others. In addition to founding MedHack(+) as well as contributing to the USST creating the Canadian International Rover Challenge, he is seeking to create even more opportunities. For example, he'd like to create a program for astronaut cadets, which would be similar to Air Cadets, except young people would be encouraged to develop skills related to space travel and, unlike Air Cadets, they would become accredited for those skills.

The 2022 Annual Meeting and Professional Development Conference was a hybrid event. All events welcomed people in person with virtual attendance available for the annual meeting, the professional development sessions and the awards banquet.

Surviving Tomorrow

Re-engineering life in the face of democratic, ecological and economic breakdown

BY MARTIN CHARLTON COMMUNICATIONS



Jared Brock was the luncheon keynote speaker for the 2022 92nd Annual Meeting and Professional Development Sessions.

Jared Brock thinks a lot about society's systems.

The author and film director has been considering many of these systems, including the global economic system, education system, health-care system and others.

At the beginning of his presentation titled Surviving Tomorrow: Re-engineering Life in the Face of the Democratic, Ecological and Economic Breakdown, he said, with sarcasm, that those systems are all "perfect." That is, they are perfect for their desired outcomes.

He then quoted Carl Jung. "If you cannot understand why someone did something, look at the consequences — and infer the motivation." He suggested the same can be done for politics and culture.

Brock told the group that predicting the future is easy. Simply look at the current trajectory and assume nothing will change.

He shared that to create a globally connected society, we must have a common goal. The goal he proposed was to achieve widest-spread well-being over the longest possible term. Before proceeding, he said that the engineers and geoscientists listening could take or leave any or all of the ideas he was proposing.

He then described the five major threats he identified to achieving that goal and solutions for them. Those threats and solutions are:

Democratic destruction

Brock described Canada's first-past-the-post system as a "caveman way of elections" that generates geographic favouritism and results in a majority of Canadians not being represented by those elected. He took issue with the Westminster model of parliamentary government saying it results in federal politicians not being accountable to voters. Instead, they respond to campaign backers and those who lobby them once in power.

He proposed a direct proportional democracy with active and informed citizens able to directly vote on issues rather than voting to elect representatives.

Economic irrelevance

He pointed to two main drivers of economic irrelevance – automation and financialization.

He explained Henry Ford's thinking. Ford knew that the cars he was manufacturing were too expensive for his workers. He decided he either had to build cars that were less expensive or pay workers so they could afford to buy his cars. Brock says today no one wants to create well-paid consumers to buy products.

Automation will worsen the situation. Millions of jobs will be eliminated by technology due to efficiency-driven capitalism driving specialization, making millions of humans economically irrelevant.

As for financialization, he said we are on the way to feudalism 2.0 because of "banksters," plus leveraged financial investors, plus rent-seeking equals serfdom.

This equation, he says, is going to drive young Canadians to leave for other countries and discourage anyone else from immigrating here.

His solution is to ban rent seeking, which he described as companies providing goods for rent rather than ownership. He'd also like limits put on individual private wealth and property ownership and to index a national living wage to real inflation to ensure innovation and affordability.

Ecological collapse

Brock described why he believes today's global civilization is not ecologically sustainable, describing soil nutrition, the extinction of species, microplastics in our water and air, and our warming planet.

He suggests population control through having fewer children rather than depending on technology to resolve this situation.

Technological dominance

He described technology as an "invasive species" that captivates our attention and knows far more about each of us than we might realize. He is concerned about digital currency and how it could be used to track our financial transactions, suggesting it could lead to governments having the ability to delete currency and exclude individuals from participating in the economy.

He would like to see that no data is collected on any individual without them providing their express permission for that collection.

Spiritual bankruptcy

Finally, he is concerned about fragmentation in our global society because of individualism. He encouraged others to consider what freedom means, which he says has boundaries, such as truth, and why what we deem as freedom today is actually autonomy, which he described as the ability to do whatever you want whenever you want in whatever way you want. This, he said, leads to power, rather than truth, deciding who wins when people with opposing preferences collide.

His solution is a voluntary surrender of self to agree to pursue the goal he proposed – the widest-spread well-being over the longest possible term.

He concluded by saying that what he described are perhaps "terrible ideas," but what got humanity to this point will not get us to where we need to go. That is what makes this an exciting time to be alive so that we can work together to create what is needed in order to survive tomorrow.

What is the Duty to Consult and Accommodate … and Why Should I Care?

BY MARTIN CHARLTON COMMUNICATIONS

Tracy Campbell is not surprised that engineers and geoscientists might be confused about how to ensure their projects avoid lawsuits and protests related to Aboriginal and treaty rights.

As Principal with Calliou Group, she acts as a consultant to assist First Nations and Indigenous groups and individuals across Canada to protect their Section 35 rights.

This section of the *Constitution Act 1982* recognizes and affirms existing Aboriginal and treaty rights. It indicates that the "Aboriginal peoples of Canada" includes the First Nation, Inuit and Métis peoples of Canada.

Campbell identified the competing views that exist in Canadian society around these rights and their connection to the projects of geoscientists and engineers. Proponents of a project and the Crown say it will have no effect on Section 35 rights and Indigenous people point out how there will be negative effects. That difference makes for a contentious relationship.

She explained that there are three main hurdles for engineers and geoscientists looking to avoid this confusion and contention.

First, there is a general lack of recognition of Section 35 rights. Questions about who holds these rights and what those rights include are just the beginning. Then, there is a lack of identification of what impacts those rights. Finally, appropriate accommodation of those rights is not implemented often enough.

That is what makes the duty to consult and accommodate crucial, which she explained is the "process of identifying and seeking to address potential adverse effects to the exercise of Section 35 rights."

Looking to provincial governments for direction on what is expected and required of proponents of a project does not provide adequate guidance, Campbell explained. Each province will have different guidelines and policies and they are not to the level that the courts have determined is appropriate.

She provided the definition of treaty rights that the Saskatchewan government relies on, which is the beginning of the issue. She pointed out how narrow that definition is and how that could lead to skipping over looking for impacts to rights and accommodating them.

Her expertise is in Section 35 rights as well as environmental assessment methodology and regulatory review. At the intersection of those three lies the duty to consult and accommodate.

Just as is done in environmental assessment methodology, she advises proponents of a project to identify impacts and then identify what to do about them.

She recommends following standardized steps that scientists use to identify biophysical or socioeconomic changes. Pick what to study, set parameters for the study, collect information about the specific project and describe how change will be measured.

When identifying impacts, she strongly discourages against relying on traditional land use (TLU) evidence to determine when there is a duty to consult and accommodate. TLU evidence is being used by governments to attempt to narrow where rights exist to only where Indigenous people use the land, which she said is problematic. She explained there is a reason why more projects are being litigated due to the misuse of TLU. It is important to consult Indigenous people on current use of the land and resources for traditional purposes.

Campbell advises going above provincial minimums – particularly in Saskatchewan and Alberta – and following the direction of the Supreme Court of Canada over the last 30 years to establish meaningful consultation with Indigenous people about their Section 35 rights. She likens it to employers referencing safety regulations and choosing to go above the bare minimum required to provide adequate protection to their employees.

Ignoring what the courts across Canada are deciding can be a risk. She pointed out how projects in Saskatchewan could be impacted by a decision by the British Columbia Supreme Court last summer.

That court ruled that the rights of the Blueberry River First Nations under Treaty 8 in northeast British Columbia had been infringed upon by the cumulative impacts of industrial developments, including those in forestry, oil and gas, renewable energy and agriculture, within its traditional territory.

This decision could potentially increase regulatory risks for new infrastructure projects in that province and extend out to other provinces in Canada where similar claims could be made.

Dr. Iain D. Stewart was part of a track of speakers who focused on practising the professions.

Urban Climate and City Design

BY MARTIN CHARLTON COMMUNICATIONS

While only two per cent of the Earth's surface is covered with urban areas, much of the world's population lives in cities, making climate conditions in those communities critically important.

Dr. Iain D. Stewart explained that by 2050, more than 60 per cent of the world's population will live in cities. Stewart is a research associate at Ontario Tech University and a Fellow of the Global Cities Institute in Toronto. He holds a PhD in Geography from the University of British Columbia and is a specialist in urban climatology and climate-sensitive urban design.

He explained that cities will bear the brunt of climate change related to temperature. Very hot days will become more frequent. For example, in Regina and Saskatoon, it is typical for there to be 10 to 12 days a year where the daytime maximum temperature is above 30° C. The summer of 2021 – when Regina had 33 days of above 30° C and Saskatoon had 31 — is an indicator of what is to come, he said.

What is critical to understand is that the temperatures recorded for Canadian cities by Environment Canada are lower than what would be recorded if the temperature was taken in the centre of the city. Using meteorological sensors in urban areas and just outside them show there is an urban effect on climate. These wind effects go beyond increasing temperature to reducing wind speed, fog and humidity and solar radiation as well as increase thunderstorms and precipitation.

Near a city centre where there are taller buildings clustered closer together, a peak temperature is reached. An urban heat island exists were the air in a city compared to air just outside it tends to be three to 10 degrees Celsius warmer at night on a typical night in October.

Stewart explained what is modifying the climate in urban areas. First, there are urban canyons, which are streets that are flanked by buildings on either side. Cities with deep and narrow canyons have strong heat island effects. The climate in a city's centre is dependent on the spacing of buildings and their height.

The second effect is thermal properties of urban surfaces. The materials used when constructing buildings, roads and other infrastructure has an impact on more than air temperatures in a city. There are the surfaces of building walls and surfaces beneath tree canopies to consider.

Urban heat islands go down below a city's surface where there are thermal effects from paving and underground infrastructure, such as sewers.

Cities become heat domes where cool air reaches the top of the dome, condenses and falls at the end of the city limits generating a wind towards the city's centre. At the edge of cities is a dynamic space in urban meteorology which is typically where there is new construction as well as industrial development. This can impact air quality as pollutants from factories are drawn to the city centre by the movement of air due to the heat dome. This wind pattern is a significant consideration for zoning.

Another significant consideration of heat domes is the increase in the frequency and duration of heat waves. Canada – and in particular B.C. – has already experienced a heat wave that became fatal for vulnerable residents.

Stewart shared some guiding principles for climate-sensitive urban design. First, consider climate issues at the earliest opportunity. Once land has been developed for urban use, much of the urban climate effect is locked in and opportunities to change this are limited. Second, remember that no single design can meet all climate objectives. Decide on compromises, such as shade versus sunshine. There is also a rule of thumb to remember which is height/width ratios of ~0.5 satisfy the need for wind, shelter, solar access and shade.

He explained the pros and cons of compact cities. While they can reduce land consumption and make transportation more efficient, they can also reduce solar access, limit the number of trees and make heat islands stronger.

Finally, he explained what contributes to cities being more comfortable for their residents, such as parks, trees and vegetation that contribute to air flow as well as help with temperature control and humidity levels. He advised against placing buildings in patterns that create wall effects that block the movement of air and urged careful consideration of facet-level interventions, such as painting roads white, in order to prevent unforeseen circumstances.

Outgoing President, Kristen Darr, P.Geo, giving opening remarks at the 2022 Annual Meeting and Professional Development Conference.

New Resources in Saskatchewan

BY MARTIN CHARLTON COMMUNICATIONS

Zach Maurer, Geoscientist-in-Training, of Prairie Lithium was joined by Andrew Davidson, CPA, of Royal Helium and Roger Lemaitre, P.Eng., P.Geo., of UEX to talk about new resources in Saskatchewan.

The world is in need of Saskatchewan's resources and three in particular – helium, lithium and cobalt – are in high demand as the world prepares for a future that relies less on oil and gas and depends even more on advanced technology.

A panel of speakers presented about these resources. Andrew Davidson, CPA, the CEO of Royal Helium, started by explaining helium has been produced in Saskatchewan since the 1960s. However, some significant developments have changed the supply-and-demand equation for helium in the global market which benefits Saskatchewan.

Historically, the U.S. has been the world's largest producer of helium, which was done in conjunction with natural gas production, but that has started to dwindle in that country. Meanwhile, Russia is another producer, but being sanctioned because of its aggression in Ukraine means a large percentage of helium has been taken off the market.

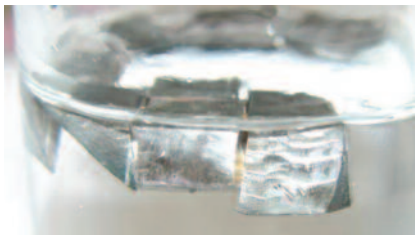
At the same time, industries relying on helium, such as the health-care industry, space exploration and quantum computing, are increasingly needing more helium, driving up demand.

