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*Association of Professional Engineers
& Geoscientists of Saskatchewan*

THE PROFESSIONAL

EDGE

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2018
Salary Survey

Waste Management

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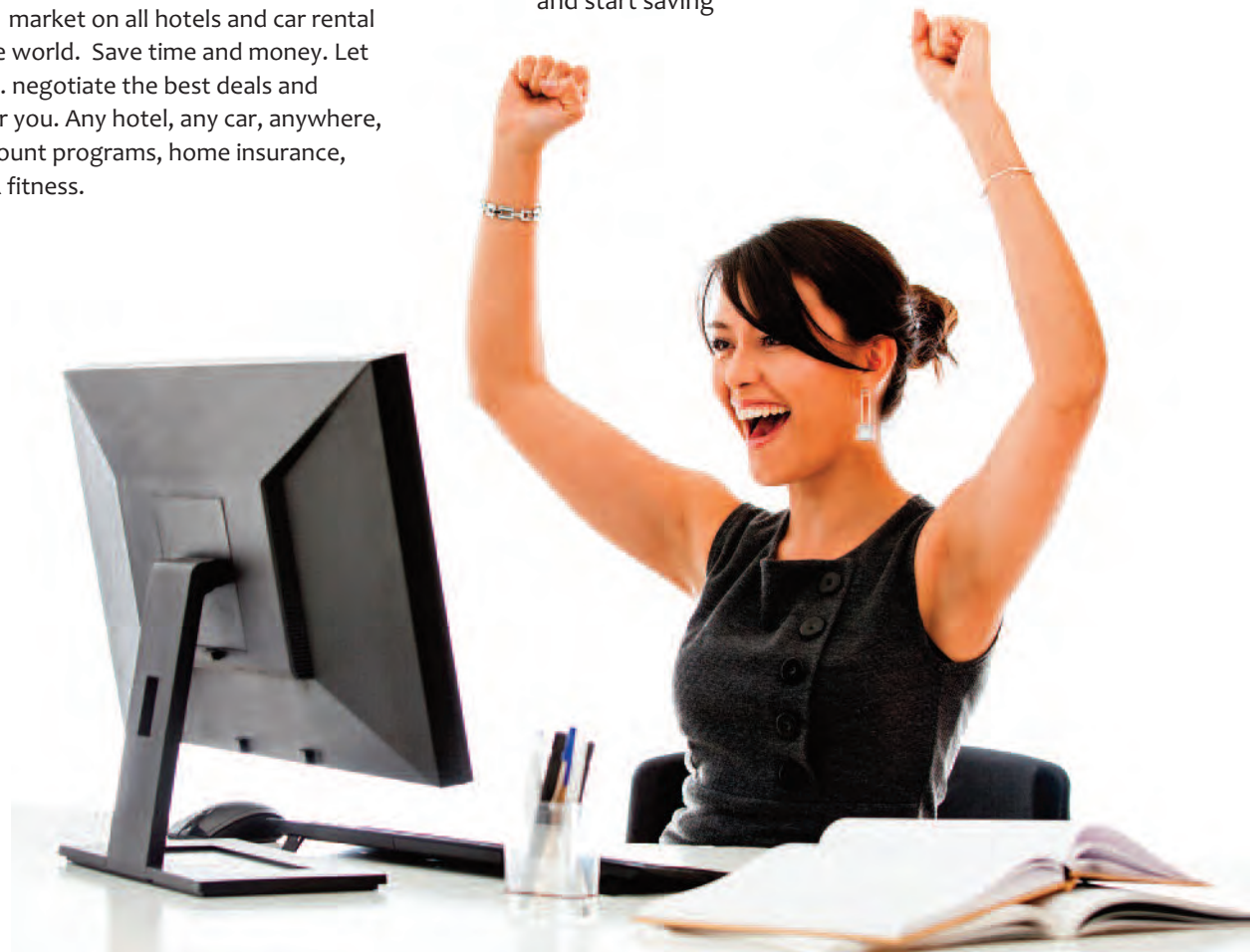
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President's Message



Stormy Holmes, P.Eng., FEC

In recent years a few professions across the country have had their privilege of self-regulation removed. Looking into why this privilege has been removed we see that some organizations have deviated from their core requirements as defined by their Acts and Bylaws. APEGS firmly believes that we are best positioned to regulate the practices of professional engineering and professional geoscience for the protection of the public. As such, we need to be sure that what we do is within the bounds of our Act and Bylaws.

We had a number of events this June focused on reviewing how well we are aligned to the Objects of the Association: The New Councillor Orientation. June Council Meeting and Council Planning Session were conducted in Yorkton as part of the APEGS Annual Planning Cycle. During the Continuing Professional Development and Competency Based Assessment town halls earlier this year, we found that our members appreciate local contact. As a result, we are working on various ways to interact with our members in their local communities. Part of that local contact included holding the previously mentioned events outside of Saskatoon and Regina and inviting the local members to attend.

This year was the first time we held a New Councillor Orientation session. This idea was garnered from one of our sister associations during a visit to their Annual Meeting. The orientation was a chance to help inform our new councillors on current and future issues to be discussed at council meetings, the APEGS organizational structure and the board and committee structure. Our new councillors also received guidance regarding their role as a councillor as well as many other items. The sessions provided them with an opportunity to network with each other and senior APEGS staff. This event will help our councillors understand how their work fits within the APEGS acts and bylaws.

APEGS Strategic Planning is laid out in the APEGS Value Proposition (AVP), which embodies the strategic and operational direction for our association. Anchoring the AVP are the Objects of the Association, found in Section 5 of *The Engineering and Geoscience Professions Act*:

- (a) to ensure the proficiency and competency of members in the practice of professional engineering or the practice of professional geoscience in order to safeguard the public;
- (b) to regulate the practice of professional engineering and the practice of professional geoscience by members in accordance with this act and the bylaws;
- (c) to promote and improve the proficiency and competency of members;
- (d) to foster the practice of professional engineering and the practice of professional geoscience by members in a manner that is in the public interest.

During the Council Planning Session, which was attended by many of the committee chairs, several factors discussed revealed the need for a review of the APEGS Council, Board and Committee organizational structure. Reviewing the committee's Terms of Reference has indicated possible misalignments with the Objects.

Over the past year, the APEGS Communication Manager has provided a view of how our structure is working and the tools to develop and implement a communications plan. Finally, a review of the council electoral groups indicates that some disciplines represented are no longer current.

I look forward to seeing the outcomes of the review process and sharing the results with our membership.

Honouring Mentors



Do you have a story to tell about someone who was a special mentor in your life?

Was there a university professor, a workplace supervisor or a colleague who made exceptional efforts to guide you on your professional career?

The November-December 2018 issue of *The Professional Edge* will be all about mentors. We invite you to take this opportunity to help us give these special people the credit they deserve.

Please send your suggestions to: Lyle Hewitt, Managing Editor, Professional Edge
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A fibre line in Emterra Environmental's Single Stream Material Recovery Facility in Regina

Swords, Cow Heads and Miracle Glass: Adventures in Recycling

BY MARTIN CHARLTON COMMUNICATIONS

For the record, cow heads cannot be recycled. “One of the biggest challenges in the recycling industry is sorting. People put an astonishing array of things into their recycle bins. For us, it isn’t ‘everything but the kitchen sink’. It’s literally everything including the kitchen sink. No joke, we once had a cow head come through the line,” says Tim Teeple, general manager for Emterra Environmental’s Saskatchewan operations.

Emterra, based out of Burlington, Ontario, provides a wide range of recycling and other waste diversion services to municipalities and businesses across North America. The familiar residential blue bins in Regina and surrounding communities are contracted to Emterra.

Eye Can’t Do It

Teeple has worked in the recycling industry for over 30 years. Over that time, the single biggest change he has seen has been the overwhelming growth in the volume and variety of recycled material as individuals, municipalities and businesses have become more engaged in the waste reduction effort. But this growth has also strained the ability of recycling facilities to keep up with demand.

“The simple fact is that the traditional methods of manual sorting of materials just aren’t feasible anymore. If you consider plastics alone, which have to be sorted into different types according to resin levels, the stream of product coming through a conveyor belt is going by so fast

that it's effectively impossible for the human eye to make those distinctions," Teeple says.

Instead, Emterra now employs a single stream recycling system that automates the process.

"We still do some manual sorting to filter out some larger or obviously inappropriate objects. We also use conventional mechanical filtration techniques to take out small objects. From there, we use a system of optical sensors, pneumatic tubes and magnets to separate the materials," says Nevil Davies, director of special project and process improvement at Emterra Group.

The automated sorting system, located at the Global Transportation Hub (GTH) in Regina, can disentangle everything from different types of plastic to paper to metal. The system typically allows Emterra to recover 20 to 25 per cent more recyclable material compared to systems where the consumer pre-sorts materials into different bins.



Bales of waste paper and plastic at the Emterra facility

Setting the Example

Emterra's GTH facility is its newest and most state-of-the-art, putting the company at the top of the industry in resource recovery. Completed in 2013, it's Emterra's first facility built from the ground up to incorporate environmental sustainability. The 45,000 square foot plant follows Leadership in Energy and Environmental Design's (LEED) best practices for the design, construction and operation of high-performance green buildings.

The facility is designed to process over 50,000 tonnes of recyclables each year. But it doesn't just process recyclables. It uses them. In addition to its energy-saving aspects, some of its features include:

Recycled Asphalt: Over 250 metric tonnes of recycled asphalt were incorporated into the site development.

Green Windows: All aluminum components are made from approximately 50 per cent recycled materials.

Recycled Metal Structure and Panels: Nearly 137 metric tonnes of recycled steel is included in the structure and cladding systems.

The Glass Menagerie

One of the most difficult and, at times, controversial aspects of the recycling business is glass.

Hard fact: It doesn't really get recycled.

"Just think about the journey a glass bottle makes from your house to the recycling facility. You toss it, probably pretty roughly, into the bin. Then it's dumped into the collection truck where it's compacted several times. Then it's dumped out and shoved around on the floor of the processing facility," Teeple says.

"We sometimes get whole, intact reusable glass containers that come through the line. We have a name for them. We call them 'Miracle Glass'."

The rest of the sharp chunks of shattered glass must be filtered out of the pile of recyclables before it goes into the single stream process.

"We call these glass 'fines' and they are removed through a series of conventional size-sorting filters. The trouble is that other objects of the same size get filtered out at the same time so what comes out the other end isn't glass so much as it's a mish-mash of trash with some glass in it," says Davies.

Since no economical method has yet been found to extract the glass from this conglomeration, it is most commonly just sent to the landfill. Emterra and others in the industry continue to look for other applications for this material including "glassphalt" road-coating material or as an aggregate to fill drill sites.

The Sword of Beijing

While most of the world today is focused on trade disputes with America, the recycling industry has found itself struggling with new Chinese regulations bearing the dramatic name National Sword.

China has traditionally been the world's largest market for recyclable materials, especially paper and plastics. This market was assisted by relatively lax regulations about the treatment of mixed waste (i.e. garbage) in shipments of recyclables. Previously, Chinese buyers of recyclables used a system similar to the dockage system familiar to Saskatchewan farmers. There was a guideline for levels of mixed waste but, if the guideline was exceeded, the buyer would simply penalize the seller but still accept the shipment.

But the Chinese government has grown tired of accepting the world's garbage so it has brought in strict new regulations. Under National Sword, the levels of acceptable mixed waste have been slashed dramatically. Further, the limits are enforced by government inspectors and shipments will be sent back if they fail to meet them.

"This has thrown the entire recycling industry into crisis. The targets the Chinese government have set are not really achievable. The industry is struggling to adapt. Recyclers who have long-term contracts with municipalities are trying to renegotiate those contracts to account for the higher processing costs. Materials that once had a market are now ending up in landfill," Teeple says.

Emterra has a couple of advantages in facing this challenge. First, it was ahead of the curve in adopting optical scanning technology that helps reduce the level of mixed waste.

"We managed to acquire 10 of them early on. Today, the wait time for optical scanners is over 50 weeks," Teeple says.

Emterra also has its own plastics recycling facility in Ontario that handles most of the materials it gathers from its North America-wide operations so it is not as dependent on the Chinese market for those products. Paper, on the other hand, remains a problem.

Consumers Are the Key

Teeple and Davies deliver a message that is common throughout the waste management sector: effective recycling starts with the consumer.

"It isn't just a matter of throwing everything into the big blue bin. It's important for consumers to do a bit of a pre-sort by being knowledgeable about what kinds of materials can and can't be recycled. It's a small thing, but rinsing your recyclables well makes a huge difference. Unrinsed yogurt containers, for example, are a big headache for us because the yogurt gums up the machinery," Teeple says.

"The goal for all of us is to keep material out of the landfill but we all have to work together to achieve that goal."

"It isn't just a matter of throwing everything into the big blue bin. It's important for consumers to do a bit of a pre-sort by being knowledgeable about what kinds of materials can and can't be recycled. It's a small thing, but rinsing your recyclables well makes a huge difference."



Emterra Environmental's Regina facility can process 77,000 tonnes of recyclables annually

Mine Ambassador

The People Side of Mining and Environmental Management

BY MARTIN CHARLTON COMMUNICATIONS



Mark Liskowich, P.Geol. (right) enjoying a tour of the community of Patuanak with Chief Lawrence McIntyre (left) of English River First Nation



Mark Liskowich, P.Geol.

Engagement before exploration. That's the secret to Mark Liskowich's success. Liskowich's geology degree enabled him to secure a career in mining and exploration, and eventually with SRK Consulting where he has served as a principal consultant for the past

12 years. But it's his people skills and social interactions that allow him to achieve favourable outcomes within that role.

Engaging Communities

Liskowich's main area of work centres around environmental mine management (tailings, waste rock and contaminated water), permitting and social licensing and closure for mining projects. Through phone calls and face-to-face meetings, Liskowich engages community and First Nations leaders and stakeholders whose neck of the woods may be impacted by proposed mining projects and subsequent outcomes from those projects.

"By trade, I'm a geologist. But (people skills) is something you gain through experience and it's a very big part of what I do," Liskowich said from his SRK office in Saskatoon.

"Working and living in northern Saskatchewan is probably where I got the foundation for it. It's being involved with First Nations communities and understanding their needs and their concerns. It's about going into every meeting with an open mind. There's a significant cultural difference between European culture and Aboriginal culture and being able to recognize those differences goes a long way to helping to bridge and develop those relationships. Basically, it comes down to respecting people and treating everyone as equals and listening."

Career Transition

Liskowich has been involved with environmental management of the mining industry as far back as 1992. His career began with the provincial government as a mines inspector in northern Saskatchewan before he transitioned to a role as manager of the Northern Mines Monitoring Secretariat – a communications conduit between regulators



Liskowich facilitating a community workshop in the community of Ile a la Crosse for Denison's Wheeler River Uranium Project

and the uranium industry and northern communities. He worked in this role for several years, with a focus on uranium mining. Following that, he served for five years as the head of technical and environmental services for the Giant Mine remediation project in Yellowknife.

"I chose to get into consulting at that point," Liskowich said. "I joined SRK with the intent of opening an office in Saskatoon. SRK, as a company, had done a lot of work in Saskatchewan over the years and felt it was time that we had a physical presence in the province."

What sparked that change from geology to environmental management? People. And a better understanding of how the industry operates.

"I felt it was important that people managing the environment within the mining space had some understanding of mining and exploration," he explained. "That was my main driver. If you're going to regulate an industry you should have a little bit of understanding of it."

Building Relationships

Saskatchewan is a global hotbed for mining. According to a survey from the Fraser Institute, which measured the attractiveness of a jurisdiction for mining, Saskatchewan landed the top two spots in the world – with uranium and potash leading the way. The analysis looked at a mix of

things such as mining reserves, public policy, ease of permitting. Even with commodity prices softening, investment generated by mining is significant and important to any jurisdiction.

But before a drill hits the ground, relationships need to develop. What is the environmental impact of the proposed project? The socio-economic benefits? These questions and several others are addressed by Liskowich and his team when they meet with community leaders and stakeholders.

It starts with a phone call. He'll contact the leadership of the community or the First Nation and request an opportunity to meet to tell them about the project. Liskowich requests that they be a part of the ongoing process to move the project forward. From there it moves to a broader audience like community interest groups.

If handled properly, these bonds usually last the lifetime of the project – development, design, construction, operation and closure. As well, there's opportunity for stakeholder engagement in all phases.

"There has been a lot of work in northern Saskatchewan in the last 20 years with respect to mining and engaging communities, much more so than in other jurisdictions in other parts of Canada," Liskowich continued. "We have a very strong record of that here. If there was a flaw in that, it's that we're not engaging the communities early enough. I hear

from communities and they tell me more often than not we come in after we've started the mine and after we submitted our applications. They would have liked to have been at the table with us when we started so they can be prepared and bring their community along with the project.

"Because it's people dealing with people, it takes time. You have to develop a relationship with communities, with individuals, and if you're able to develop those relationships early in your process for a new project, nine out of 10 times you're going to get acceptance of that project by those groups. They're allowed to move along with the project and be a part of the successes of the project. They'll also have ownership of some of the controls that are involved with the project in order to protect their interests – whether they be environmental or socio-economic."

That's where Liskowich and his social interactions come into play. Phone calls and in-person meetings dominate much of his preparation. While Liskowich understands that social licensing is a common term, the definition may change from group to group. His interpretation of a social license is simple.

"It's a positive relationship, a partnership, agreements to work together... between proponent and stakeholder," he said. "It's based on a relationship that is founded on trust. It typically has, in mining space, commitments from the proponent to work with the stakeholder groups to, as the project benefits, so do they."

Overcoming the Past

There have been cases of mining companies with a dark past. This, propped up by negative media attention, makes Liskowich's job challenging at times. Some community groups are more difficult to consult with than others – though the commodity makes a difference, as does the location.

"As an industry, I don't think we have done a great job of promoting the positives of mining," Liskowich said. "The press that you see and read on mining seems to be about the mistakes or the accidents over the years. Mining is no different than any other industry – if there's a townhall meeting, typically, the majority of the people who come are the ones who have an axe to grind or have something to say against the particular project. You have to be ready to deal with people who come in with a negative approach or

negative opinion. Ideally, in order to overcome that, you go into the communities as early in the process as possible."

Liskowich explained there wasn't a lot of emphasis placed on the environment in the early days of mining. A number of sites throughout the country are lasting reminders of poor management from the past. But in some cases, the legacy still persists.

Steps have been made to improve the industry's reputation. For example, water is now treated before it is discharged so it's acceptable to the environment. And wastes are managed in engineered facilities so they're contained.

"There are some historic scars on the industry," Liskowich said. "(But) we have grown. In Canada, our legislation and our regulations for the protection of the environment are arguably second to none in the world. Other countries around the world use it as a benchmark."

"I think as an industry we have grown over the years. In my career, I have seen a change in the level of involvement of First Nations and non-

First Nations stakeholder groups. The regulations have changed, but also the level of understanding within the industry has changed to the point where industry as a rule believes it's important and therefore make the effort to involve First Nations communities and non-First Nations communities. It's not challenging. It just takes a concerted effort to do it."

Looking Ahead

It's no secret mining is critical to the economy of Saskatchewan and Canada. Liskowich feels proper environmental management, environmental safeguards and maintaining public acceptance will allow the mining industry to continue.

"You can mine successfully, and at the same time protect the environment, and at the same time protect the interests of the public," he said.

As for the future of mining, Liskowich sees it as strong.

"We need to continue working to reduce potential impacts of mining operations, whether it be a change in footprints, more detailed engineering in terms of waste management or more innovative thinking in terms of new and less-damaging extraction techniques," he said.

"We're continuing to always push the envelope to try to make things better environmentally and still provide the commodities that the global populations need."

"It's a positive relationship, a partnership, agreements to work together... between proponent and stakeholder," he said. "It's based on a relationship that is founded on trust. It typically has, in mining space, commitments from the proponent to work with the stakeholder groups to, as the project benefits, so do they."

Down in the Dumps

Regina and Saskatoon Face the Challenge of Waste Management

BY MARTIN CHARLTON COMMUNICATIONS



Compost turner at the City of Saskatoon compost depot

Regina and Saskatoon compete in many ways, but there is one dubious distinction they share: Saskatchewan residents produce more waste per capita than any other province.

According to Michelle Jelinski, P.Eng., Senior Project Management Engineer at the City of Saskatoon's Water & Waste Stream Division, the reasons for this are largely cultural ones.

"In Saskatchewan, we have always had the luxury of lots of land and a low population density. Consequently, building and running landfills has, to this point, been cheap and easy. Saskatchewan has one of the highest per capita number of landfills in North America. So, people have developed a feeling of entitlement about waste disposal. At the City, we often hear people complain, 'why do I have to pay \$15 for tipping fees when I only had to pay \$2 back in my hometown?'" says Jelinski.

As well, Jelinski notes, because of this luxury of space Saskatchewan cities are in some cases decades behind other jurisdictions in tackling the challenge of waste diversion.

"But in a way that's also an advantage. It gives us the opportunity to gather a wealth of information about best practices and lessons learned from other cities," she says. Both cities have set aggressive targets to improve their waste diversion rates. But getting there won't be easy.

A Breed Apart

The task of reducing waste in the major cities is a monumental engineering task that requires a special breed of professionals. While waste management may seem unglamorous, those in the industry speak of it with passion and excitement.

"I was drawn to this field by the diversity of engineering work involved," says Greg Kuntz, P.Eng., Manager of Engineering Services for the City of Regina. "Almost every field of engineering is involved in waste management. Building and maintaining landfills is, essentially, a civil engineering task. There are elements of chemical engineering in examining the nature and decomposition of the waste. And, of course, there are the multi-faceted aspects of environmental engineering involved."

To Jelinski, the waste management field is a special calling. “The people drawn to this field are people who want to make a difference, who want to make the world a better place. Waste is something that affects everyone – we all contribute to it. Finding ways to manage waste that are more sustainable and safer for the environment– that’s a challenge people in our department find very rewarding,” she says.



Collection trucks at the City of Saskatoon recycling depot

Sorting Out the Problem

Both cities, at around the same time in the early years of this decade, undertook studies to examine how they could manage waste better.

“In Regina, what we found is that not much had changed over the decades. The way we were handling waste in 2012 was not significantly different from the way we did it in 1992. That wasn’t sustainable. The landfill was filling up too fast and we didn’t have good control over how we were managing the landfill site. We needed to look at best practices and figure out what would work for Regina,” says Lisa Legault, Director of Solid Waste for the City of Regina.

The two cities both set steep goals for waste reduction. Saskatoon aims to reduce its waste sent to landfill by 70 per cent (compared to 2013 levels) by 2023. Regina is shooting for a reduction of 65 per cent (compared to 2011 levels) by 2020.

The first step – in some ways the easiest and most obvious one – was to implement curbside residential recycling programs. Blue bins soon became as ubiquitous in Saskatoon and Regina as in other North American centres. Both cities also followed up the program with aggressive public education and promotion efforts.

A Big Gap to Close

For all of the public attention given to recycling, it has proven to be just a baby step towards the cities’ larger goals. Roughly eight years down the road, both cities have

seen their waste diversion rates hover stubbornly around the 20 per cent mark. In contrast, larger centres like Toronto and Vancouver have already exceeded the 60 per cent diversion rate.