Helium is formed by the radioactive decay of uranium and thorium. Saskatchewan is not only known to have uranium, but it is fortunate to have geology that traps that helium so it can be recovered.

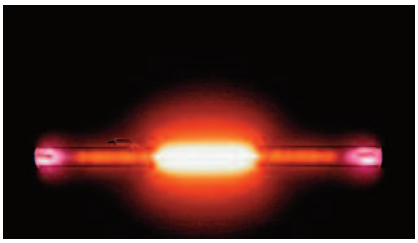
Royal Helium has holdings in southwest and southeast Saskatchewan. Last year, Royal Helium drilled wells in the Climax area with all finding economic helium concentrations. It is in that area that the Nazare zone was discovered, which Davidson described as a "game changer" because of its thickness, area size and helium concentration in that play.

The company has engaged Dr. Gary Zhao, P.Eng., of the University of Regina's Petroleum Systems Engineering Laboratory, to construct simulation development models for the Nazare zone to determine the drill design and completion method to develop that zone.

The Ogema area is another that the company drilled during 2021, which was the first helium-specific drilling program in southeastern Saskatchewan. That area has some of the highest historic helium shows in the province. This year, the company will be drilling in the Val Marie area



Lithium



Helium

Cobalt

in southwest Saskatchewan with Royal Helium prepared to move from exploration to production in the Climax area.

Purifying helium requires processing, and transporting it requires liquifying. Canada has no liquifiers at this time, but, Saskatchewan will as the provincial government has a goal to supply 10 per cent of the global helium market share by 2030. Its Helium Action Plan includes building up to 15 helium purification and liquefaction facilities in the province.

While helium has been produced for decades in Saskatchewan, lithium is a new mineral for the province. Research has been done over the last 20 years, but not exploration — until recently. Prairie Lithium's Zach Maurer, Geoscientist-in-Training, explained that he wanted to better understand the origin and evolution of the resource, so he proposed a Master's project in 2017 to the University of Regina. He worked on it during his evenings and weekends until he felt he "cracked the code" in 2018 and understood why the mineral was concentrated in certain formations.

Lithium is the lightest metal with the highest energy density making it desirable for the chemistry of batteries. There are four main sources of lithium in the world — brine, hard rock, certain sedimentary rock and recycling.

The techniques used to produce lithium in other parts of the world are much different than the one developed by Maurer's company. In Australia, it is found in hard rock, which requires identifying ore with lithium that is crushed so the lithium can be leached out. In South America, they bring brine to the surface, where they use a series of evaporation ponds over a period of 18 to 24 months to extract the lithium.

Prairie Lithium is doing direct lithium extraction. The company brings the brine found in the Williston Basin to the surface where the lithium is extracted at a central processing facility. Prairie Lithium has developed a technology known as Plix, which selectively removes that lithium from the brine very quickly. The waste brine is injected back underground.

Being able to produce lithium quickly is important because the world's appetite for the mineral is rapidly growing due to the pressure to produce enough batteries for electric vehicles to meet government targets. Maurer said the number of lithium mines in the world would have to quadruple to meet the demand that exists. He sees lithium becoming a multibillion-dollar revenue stream for the province.

Another mineral needed for electric vehicle batteries is cobalt, which Roger Lemaitre, P.Eng., P.Geo., explained. He is the CEO of UEX, which is primarily a uranium company.

Lemaitre explained that this blue mineral is a critical component for extending the range of these batteries. Cobalt is thermally stable and has high-energy density. Battery cathodes made with cobalt won't overheat and the batteries are able to store and transfer more energy.

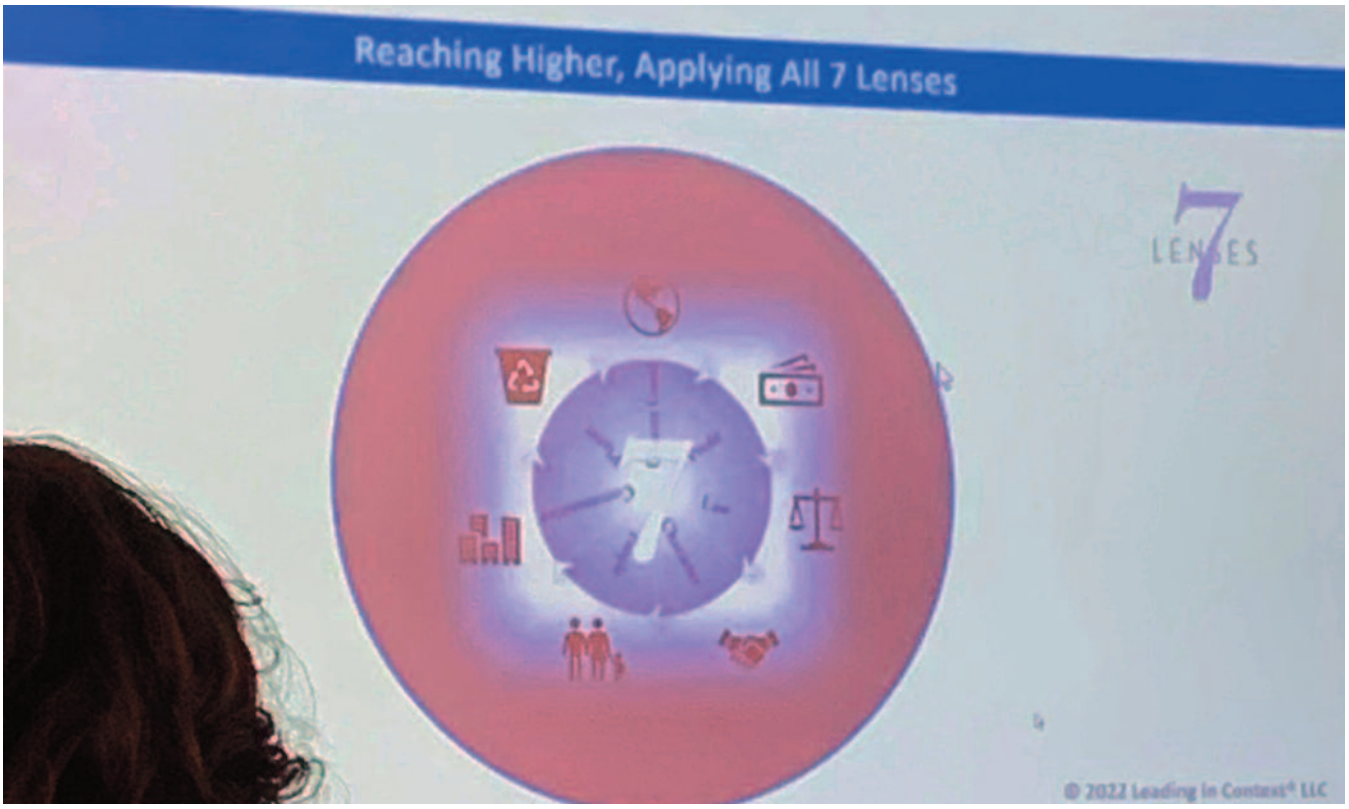
Demand for cobalt has doubled since 2017. Only one per cent of the global supply of cobalt comes from a mine dedicated to cobalt production. Much of it is produced as a by-product of copper or nickel mining in areas of the world such as the Democratic Republic of Congo as well as Australia, other parts of Canada and Russia.

Cobalt in Saskatchewan is found in northern Saskatchewan's Athabasca Basin, which is known for its uranium. Cobalt is commonly found in the same geological environments as uranium. The skills for finding uranium are the same ones needed for finding cobalt.

Lemaitre likened drilling for cobalt to five people who can not see trying to describe an elephant by touch. What you describe depends on where you are located. However, he explained that what is being found in Saskatchewan in terms of cobalt it not like anything found in the world yet today.

There is a West Bear Cobalt-Nickel Deposit in the eastern area of the Athabasca. Lemaitre said the area has been drilled numerous times without people recognizing what was there. Testing revealed it for his company.

However, that area on its own was not enough to be commercially viable, so the company went looking at other deposits in the area. Exploring and developing the West Bear project was tasked to a subsidiary company of UEX known as CoEx Metals in late 2017. More recently, drilling was done which is how they discovered the Michael Lake Cobalt-Nickel Zone. There are many more targets within West Bear the company has identified, leading Lemaitre to share that the Athabasca Basin has the potential to become a significant source of primary cobalt and nickel for the electric vehicle battery industry.



7 Lenses of Ethical Leadership

Applying Ethical Thinking

BY MARTIN CHARLTON COMMUNICATIONS

A glass-box culture has replaced the black-box culture that once existed, Linda Fisher Thornton explained, making ethical considerations all that much more important.

Fisher Thornton is the Founder and CEO of Leading in Context, and author of the award-winning book 7 Lenses. She described how in years past, it was possible for those outside an organization to not know what was happening inside. But today, with social media and online reviews, you not only can know, you can see for yourself the culture of an organization.

That impacts consumers' decisions as they want the satisfaction of spending their money with companies that align with their values. But agreeing to what is ethically responsible is complex with limited agreement on how to define it. That is what led her to come up with seven lenses through which an organization can evaluate its decisions.

1. Profit
2. Law
3. Character
4. People
5. Communities
6. Planet
7. Greater good

Filtering decisions through these lenses allows an organization to see if it is balanced in its decision-making.

Not only can these lenses help an organization understand the ethics of its own decisions, but they can help a person understand decisions made by other organizations. Those that make the news and are perceived as unethical might be too focused on one lens to the exclusion of others.

To help those at her session better understand how these lenses can be applied, Fisher Thornton asked those present to form groups to discuss real-world situations.

The first was about wildfires in California that PG & E was found to have contributed to causing. Fisher Thornton presented details she pulled from news coverage.

First, the utility had a monopoly on providing electricity to 16 million people in that state. Fisher Thornton said it was found to have failed to maintain aging power lines, ignored warnings that this aged equipment could cause fires and violated California state regulations.

The company pleaded guilty to numerous counts of involuntary manslaughter and a felony count of unlawfully causing a fire. It said that the fire was worse due to climate change and overgrown conditions. PG & E went through bankruptcy and was on probation when another fire was caused. Victims of the fires were waiting for their settlements.

Fisher Thornton asked the groups to look at this situation through the seven lenses she provided and determine which lenses had been honoured and which had been dishonoured.

The second real-world situation she provided the groups was about German car manufacturers found to have colluded to limit the effectiveness of their emissions technology. This led to higher levels of diesel pollution. The manufacturers – which are that country's three largest carmakers – illegally agreed to deploy emissions technology that met minimum legal standards, but was not as good as they could have distributed. What was illegal under European Commission antitrust legislation was colluding to limit technical development.

They colluded to shrink the size of Diesel Exhaust Fluid (DEF) tanks, reducing how effectively nitrogen oxide was removed. By using smaller tanks, they increased their profits by billions.

Buyers of the vehicles benefitted by gaining trunk space and paying less. However, they would be harmed by the nitrogen oxide pollution. This was the first time a crime such as this had been prosecuted.

Fisher Thornton encouraged them to think about these kinds of situations in terms of their impact in addition to their intention.

She also recommended considering the difference between critical thinking and ethical thinking. Critical thinking narrows a person's focus while ethical thinking broadens it.

Those intrigued can view Fisher Thornton's presentation for themselves online at APEGS Central until August 6, 2022.

President, John Desjarlais, P.Eng., and President-Elect, Greg Vogelsang, P.Eng., P.Geo at the awards reception.

APEGS 2022 Awards

APEGS celebrated the award recipients listed below with a banquet and ceremony on May 7, 2022 as part of the APEGS 2022 Annual Meeting and Professional Development Conference. APEGS Awards recognize professional excellence and showcase exemplary competence and conduct to promote awareness of the role of APEGS in protecting the public and in fostering professional excellence among members. To view the video of each recipient, visit apegs.ca under Members/Honours & Awards.

Recipients of APEGS 2022 Awards

Brian Eckel Distinguished Service Award
Dr. Daniel Brisbin, P.Geo.

Outstanding Achievement Award
Shauna Lehmann, P.Eng.

McCannel Award
Frank McDougall, P.Geo.

Exceptional Engineering/Geoscience Project Award
DEEP Earth Energy Production Corp.

Environmental Excellence Award
Wesley Kotyk, P.Eng.

Promising Member Award
Michele Tuchscherer, P.Eng.

Friend of the Professions Award
Dr. Adam McInnes, M.D., M.Sc.

The following members received other awards:

Robert Chabot, P.Eng., Nwakaku Okere, Engineer-in-Training and Kendall Sampson, P.Eng. received the Gerry Zoerb Award for achieving the highest mark in the Principles of Professional Practice Exam for 2021.

Kristen J. Darr, P.Geo., FEC (Hon.) received a certificate of fellowship and the privilege of using the designation Honorary Geoscientists Canada Fellow (FEC Hon.) from Engineers Canada upon recommendation from APEGS in honour of exceptional contributions to the engineering profession.

The following members received a certificate of fellowship and the privilege of using the designation Fellow of Engineers Canada (FEC) from Engineers Canada upon recommendation from APEGS in honour of exceptional contributions to the engineering profession.

Lei Meng, P.Eng., FEC

Kevin L. Ness, P.Eng., FEC

Satyanarayan Panigrahi, P.Eng., FEC

Bruce A. Peberdy, P.Eng., FEC

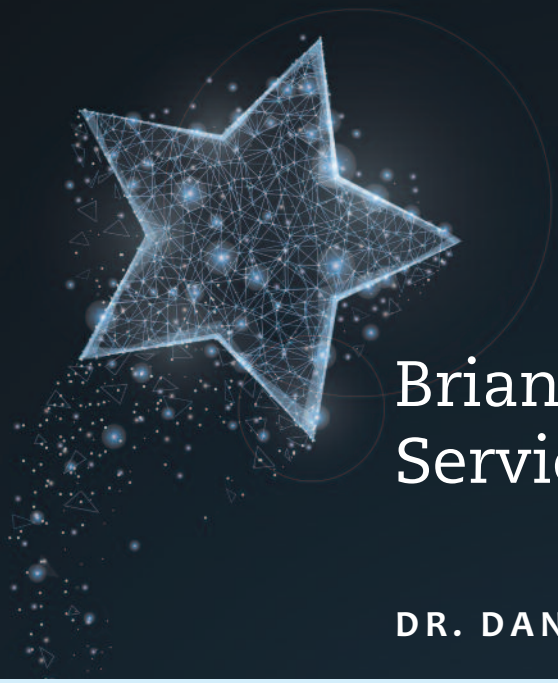
Ondiveerapan Thirunavukkarasu, P.Eng., FEC

Lisa N. White, P.Eng., FEC

The following members received a certificate of fellowship and the privilege of using the designation Fellow of Geoscience Canada (FGC) from Geoscience Canada upon recommendation from APEGS in honour of exceptional contributions to the geoscience profession.

Ronald W. Avery, P.Geo., FGC

Kristen J. Darr, P.Geo., FGC
Dirk H. de Boer, P.Geo., FGC



Brian Eckel Distinguished Service Award

DR. DANIEL BRISBIN, P.GEO.

Dr. Daniel Brisbin, P.Geo.

Dr. Daniel (Dan) Brisbin is an economic geologist with 40 years of experience who specializes in project and target generation, project execution and in leading and developing exploration teams.

His experience includes project to management level roles with Falconbridge Limited, Cameco Corporation and Alamos Gold Inc.; and spans exploration, mine and research geology in gold, base metal, platinum group element and uranium exploration in both mature mining camps and remote greenfield settings. He is currently Alamos Gold's exploration manager in Lynn Lake, Manitoba.

Dan obtained his Honours B.Sc. in Geological Sciences, M.Sc. in Mineral Exploration and PhD in Geological Sciences from Queen's University. He is a registered Professional Geoscientist in Saskatchewan, Manitoba and Ontario; a Fellow of the Society of Economic Geologists and the Geological Association of Canada and a Member of the Prospectors and Developers Association of Canada.

Dan has volunteered with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), Association of Professional Engineers and Geoscientists of Saskatchewan and the Mineral Deposits Division of the Geological Association of Canada. He was Chairperson of the organizing committee for CIM Geological Society 2006 Field Conference held in Saskatoon. In various industry positions he has championed and facilitated joint industry - government - university mineral exploration geoscience research; including serving on the Board of Directors for the recently completed Canadian Mining Innovation Council Footprints exploration research project.

Dan, his wife Karen and children Andrew and Sarah, all enjoy outdoor activities, including cross-country skiing where Dan has also devoted his volunteer time. He has served on boards of the Saskatoon Nordic Ski Club, Cross Country Saskatchewan and Cross Country Canada. He is certified as a FIS Technical Delegate; and has organized and officiated at events from local to international levels – including most recently at the 2022 Paralympic Winter Games in China.

Outstanding Achievement Award

SHAUNA LEHMANN, P.ENG.

Shauna Lehmann, P.Eng.

Shauna was born and raised in Saskatchewan and grew up with a passion for art, music and the environment. In high school, she was awarded a work placement scholarship from the Ministry of Highways. Over two summers, Shauna worked in the materials lab and assisted with the Highway 1 East twinning project. She also developed a preservation data collection process as her final year design project. Shauna received a degree in Environmental Systems Engineering from the University of Regina in 2002, a Master's Certificate in Project Management from the Edwards School of Business in 2008 and Invasive Species Management Practitioner Certification in 2013.

Shauna's career began in Minnesota as an environmental consultant, where she led environmental site assessments for commercial property transactions and highway corridor developments, conducted regulatory impact analyses for the U.S. Environmental Protection Agency and assisted in the development of hazardous waste management plans and ISO 14001 Environmental Management Systems.

While in Minnesota, Shauna met her husband Karl, a fellow engineer from Saskatchewan and they eventually moved home where she returned to the Ministry of Highways. Throughout her 16-plus-year career with the ministry, Shauna has served in various positions in operations, transportation planning, preservation planning, construction project management, and environmental engineering and is currently the Director of the ministry's Environment Unit. Shauna has contributed to several major projects, including the Regina Bypass, Warman-Martensville Interchanges, Saskatoon Freeway Study and the Westside Irrigation Project.

Shauna is a member of several committees with the Transportation Association of Canada, serves on the Board of Directors of the Saskatchewan Invasive Species Council and, in her personal time, has volunteered with the Christopher Leadership Courses of Canada – Saskatoon Chapter as Vice Chair, Promotions Director and Public Speaking Instructor. Shauna enjoys travel, creating watercolour and illustration art and performing in a local karaoke league.

McCannel Award

FRANK McDOUGALL, P.GEO.

Frank McDougall, P.Geo.

Frank is a retired exploration geologist and palaeontologist. He was born in the small town of Earl Grey and grew up on a mixed farm where his interest in geology and palaeontology was sparked at a young age while hand-picking rocks. Frank received his Bachelor of Science degree in geology at the University of Regina in 1973.

Frank worked with the provincial geological survey as a summer student and an exploration project geologist for various mining companies in northern Saskatchewan on industrial mineral, precious and base metal and uranium projects. He has also been a full- and part-time lab instructor for the geology departments at both universities. In addition, he has worked as a palaeontologist on projects for Parks Canada, the Royal Saskatchewan Museum and heritage impact companies.

Frank has been an active volunteer for much of his life contributing his knowledge and experience to public education in the geosciences. Frank is an active member of the Saskatchewan Archaeological Society (SAS) for the last 44 years where he has volunteered for most of that time. He has also volunteered with the Royal Saskatchewan Museum for more than 30 years working on many of their major fossil excavations and has served on the palaeontology advisory committee for Grasslands National Park. In addition, Frank participated in outreach to public schools throughout the province with Innovators in the School and other similar programs. He also develops free downloadable public education publications for identifying fossil and rock specimens found in Saskatchewan.

For this dedication to volunteering, Frank was a recipient of the 2020 Saskatchewan Volunteer Medal.

Exceptional Engineering/ Geoscience Project Award

DEEP EARTH ENERGY PRODUCTION CORP.

DEEP Earth Energy Production Corp

After more than a decade of preliminary work and preparatory engineering, DEEP Earth Energy Production Corp. is positioned to be the first producer of large-scale geothermal power in Canada.

DEEP has the geothermal rights within 39,120 hectares (approximately 100,000 acres) in Southeastern Saskatchewan with the potential for approximately 140 MW of geothermal power. This could offset approximately 385,000 tonnes/year of carbon dioxide equivalent (CO_2e), removing the equivalent of 85,000 cars off the road annually.

Successful geothermal resource exploration in a hot sedimentary aquifer (HSA) requires two main contributing factors: hot fluid in permeable rocks; and high well productivity.

Modern well design has made sweeping the heat from the reservoir possible. DEEP developed a unique geothermal field design to maximize flow rates and optimize an important regional geothermal resource. DEEP's "ribcage" geothermal well field design is globally unique and may be a transformative application of modern oil and gas drilling, completions and stimulation design applied for the first time on a renewable energy project.

Environmental Excellence Award

WESLEY KOTYK, P.ENG.

Wesley Kotyk, P.Eng.

Wes Kotyk is the Assistant Deputy Minister of the Environmental Protection Division in the Saskatchewan Ministry of Environment.

Wes has held a number of progressive positions over his 30-year career with the Ministry of Environment. Current program areas of responsibility include Mining and Industrial Regulatory Compliance, Landfills and Impacted Sites Management, Air Quality, Hazmat and Spill response, Compliance Audit, Environmental Assessment, Waste Stewardship and the Ministry's business support function.

Wes was a significant contributor to the Ministry's results-based regulatory reform initiative leading efforts on development of chapters of the Saskatchewan Environmental Code for Impacted Sites and Discharge Reporting as well as leading the development of the Ministry's Compliance Framework.

Wes received his Bachelor of Applied Science in Industrial Systems Engineering from the University of Regina and is a professional engineer with APEGS.

Wes is married to his wife Keri. They have a daughter (Sarah), son-in-law (Dan) and two granddaughters (Isabelle and Anastasia) living in Saskatoon. Their son Daniel resides with them in Regina where they returned in 2017 after spending 19 years in Saskatoon.

Wes enjoys spending time with family and friends and his interests include gardening, hiking and travelling. Wes currently sits on the Board of Directors for Chip and Dale Homes in Regina.

Promising Member

MICHELE TUCHSCHERER, P.ENG.

Michele Tuchscherer P.Eng.

Michele is a professional engineer with a passion for innovation and sustainable mining. In her current role as Operations Manager for Novex, she is part of a team evaluating the feasibility of the extraction of critical minerals and rare-earth elements from mine waste.

Michele graduated with a B.A.Sc. in Chemical Engineering from the University of Saskatchewan in 2015. During her undergraduate studies, she worked for Nutrien in various student roles and was an executive member of the U of S CIM Student Chapter as well as a volunteer tutor with Frontier College.

Michele has worked for Nutrien (legacy PotashCorp) since 2012, most recently as a process engineer at Nutrien Allan, where she obtained extensive experience in operations, R&D, process modelling, metallurgical testing, commissioning and circuit optimization. Her passion for potash processing is evident in her in-depth understanding of the process and willingness to challenge conventional potash-processing ideologies. In 2020, she received Nutrien's Our World Award for Innovation for her project to address two of the largest challenges facing the conventional potash industry: the recovery of ultrafine potash; and the high capital cost and environmental impact of fine tailings management.

Most recently, Michele completed her M.A.Sc. in Mining Engineering at the University of British Columbia in the spring of 2022. She received the GoldCorp #DisruptMining award in 2019 for her scavenger flotation thesis concept.

Michele is the current Chair of the Canadian Mineral Processors MB-SK branch and has been an executive member of the committee since 2017. Through her role at Nutrien Allan, she has been an annual Capstone Industry Sponsor for the U of S Chemical Engineering program since 2017.

Since completing her graduate studies, Michele has enrolled in extracurricular classes to improve her French language skills and has been enjoying exploring Vancouver Island.

Friend of the Professions

DR. ADAM McINNES, M.D., M.Sc.

Dr. Adam McInnes, M.D., M.Sc.

His activities have included: joining the University of Saskatchewan Space Design Team and SaskInvent engineering student groups while he was in medical school; helping to found and volunteer with the Canadian Space Technology Advocacy Group to promote space exploration through the annual Canadian International Rover Challenge and plans for a winter rover challenge; and helping to found a health-care hackathon called Med.Hack(+) to facilitate the development of technology to solve problems in health care through interdisciplinary collaborative efforts, with both companies providing experiential learning opportunities for students; and working to establish post-secondary educational opportunities that combine engineering and health, including as a client on capstone projects to develop methods for solving identified global health needs in low- and middle-income countries and proposals for new academic programs.