How will Saskatchewan cities close the gap?

“In both cities, we went through exercises in waste characterization – looking at samples of what people were actually putting in their garbage bins. For a typical single-family residential household, only about 16 per cent of the material in the bin is really garbage. Roughly 58 per cent is organic waste. If we can reclaim that, through ‘green bins’ and composting, that will go a long way to helping us achieve our goals,” Jelinski says.

Both city solid waste departments now have proposals before their respective city councils to examine organic waste programs.

“There are many ways we could end up going with such a program – anywhere from simple yard waste collection to scrape-your-plate waste food composting. Council is eager to hear and consider our proposals,” Legault says.

Saskatoon, likewise, is in the midst of drawing up organics proposals that will go before Saskatoon City Council in the fall.

Turning Trash into Gold

In addition to recycling and organics, the cities’ waste management departments also look for ways to find other uses for waste.

“My view is that we need to approach waste as a resource rather than as a problem. Can we use this resource in positive ways instead of just piling it up?” says Kuntz.

Both cities have implemented landfill gas energy systems, using the methane gas produced by decomposing waste to produce power. Each station produces enough power to supply over 1,000 homes and has the emissions reduction equivalent of up to 8,000 cars.

Regina and Saskatoon also make efforts to reclaim building materials from waste.



“Around construction and demolition season, we see lots of old lumber, concrete, rebar and the like going to the landfill. Those are valuable materials that should be put to another use,” Jelinski says.

Last year, Regina undertook a particularly massive and historically notable demolition reclamation initiative. After the old Mosaic Stadium (aka Taylor Field) was demolished, the city auctioned off nearly every scrap of it – roughly 29,000 tonnes – thereby keeping approximately 99 per cent of the demolished materials from going to landfill.

The China Connection

One factor that has proven to be a setback for waste diversion around North America is the strict new set of purity standards for recyclable materials under China’s National Sword program. Since China has, to date been the world’s largest buyer of recyclables, National Sword has cities and recycling companies scrambling to either find new markets or adapt to the stringent new rules.

For more on the effects of the National Sword program, read “Swords, Cow Heads and Miracle Glass” in this issue of *The Professional Edge*.

Don’t Forget the Other Two ‘R’s

While recycling is important, Kuntz and Jelinski agree that it is far from the whole solution.

“The whole expression is ‘Reduce, Reuse, Recycle’. People often forget about those other two ‘R’s’. The best way to deal with waste is not to produce waste in the first place. All of us can contribute to that, both individuals and businesses, by being more mindful of what and how much we throw away. We also work with various levels of government and the Saskatchewan Waste Reduction Council in an effort to reduce excess packaging for products,” Kuntz says.

“This is an area where everyone needs to get involved and be informed. Even simple things like selling items on Kijiji or holding garage sales can help. Instead of taking the easy way out by automatically throwing something out, try to give some thought about what other use it might have,” Jelinski adds.



City of Saskatoon Green Cart for organic waste

Member Profile



This month *The Professional Edge* chats with Jamie Bakos, P.Eng., President and CEO of Titan Clean Energy Projects Corp. in Craik.

Tell us about your personal and professional background.

I was born and raised in Saskatoon. I graduated from Evan Hardy High School and went straight into civil engineering at the University of Saskatchewan. After a couple of years, I transferred to the University of Guelph which offered Canada's first-ever environmental engineering program in 1990.

Why did you choose engineering?

For engineering in general, my reasons were pretty mundane. I was good at math and science and the economy was struggling when I left high school, so I wanted to go into a program with a solid career opportunity. But after a while, studying civil engineering, the prospect of spending my days looking at road designs didn't appeal to me. I had excelled at the courses that dealt with air, water and soil issues and found those courses very interesting. As well, it seemed at the time that the environment would become a bigger issue in the future.

What was your biggest challenge in college?

Being a transfer student, not all my courses transferred but I still wanted to graduate on time, in part because my funds were running thin. I took nine courses in my final year to ensure I graduated on schedule. Financially, I was down to running on \$3 a day. A local restaurant offered a dish of carrots and peas for 75 cents so that became a staple. But I was doing something I enjoyed so that got me through.

What was your first job after college?

I was fortunate to meet an executive of Wardrop Engineering and was hired into their environmental services division in Winnipeg. This was the early days of the field, so it was an exciting time. I was part of a really good, creative group of 20-somethings and intermediate and senior engineers who worked hard and played hard. It was a great way to start a career.

What is your greatest accomplishment as an engineer?

In broad terms, having the opportunity to find, hire and mentor good people. I think my single biggest skill is to hire engineers and other individuals who are better than me. Of course, I'm also proud to be the co-founder of Titan Clean Energy, a company that is making a cleaner world by building technologies and manufacturing products that protect the environment.

What do you do for continuing professional development (CPD)?

CPD for me is constant every day. I'm always studying patents and technical papers and new technologies. I do speaking engagements to students two or three times a year. I make public education presentations about green technologies and products at trade shows. I serve on the board of the Saskatchewan Waste Reduction Council, which offers numerous professional opportunities to its members. For example, I attended a board workshop on the impact of social media and another on corporate governance. The board also runs a book of the month club on business and cultural themes.

What are your interests outside of work?

Ten years ago, I could have given you a long list of sports and outdoor recreation but these days I either don't have time or there isn't the opportunity in a small town. One pastime I really enjoy is golf at the Craik golf course.

Have you ever met anyone famous?

I've met a bunch of politicians and musicians in passing. I met Jean Chretien at an environmental awards ceremony in Ontario. I remember thinking how soft his hands were when shaking his hand – he obviously hadn't spent a lot of time working hard labour. Another time, I had drinks with the then mayor of Toronto David Miller. At one point, some people came by and asked for a picture. He assumed they wanted a selfie with him. It turned out they had no idea who he was and just wanted him to take a picture of them. He graciously and humorously complied.

What is your favourite vacation spot?

My favourite is probably my next one. I try to do something different each the time and never go to the same place twice. I tend to alternate between cultural destinations and relaxation-oriented places. My second last was in Thailand, which was an amazing place with wonderful, hospitable and resilient people. My last one was just a mindless beach vacation to the Dominican Republic, but there was a funny story to it. While out on a whale-watching excursion, I lost my Tilley hat, which had a

little secret pocket with my ID, credit cards, bank card and some cash. A few days later, a question was sent to the company website asking if I was OK. The hat had been found 30 kilometres up the coast. The people who found it took the trouble to make the trip to bring it back to me.

Who has had the greatest influence on your life and career?

For my life in general, I would certainly have to say my parents. They instilled, by example, a great work ethic in my brothers and me. They grew up in the Depression in small-town Saskatchewan where there were few opportunities, but they created an environment for my brothers and me to go to university to pursue our dreams.

In my career, an important early mentor for me on my first job was Ed Wolowich P.Eng., who not only stressed good engineering but also the importance of good writing skills, communication, project management and customer relationships. He gave me the opportunity to start a new branch office in Saskatoon, which put me on the path from the technical path to the business side which ultimately led me to the entrepreneurial world of Titan.

TIP: Reporting Continuing Professional Development

A romantic scene of a man and a woman sitting on a swing, silhouetted against a bright, low sun over the ocean. The woman is on the left, wearing a light-colored dress, and the man is on the right, wearing a dark shirt. They are both looking out at the water. The sky is a warm orange, and the ocean has gentle waves. The overall mood is peaceful and intimate.

Sit back and relax

**If you have worked full-time since January 1, you
have now earned 50 credits for Professional Practice**



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Managing Change

Change is a constant: technologies, processes, people, ideas, and methods often change affecting the way we perform and live our lives.

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History shows us the key attributes of effective leaders and how we can apply the lessons in our global businesses. Leaders are not born, they watch and learn.

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It all comes down to how we communicate, internally and externally. We speak, we write and we use non-verbal messages intentionally and unintentionally.

Leaders recognize the power of clear & concise communications.



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Good decisions are ethical decisions and require logic. Unlike a legal course, we take a philosophical perspective at how/why individuals act, react, and decide what to do.

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2018 APEGS Salary Survey Summary Results

The Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) contacted 6,103 Professional Engineers, Professional Geoscientists, Engineers-in-Training, Geoscientists-in-Training and Licensees living in Saskatchewan. A total of 2,270 members completed the survey representing a 37.2% response rate. Surveys were completed in March and April 2018 and salaries reported were as at December 31, 2017. Insightrix Research Inc. compiled and tabulated all results. The detailed report, which includes analysis by gender, can be found on the APEGS web site at <http://www.apegs.ca/Portal/Pages/salary-survey>

The main goals of the survey are:

- to provide information to all members regarding monetary compensation for different levels of responsibility and advanced degrees;
- to provide information to employers to assist them in establishing appropriate pay levels for recent graduates and ensuring competitive compensation packages for experienced professionals; and
- to give students, career counsellors and other interested persons information on employment, including salaries, 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
1976 & Prior	30	1.3%	\$143,749	\$65,000	\$105,575	\$136,500	\$185,000	\$250,000
1977*	*	*	*	*	*	*	*	*
1978	10	0.4%	\$147,150	\$61,000	\$90,000	\$137,750	\$172,000	\$290,000
1979*	*	*	*	*	*	*	*	*
1980*	*	*	*	*	*	*	*	*
1981*	*	*	*	*	*	*	*	*
1982	22	1.0%	\$138,012	\$85,000	\$105,000	\$141,250	\$162,261	\$185,000
1983	16	0.7%	\$156,124	\$60,000	\$111,250	\$156,000	\$200,478	\$250,000
1984	16	0.7%	\$149,672	\$84,000	\$106,500	\$148,000	\$176,500	\$235,000
1985	18	0.8%	\$150,907	\$35,000	\$102,100	\$130,000	\$200,000	\$275,000
1986	20	0.9%	\$140,458	\$81,100	\$103,686	\$135,000	\$177,500	\$201,750
1987	30	1.3%	\$150,174	\$96,000	\$115,000	\$149,688	\$174,700	\$203,000
1988	21	0.9%	\$139,281	\$73,000	\$125,000	\$145,000	\$168,000	\$186,000
1989	24	1.1%	\$135,604	\$73,000	\$100,118	\$148,500	\$163,750	\$196,000
1990	21	0.9%	\$137,764	\$93,000	\$110,000	\$133,548	\$159,000	\$190,000
1991	19	0.8%	\$148,588	\$55,000	\$120,000	\$134,000	\$175,500	\$270,000
1992	13	0.6%	\$140,463	\$1,000	\$110,000	\$149,000	\$184,217	\$224,000
1993	23	1.0%	\$140,234	\$85,000	\$96,000	\$143,000	\$160,000	\$200,000
1994	32	1.4%	\$135,797	\$65,000	\$95,250	\$135,500	\$171,000	\$244,000
1995	36	1.6%	\$131,151	\$10,000	\$104,000	\$129,000	\$168,750	\$200,000
1996	30	1.3%	\$136,897	\$84,900	\$105,000	\$142,000	\$161,570	\$200,000
1997	37	1.6%	\$128,676	\$75,000	\$108,000	\$125,000	\$154,000	\$196,000
1998	32	1.4%	\$120,573	\$65,000	\$100,830	\$120,027	\$134,000	\$178,000
1999	43	1.9%	\$132,357	\$92,900	\$102,000	\$123,000	\$143,100	\$220,000
2000	48	2.1%	\$116,377	\$57,000	\$95,250	\$114,700	\$135,000	\$175,000
2001	58	2.6%	\$127,595	\$75,000	\$110,000	\$121,500	\$139,850	\$192,000
2002	52	2.3%	\$122,432	\$70,000	\$104,250	\$117,594	\$142,875	\$171,000
2003	77	3.4%	\$119,757	\$68,000	\$98,000	\$118,000	\$135,000	\$190,000
2004	60	2.7%	\$119,327	\$72,319	\$93,000	\$113,500	\$132,550	\$192,068
2005	80	3.6%	\$106,450	\$58,025	\$90,250	\$107,000	\$130,250	\$150,694
2006	71	3.2%	\$106,086	\$71,500	\$91,850	\$106,226	\$121,300	\$145,000
2007	91	4.0%	\$103,988	\$70,000	\$87,000	\$101,000	\$125,000	\$145,000
2008	106	4.7%	\$98,011	\$60,000	\$86,000	\$98,250	\$112,000	\$136,000
2009	113	5.0%	\$97,335	\$50,000	\$85,000	\$96,469	\$107,853	\$141,000
2010	110	4.9%	\$91,559	\$57,200	\$81,068	\$90,299	\$99,798	\$121,800
2011	107	4.7%	\$88,982	\$65,000	\$77,665	\$85,000	\$96,000	\$133,500
2012	161	7.1%	\$82,531	\$59,000	\$72,800	\$80,000	\$90,000	\$112,000
2013	118	5.2%	\$79,448	\$55,000	\$71,760	\$78,000	\$89,566	\$104,000
2014	108	4.8%	\$74,033	\$54,200	\$65,000	\$72,000	\$83,331	\$98,000
2015	121	5.4%	\$69,254	\$53,000	\$63,360	\$67,000	\$75,000	\$92,000
2016	82	3.6%	\$62,200	\$42,000	\$57,000	\$63,000	\$72,000	\$80,000
2017	67	3.0%	\$62,231	\$48,000	\$57,000	\$61,000	\$67,000	\$78,000

*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.	1,407	65.1%	\$117,229	\$74,500	\$91,000	\$109,000	\$135,000	\$189,800
P.Geo.	87	4.0%	\$120,647	\$70,000	\$92,000	\$113,080	\$140,000	\$210,000
P.Eng. and P.Geo	15	0.7%	\$139,500	\$95,500	\$105,000	\$146,000	\$165,000	\$208,000
Engineering License	12	0.6%	\$118,258	\$76,000	\$97,664	\$106,620	\$154,500	\$166,000
Engineer-in-Training	606	28.0%	\$73,665	\$52,000	\$62,500	\$70,000	\$80,000	\$108,000
Geoscientist-in-Training	33	1.5%	\$80,652	\$46,500	\$70,000	\$82,000	\$93,600	\$114,000
Geo Licensee*	*	*	*	*	*	*	*	*

Annual Salary by Discipline

	Count	Column N %	Mean	Percentile 05	Percentile 25	Median	Percentile 75	Percentile 95
Civil	442	20.4%	\$98,078	\$60,000	\$73,416	\$90,000	\$112,543	\$165,000
Mech/Industrial	506	23.4%	\$106,345	\$60,000	\$77,500	\$97,400	\$129,334	\$184,000
Elec/Eng Physics	336	15.5%	\$103,848	\$62,000	\$80,000	\$98,000	\$125,000	\$162,000
Chem/Ceramic/Metal	110	5.1%	\$110,237	\$55,000	\$84,000	\$102,250	\$129,340	\$195,000
Geo/Mining/Petro Eng.	232	10.7%	\$116,319	\$62,400	\$86,000	\$103,028	\$133,000	\$198,000
Ag/Forestry	40	1.9%	\$93,285	\$53,509	\$68,475	\$81,766	\$114,220	\$174,500
Environmental	141	6.5%	\$95,321	\$56,000	\$72,000	\$90,000	\$112,000	\$161,570
Geosciences	110	5.1%	\$112,808	\$60,000	\$86,000	\$105,500	\$135,000	\$185,000
Software/Computer Eng.	50	2.3%	\$96,552	\$60,000	\$73,000	\$86,689	\$111,885	\$180,000
Biological/Biomedical*	*	*	*	*	*	*	*	*
Other	190	8.8%	\$107,270	\$55,000	\$73,000	\$100,000	\$130,000	\$210,000

Annual Salary by Function

	Count	Column N %	Mean	Percentile 05	Percentile 25	Median	Percentile 75	Percentile 95
Corp Mgmt.	164	7.6%	\$152,049	\$92,000	\$125,000	\$149,000	\$170,910	\$250,000
Project/Op. Mgmt.	814	37.7%	\$109,371	\$61,400	\$83,000	\$102,000	\$129,500	\$185,000
Project Admin.	65	3.0%	\$87,283	\$56,000	\$67,200	\$78,000	\$99,000	\$150,000
Design	488	22.6%	\$90,810	\$56,000	\$70,000	\$83,107	\$104,925	\$147,000
Research/Planning	123	5.7%	\$98,648	\$48,000	\$76,000	\$96,000	\$120,000	\$150,000
Inspect/Quality Control	59	2.7%	\$78,801	\$52,000	\$62,400	\$71,000	\$90,000	\$125,000
Operating/Maint.	197	9.1%	\$104,127	\$56,650	\$82,000	\$102,000	\$123,252	\$156,000
Teaching	36	1.7%	\$114,505	\$65,000	\$87,250	\$99,783	\$148,275	\$182,000
Marketing/Sales	27	1.2%	\$100,394	\$45,700	\$72,800	\$90,000	\$120,000	\$192,250
Reg. Approvals/Enforce	63	2.9%	\$94,415	\$62,000	\$79,000	\$92,000	\$110,000	\$135,000
Exploration	47	2.2%	\$107,266	\$70,000	\$80,000	\$95,000	\$117,000	\$185,000
Other	79	3.7%	\$93,468	\$42,473	\$72,000	\$86,378	\$116,400	\$150,000

*Not available due to reporting rules (insufficient data)

Annual Salary by Industry

	Count	Column N %	Mean	Percentile 05	Percentile 25	Median	Percentile 75	Percentile 95
Consulting Service	479	24.0%	\$97,691	\$60,000	\$71,060	\$87,570	\$113,200	\$175,000
Oil & Gas	109	5.5%	\$97,400	\$55,000	\$75,200	\$90,000	\$116,286	\$155,000
Except Oil & Gas	369	18.5%	\$125,920	\$73,713	\$94,000	\$113,000	\$145,000	\$198,000
Procure/Const.	171	8.6%	\$102,137	\$62,400	\$72,000	\$93,000	\$120,000	\$185,000
Manufac. Durables	182	9.1%	\$89,602	\$53,857	\$67,200	\$82,350	\$109,000	\$145,000
Manufac. Non-Durables	76	3.8%	\$128,908	\$57,700	\$85,445	\$108,450	\$146,860	\$212,000
Service For Profit	29	1.5%	\$102,446	\$49,000	\$70,000	\$81,500	\$101,112	\$205,000
Service Not For Profit	148	7.4%	\$99,331	\$59,892	\$80,000	\$97,270	\$111,050	\$150,000
Utilities	265	13.3%	\$115,930	\$62,000	\$86,000	\$109,920	\$131,635	\$177,610
Educational Services	76	3.8%	\$130,817	\$40,000	\$84,180	\$125,000	\$162,144	\$203,000
Agriculture/Forestry	18	0.9%	\$79,328	\$42,000	\$63,000	\$74,062	\$93,252	\$130,000
Other	74	3.7%	\$89,508	\$24,000	\$69,000	\$85,000	\$110,000	\$159,360

Annual Salary by Degrees

	Count	Column N %	Mean	Percentile 05	Percentile 25	Median	Percentile 75	Percentile 95
Bachelor's	1455	67.3%	\$100,819	\$58,500	\$75,000	\$94,100	\$120,000	\$170,000
...	237	11.0%	\$110,740	\$62,000	\$85,000	\$104,000	\$129,500	\$185,000
Master's Degree	331	15.3%	\$108,965	\$56,000	\$80,000	\$103,204	\$130,000	\$185,000
...	45	2.1%	\$125,692	\$54,000	\$90,000	\$109,000	\$154,000	\$225,000
Doctorate Degree	94	4.3%	\$125,468	\$60,000	\$90,000	\$120,000	\$160,000	\$200,000

Annual Salary by Experience

	Count	Column N %	Mean	Percentile 05	Percentile 25	Median	Percentile 75	Percentile 95
<1 year	94	4.3%	\$66,818	\$50,000	\$58,000	\$64,000	\$72,000	\$95,722
1 year	38	1.8%	\$65,301	\$36,000	\$56,215	\$63,750	\$76,000	\$108,000
1.5 years	69	3.2%	\$72,497	\$52,500	\$61,000	\$67,500	\$81,000	\$110,000
2 years	101	4.7%	\$73,409	\$50,000	\$62,000	\$68,000	\$77,500	\$113,500
3 years	135	6.2%	\$72,146	\$50,000	\$64,000	\$70,000	\$81,500	\$103,000
4 years	141	6.5%	\$81,158	\$60,000	\$70,000	\$77,000	\$89,566	\$110,000
5 years	159	7.4%	\$85,244	\$60,000	\$74,708	\$83,000	\$94,000	\$115,000
6 years	148	6.8%	\$87,886	\$62,000	\$77,316	\$84,212	\$95,950	\$125,000
7-8 years	216	10.0%	\$94,930	\$70,000	\$85,000	\$93,147	\$103,041	\$126,000
9-10 years	197	9.1%	\$106,861	\$76,000	\$92,618	\$103,500	\$120,000	\$148,000
11-12 years	143	6.6%	\$111,949	\$77,157	\$95,000	\$110,076	\$126,000	\$152,000
13-14 years	134	6.2%	\$122,787	\$77,200	\$104,000	\$118,750	\$135,000	\$188,000
15-17 years	150	6.9%	\$129,382	\$91,021	\$107,532	\$129,500	\$143,000	\$175,000
18-20 years	101	4.7%	\$137,411	\$90,000	\$110,000	\$130,563	\$165,000	\$196,000
21-24 years	107	4.9%	\$143,790	\$90,000	\$111,885	\$140,000	\$169,000	\$200,000
25+ years	229	10.6%	\$152,149	\$90,000	\$120,000	\$150,000	\$178,000	\$240,000

Annual Salary by Sector

	Count	Column N %	Mean	Percentile 05	Percentile 25	Median	Percentile 75	Percentile 95
Public Sector	680	100.0%	\$106,900	\$62,525	\$82,585	\$101,000	\$125,000	\$170,000
Private Sector	1,462	100.0%	\$103,771	\$57,600	\$75,000	\$95,400	\$125,000	\$180,000

Total Salary (full time positions)

	Count	Column N %	Mean	Percentile 05	Percentile 25	Median	Percentile 75	Percentile 95
Base Salary	2253	100.0%	\$103,539	\$56,000	\$76,000	\$96,000	\$125,000	\$180,000
Salary incl. bonus	2253	100.0%	\$120,504	\$59,500	\$81,000	\$106,000	\$143,800	\$225,000

*Not available due to reporting rules (insufficient data)

Salary Changes - Full-Time Positions

	median	% increase	mean	% increase
1987	\$48,000		\$49,269	
1989	\$50,928	6.10%	\$62,887	27.64%
1991	\$54,110	6.25%	\$57,578	-8.44%
1993	\$54,480	0.68%	\$56,703	-1.52%
1995	\$56,400	3.52%	\$59,142	4.30%
1997	\$60,000	6.38%	\$62,266	5.28%
1999	\$62,500	4.17%	\$65,401	5.03%
2001	\$66,000	5.60%	\$68,877	5.31%
2003	\$68,800	4.24%	\$71,210	3.39%
2005	\$71,008	3.21%	\$73,607	3.37%
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%

Regression Analysis

A stepwise linear regression was used to find the best model for predicting salaries for engineers and geoscientists working in different industries. This process was used to:

- Identify key factors which predict salary as well as factors which are not related to salary
- Make the results independent of the different scales used to measure each factor
- Identify Boolean components (such as receipt of professional designation) influencing salary
- Create a linear formula with as much predictive power as possible

An overall formula was also produced which members of APEGS can easily use to estimate their salary. The formula for 2017 explains about 50 percent (48.2%) of variance in salary. Any model explaining at least 50% of the variance in the dependent variable can be considered an effective model. B-values are the raw numerical coefficients of each variable. Since the scales for each variable are different, the beta values are a better measure of relative importance of factors within the model. Refer to the “Classification Rating Guide”, which can be found on www.apecs.ca, to determine the values for each factor.