Furthermore, Adam is currently working to build a STEAM education program for youth. Adam grew up on a small farm in southwestern Saskatchewan. He also serves as president of Saskatoon Métis Local 126, supporting Métis post-secondary students, staff and faculty in Saskatoon, engaging in economic development and developing programs and services for the Métis community in Saskatoon and he is involved in governance building of the Métis Nation – Saskatchewan.

Call for APEGS Awards Nominations

APEGS members do great work that benefits everyone in the province. Let's celebrate what we do!

The Awards Committee is seeking nominations for the APEGS awards, which recognize our members' professional excellence and showcase exemplary competence and conduct. One award is for a non-member who has made special contributions to the professions. The awards help promote awareness of the role of APEGS in protecting the public and in fostering professional excellence among members.

The APEGS awards are:

Brian Eckel Distinguished Service Award

Outstanding Achievement Award

McCannel Award

Exceptional Engineering/Geoscience Project Award

Environmental Excellence Award

Promising Member Award

Friend of the Professions Award

In addition, the Awards Committee nominates APEGS members for awards presented by both Engineers Canada and Geoscientists Canada and numerous other provincial and national awards such as the Saskatchewan Order of Merit and the Order of Canada.

If you have a friend, colleague, employee or client who has done something outstanding, this year or over the course of their career, please make sure we hear about it.

Nomination is quick and easy!

Complete the form at apegs.ca under Members/Honours & Awards.
Email the form to apegs@apegs.ca.

Submit nominations for 2023 by Nov. 30, 2022.

2022 APEGS Salary Survey Summary Results

The Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) contacted 6,501 professional engineers, professional geoscientists, engineers-in-training, geoscientists-in-training and licensees living in Saskatchewan. A total of 1,457 members completed the survey representing a 22.4 per cent response rate. Surveys were completed in March and April 2022 and salaries reported were as of Dec. 31, 2021. Insightrix Research Inc. compiled and tabulated all results. The detailed report, which includes analysis by gender, can be found on the APEGS website under the 'About' menu.

Supervision scope, absence from base of operations and professional designation (P.Eng. and/or P.Geo.) are the top three predictors of salary.

The work of engineering and geoscience professionals contributes to the public well-being and economic stability of Saskatchewan. The goal of providing current market salary information for engineers and geoscientists is to help ensure that the province retains proficient and competent services in engineering and geoscience. Making this information available provides guidance to both employers and employees to assess current compensation for professionals at various levels of education, experience and responsibility. The salary survey also has the additional benefit of providing students, career counsellors and other interested persons with information on employment in the engineering and geoscience professions in Saskatchewan.

Annual Salary by Final Year of Graduation (B.Sc.)

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
1978†								
1980†								
1981†								
1982	11	0.8%	$175,789	$86,000	$100,000	$114,000	$190,000	$600,000
1983†								
1984†								
1985†								
1986	11	0.8%	$151,495	$99,000	$108,448	$158,000	$190,000	$210,000
1987	19	1.4%	$140,691	$15,000	$86,817	$170,000	$180,000	$228,000
1988	12	0.9%	$178,897	$140,000	$147,282	$181,709	$202,993	$225,000
1989	12	0.9%	$139,625	$96,000	$122,500	$140,750	$160,000	$183,000
1990†								
1991†								
1992†								
1993	10	0.7%	$153,225	$115,115	$132,000	$142,500	$168,933	$220,000
1994	17	1.2%	$151,767	$84,000	$118,000	$160,000	$180,000	$225,000
1995	19	1.4%	$157,977	$90,000	$120,000	$147,500	$190,000	$325,000
1996	16	1.2%	$171,768	$112,000	$150,375	$172,869	$194,275	$240,000
1997	19	1.4%	$148,625	$81,000	$124,821	$145,000	$175,000	$250,000
1998	11	0.8%	$157,510	$60,000	$134,000	$158,481	$185,000	$238,000
1999	29	2.1%	$160,601	$109,000	$123,227	$140,000	$204,000	$250,000
2000	23	1.7%	$142,366	$73,000	$116,940	$135,000	$170,334	$225,000
2001	35	2.5%	$139,641	$74,400	$105,000	$137,000	$168,500	$215,225
2002	26	1.9%	$138,243	$96,000	$115,000	$136,500	$162,500	$197,000
2003	35	2.5%	$134,397	$70,000	$100,000	$131,000	$159,000	$206,000
2004	48	3.5%	$126,569	$32,640	$97,386	$130,000	$150,275	$202,000
2005	48	3.5%	$134,410	$75,500	$110,000	$131,500	$159,891	$200,000
2006	33	2.4%	$120,418	$70,000	$104,550	$119,000	$134,508	$167,000
2007	54	3.9%	$116,983	$70,000	$101,000	$113,393	$131,000	$160,000
2008	63	4.6%	$120,591	$88,800	$105,000	$115,000	$135,000	$174,000
2009	61	4.4%	$107,573	$52,000	$91,104	$110,000	$124,000	$150,000
2010	59	4.3%	$116,463	$82,621	$99,240	$115,000	$135,000	$154,000
2011	61	4.4%	$107,703	$77,500	$92,900	$102,178	$123,000	$145,000

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
2012	73	5.3%	$103,897	$73,730	$90,000	$100,360	$113,500	$140,000
2013	61	4.4%	$102,187	$57,000	$90,000	$101,000	$112,500	$145,000
2014	58	4.2%	$93,630	$68,000	$80,000	$89,000	$101,400	$140,000
2015	80	5.8%	$87,832	$60,000	$76,970	$89,000	$98,000	$125,624
2016	52	3.8%	$89,646	$65,000	$77,125	$89,000	$99,500	$130,000
2017	60	4.3%	$81,921	$55,009	$69,501	$78,918	$90,963	$114,625
2018	57	4.1%	$76,467	$58,000	$70,000	$75,000	$82,000	$98,000
2019	55	4.0%	$72,933	$51,840	$66,700	$72,349	$79,900	$92,600
2020	49	3.5%	$70,406	$55,000	$62,400	$69,000	$80,151	$86,000
2021	48	3.5%	$64,738	$52,000	$61,000	$64,900	$69,100	$81,000
2022†								

†Not available due to reporting rules (insufficient data)

Annual Salary by Designation

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
P.Eng.	943	66.3%	$126,480	$78,000	$98,000	$118,000	$145,016	$200,000
P.Geo.	54	3.8%	$137,561	$89,000	$106,000	$125,200	$165,000	$225,000
P.Eng./P.Geo	10	0.7%	$121,900	$70,000	$107,000	$120,000	$140,000	$175,000
Eng. License	10	0.7%	$121,569	$85,597	$108,305	$114,258	$140,000	$174,000
Engineer-in-Training	376	26.4%	$76,315	$51,840	$64,575	$73,000	$84,000	$110,000
Geoscientist-in-Training	28	2.0%	$97,595	$55,000	$80,875	$90,625	$106,500	$166,800
Geo Licensee†								

†Not available due to reporting rules (insufficient data)

Annual Salary by Discipline

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Agriculture/Forestry	30	2.1%	$92,894	$46,700	$73,000	$87,190	$102,500	$165,000
Biological /Biomedical†								
Chem./Ceramic/Metallurgical	65	4.6%	$116,482	$60,000	$91,200	$108,800	$140,000	$190,000
Civil	303	21.3%	$111,235	$63,000	$80,113	$100,800	$128,000	$190,000
Electrical/Eng. Physics	200	14.1%	$116,454	$65,262	$83,023	$108,631	$144,000	$199,500
Environmental	91	6.4%	$105,054	$57,000	$77,692	$96,834	$125,000	$175,000
Geo., Mining, Petro. Eng.	124	8.7%	$127,845	$72,800	$92,250	$120,250	$151,500	$216,000
Geosciences	74	5.2%	$126,541	$74,400	$95,000	$114,000	$150,800	$225,000
Mech./Industrial	341	24.0%	$111,522	$60,000	$80,250	$106,840	$134,508	$190,000
Software Engineering	34	2.4%	$95,286	$53,927	$77,800	$93,500	$119,000	$145,000
Other	157	11.0%	$107,897	$56,000	$78,000	$100,000	$128,000	$198,000

†Not available due to reporting rules (insufficient data)

Annual Salary by Function

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Corporate Mgmt.	138	9.7%	$167,354	$100,000	$135,000	$160,820	$197,240	$250,000
Project/ Operations Mgmt.	462	32.5%	$113,978	$66,700	$87,000	$107,700	$135,800	$187,000
Project Administration	39	2.7%	$101,585	$61,100	$80,000	$96,000	$118,656	$170,000
Design	328	23.1%	$97,528	$60,000	$70,000	$89,500	$113,875	$155,000
Research/Planning	64	4.5%	$106,170	$56,000	$83,010	$97,082	$123,250	$175,642
Inspection/Quality/Resident	30	2.1%	$89,830	$50,000	$65,480	$82,500	$116,000	$135,000
Operatin /Maintenance	157	11.0%	$115,480	$65,550	$91,000	$110,594	$140,000	$178,000
Teaching	24	1.7%	$129,980	$78,000	$98,847	$108,517	$182,250	$200,000
Marketing/Sales	20	1.4%	$107,305	$61,835	$84,630	$96,477	$126,125	$199,400
Reg. Approvals/Enforcement	56	3.9%	$102,452	$72,000	$80,250	$98,228	$118,000	$171,000
Exploration	40	2.8%	$110,679	$40,750	$85,000	$97,000	$131,250	$190,675
Other	64	4.5%	$91,359	$47,000	$65,500	$89,500	$109,750	$165,000

Annual Salary by Industry

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Consulting Service	297	20.9%	$107,609	$58,000	$75,000	$95,000	$127,000	$185,000
Resource Ind. Oil & Gas	59	4.1%	$111,419	$40,000	$90,405	$108,800	$134,000	$167,000
Resource Ind. Except Oil & Gas	248	17.4%	$132,208	$80,000	$100,000	$124,911	$151,875	$209,000
Procurement/Construction	129	9.1%	$109,140	$64,500	$77,592	$100,800	$128,000	$187,500
Manufacturing Durables	137	9.6%	$89,981	$54,000	$68,000	$84,000	$104,000	$160,000
Manufacturing Non-Durables	56	3.9%	$129,103	$75,000	$97,177	$115,500	$148,513	$215,225
Service For Profit	26	1.8%	$98,389	$61,000	$78,000	$90,326	$118,000	$159,564
Service Not For Profit	124	8.7%	$105,235	$69,900	$82,170	$100,207	$118,750	$160,000
Utilities	216	15.2%	$122,445	$68,931	$90,250	$119,500	$147,500	$190,000
Educational Services	47	3.3%	$130,829	$59,000	$91,356	$111,000	$180,000	$205,234
Agriculture and Forestry	23	1.6%	$80,296	$46,700	$65,550	$77,800	$90,000	$130,000
Other	60	4.2%	$93,201	$40,250	$67,761	$88,500	$111,500	$190,200

Annual Salary by Sector

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Public Sector	464	100.0%	$114,638	$68,000	$86,000	$106,000	$136,971	$190,000
Private Sector	950	100.0%	$112,030	$59,950	$79,517	$102,446	$135,000	$191,500

Total Salary (full-time positions)

	COUNT	COLUMN N %	MEAN	PERCENTILE 05	PERCENTILE 25	MEDIAN	PERCENTILE 75	PERCENTILE 95
Base Salary	1,422	97.7%	$112,940	$61,000	$82,000	$104,000	$135,000	$190,000
Salary incl. bonus			$137,978	$63,470	$88,562	$117,000	$164,000	$276,000

Salary Changes (full-time positions) (not including bonus, not all survey years listed)

	MEDIAN SALARY	% INCREASE	MEAN SALARY	% INCREASE
1987	$48,000	n/a	$49,269	n/a
1991	$54,110	7.58%	$57,578	-8.44%
1995	$56,400	3.52%	$59,142	4.30%
1999	$62,500	4.17%	$65,401	5.03%
2003	$68,800	4.24%	$71,210	3.39%
2007	$74,000	4.21%	$77,374	5.12%
2008	$76,352	3.18%	$83,025	7.30%
2009	$80,000	4.78%	$86,908	4.68%
2010	$82,950	3.69%	$91,548	5.34%
2011	$84,224	1.54%	$91,154	-0.43%
2012	$89,472	6.23%	$96,219	5.56%
2013	$90,000	0.59%	$98,030	1.88%
2014	$94,500	5.00%	$102,475	4.53%
2015	$97,000	2.65%	$105,111	2.57%
2016	$96,000	-1.03%	$104,628	-0.46%
2017	$97,000	1.04%	$107,130	2.39%
2018	$96,485	-0.53%	$104,743	-2.23%
2019	$97,500	1.05%	$107,287	2.43%
2020	$99,265	1.81%	$107,298	0.00%
2021	$98,022	-1.25%	$108,008	0.65%
2022	$104,000	6.10%	$112,940	4.57%

Regression Analysis

A lasso regression model was used to establish a framework for predicting salaries for engineers and geoscientists working in different industries. This process was used to:

- Identify how closely factors are associated with salaries;
- Identify Boolean components (such as receipt of professional designation) influencing salary; and
- Create a linear formula that effectively predicts salaries while minimizing model overfitting

The model explains about 51 per cent (50.6 per cent) of variance in salary. A formula was produced which members of APEGS can easily use to estimate their salary.