Factor	B (Coefficient)	Relative importance (Beta)
(Constant)	41098	
Duties (A)	146	0.220
Experience (C)	390	0.368
Supervision Scope (G)	840	0.203
Recommendations, Decisions and Commitments (D)	62	0.064
Receipt of professional designation	7923	0.090

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

Formula for expected salary (SE) without bonus:

$$\text{Se} = 146 \cdot \text{A} + 390 \cdot \text{C} + 840 \cdot \text{G} + 62 \cdot \text{D} + 41,098$$

Add 7,923 if you have acquired professional status within your field (P.Eng. or P.Geo.)

NOTICE TO MEMBERS

Bylaw Change

At the May 5, 2018 APEGS Annual Meeting of Members, the members present unanimously passed two motions to amend *The Engineering and Geoscience Professions Regulatory Bylaws*.

These amendments to the Regulatory Bylaws have been approved by the Minister of Highways and Infrastructure and will come into effect on January 1, 2019.

Complete versions of *The Engineering and Geoscience Professions Act, 1997* and accompanying Regulatory and Administrative Bylaws can be found on the APEGS website: (<http://www.apegs.ca/Portal/Pages/Act-Bylaws>).

The first amendment was to Appendix 3, to include the requirements for Competency-Based Assessment experience reporting. The amendments are as follows (identified by bold, underlined text):

Appendix 3 of the Regulatory Bylaws

Components of Acceptable Engineering Work Experience

Work experience is an essential element in determining whether or not an individual is acceptable for professional licensing. The responsibility for providing the proper environment, opportunities, range and progression of activities necessary to meet the work experience requirements rests with the employers of applicants, and the individuals who provide supervision during the internship period. Acceptable engineering work experience must include the application of theory and should provide exposure to, or experience in the following broad areas: practical experience, management, communication, and the social implications of engineering. Assessment of the acceptability of the work experience is based on the extent to which the applicant's experience includes these areas, each of which is outlined in the following sections.

For a person who is registered as an engineer-in-training on or after January 1, 2019 or a person who is registered as an engineer-in-training on or before December 31, 2018 who has not submitted any experience reports by December 31, 2018, experience in engineering work satisfactory to the Council comprises the following competency-based assessment elements:

1. Technical competence

2. Communication

3. Project and financial management

4. Team effectiveness

5. Professional Accountability

6. Social, economic, environmental and sustainability

7. Personal Continuing Professional Development

For a person who is registered as an engineer-in-training on or before December 31, 2018 and who has submitted at least one experience report on or before December 31, 2018, experience in engineering work satisfactory to the Council includes the following:

1) Application of Theory

- (A) analysis (for example: scope and operating conditions, feasibility assessment, safety and environmental issues, technology assessment, and economic assessment, etc.);
- (B) design and synthesis (for example: functionality or product specification, component selection, integration of components and subsystems into larger systems, reliability and maintenance factors, human and environmental aspects, and the societal implications of the product or process, etc);
- (C) testing methods (for example: devising testing methodology and techniques, functional specification verification, and new product or technology commissioning and assessment, etc.); and,
- (D) implementation methods (for example: technology application, engineering cost studies, optimization techniques, process flow and time studies, quality assurance implementation, cost/benefit analysis, safety and environmental issues and recommendations, and maintenance and replacement evaluation, etc.).

2) Practical Experience

- (A) site visits to existing engineering works, with opportunities to see equipment and systems in both operational and maintenance circumstances;
- (B) application of equipment as part of the larger system, including, for example, the merits of reliability, the role of computer software, and understanding the end product or engineering work in relationship to the equipment;

- (C) opportunities to experience and understand the limitations of practical engineering and related human systems in achieving desired goals, including limitations of production methods, manufacturing tolerances, performance minima, maintenance philosophies, etc.; and,
- (D) opportunities to experience the significance of time in the engineering process, including workflow, scheduling, equipment wear-out and replacement scheduling, etc.

3) Management of Engineering

- (A) planning, from conception through to implementation. This includes: needs assessment, concept development, assessment of resources required, and assessment of impacts, including societal and project implementation;
- (B) scheduling, from establishing interactions and constraints, developing activity or task schedules, and allocation of resources, through to the assessment of delay impacts and beyond to broader aspects, such as interactions with other projects and the marketplace;
- (C) budgeting, including the development of preliminary and detailed budgets, identifying labour, materials and overhead, risk analysis, life-cycle analysis, and tracking;
- (D) supervision, including leadership, professional conduct, organization of human resources, team building, and management of technology;
- (E) project control, including co-ordination of work phases, tracking and monitoring costs and progress, and implementing changes to reflect actual progress and needs; and,
- (F) risk-analysis related to operating equipment and system performance, product performance evaluation, and evaluation of societal and environmental impacts.

4) Social Implications of Engineering

- (A) a recognition of the value and benefits of the engineering work to the public;
- (B) an understanding of the safeguards required to protect the public and methods of mitigating adverse impacts;
- (C) an understanding of the relationship between the engineering activity and the public;
- (D) a demonstrated interest and involvement in the broader social implications of engineering;

- (E) an appreciation of the role of regulatory bodies on the practice of engineering; and,
- (F) an understanding of the provincial health and safety of the workplace legislation.

5) Communication Skills

- (A) preparation of written work, including day-to-day correspondence, record-keeping, and report writing;
- (B) making oral reports or presentations to colleagues, supervisors, senior management, and an exposure to, or participation in, reports to clients and regulators; and,
- (C) making public presentations.

The second amendment was the addition of Section 23.2 and Appendix 5, implementing a required Continuing Professional Development Program, including annual reporting. Note that these are entirely new sections and are presented below:

Continuing Professional Development

Program

23.2

- (1) In accordance with section 5 and clause 16(2)(j) of the Act and clause 20(2)(d) and Appendix 5, the council shall:
 - a) establish and maintain a continuing professional development program;
 - b) publish the continuing professional development program and ensure that the published document is publicly available without charge; and
 - c) verify and ensure compliance of members with the continuing professional development program.
- (2) As of January 1, 2019, all members, other than life members, must annually meet the continuing professional development program requirements, as set out in Appendix 5 and in the program established pursuant to clause (1)(a), by January 31 of the year following the calendar year to which they relate.
- (3) If a member does not comply with subsection (2), the registrar may:
 - a) assign a remediation plan with which the member must comply;
 - b) suspend the member's licence.

- (4) If a member ceases to have a licence by reason of his or her failure to comply with the continuing professional development program requirements, the registrar may reinstate the licence on receipt of a CPD reinstatement application from the member and proof that the member has met the reinstatement requirements set by council.
- (5) If a member has a licence waiver pursuant to subsection 13(2) and fails to comply with the continuing professional development program requirements, the registrar may reinstate the member's licence on receipt of an application from the member and proof that the member has met the reinstatement requirements set by council.

Appendix 5

Continuing Professional Development

Core Elements

This appendix summarizes the core elements of the Continuing Professional Development Program. A detailed description of the full program can be found in the Continuing Professional Development Program document, available online at the APEGs website or in person at the APEGs office.

The Continuing Professional Development Program meets APEGs' statutory requirements as well as the professional obligations of members. Section 5 of **The Engineering and Geoscience Professions Act** states the Objects of the Association and speaks to the need for a Continuing Professional Development Program.

As well, clause 20(2)(d) of the Regulatory Bylaws (the Code of Ethics) requires members to:

Keep themselves informed in order to maintain their competencies, strive to advance the body of knowledge with which they practice and provide opportunities for professional development of their subordinates.

The Continuing Professional Development Program establishes a benchmark against which members will evaluate their ongoing professional development activities and provides tools for analyzing needs, planning programs, and recording and reporting activities.

The Continuing Professional Development Program requires the following annual components:

1) Ethics Component

- a. Members must complete an annual ethics component, as outlined in the Continuing Professional Development Program document.

2) Minimum Credit Requirements

- a. Each member is required to accumulate 80 credits annually.
- b. Any credits accumulated in excess of the annual 80 credit requirement may be banked and then applied toward credit requirements for up to two subsequent years.

3) Minimum Categories

- a. Members must annually obtain credits from at least three of the categories recognized in the Continuing Professional Development Program.

4) Member Record Keeping and Reporting

- a. Each member shall maintain a complete record of their Continuing Professional Development Program for at least the previous three years.
- b. This record shall clearly document:
 - i. individual scope of practice,
 - ii. program plan, and
 - iii. a detailed record of completed activities and the number of credits earned.
- c. Members shall report their Continuing Professional Development annually, as directed in the Continuing Professional Development Program document.

5) Program Variation

Members with special circumstances may apply for reduced Continuing Professional Development requirements by submitting a Continuing Professional Development Program Variation Request in the manner outlined in the Continuing Professional Development Program document.

6) Requirements for Members Who Have a Licence Waiver

- a. Members who have a licence waiver as defined in section 13(2) have a reduced credit requirement of 30 credits during each waiver year.
- b. Members who have a license waiver as defined in section 13(2) must obtain credits from at least two of the categories recognized in the Continuing Professional Development Program during each waiver year.

Competency-Based Assessment is Coming

January 1, 2019 for Engineers-in-Training

TINA MAKI, P.ENG., FEC, FGC (Hon.), DIRECTOR OF SPECIAL PROJECTS

Here are further details about the upcoming changes to experience reporting for Engineers-in-Training to Competency-Based Assessment (CBA). Please refer to full, approved bylaw text in a separate announcement in this issue of *The Professional Edge*.



What is Competency-Based Assessment?

- Competencies are observable and measurable skills, knowledge, abilities, motivations or traits required for professional registration.
- They are demonstrated through the actions and behaviours of the applicant.
- CBA is the assessment of those competencies to determine if an applicant is qualified for registration as a professional engineer.

The Proposed Changes

- Come into effect January 1, 2019.
- APEGS is introducing a new online experience reporting tool to facilitate CBA for Engineers-in-Training.
- What constitutes acceptable engineering experience is not changing, we are simply better defining it.
- More quantitative, precise, objective, transparent and consistent measuring system.
- Increases the confidence of all who participate in the process: applicants, validators, employers and assessors on the Experience Review Committee.
- It is a more thorough explanation of your work experience in 34 competency examples from any of your past work experience. That is compared to the current 54 examples across three reports (18 points per report). Currently there are often more than 54 examples submitted because many applicants are submitting more than three reports.

Who it applies to

- Professional engineer applicants (i.e., engineers-in-training).
- You will use the new CBA system if, as of Jan 1, 2019 you are either:
 - a current engineer-in-training, no experience reports submitted, or
 - have applied to APEGS as an engineer-in-training on or after Jan 1, 2019.
- You are given the choice to use the current or new system if, as of Jan 1, 2019:
 - you are a current engineer-in-training who has submitted one or more experience reports.
 - you are encouraged and invited to switch to the online CBA system even if you have already submitted at least one experience report on the existing system.

You are encouraged and invited to switch to the online CBA system even if you have already submitted at least one experience report on the existing system.

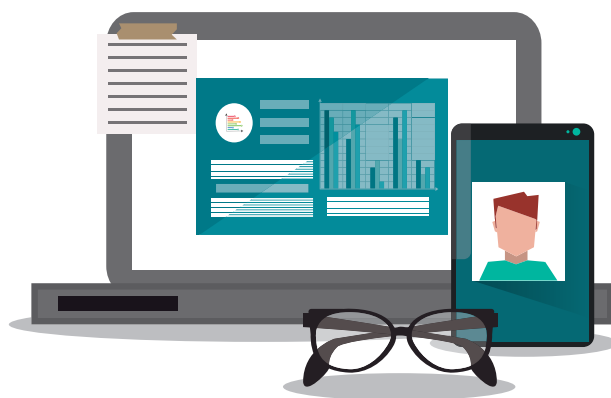
How will CBA benefit me?

- Applicants will have greater confidence knowing what the requirements are and whether or not they have met them, even before they submit their work experience. Two reasons for this are being that the requirements are more thoroughly described with indicators, and there is an explicit rating scale that the applicant, validators and the assessors use.
- The reporting process is all online. Applicants enter their information in the appropriate boxes and validators get an automatic email with a link to access the system to review and rate the competency examples. APEGS staff are notified and assign assessors directly within the system. Assessors log into the same system and rate the submission. All entries are available for download at any time as a pdf.

CBA Framework

- 34 competencies from any past experience. This is different than our current system where you describe work experience from within specific time frames.
- Grouped into 7 categories.
- Provide one example per competency.
- Indicators for each competency - guidance on example content that will demonstrate the competency.
- Rating scale 0-5.
- Online submission - Interim and Final.

The Interim submission happens at about the two year mark and includes at least three of the 34 competencies. Once the Interim submission competencies are passed, they are fully complete and are not required on the final submission.



Competency Rating Scale (abbreviated summary)

- 0 little or no exposure to the competency
- 1 general appreciation and awareness
- 2 knowledge and understanding of objectives, uses standard engineering methods, limited scope and complexity
- 3 moderate scope and complexity
- 4 responsible, varied assignments, working at a professional level
- 5 mature professional level, independent

More Information

For full details, go to the APEGS website, www.apegs.ca, under Members, Competency-Based Assessment:

<https://www.apegs.ca/Portal/Pages/competency-based-assessment>

This web page also indicates who to call if you still have questions after you have reviewed the material online.

Competency Categories

CATAGORY #	CATEGORY NAME	# COMPETENCIES	MIN. AVG RATING
1	Technical competence	10	3
2	Communication	3	3
3	Project and financial management	5	2
4	Team effectiveness	2	3
5	Professional accountability	6	3
6	Social, economic, environmental and sustainability	5	2
7	Personal Continuing Professional Development	3	3

Notes From APEGS Council

The APEGS Council met Thursday June 21, 2018 at the Gallagher Center in Yorkton. 16 of 19 Councillors were present. Mike Griffin, APEGS legal counsel, attended as a guest. Council will meet next on October 5, 2018 in Regina. On October 4, 2018 council will be meeting with the APEGS past presidents, also in Regina.

Council received the following presentations and information items:

- The Executive Director and Registrar provided council with a presentation on self-regulation.
- Mike Griffin, LL.B., APEGS external legal counsel delivered a presentation on fiduciary responsibility.
- Activity updates were provided from the constituent society liaisons, the ACEC-SK liaison, the Sponsorship Task Group liaison and the 30by30 Task Group Liaison.
- The Executive Director and Registrar provided council with an update on staffing. Additional staff have been hired as a result of a large increase in international applicants. The Assistant Director of Registration updated council on renovations at the APEGS office to accommodate the new staff.
- The Director of Special Projects reported on the development and testing of the new member database. The project has incurred some delays and detailed timelines and action items to mitigate further delays were provided to council. The project budget will not be impacted because it is a fixed price contract.
- The Director of Registration reported on the new “tools” being implemented for onboarding new council members: the APEGS Buddy Councillor (ABC) Program – a mentoring program for new councillors; and the New Council Orientation, a half day seminar delivered on June 20, 2018.
- The APEGS Director to Engineers Canada reported on activities at the national organization. The APEGS Director to Geoscientists Canada unable to attend in person and submitted a written report to council.

Council passed motions as follows:

- Approving the updated Assessor’s Guide, which clarifies the process for re-assessment. Two scenarios where three re-Assessors are required. a) the initial two Assessors agree that some or all competencies are not passed, or b) lack of consensus between the initial two Assessors.
- Appointing Malcolm Reeves, P.Eng., P.Geo., FEC, FGC as Chair of the Academic Review Committee for a two-year term.

Approving Life Membership for the following members:

- Danyluk, Terence K., P.Geo.
 - Karsan, Alnoor, P.Eng.
 - Little, Grant D., P.Eng.
 - McLean, Richard G., P.Eng.
 - Pappas, Ernie S., P.Eng.
 - Rorquist, Wayne D., P.Eng.
 - Scobie, Kevin R., P.Eng.
-
- Appointing Danae Lemieux, P.Eng., as Chair of the Communications and Public Relations Committee for a two-year term.
 - Appointing Rob Stables, P.Eng., as Chair of the Equity and Diversity Committee for a two-year term.
 - Appointing Zahra Darzi, P.Eng., FEC, as Chair of the Professional Edge Committee for a two-year term.
 - Appointing Russell Johnson, P.Eng. and Ross Welford, P.Eng. to the Investigation Committee for a three-year term.
 - Appointing Brent Marjerison, P.Eng., Kaylee Puchala, P.Eng. and Jason Whitelaw, Engineer-in-Training to the Investigation Committee for a three-year term to begin October 1, 2018.
 - Appointing Connor Wright, P.Eng., Don George, P.Eng., Satya Panigrahi, P.Eng., Jody Scammel, P.Eng. and Jaime Tratch, P.Eng. to the Discipline Committee for a second three-year term.

Council noted and received the following reports:

Registrar’s reports for March, April and May 2018.

The report on compliance activities for January 1 to May 31, 2018 and the CPD reporting statistic report for 2017.

The unaudited financial statements for March and April 2018.

Executive Committee minutes, Board minutes and the reports from the committees.

APEGS Value Proposition (AVP)

On June 22, 2018, also at the Gallagher Center in Yorkton, council, APEGS staff and committee representatives conducted a full day of AVP planning. The planning session was facilitated by T. Bakkeli Consultants Inc.



30 By 30 Report

Women of APEGGS Subcommittee

APEGGS not only has a 30 by 30 Task Group focused on increasing the number of newly licensed women in APEGGS to 30 per cent by 2030, but it also has a Women of APEGGS Subcommittee (WOA) working with and reporting to the Equity and Diversity Committee.

This subcommittee includes women from multiple industries and stages of life. The directive of the WOA subcommittee is to:

- encourage enrollment of women in engineering and geoscience and foster career development and retention;
- identify barriers for women in the professions of engineering and geosciences; and
- foster an understanding among all APEGGS members of the role of equity and diversity within the professions.

Society of Women in Engineering

This past fall, two members of the WOA subcommittee attended the Society of Women in Engineering (SWE) conference in Austin, Texas.

SWE is a not-for-profit educational and service organization that empowers women to succeed and advance in the field of engineering and to be recognized for their life-changing contributions as engineers and leaders.

SWE is the driving force that establishes engineering as a highly desirable career for women through an exciting array of training and development programs, networking opportunities, scholarships and outreach and advocacy activities.

For more than six decades, SWE has given women engineers a unique place and voice within the engineering industry. This organization is driven by a passion for its members' success and continues to evolve with the challenges and opportunities reflected in today's exciting engineering and technology specialties.

SWE 2017

The Austin SWE Conference was the largest SWE conference to date with nearly 15,000 registrants from 26 countries, 515 volunteers and 326 companies in attendance at the career fair. The conference included panels, interactive sessions, lightning talks, workshops and networking opportunities. This year's conference was titled 'Always Connecting, Always Engineering'.

The conference focused on what North America is doing to attract and retain women into engineering and other STEM (science, technology, engineering and medicine) fields. The conference also examined what other worldwide networks are doing to promote women in engineering and STEM fields. Learning what's working and what's not working is important to help APEGGS reach its 30 by 30 goal and to help the WOA subcommittee fulfill its mandate.

Next year's conference, to be held October 18-20, 2018 in Minneapolis, is titled 'Let's Break Boundaries'.

Ideas and Takeaways

The APEGGS WOA representatives presented what they had learned from the conference to Council and the appropriate committees.

One of the biggest takeaways was the effectiveness of mentorship and sponsorship to help women succeed in the professions. Mentorship is important not just at the start of one's career but throughout a person's career stages.

The conference highlighted to the WOA subcommittee that not only does APEGGS need to encourage young women to enter the professions, but it also needs to support them throughout their careers.

In 2018, the WOA subcommittee will be looking at:

- potential mentorship programs;
- continued fun, casual settings for members to relax, make connections and experience comradery;
- continued identification of the barriers that prevent women from entering the professions or continuing in their careers.

Inclusion Means Everyone

Another takeaway from the SWE conference came from male panels. Participants pointed out that men sometimes don't feel they have a seat at the diversity table. Diversity and inclusion will require everyone. APEGGS has already taken steps to recognize this. On the 30 by 30 Task Group, there is a mix of males and females from various committees within APEGGS as well as community liaisons.



Courtney Rohachuk, P.Eng. (left) and Amanda Kostiuk, P.Eng. (right) representing APEGS at the SWE conference

Get Informed. Get Involved.

For more information about SWE and to access free resources please visit: societyofwomenengineers.swe.org

For more information about APEGS WOA, e-mail us at: womenofapegs@gmail.com

Stay tuned for our fourth annual fall networking event in Saskatoon and our inaugural networking event in Regina.



Call for Award Nominations

The Awards Committee is seeking nominations for the APEGS awards as well as other provincial and national awards such as the Saskatchewan Order of Merit, the Order of Canada, the Canadian Engineers' Awards (Engineers Canada) and the Canadian Professional Geoscientist Award (Geoscientists Canada).

If you know of a Professional Engineer or Professional Geoscientist who should be considered for an award, or an exceptional engineering or geoscience project that should receive an award, the committee would like you to nominate that member or project. There are seven APEGS awards:

Exceptional Engineering/Geoscience Project Award

Accomplishments in Engineering/Geoscience (100%). The project team must be made up predominantly of Saskatchewan engineers and/or geoscientists. The project may be located inside or outside of Saskatchewan. The award will be granted when the efforts of an individual or team of engineers/geoscientists is deemed to be of great significance.

Environmental Excellence Award

(all professional members of APEGS are eligible)

Environmental awareness, preservation, protection and reclamation through education, leadership and/or involvement (25%). Enhancement of quality of life by improvement of the physical or social environment through engineering, geoscience or other works (10%). A real extent of environmental protection or preservation as a result of the efforts (50%). Prevention of potential environmental impacts vs. correction/remediation of existing impacts (15%). This award is intended to have broad scope and be open to a wide range of projects, achievements, initiatives and activities contributing to the protection and preservation of the environment.

Friend of the Professions Service Award

(available to anyone who is not a member of APEGS)

Recognizes contributions by an individual or a group in the support and promotion of the professions (100%). Examples of activities include: documentation of the history of the professions; comprehensive media coverage of an outstanding engineering or geoscience achievement; long-time service on an APEGS committee or other form of contribution to the success of activities promoting the professions to the public.

Promising Member Award

(available to any member who has held P.Eng./P.Geo. for less than 5 years)

Accomplishments in Engineering/Geoscience (50%). Service to the professions in public education and/or active participation in engineering/geoscience associations, societies, institutes (25%). Service to community (25%).