FACTOR	COEFFICIENT
(Constant)	$ 44,683.33
Duties (D)	$ 209.19
Experience (E)	$ 364.61
Recommendations (R)	$ 28.95
Supervision Scope (S)	$ 889.89
Job Environment (J)	$ -52.08
Absence from Base of Operations (A)	$ 673.97
Accident and Health Hazards (H)	$ -60.13
Professional Designation(s)	$8,152.63

To calculate the approximate projected salary, input the points for each variable in the following formula:

Formula for expected salary (SE) without bonus:

SE = 44,683 + 209*D + 365*E + 29*R + 890*S – 52*J + 674*A - 60*H

Add $8,153 if you have acquired professional status within your field (P.Eng. and/or P.Geo.)

APEGS Member Disciplined for Professional Misconduct

A Professional Engineer member of the Association of Professional Engineers and Geoscientists of Saskatchewan pled not guilty to one count of professional misconduct before a hearing panel of the Discipline Committee on March 23, 2022.

The allegations with respect to the conduct of the member were as follows:

The member did commit acts of professional misconduct, contrary to the provisions of subsections 30(a), 30(b) and 30(c) of *The Engineering and Geoscience Professions Act* (the Act), in that their actions were harmful to the best interests of the public or the members, harmed the standing of the profession and were a breach of The Engineering and Geoscience Professions Regulatory Bylaws, the particulars of which are below.

The member prepared a drawing bearing their professional seal for the deck built and attached to their home, contrary to subsections 20(2)(a) and 20(2)(b) of The Engineering and Geoscience Professions Regulatory Bylaws which requires licensees to hold paramount the safety, health and welfare of the public and offer services, advise on or undertake professional assignments only in areas of their competence and practise in a careful and diligent manner.

Particulars:

The complainant made an offer for purchase of the member's property in a municipality of Saskatchewan. In promoting the sale of their home, the member represented the deck attached to the home as being professionally engineered. The complainant subsequently purchased the home and took possession. A drawing of the deck bearing the seal of the member was obtained by the purchaser of the home. Following the sale of the home an engineering consultant was engaged to inspect and report on the deck. The consultant declined to certify the structure as being suitable for its intended service.

The hearing panel made the following findings of fact:

1. Member, P.Eng. prepared a sketch for the deck attached to their home.
2. Member, P.Eng. applied their Professional Engineer seal to the deck sketch that they had prepared.
3. Member, P.Eng. lost control of the deck sketch that they had prepared and sealed and the deck sketch came into the possession of the purchaser of their home.

The panel determined that these actions by the member were in breach of section 21 of the Act governing the use of professional seals by members. Subsections 21(1) and 21(4) of the Act provides that professional seals may only be applied to final drawings. By applying a professional seal to an incomplete sketch, the member breached section 21 of the Act. These actions constituted professional misconduct as defined in subsection 30(c) of the Act which provides that a breach of the Act or the Bylaws is professional misconduct.

Counsel for the Investigation Committee suggested that the issue of delay was relevant to this case. The member advised the hearing panel that their health had been compromised by the delay in having the matter heard. Counsel for the Investigation Committee advised that there must be significant prejudice for a matter to be stayed because of inordinate delay. Other remedies to deal with delay include reduced fines and orders for costs. The panel found that the delay in this case was not so unreasonable to warrant a stay of proceedings. However, the panel considered the issue of delay in dealing with the disposition of the matter.

In the Submission as to Disposition, the Investigation Committee cited Casey, Regulation of Professions, 2005 – Release 1, Section 14.2, Purposes of Sentencing, pages 14-5 to 14-9 and Salte, The Law of Professional Regulation, 2015 – Chapter 8.2, Penalty – Principles, 233-246.

The hearing panel acknowledged that the fundamental purpose of sentencing for professional misconduct is the protection of the public.

The hearing panel also considered the following factors when determining its sentence:

- nature and gravity of conduct proven.
- effect on the victim.
- advantage gained, or to be gained, by the member.
- the number of times the offending conduct occurred.
- the possibility of remediating or rehabilitating the member.
- need to ensure the public's confidence in the integrity of the profession.
- risk to public safety.
- specific deterrence of the member from engaging in further misconduct.
- general deterrence of other members of the profession.
- punishment of the offender.
- denunciation by society of the conduct.
- range of sentences in other cases.

The hearing panel also considered mitigating circumstances:

- age and experience of the member at the time the action(s) occurred.
- previous character of the member.
- history of the member's professional conduct.
- member's acknowledgement of responsibility and steps taken to disclose and redress the wrong.
- effect on the member of criminal or other sanctions or penalties.
- effect of the proposed penalty on the member.
- family and personal circumstances.
- the delay in bringing the matter before the hearing panel.

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The hearing panel ordered as follows:

1. That the member is hereby reprimanded for professional misconduct.
2. That the member shall complete and provide proof of completion of the APEGS Law and Ethics Seminar.
3. That the member shall have 12 months from the date of the Decision and Order to complete the Law and Ethics Seminar.
4. That the Decision and Order shall be published on the APEGS website and in *The Professional Edge*, without names.

Failure to comply with any of the foregoing orders of the Hearing Panel would result in the member being suspended from the Association of Professional Engineers and Geoscientists of Saskatchewan and remain suspended until there is compliance with the orders.

Member Profile

Jack Jensen, P.Eng.

I grew up on a mixed farm with my five brothers. There was an age gap, so I was the middle son of the younger three brothers. Much of the farm income was derived from shipping cream, so there was always lots of work with milking, haying and barn cleaning.

I had good marks in all subjects but I felt there were more job opportunities in math-related fields.

I went into civil engineering, what I would consider the most generalized of the engineering specialties.

I began my studies just as the transition started away from slide rules and towards hand calculators and before the era of personal computers. I remember my first-year physics professor, Dr. Katz, mention that he had seen demonstrations of hand calculators and they would soon be available. Professors had to alter how they wrote examinations to account for the advent of hand calculators. The quality of instruction was high. I remember a hydraulics course where the regular professor had to get a substitute instructor for a class and it turned out to be Professor C. D. Smith. Professor Smith found that the day's lesson was on calculating flow over weirs, so, without any notes or preparation time, he proceeded to develop the weir flow equations from first principles, which I thought was pretty impressive.

My first job was as a Resident Engineer with the Saskatchewan Department of Highways and Transportation. My projects included the paving across the recently completed Nipawin Bridge. In 1975, I married Linda, a dietetics graduate who had an intern position at Vancouver General Hospital. Within a week of our arrival, I was hired by H. A. Simons International, which at the time was the largest consulting engineering company in Canada with over 1,000 employees. My projects included the layout of large-diameter fibreglass pipes for a pulp mill being built in Longview, Wash. and site work and railway yard layout for a pulp mill in Kwidzyn, Poland. After Linda's internship period was completed, we returned to Prince Albert and I accepted a position with the Prince Albert engineering department, where I worked for the next 29 years.

Being or becoming a professional engineer was a stipulation for accepting the position with the Prince Albert engineering department. My application was submitted and approved in 1976, within months of our return to Prince Albert.

Prince Albert was emerging from decades of economic stagnation because of the La Colle Falls energy project debacle which removed the city's ability to borrow money for development. As such, most streets were gravel, arterials had strip pavement with no curbs or sidewalks and there was a backlog of underground maintenance. It was a great experience to be part of the design and supervision of needed capital works and operational maintenance. It was a small engineering department, so things like subdivision design and surface work contracts were handled in-house, and specialty work like water treatment plant upgrades were contracted to consultants.

I had several mentors including Pat Nieman, the Assistant City Engineer, and Tom Hall, the SaskPower District Engineer. Both were very knowledgeable and were willing to impart their wisdom and experience to assist a junior engineer. Mentorship also came from people who had gained valuable experience and knowledge from working in the field. They also knew what problems they faced. By developing a rapport and friendship with the sewer and water crews, we were able to work together to solve problems and effect change that they were unable to do on their own. For example, there had been a practice from earlier times to connect sanitary and storm

sewers together to divert sanitary sewage away from downstream work on the sanitary sewer. This can lead to inadvertent sanitary sewage discharge if downstream sanitary sewers get plugged. I was made aware of these interconnections and plugged them and purchased proper pumping equipment for dealing with the problem.

There was a problem with the collapsing of old brick manholes. Over time, sewer gas corroded the mortar and the interior brick edges to the extent that each exposed brick was chisel-shaped. While attending a public works conference in Saskatoon, I struck up a conversation with a contractor who applied shotcrete in mine shafts. I asked if he had ever worked in a space as restrictive as a manhole. He had not, but I arranged for a demonstration project, which would appear to be the first shotcrete-rehabilitated manhole in North America. Over time, 241 manholes were shotcreted in Prince Albert at approximately two-thirds of the cost of replacement, with little disruption to the public and with zero pavement repair costs. The fledgling shotcrete company went on to shotcrete brick and concrete block manholes throughout the Prairie provinces.

I enjoy painting, drawing, cartooning and sculpting. I am a co-founder and active member of a regional artist group called Kyla Art Group, which is planning its 45th annual fall art exhibition and sale. I have made five life-size or larger bronze sculptures. I have also made small bronze sculptures – such as the bronze beaver paperweights that have been presented annually to the APEGS incoming president since 1990 when I presented one to President Dennis Paddock.

I also like making shallow-relief cast paper sculptures. In 2010, I was Team Captain of Saskatchewan's snow sculpting team at Winterlude, the National Capital Commission's winter festival in Gatineau, Que. In 2008, I was one of two Saskatchewan artists at The Encampment, an outdoor presentation in illuminated tents set up in Major's Hill Park, Ottawa. The exhibition featured works depicting the current and historic stories of intellectually disabled people within the society. The wide variety of work was created by artists from across Canada including those with intellectual disabilities.

Another creative outlet is the creation of cartoons. I have created over 400 cartoons and have had two solo cartoon exhibitions. I have also been part of international cartoon exhibitions in Germany and Croatia.

When our children were growing up they became involved in acting and singing, so Linda and I joined them on stage in many community and semi-professional musicals, plays and fundraising events.

For the past several years, I have helped refugees learn English and navigate "the system." I am amazed by the resilience that they demonstrate as they learn a new language, look for new employment prospects and adapt to new customs in a new country far from all that is familiar. Their positive attitude and generosity has touched me greatly.

Jack Jensen has sculpted the small bronze beaver paperweights given annually to the incoming APEGS president since the early 1990s.

Gems of Geoscience

Mike Blair, P.Geo., doing demonstration for classroom

I was born and raised in Regina where my parents still live. I also have a younger brother, who works in the mining industry.

Growing up in Regina, I spent many weekends and holidays at my grandparents' farm just south of Melville. In my teen years, I focused on speed swimming with the Regina Optimist Dolphins swim club. I enjoyed every minute of the practising, racing and travelling around the country with the club.

I attended K-12 schooling in Regina before enrolling at the University of Regina in general science classes. In my first year after taking the Geology 102 class with Dr. Stephen Bend, P.Geo., I was hooked and began focusing on geology.

I quickly realized that I really enjoyed understanding why things are the way they are and geology, being very much a hybrid science, offered me the ability to study and then apply learnings in biology, chemistry and physics in the context of geology.