McCannel Award

Accomplishments in Engineering/Geoscience (20%). Service to the professions in public education and/or active participation in engineering/geoscience associations, societies, institutes (70%). Service to community (10%).

Brian Eckel Distinguished Service Award

Accomplishments in Engineering/Geoscience (35%). Service to the professions in public education and/or active participation in engineering/geoscience associations, societies, institutes (35%). Service to community (30%).

Outstanding Achievement Award

Accomplishments in Engineering/Geoscience (70%). Service to the professions in public education and/or active participation in engineering/geoscience associations, societies, institutes (20%). Service to community (10%).

In addition to the APEGS Awards, the awards Committee nominates APEGS members for awards presented by both Engineers Canada and Geoscientists Canada. Nominations for awards must be received by November 30 to provide time for the Awards Committee to review and consider the nominations for the annual APEGS awards and to prepare nomination packages for provincial and national awards. The Awards Committee will develop and maintain a list of nominees for consideration for the various awards.

Nomination can be submitted

Online at: <https://www.apegs.ca/Portal/Pages/Apegs-Awards>

or to:

APEGS Awards Committee

300 4581 Parliament Avenue

Regina SK S4W 0G3

Fax: (306) 5250851

Email: apegs@apegs.ca

Fall 2018

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Want to Attend?

Early Bird Pricing ends
October 1, 2018

Last Day to Register:
October 31, 2018

For more information
and to register, please visit:
apegs.ca

News Beyond Our Borders



Engineers Canada backs federal Climate Lens

Engineers Canada - The Government of Canada has announced that as part of the Investing in Canada plan, new major infrastructure projects seeking federal funding will be required to undertake an assessment of how their projects will contribute to or reduce carbon pollution and to consider climate change risks in the location, design and planned operation of a project.

This Climate Lens announcement puts Canada on track to have climate change considered as a core part of the country's infrastructure planning.

The Climate Lens applies to projects under the Investing in Canada Infrastructure Program, the Disaster Mitigation and Adaptation Fund and select finalists under the Smart Cities Challenge.

The greenhouse gas (GHG) mitigation assessment will measure an infrastructure projects' anticipated GHG emissions impact during the construction, operation and maintenance of the asset's expected useful life. The assessment must be completed or, at a minimum, validated by a qualified assessor, which the Climate Lens explains must be a professional engineer or a GHG accountant.

"The measurement and calculation of GHG emissions and reductions is highly complex and technically demanding to ensure confidence in the results," said Annette Bergeron, MBA, FEC, P.Eng., Engineers Canada President. "Engineers Canada is pleased to see the federal government recognize that professional engineers have these skills, coupled with the professional responsibility, to ensure the quality and integrity of such calculations."

Combining traditional knowledge with the PIEVC framework

Engineers Canada - Working together with the Ontario First Nations Technical Services Corporation (OFNTSC) and Stantec, Engineers Canada has released a new version of the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol that is tailored specifically for the unique requirements of First Nations communities.

OFNTSC, Stantec and Engineers Canada first began developing the First Nations PIEVC/Asset Management Toolkit when applying the PIEVC Protocol to the water and wastewater systems of the Mohawk Council of Akwesasne. As they went through the process, they learned about elements that could be modified, refined and made applicable to First Nations, which eventually led to the creation of the new toolkit, officially launched at the OFNTSC Ontario Water Conference held in Niagara Falls on May 15, 2018.

The toolkit adapts the PIEVC Protocol to the unique characteristics of many First Nations. For example, many First Nations communities are smaller than the municipalities that have previously used the PIEVC Protocol, they often work with a skeleton infrastructure and they may not have the climate data upon which the PIEVC Protocol relies.

On the other hand, First Nations communities can take advantage of their traditional knowledge, passed down for generations, that can give them insight about nature, climate and changes in climate. It may be that members of the community see that their hunting grounds are moving, or that their medicinal plants are not available in the area where they used to be. Integrating this knowledge with the PIEVC protocol ultimately offers a far more complete picture of climate-related issues than could be obtained using data alone.

Expedited member-in-training program now permanent in BC

Engineers & Geoscientists British Columbia - A pilot training program that helps members-in-training quickly get the skills and experience they need for professional licensing has reached a new milestone. Following the successful conclusion of the pilot, the Engineers and Geoscientists BC Accredited Employer Member-in-Training (MIT) Program is now a permanent offering.

The idea behind the program was to help members-in-training and their employers work together to meet the shared goal of having members-in-training become qualified, registered professionals. Since launching as a pilot in November 2015, the program has accredited 16 organizations and produced an initial cohort of 34 new professionals.

Through the Accredited Employer MIT Program, association registration staff works directly with employers to develop a training program that will ensure the organization's MITs acquire the competencies required for professional licensure. Once the MIT completes four years of work experience and reports their work examples using the Competency-Based Assessment System, their applications qualify for an expedited review process.

Outside the program, the process for reviewing an engineer-in-training's work experience and application can take between 8-16 weeks. Through the program, this process can take as little as five weeks. Program administrator Leila Lagroix thinks of it as "a Nexus lane" for professional registration.

"Members-in-Training like the program because they get that one-on-one support and know that they're getting the right kinds of skills and experience. Employers like it because they know their employees will be ready to take on professional responsibility sooner."

Bowden Refinery gets a second act—as a re-refinery

APEGA – The Bowden Refinery is now a re-refinery in two different ways. First, because the refinery is getting a new lease on life. And second, because its job will be to re-refine used oil from industry.

Energy company Gen III Oil Corp. has announced plans that will return to duty the neglected refinery near the town, located about 45 kilometres south of Red Deer. After sitting idle for 17 years, the refinery could resume activity as soon as the first quarter of 2019, with construction slated to start this summer. Once the \$90 million project is complete, the redeveloped facility will become the first re-refinery in the Prairies and process about 2,800 barrels per day.

Tech Corner >>>>>>>>>>

The Race to Make a Great Fake Steak

IEEE Spectrum - Some of the world's leading food conglomerates, including Unilever, the Swiss flavour maker Givaudan and Avril Group, the Paris-based agro-industrial concern are racing to develop meat substitutes that more closely resemble real meat. There's more than money at stake here. The global meat industry is the source of about 15 per cent of greenhouse gas emissions or roughly as much as what comes from all the vehicles on the planet. What's more, the UN's Food and Agriculture Organization expects meat consumption to soar in coming decades as more countries industrialize.

A number of companies have produced reasonably convincing ground-beef substitutes, but a fake steak is much more difficult to produce than a good stand-in for ground meat. Researchers are pursuing two main avenues: cultured meat and vegetable-based meat substitutes. Cultured meat is also known as lab-grown meat or in vitro meat. One of the difficulties in producing cultured meat is acquiring fetal bovine serum, which is expensive and not compatible with the ethical imperatives of the vegetarian market.

Researchers are now investigating a wide assortment of non-animal serum alternatives—for example, ones based on algae or mushroom extracts. A number of companies claim they are close to solving the serum problem.

Dutch researchers have succeeded in creating a steak substitute based on legumes which they claim has the taste and texture of meat and which they claim cooks the same as a real steak, although pictures of the product more closely resemble Spam and the product has rarely been subjected to independent taste tests.

A Prosthetic That Feels Pain

IEEE Spectrum - By mimicking the natural abilities of our skin, a team of researchers at Johns Hopkins University has enabled a prosthesis to perceive and transmit the feeling of pain.

But why would anyone want to feel pain? Study author Nitish Thakor, a professor of biomedical engineering at Hopkins and IEEE Fellow, has been getting that question a lot.

In the most practical sense, pain sensors in the skin help protect our bodies from damaging objects, such as a hot stove or sharp knife. By the same token, an amputee could rely on the perception of pain to protect his or her prosthesis from damage, says Thakor.

But he also gives a more holistic, almost poetic answer: "We can now span a very human-like sense of perception, from light touch to pressure to pain and I think that makes prosthetics more human."

The Hopkins team was inspired by the way biological touch receptors work in human skin, says Thakor. Real skin consists of layers of receptors. Similarly, the team's "e-dermis" has numerous layers—made of piezoresistive and conductive fabrics, rather than different types of cells—that sense and measure pressure. Also, like real skin, those sensing layers react in different ways to pressure: some react quickly to stimuli, while others respond more slowly.

The pressure information from the e-dermis is converted into neuron-like pulses that are similar to the spikes of electricity, or action potentials, that living neurons use to communicate. That neuron-like, or neuromorphic, signal is then delivered via small electrical stimulations to the peripheral nerves in the skin of an amputee to elicit feelings of pressure and pain.

News From The Field



Flin Flon fosters future geologists

The Reminder (Flin Flon) - Students are saying a program run in collaboration between Creighton Community School and the Northern Manitoba Mining Academy (NMMA) really rocks.

Through a university-level geology class at the NMMA, some students had the chance to study the geology of northern Saskatchewan and Manitoba at the academy, learning how to use advanced equipment and discovering more about the region.

The origin of the program came from Creighton Community School teacher Ryan Gray, who reached out to the mining academy to determine if they could help him expand his high school geology class.

The two schools quickly agreed on ways to expand the course. Now, every Thursday morning a van load of Creighton students heads to the academy for hands-on, in-depth learning.

At times, those teachings have included field trips around the Flin Flon area to study the area's geological roots.

From the beginning, one of the program's main goals was to provide field learning and training with specialized equipment that a typical geology class may not deliver. The students are big fans of the approach.

"It's a lot more in depth and hands on. We can actually use the knowledge more – instead of just hearing it in class, we could actually go out and do it," said student Christin Straile.

Janessa Berezitzky, one of the Grade 11 students in the program, said she has thought about pursuing geology as a career after high school.

OIL AND GAS

SK oil and gas rights sales rebounding

CKRM - This month's public offering of crown petroleum and natural gas rights raised more than \$15 million in revenue for the province.

This month's revenue is as much as the last three public offerings combined and the highest single total since last October.

One exploration license in southeast Saskatchewan received a bonus bid of \$10.5 million.

The next public offering will be held August 14.

Husky Energy keen to replace leaky pipes

The Canadian Press - The company behind the 2016 oil spill that fouled the North Saskatchewan River and threatened the water supply of Prince Albert and other communities wants to build new pipelines to replace the structure that leaked.

Husky Energy held an open house in Prince Albert to discuss its proposal.

Calgary-based Husky says its plan calls for the construction of two new pipelines to transport blended crude and condensate to Lloydminster from across the river.

Sediment and vegetation are still being removed from the North Saskatchewan River, but there are no longer signs of oil in the water. Husky oil spill cleanup continues on the North Saskatchewan River one year after pipeline leak.

Travis Davies, a Husky Energy spokesman, says the new line would be higher in the hilltops on each side to minimize the risk of ground shifting.

He says Husky has also improved its operating procedures to ensure problems are reported quickly.

The Husky spill caused more than 225,000 litres of diluted heavy oil to leak. About 40 per cent of the oil went into the river near Maidstone.

The company was later charged with violating provincial and federal environmental laws and paid \$5 million to the City of Prince Albert for its costs related to the spill. Court proceedings in the case are still ongoing.

More public consultation is planned on the project, but Davies said Husky hopes to start construction of the new pipeline in the fall.

Oil wells not all well in SK

Global Regina - In Saskatchewan, the number of inactive oil well increased by nearly 90 per cent between 2005 and 2017. Saskatchewan's auditor, Judy Ferguson, is asking the Ministry of Energy and Resources whether they are able to handle approximately 9,000 inactive wells.