I received my bachelor's degree in Geology in 1999 from the University of Regina. In 1999, I started a master's thesis project with Dr. Kathy Bergman working on defining the stratigraphy of the Middle Jurassic Gravelbourg Formation in southern Saskatchewan, characterizing the changes in Gravelbourg equivalent geology between oil fields in southwest Saskatchewan and those in the Wapella area of eastern Saskatchewan.

While finishing my master's thesis, I took a geologist job at Talisman Energy in January 2001 and moved to Calgary. I left Talisman one year later to begin working at Canadian Natural Resources Limited (CNRL).

One of my many great career memories was working at a site in east Calgary logging cores for CNRL during the delineation coring phase of what is now the operating Horizon mine project north of Fort McMurray. We had a great group of geologists who managed to finish logging 26 miles of core over one winter drilling season, which we called the "marathon of core." I left CNRL in 2009 after working in many areas of Western Canada and started with Crescent Point Energy.

I have worked in several roles at Crescent Point as an exploration and new ventures geologist and in 2019 I became the Vice-President of Exploration and New Ventures. I now get to lead an excellent geoscience team focusing on integrating petrophysical logging data, seismic data and core data into geologic models while collaborating with other disciplines to calibrate oil and gas production data and other engineering data.

Prior to focusing on a career in oil and gas, I worked as a field assistant in northern Saskatchewan and northwestern Ontario during two separate summer field seasons on the Canadian Shield. My time spent in northern Saskatchewan, first with my dad and brother on a fishing trip, and subsequently as a student field assistant, left a lasting impression.

Since 2001, I have returned to the Canadian Shield in northern Saskatchewan at least once per year for fishing trips. I have my son hooked on the area. He once told me, following a fishing trip, "When I grow up, I want to live in La Ronge." I just love the endless outcrops and lakes on the shield and seeing the area from a float plane is unforgettable.

Geologists usually get asked about their favourite rock or mineral. In my case, I favour a collection of rocks and minerals. My wife is a teacher and over the years I built up a collection of samples that I would take into elementary school classrooms for a hands-on rocks and minerals class, usually with Grade 3 classes.

Prior to COVID-19, this grew to include several of our geoscience staff at Crescent Point Energy who also volunteered their time and contributed samples to the school visits. The enthusiasm from the kids and teachers during our school visits always reminds me that studying and working in geoscience is a gift, which is very rewarding and nice to consider on those busy, stressful days we all have from time to time.

Continuing Professional Development

The Continuing Professional Development (CPD) Program requires APEGS members to complete ongoing professional development activities to maintain and improve their competence. It encourages members to engage in lifelong learning to protect public health, safety and welfare. The program provides tools for members to assess their current skills, knowledge and abilities, determine activities to maintain or enhance them and report completed activities online to APEGS as professional development credits.

For more information, navigate to the CPD menu at apegs.ca.

Update - 2021 CPD Reporting Compliance Review Results

The 2021 CPD reporting cycle has ended and APEGS is pleased to say that the annual compliance rate has improved. Here's a look at the final compliance statistics as of April 1, 2022:

YEAR	2019 VALUE	2019 PER CENT	2020 VALUE	2020 PER CENT	2021 VALUE	2021 PER CENT
Members who reported No CPD	945	8%	429	3%	172	1%
Members who reported but not compliant	471	4%	739	6%	263	2%
Compliant	10,774	88%	11,298	91%	12,415	97%
Total Number of Records	12,190	100%	12,466	100%	12,850	100%

Members Administratively Suspended for 2021

Number of members newly suspended on April 1, 2022	105
Number of members administratively suspended for 2020 CPD non-compliance and also suspended for 2021 CPD non-compliance	67
Total	**172**

To ensure you are working with a member in good standing, please refer to the APEGS public Register of Engineers and Geoscientists at https://register.apegs.ca.

Featured Professional Development Opportunities

Online Ethics Module #4 Launched in May

APEGS has free one-hour online ethics modules available to assist members in obtaining their ethics credit for the year. The modules are not mandatory and are offered as one option available to members.

Ethics Module #4 is now live!

Our current ethics module topics are:

Module 1 - Professionalism and Ethics

Module 2 - Conflict of Interest

Module 3 - Investigation and Discipline

Module 4 - The Ethics of Continuing Professional Development

For more information and to access the modules, please visit the CPD menu at apegs.ca.

4 Seasons of Reconciliation

Indigenous Awareness Training

APEGS is introducing 4 Seasons of Reconciliation in partnership with the First Nations University of Canada. This online course provides an education in line with the Truth and Reconciliation Commission's 94 Calls to Action. The intent is to promote a renewed relationship between Indigenous Peoples and Canadian settlers through transformative multi-media learning.

Looking for more Professional Development Training?

Do you need help finding available professional development opportunities? The Professional Development Committee continuously sources professional development options which may be of interest to APEGS members.

Links to these courses are organized by industry and are available on the APEGS website. Visit the Professional Development Courses section under the CPD heading on the APEGS website for more details.

Does Your Next Meeting Need an Ethics Topic?

Join the APEGS ethics moment email list to receive a new ethics topic and related discussion questions for use at your upcoming meetings. A new ethics moment is emailed once a month.

When an ethics moment is included in the minutes of a meeting, along with the start and end times of the ethics moment discussion, this time can count as part of the member's annual ethics requirement.

If you would like to be added to this email list, please email cpd@apegs.ca.

GEOLOGIZE

Free Course on Practical Geocommunication

Through Geoscientists Canada, APEGS has acquired a professional development opportunity which allows all members free access to Geologize's critically acclaimed course 'Practical Geocommunication' – a $450 US per person value.

This 10-hour course has video lessons, quizzes, brief assignments and the opportunity to interact directly with Dr. Haydon Mort, the course instructor, through forums. Launched Jan. 5, 2022, the course is on-demand and available until Dec. 31, 2023. Members can sign up now and start at any point.

The geocommunications training helps geoscientists become more effective and powerful public ambassadors for geoscience. This skill is more important today than ever as professionals communicate with broad audiences about the effects and mitigation of climate change, impart knowledge concerning critical minerals, communicate with various stakeholder groups, inspire the next generation of geoscientists in the face of declining post-secondary geoscience enrolment and so many other important topics.

How to Enrol

Get APEGS' unique access code by logging into APEGS Central, the self-serve portal, where you will see the code front and centre on the main screen in the news section.

Go to https://training.geologize.org/courses/gc

1. Click on ''Member Access"
2. Register (Important - use an email address you have on record with APEGS)
3. On the payment screen, click the link 'Have a coupon?'
4. Enter coupon code (available on the APEGS Central newsfeed)
5. Click "Enroll Now"

Use of this code is limited to members of APEGS. Periodic checks will made by the course developer to ensure the code is only being used by members. Those enrolled follow the course at their own pace, with the ability to save and continue at any point. A certificate is provided at the end of the course.

Natasha Skea, P.Eng.

MANAGER OF EXPERIENCE ASSESSMENT

New Staff Member

APEGS welcomes Natasha Skea, P.Eng., to the newly created Manager of Experience Assessment (MEA) position within the Registration department. Natasha will be responsible for managing the experience assessment process including quality assurance and quality control and volunteer management and training.

The MEA also fosters APEGS' relationship with members-in-training and oversees the member-in-training to professional member registration process.

Natasha is a professional engineer from WSP and the consulting world. In the past nine years, she has held various roles with WSP but most recently performed commissioning on mechanical systems in buildings across Saskatchewan.She loves to look at the big picture, figure out how things work and try to make them work better.

She was born and raised in Regina and graduated with a BASc. in Industrial Systems Engineering from the University of Regina in 2012. In the early years of her career, she was privileged to live in Vancouver and Edmonton before returning to Regina where she lives with her husband and two small children. She is delighted to start this new chapter of her career with APEGS.

Member Grant Recipient for 2022

Khaled Zoroufchi Benis

ENGINEER-IN-TRAINING

Through the University of Saskatchewan and the University of Regina, APEGS offers six merit-based grants of $7,500 each to encourage existing APEGS members to further their education in engineering or geosciences or attain an MBA.

This year, the only member to receive a grant was Khaled Zoroufchi Benis, Engineer-in-Training.

Eligibility requirements

Members returning to post-graduation studies at either university in the field of engineering or geoscience or for an MBA program are eligible to apply. Applicants are evaluated in the following areas:

- Accomplishments in the practice of professional engineering or professional geoscience which indicates exceptional potential.
- Demonstration of leadership, volunteerism and community involvement.
- Service to the professions in public education, understanding the role of professionals in society and/or active participation in engineering/geoscience associations, societies and institutes.
- Reasons for pursuing the post-graduate degree, goals, personal statement, how their studies will contribute to the professions.

How to Apply

Applications may be sent to APEGS any time throughout the year. Applications received by Dec. 31 of each year are considered and awarded early the following year with presentations made at APEGS' annual awards ceremony, typically in early May of each year. Go to www.apegs.ca and select Member Grants under the Members menu for the application form and more information.

News From The Field

Study into potential hydrogen hub

SaskToday.ca - The potential development of a hydrogen hub in the Regina-Moose Jaw area is being supported by the provincial government as well as Whitecap Resources and Federated Co-operatives Limited.

The three are supporting a foundation report study in order to provide investors a thorough analysis of commercial-scale hydrogen opportunities and synergies with carbon-capture utilization and storage (CCUS) infrastructure in Saskatchewan.

The study is to be developed by the Transition Accelerator and the Saskatchewan Research Council. The Transition Accelerator is a pan-Canadian charity that creates positive, transformational system changes that solve societal challenges while moving Canada to reach net-zero greenhouse gas emissions by 2050. It launched Canada's first two hydrogen hubs. One is in the Edmonton region and another is in the southeast Alberta region.

The Ministry of Energy and Resources is providing a grant of $100,000 to complete the report. Whitecap Resources and FCL will provide another $50,000.

Announcing this study is the latest in a series of developments to promote and develop CCUS in the province. In September, the provincial government announced new policy commitments to advance CCUS projects, including opportunities to advance an infrastructure hub in the Regina- Moose Jaw industrial corridor that could lead to a commercial-scale hydrogen supply-and-demand chain in the province.

In October, Whitecap Resources and FCL signed a memorandum of understanding to explore CCUS opportunities as well as enhanced oil recovery and CO_2 transportation infrastructure.

BHP wants to accelerate Jansen project

StarPhoenix – BHP wants to find ways to speed up its development of its multibillion-dollar Jansen potash project.

BHP Group President Minerals Americas Ragnar Udd was in Saskatchewan in late April to evaluate options for accelerating the project.

The first stage of construction of Jansen was approved in August. It is expected to start production in 2027 and will be one of the world's top producers of potash.

This interest in speeding up the project comes at a time when supply chains are straining as a result of Russia's invasion of Ukraine, pushing up crop nutrient prices.

"If there are options to bring it forward — there may be a month or two in it one way or the other — we'll take a look at that," Udd said.

He explained that BHP isn't building Jansen "for what may play out in the next six months," but rather for its long-term value.

thestarphoenix.com

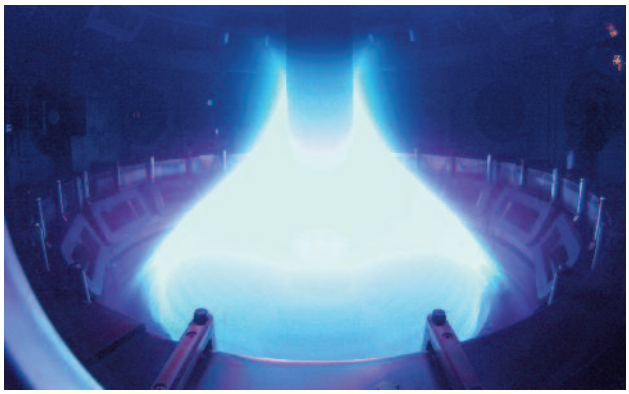
Record potash production and sales

Global News – Saskatchewan's potash sector set new records in both sales and production last year.

The Saskatchewan government said production was recorded at 14.2 million tonnes and the value of sales was $7.6 billion.

The government's objective is to increase the annual value of potash sales to $9 billion well before 2030 and it says it is on target to achieve that.

Saskatchewan's potash sector accounts for approximately 30 per cent of world production from the province's 10 mines.



wikepedia

Magnetic fusion research leader reflects

USask – Dennis Whyte, one of the leaders of the SPARC project to design and build the world's first fusion power plant, was in Saskatoon in early May to receive a 2022 USask Alumni Lifetime Achievement Award.

The honour is to recognize his significant accomplishments since graduating from USask. After graduating from Shaunavon High School, Whyte headed to the University of Saskatchewan College of Engineering (USask Engineering), where he knew almost from day one that he wanted to be in engineering physics.

Today, Whyte is a recognized leader in magnetic fusion research. Whyte is the director of the Plasma Science and Fusion Center at the Massachusetts Institute of Technology (MIT), a professor in MIT's Department of Nuclear Science and Engineering and the Hitachi America Professor of Engineering at MIT.

He credits the USask's engineering physics program and a pivotal 10-minute meeting with a respected USask professor for putting him on the path to where he is today.

Near the end of his USask degree, Whyte visited the office of Dr. Harvey Skarsgard about continuing his academic career. The timing was perfect as Skarsgard knew a colleague in Quebec looking for graduate students. Whyte earned his master's and PhD from INRS-Energie, which stands for Institut national de la recherche scientifique.

"Professor Skarsgard, God bless him. That's the 10 minutes that changed my entire life," Whyte said.

While Whyte was in town to receive his USask award, he delivered the Cheriton Lecture, detailing his work at MIT and progress on the SPARC project. Progress on the project took a giant leap forward last fall.

"On Sept. 5, for the first time, a large high-temperature superconducting electromagnet was ramped up to a field strength of 20 tesla, the most powerful magnetic field of its kind ever created on Earth," states a news post on the Plasma Science and Fusion Center website.

Developing the new magnet was seen as the greatest technological hurdle in developing a viable fusion power plant.

"You could argue that this moment changes the trajectory of humanity, because it's the ultimate energy source that we've never been able to realize," said Whyte.

"It sounds a little overly poetic but it's actually an arc that you could argue started with fire."

That discovery – creating a star on Earth – on its own is not enough, according to Whyte.

"What you actually have to have is a practical energy system that takes that and puts watts on the grid for everyone in the world."

Whyte says the scale-up and the commercialization of the technology will use skills he first developed while studying at USask.

"That's exactly what engineering physics is. It's got deep physics but it's got practical aspects of applying this to the real world."

Northern Saskatchewan mineral exploration conference

larongeNOW – The demand for minerals found in Northern Saskatchewan as well as the number of people required to work in exploration was discussed at a recent conference in Air Ronge.

Keewatin Community Development Association CEO Randy Johns hosted a conference called Core Days 2022 which attracted exploration companies, government agencies and others. Appia Rare Earths and Uranium Corporation, CanAlaska Uranium, Eagle Plains Resources, Fortune Bay Corporation and MAS Gold Corporation were some of the companies there.

The event included presentations about various projects and mineral deposits throughout the region.

"There's more gold that is coming on stream. There is rare earth [minerals] and there is a whole lot of interest in uranium, so we're looking at a boom here is what's going on," Johns said.

Johns also noted Cameco is reopening the McArthur River mine site and Key Lake mill. By 2025, the uranium giant is expected to hire hundreds of new employees.

Energy industry representatives support Ukrainians

SaskToday – Steve Halabura, P.Geo., has organized a group of people in the energy industry concerned about what is occurring in Ukraine to form what is being called the Sunflower Network to bring Ukrainians to Saskatchewan.

The Sunflower Network is comprised of about 25 people between Saskatchewan and Alberta. The Saskatchewan contingent includes representatives from Estevan, Carnduff, Moosomin, Saskatoon and Abernethy.

Brian Crossman of Estevan is part of the group. He said many of Ukrainians who could come to Saskatchewan are now staying in Poland and other countries.

"They can choose to stay in Canada, or when the war is over, they can go home," said Crossman.

Halabura has brought a doctor and his wife to Saskatoon. Crossman expects an influx of Ukrainian people moving to communities across the province. The people in Abernethy want people interested in farming, while those in Estevan are looking for those interested in the energy sector.

Many Ukrainians are talking to their families in Canada, which helps them get to this country. Some of those Ukrainian families moved here more than a decade ago during the Saskatchewan boom years.

world-nuclear-news.org

Plan for small modular reactors launched

CBC Saskatchewan/The Leader-Post – Saskatchewan released a joint strategic plan with Ontario and Alberta to expand the use of nuclear power using small modular reactors (SMR).

The plan calls for support to develop three types of SMRs, a regulatory framework, a waste-management plan, opportunities for Indigenous participation and public engagement and co-operation with federal authorities.

SMRs take about 12 years to develop. The plan includes a goal of building its first modular reactor in Ontario by 2028. Four more would be built in Saskatchewan starting 2034.

The Saskatchewan government has not determined where a new reactor would be located but intends to have a site chosen by 2023. Public engagement on selecting a site is expected later this year.

Initial plans would be submitted to regulators in 2024. How the supply chain would work is to be figured out by 2026. Uranium would be mined in Saskatchewan, but where it would be enriched has not yet been determined. Waste is to be stored at one of two locations in Ontario. A storage site is expected to be chosen in 2023.

In 2027, the province would send regulators an impact assessment for the first facility so it could be approved by 2030. The industry is regulated by the Canadian Nuclear Safety Commission.

In 2030, Saskatchewan would then make a decision on whether it should proceed. Construction would begin in 2031 with the first SMR operational by 2034. Saskatchewan could see a total of four SMRs by 2042.

Saskatchewan is also looking at developing "micro" SMRs. These would not be tied to the grid and could be used in northern and remote communities as well as for industrial sites.

SMRs could be a tool in fighting climate change and reducing Canada's reliance on fossil fuels, Esam Hussein, P.Eng., the dean of engineering and applied science at the University of Regina and a member of the Canadian Nuclear Society said.

Governments wanting to move away from coal-fired energy to reduce greenhouse gas emissions need to add nuclear power alongside wind, solar and hydro, said Hussein. He sees renewables as being key in the future of energy, but says they are generally only available 30 per cent of the time. Nuclear power is available over 90 per cent of the time, which could help develop renewable energy.

"I see that having a baseload — clean, no greenhouse gas emission baseload — will actually encourage more development and more use of renewables because now you have the backup," said Hussein.

A federal government plan requires provinces phase out coal by 2030. Ottawa also wants Canada to produce net-zero emissions by 2035.

MOU signed for micro-reactors

Government of Saskatchewan – It was announced in mid-May that the Saskatchewan Research Council (SRC) and Westinghouse Electric Canada signed a Memorandum of Understanding (MOU) to advance very small modular reactors (vSMRs), also known as micro-reactors, in Saskatchewan.

The two will jointly develop a project to locate an eVincitm micro-reactor in the province for the development and testing of industrial, research and energy-use applications. It, as well as its surrounding infrastructure, is approximately half the size of a hockey rink. It is capable of producing five megawatts of electricity, over 13 megawatts of high-temperature heat, or operating in combined heat and power mode.

The eVinci micro-reactor nuclear battery provides power solutions at a different scale than centrally generated utility-scale power. It can support remote mining operations, remote communities, individual industrial heat and power scenarios, distributed hydrogen generation and integrated energy solutions.

esemag.com

Lake Diefenbaker irrigation expansion project

Western Investor - Engineering work is being pointed to as the reason why construction of the $4-billion Lake Diefenbaker irrigation expansion project has not begun.

The project is to double Saskatchewan's irrigation capacity. It is still in the design phase nearly two years after it was announced by the Saskatchewan government.

"I realize people always want to see some dirt being moved and something being built," SaskBuilds minister Jim Reiter said.

"But a project like this, there's an incredible amount of engineering that goes into it."

Provincial officials are waiting for a pre-design engineering report that has been in the works since last year. This will be followed by more engineering. There is also consultation and environmental work to be done, said Reiter. Concerns about downstream impacts on the Saskatchewan River delta at Cumberland House, lake levels and more need to be addressed.

While the pre-engineering work continues, so, too, does work on the business case for the project. The cost of the project is a concern, Reiter said. The province hoped the federal government would invest in the project as it contributes to climate resiliency.

Ottawa is steering Saskatchewan toward the federal infrastructure bank instead. Reiter said the province is looking to partner on the project, not find a lender.

The recent provincial budget allocated $23 million specifically for work at Lake Diefenbaker. The project includes three phases: the rehabilitation and then further development of the Westside irrigation area and then the construction of the Qu'Appelle South Water Conveyance, which will include irrigation. When complete it could add 500,000 acres of irrigation.

Reiter said shovels could be in the ground in 2023.

USask identifies sectors risking freshwater

USask – A "first of its kind" report by University of Saskatchewan (USask) researchers establishes the scientific case that industry activities are leading to severe and systemic impacts to freshwater resources.

"Our research clearly makes a case that industries such as food production, energy production, textiles and technology must do better not only to protect the freshwater resources of our planet, but to remain competitive in the market," said Dr. Jay Famiglietti (PhD), executive director of the USask Global Institute for Water Security (GIWS), who led the team of researchers working on the report.

The Global Assessment of Private Sector Impacts on Water report looks at threats to global freshwater systems, including groundwater depletion, metal contamination, plastic pollution and water diversion.

"Water has been the messenger that is delivering the harsh realities about climate change to us," said Palash Sanyal, engineer-in-training, strategic partnership and project manager at GIWS and a co-author of the report.

"Now scientists, industry and non-profit partners are all needed to do more to assess the impacts on our global water supply and to protect and manage our water in the future. There is a lot more that needs to be done to assess the impacts and the report is a step towards that."

Industries and consumers are being asked to start thinking about how much freshwater is used in products and food. Those who wrote the report wanted to provide investors, businesses, and stakeholders with core actions that would improve how threats to freshwater could be mediated as well as innovative actions around water quantity, water quality, ecosystem protection, access to water and sanitation and public policy engagement and water governance.

"As climate changes and our population grows, clean water is becoming scarcer for most people around the world," he said.

"We have the data, we have the maps, we have the research to show what's going on, but we can't move the needle on protecting global water resources without committed industry leadership and stewardship."

The report was co-developed with the support of U.S.-based not-for-profit group Ceres. It is the latest from the Intergovernmental Panel on Climate Change warning of how the world stands on the edge of unavoidable and irreversible adverse impacts from rising temperatures.

News Beyond Our Borders

cbc

B.C. engineers disciplined

CTV Vancouver - Three engineers have been disciplined nearly eight years after the Mount Polley disaster, one of Canada's worst mining catastrophes.

The tailings dam at the Mount Polley copper and gold mine failed in August 2014, releasing more than 20 million cubic metres of mining wastewater into surrounding waterways in B.C.'s Interior.

Engineers and Geoscientists British Columbia, a provincial regulatory and licensing body, said investigation into the Mount Polley disaster was among its most complex cases, taking years to complete. The regulator reviewed thousands of documents including contracts, technical reports and drawings, correspondence and daily site reports.

During disciplinary hearings, it did not make allegations or findings as to the cause of the embankment failure.

That investigation resulted in two former engineers being ordered to pay a combined $226,500. A third has been temporarily suspended and ordered to complete additional training.

Former engineers Todd Martin and Stephen Rice were ordered to pay $94,000 and $132,500, respectively, in fines and legal fees after the panel found both acted unprofessionally.

The regulator said Martin, who was responsible for the geotechnical engineering work at the mine, admitted in a consent order that some of his work was not consistent with prudent engineering practices, including his failure to recommend drilling to improve embankment foundation soils and his failure to record important field observations in 2011. Martin resigned his licence in 2020.

Rice's unprofessional conduct included failing to properly fill the role of review engineer and allowing a junior engineer with little experience in embankment design to act in a senior role on the project, the regulator said. Rice resigned in 2018.

Neither is permitted to practise professional engineering in British Columbia; however, they can reapply under conditions.

Laura Fidel, who was the junior engineer, was found to have failed to ensure sufficient observation of the dam and to monitor seepage flows that could provide evidence of unsafe embankment conditions. The panel ordered her to undergo more training and suspended her registration as a professional engineer for two months.

After the breach, Engineers and Geoscientists B.C. says it also took actions to improve dam safety, including producing professional practice guidelines relating to dam foundations, updating existing guidelines to clarify certain duties and hosting professional development seminars.

It is currently updating guidelines on legislated dam safety reviews, it said.

“The conclusion of these cases, combined with resources we've developed to improve dam safety, will strengthen our professions and our province's environmental safeguards,” said Engineers and Geoscientists B.C. CEO Heidi Yang in a statement.

Proposed change to definition of engineer opposed

Engineers Canada – A change to the definition of the term “engineer” that is being proposed to the Canadian Standard of the American Society for Testing Materials (ASTM) F2783 has been flagged.

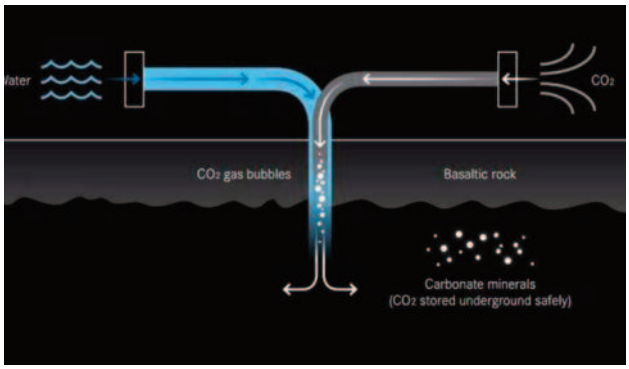
The change is specifically related to ASTM F2783-20 - Standard Practice for Design, Manufacture, Operation, Maintenance, and Inspection of Amusement Rides and Devices, in Canada.

The current definition states that an engineer is “defined by and licensed in accordance with the applicable provincial or territorial statute.” The proposed change would be that an engineer is “defined in accordance with the applicable local statutes or by the AHJ”. (AHJ stands for authority having jurisdiction.)

It is understood that the change is being proposed to “harmonize the Canadian version of the code with the U.S. version.”

Engineers Canada pointed out to the American Society for Testing Materials (ASTM) International in a letter that in Canada, the terms “professional engineer” and “engineer” are restricted by provincial law. Those terms are used in reference to individuals

who hold a licence with a provincial or territorial engineering regulator. Just as it is in the medical and legal professions, engineers in Canada are licences to be held accountable in the provinces in which they conduct their engineering work. Legislation in all Canadian provinces and territories provide engineering regulators the mandate to regulate the practice of engineering in the public interest.



phys.org

Research advances carbon-capture and storage

The Kindersley Clarion – Improving how carbon dioxide is stored and absorbed when it's pumped underground for safe, long-term storage is the focus of work being done by a University of Alberta researcher.

Amy Tsai, a Faculty of Engineering professor, is closely looking at the processes of carbon capture and storage (CCS) to get a better idea of how CO_2 is transported and dissolved in deep underground saline aquifers.

These natural geological formations of porous rocks filled with salty water store and eventually absorb the CO_2 as part of the rocks over decades, helping mitigate atmospheric emissions.

Saline basins are already being used in Alberta and Saskatchewan. Tsai said they hold massive potential for CCS, noting that the underground formations can store millions of tonnes of carbon dioxide per year.

However, the amount of CO_2 that can be injected at any given site and how quickly it can be injected still needs to be discovered.

"Having that data is crucial for assessing suitable CO_2 storage sites and for successful computer calculations for CCS processes," said Tsai.

To get more accurate measurements, Tsai's lab is exploring at a very small scale how the CCS process works when the CO_2 is injected underground at the supercritical, or heated, high-pressure stage. Pushing the CO_2 to that stage is a necessary part of carbon capture and storage.

However, supercritical CO_2 is difficult to visualize at pore scales. Tsai's lab is capturing the dynamics of how CO_2 dissolves and transfers into water and saline once it is underground by using microscopes and high-speed imaging and by mimicking the same conditions as a deep saline aquifer.

"We're looking at how much and how fast CO_2 can be stored in the brine at a small scale, comparable to factors such as how porous the rocks are."

The research allows the rock pores to be closely viewed for any impurities, such as salt crystals, that could block the way and hinder the injection of the CO_2.

"We'll now be able to see the whole process in a very clear way and this will help determine a storage rate that will let us know how fast and at what volume we can transfer and store carbon dioxide at a particular site.

"That knowledge will help give resource companies a better idea of their capacity for carbon transfer and storage."

Tsai's work also explores the process of using CO_2 in enhanced oil recovery, which injects carbon dioxide underground while the oil is pumped out.

Using additives, such as foam, polymers and nanoparticles, Tsai and her team hope to shed light on how CO_2 interacts with the substances to displace thick, sticky oil and ultimately extract more.

The results are important for oil and gas companies seeking to extract more oil using supercritical CO_2 while mitigating emissions, Tsai added.

Tsai's team began its research in 2017, publishing papers that detail insights into how salt crystals block pores, how CO_2 transports at pore scales and how CO_2 dissolves in fluids in a supercritical state.

"Some of our observations are unique for the first time, specifically for supercritical states and that's exciting. This technique we are developing opens a lot of doors to other potential CO_2 and microfluidic applications, as well as chemical engineering processes."

Tsai's work is funded by her Canada Research Chair in Fluids and Interfaces, the Natural Sciences and Engineering Research Council of Canada and Future Energy Systems.

Drilling program provides communities data

Nuclear Waste Management Organization news release - The Nuclear Waste Management Organization (NWMO) has completed a deep borehole drilling program to narrow in on a site for storing used nuclear fuel.

The geology of two potential areas in Ontario has been studied for more than 10 years.

Drilling program is a key milestone in the site investigations.

Approximately eight kilometres of core samples were pulled from the bedrock at two sites under consideration. Borehole drilling and testing up to 1,000 metres below the

surface is part of the NWMO's broader site investigation work to ensure the site will meet stringent regulatory requirements.

The project will be one of the largest environmental infrastructure projects in Canadian history. Studies to confirm a safe location for a deep geological repository to safely contain and isolate Canada's used nuclear fuel are being led by some of Canada's top geoscientists.

Canada's plan for used nuclear fuel, known as Adaptive Phased Management, calls for centralized containment and isolation of this country's used nuclear fuel in suitable rock formation in an area with informed and willing hosts. This drilling program will provide data that will provide insights for those communities considering hosting the project.

The NWMO is on track to finalize site selection in 2023.

cbc.ca

Burning rocks provide insight about Mars

CBC - Rocks so hot they will melt boots exist in an area in the Northwest Territories where a mineral formation could help researchers understand the geological history of Mars.

That area is known as Smoking Hills area, or Ingniryuat in Inuvialuit communities. It is where a mineral known as jarosite is located. There is a lot of it on Mars, but is only in a few locations on Earth.

"You don't see burning rocks all over the world," said Steve Grasby, a scientist with the Geological Survey of Canada, who recently published research on the formations in the journal Chemical Geology.

Studying these formations helps those like Grasby understand Mars' environment and how it evolved. This timeline suggests that planet could be more hospitable to life that earlier believed.

The shale in Ingniryuat were deposited around 83 million years ago in oceans with an environment comparable to today. Jarosite is found in areas of Mars assumed to be acidic, but the planet may not always have been acidic, said Grasby.

"It could be something that happened millions of years later to form those layers, just like in the Smoking Hills," he said.

Jarosite is layered in low-grade shales at the mouth of the Horton River, where it meets the Beaufort Sea. The burning shales have such influence that the river formed a new terminus. Grasby says that is a new delta forming. On Earth, smoking shales appear in other high-latitude places, such as Smoky River Alta., northern Yukon and Greenland.

That N.W.T. area is so highly acidic that scientists need protective clothing and respirators with special filter cartridges for the fumes in order to take samples that have a negative pH. It is even more acidic than a mine tailings drainage site, where jarosite is also found.

It is also unbearably hot, making it difficult to collect samples. They were so hot they melted right through the jars and if spilled, would burn through clothing.

Oreo study making science accessible

CTV News - A mechanical engineer who studied splitting Oreo cookies hopes her research will get others curious about science.

"The best scientific research, even at MIT, is driven by curiosity to understand the world around us, when someone sees something weird or unknown and takes the time to think 'I wonder why that happens like that?,'" said Crystal Owens, who was the lead author of a study published in the American Institute of Physics.

She wanted to determine how to twist the cookie in a way that the cream between the wafers split and perfectly distributed across both halves.

"We learned, sadly, that even if you twist an Oreo perfectly, the cream will almost always end up mostly on one of the two wafers, with a delamination of the cream, and there's no easy way to get it to split between wafers," Owens said. Delamination is when something splits apart into layers.

If you do manage to separate the cookie evenly, the study explains it likely wasn't the result of your effort. It has more to do with the level of adhesion between the creme and cookie, which other factors have altered before you get the cookie, which could be a question for another study.

"We didn't even begin to answer all of the questions someone could ask about Oreos or cookies, which is why we made our Oreometer, so anyone with access to a 3D printer can make other measurements," Owens said.

The Oreometer is designed to split Oreo cookie with a scientifically precise amount of torque, which is a measure of force used to rotate an object.

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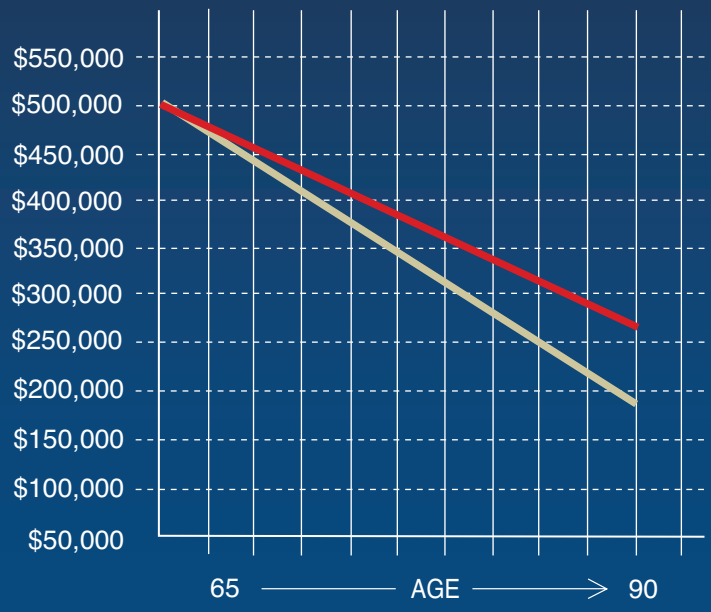

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Calendar of Events

Below are some featured events. Please see the Events calendar online for a full list of events: https://events.apegs.ca/

GeoConvention 2022
Calgary, AB
June 20-22, 2022
https://geoconvention.com/

2022 ASHRAE Annual Conference
Toronto, ON
June 25-29, 2022
https://www.ashrae.org/conferences/2022-annual-conference-toronto

SES Lecture – CERN Engineering
June 27, 2022
https://www.eventbrite.com/e/ses-lecturescern-engineering-tickets-355767810097

SES Lecture
IT & Security Challenges at CERN
June 28, 2022
https://www.eventbrite.com/e/ses-lectureit-security-challenges-at-cern-tickets-357582357457

SES Lecture
Why Control System Cyber-Security Sucks
June 29, 2022
https://www.eventbrite.com/e/ses-lecturewhy-control-system-cyber-security-sucks-tickets-357586680387

LEED Green Associate (GA) Training
On demand or live webinar
July 9, 2022
https://leadinggreen.com/online-leed-green-associate/

ACEC-SK Leadership Certification Program – Course Three
July 26, 2022
https://www.acec-sk.ca/events/acecsk_leadership_certification_program.html

ACEC-SK Leadership Certification Program – Course Four
September 13, 2022
https://www.acec-sk.ca/events/acecsk_leadership_certification_program.html

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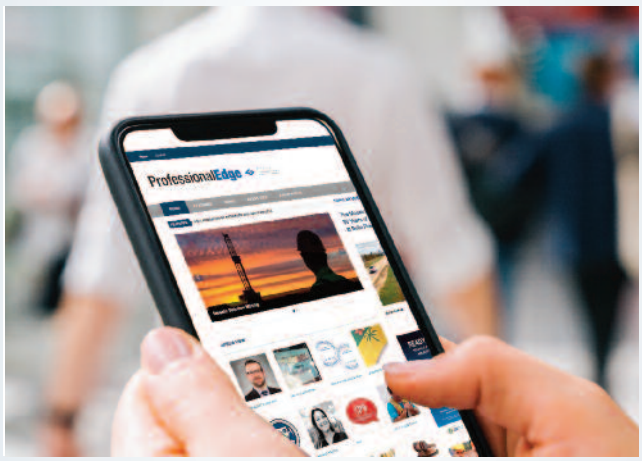

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