Legally, it is the responsibility of oil companies to clean up well sites once they are no longer needed. However, some companies go bankrupt before this can happen. In response, the province developed the Saskatchewan Oil and Gas Orphan Fund (SOGOF). Oil companies pay a levy into SOGOF each year and this money goes into remediating the orphan well sites.

This year, \$4 million is being added to SOGOF. The current balance is \$11.6 million. The levy adjusts annually based on the amount of abandoned wells.

With an upward trend of inactive well sites, Ferguson is concerned this may not be enough.

In a statement, the ministry also pointed to the Licensee Liability Rating Program (LLRP). Through this, companies whose future liabilities exceed corporate assets pay a security deposit.

In the event a company goes bankrupt, funds will be available to clean up the now abandoned wells. The current LLRP fund is \$134.7 million.



INFRASTRUCTURE

New water system well done in Bienfait

Water Canada - Construction has commenced on a new wastewater system for the Town of Bienfait, Saskatchewan, a more than \$2.86-million infrastructure project funded in part by the federal and provincial governments that will position the community for growth.

Under the federal-provincial Clean Water and Wastewater Fund (CWWF) program, the Government of Canada will contribute \$1.43 million toward the project, while the Government of Saskatchewan will contribute \$715,250. The Town of Bienfait is responsible for all remaining costs.

The project's total eligible cost under the program is \$2.86

million. The governments of Canada and Saskatchewan announced funding for the Bienfait project in 2017. Since that time, design work was completed by KGS Engineering of Regina, while ongoing project management support has been provided by both KGS and Solomon Matthewson Consulting of Carlyle.

In May, Bienfait awarded a construction contract to Glen Peterson Construction to move the existing sewage lagoon to a new location where it will have greater capacity, while other associated works will be completed in co-operation with Nexom. The entire project is targeted to be completed and operational by the end of 2018.

Province pushes for low-carbon dollars

Global Regina - Environment Minister Dustin Duncan says Saskatchewan should be eligible for previously denied infrastructure dollars through Canada's Low-Carbon Economy Fund. Now, the province has submitted applications for 11 projects aimed at lowering emissions in the hope of receiving that money.

Saskatchewan would have received approximately \$62 million through the fund had the province signed onto the Pan-Canadian Framework on Clean Growth and Climate Change. Saskatchewan did not sign on due to page 50 of the document, highlighting the importance of carbon pricing.

Duncan said Saskatchewan's application for the 11 projects, valued at \$200 million, should be eligible for \$62 million in federal funding despite differences with the federal government.

"If it's about reducing emissions, Saskatchewan should be eligible just like any other province even though we specifically disagreed with the approach the federal government took," Duncan said.

It is estimated the projects, if completed, would remove 188 million tonnes of carbon dioxide from the atmosphere during its lifespan.

Proposed projects include hooking up some First Nations communities to natural gas lines through SaskEnergy instead of using diesel generators and installing solar panels on 12 SaskWater facilities.

Big boost to water infrastructure

Swift Current Online - During the 2018-19 fiscal year, a record investment is being made to Saskatchewan's water management infrastructure.

The Water Security Agency (WSA) is investing \$43.6 million in the rehabilitation and management of the province's dams and conveyance channels – 15 times the amount invested 10 years ago.

Ten million of this will go towards 20 dams that have been

transferred from federal to provincial control under WSA. These previously federally-operated dams require upkeep including safety upgrades and structural work, with the largest single project being a \$4.2 million investment to the Highfield Dam south of Rush Lake.

One project includes the ongoing rehabilitation of the M1 Canal, which supplies six reservoirs, several towns and villages, four potash mines, 13 wetland projects and Blackstrap Provincial Park.



UNIVERSITIES AND RESEARCH

Synchrotron researchers discover irony

Phys.Org - University of Saskatchewan researchers have found that chemicals commonly used to protect samples in synchrotron experiments actually help to damage those samples, potentially misleading scientists around the world.

“Because of this discovery, we have changed the way that we operate in our lab and we’re hoping to change the way that other people operate,” said Kurt Nienaber, a Ph.D. candidate in the Department of Geological Sciences and lead author on the research.

In current techniques, samples of matter are blasted with a beam of X-rays, typically from a synchrotron light source. From the interactions between the X-rays and the samples, scientists learn detailed information about the positions of atoms in biological molecules and deduce how these molecules work within living things.

To protect the delicate samples from freezing damage at the extremely low temperatures required by the experiments, chemicals called cryoprotectants are added. But there is a risk that the radiation can cause chemical changes within the samples through a process called photoreduction.

A small amount of photoreduction is expected in synchrotron X-ray research. But the U of S researchers found that treating samples with common cryoprotectants

such as glycerol made the problem of photoreduction ten times worse.

The discovery has particularly serious implications for medical research.

“Basically, almost every modern medicine development, every new drug, [is affected],” said Graham George, professor of geological sciences, Canada Research Chair in X-ray Absorption Spectroscopy and Nienaber’s Ph.D. supervisor.

The discovery will not mean throwing away past crystallography research results, which are “still incredibly useful,” said George. But in many cases, researchers might need to go back and reexamine their findings.

Armed with this new knowledge that cryoprotectants come with a catch, scientists will be able to correct for the problem. The U of S researchers have already found ways to mitigate the issue — such as adding compounds that protect against the damage or decreasing the amount of radiation that strikes each area of a sample—and will soon be publishing their methods.

Super funding for SuperDARN

Global Saskatoon - New provincial funding will help researchers at the University of Saskatchewan monitor solar winds in space.

Nearly \$1.6 million will be provided to operate SuperDARN Canada’s radars over four years.

SuperDARN, which stands for the Super Dual Auroral Radar Network, is a global network of high-frequency radars operated and maintained by multiple universities and research institutions to monitor space weather.

The U of S is home to SuperDARN Canada’s headquarters, which operates radars in Saskatchewan, British Columbia, Northwest Territories and Nunavut.

Each of the five radars scans over 4,000 square kilometres year-round.

They allow researchers to monitor solar wind changes. These changes are connected to the northern lights and detrimental effects to infrastructure like satellites, power grids and radio communications.

U of S Vice-President Research Karen Chad said they are playing a leadership role in the global collaboration that through the development of technology and data distribution will one day enable true space weather forecasting.

Innovation Saskatchewan’s investment matches funding from the federal government and the Canadian Space Agency’s geospace observatories Canada program.

U of S Space Design Team go for lift off

Global Saskatoon - A University of Saskatchewan-led team has been chosen by the Canadian Space Agency to prepare a research satellite for launch by rocket in 2021.

Once tested, the U of S Space Design Team will launch the satellite to the International Space Station, where it will be deployed.

The satellite, roughly the size of two Rubik's cubes, will be used to study how potentially useful construction materials — ranging from ceramics to fabrics — degrade in space.

A multi-disciplinary team is anticipated to involve over 40 U of S students from engineering, computer science, physics and business, as well as several students from Saskatchewan Polytechnic.

The team was awarded \$200,000 in the CubeSat competition. The Canadian Space Agency will also cover costs associated with the space launch.

However, the team needs to raise an additional \$200,000 to match the funds. To make a donation to the project, visit the U of S online.

U of S officials said it will be Saskatchewan's first student-designed satellite mission.

Founded in 2005, the team has won several international awards for innovations that include developing rovers and rocket payloads.

U of S researcher building MRI for space

Global News - A new lightweight MRI device being built and designed at the University of Saskatchewan will help monitor the health of astronauts during space missions.

The ankle device will monitor bone and muscle health during prolonged trips in space where weightless conditions lead to the loss of bone and muscle mass.

Gordon Sarty, P.Eng., the interim chair of biomedical engineering and head of psychology at the university, said he has always been fascinated with space and had a dream of one day walking on the moon.

Instead, he turned to research and engineering.

"I may not make it to the moon, but my MRI will."

Along with meeting high safety standards, there are also weight considerations. A regular whole-body MRI that scans patients in hospitals weighs about 15 tonnes. The portable ankle-sized MRI, or "Merlin," will weigh about 30 kilograms.

It will be tested in the spring of 2019 using a steeply diving and climbing jet to create zero-gravity conditions.

The goal of the team is to have it on astronauts on the International Space Station by the early 2020s.

SNC-Lavalin to decommission research reactor

World Nuclear News – The Saskatchewan Research Council (SRC) announced that SNC-Lavalin's Candu Energy Inc is to provide decommissioning services for SRC's Slowpoke-2 research reactor. The reactor has operated at the SRC's Environmental Analytical Laboratories in Saskatoon for 37 years. The low-power reactor, which is mainly used as an analytical tool for neutron activation analysis to determine uranium and other elemental concentrations, was commissioned in 1981. In January, it surpassed 20,000 hours of operation for its lifetime.

The reactor is currently licensed to operate until June 2023, but the SRC started the process to initiate decommissioning with the Canadian Nuclear Safety Commission (CNSC) in December last year. Decommissioning is expected to take about two to three years.

SNC-Lavalin previously successfully decommissioned similar reactors at Dalhousie University and the University of Alberta.



Self-driving tractors centre stage at Ag in Motion

Saskatoon StarPhoenix - At the Ag in Motion show in Langham, one of the highlights of the live demonstrations was the fully autonomous and programmable tractor built by DOT Technology Corp, a sister company of SeedMaster.

"It's an absolute game-changer," said DOT's field research manager, Owen Kinch. "The average age of the farmer now is over 50 years old, and even that demographic sees it as an opportunity to stay in the business longer."

A farm's mapping information can be uploaded into the DOT system, and the tractor will travel the farm with no supervision required. Attachments like sprayers and seeders can lock on to the machine to perform a variety of tasks.

Because of the size of the field being used, the demonstration of DOT at Ag in Motion was remote-controlled to switch out attachments, but the message was clear: The future of farming from the perspective of a lot of farming companies is digital and autonomous.



ENERGY

Province invests in geothermal research

Regina Leader-Post - An underground aquifer could one day power hundreds of thousands of Saskatchewan homes — and the province is pitching in to figure out how.

The government announced this week that it's investing \$175,000 in a geothermal energy project near Torquay, southwest of Estevan. The money will help fund a five-megawatt facility that draws steaming hot water from deep underground, pumping it up 3,400 metres to run turbines on the surface.

It's a small test plant that Kirsten Marcia, P.Geo. hopes will lead to a much bigger project. A geoscientist and CEO of the company running the project — DEEP Earth Energy Production Corporation — she finds it “shocking” that there's no geothermal energy generation anywhere in Canada.

Wes Jickling of Innovation Saskatchewan confirmed that the project will be the first attempt to generate commercially viable electricity through geothermal power.

Marcia said drilling will begin this summer. SaskPower has already signed a deal to buy the energy, which Marcia thinks will start flowing out in about two and a half years. She said there could then be opportunities to build 10, 20 or even 30 megawatt facilities, which could be repeated across the 100-kilometre-long aquifer.

Ultimately, she suspects the aquifer could yield up to 500 megawatts of power — enough to power 500,000 households.

But there's a lot of uncertainty over whether the technology can be economically viable. The first facility is meant to demonstrate that it can work. Marcia said the government funding will help them get the \$8 million project off the ground.

Marcia is optimistic that the Estevan region is well suited to geothermal technology. The water is hot enough — at about 120 degrees celsius — and the expansive sedimentary rock formations are ideal. The site isn't far from SaskPower's carbon sequestration facility.

SaskPower announces 10 MW solar project

Global News - In 2019, just east of Swift Current, the province's first utility-scale solar plant will be operation. The 80-acre-project in the RM of Coulee is the first of two 10 megawatt (MW) plants that SaskPower plans to have operational before 2021 — part of its foray into solar energy.

“Ten megawatts is relatively small compared to the amount of generation we have in the province,” admitted Doug Opseth, P.Eng., generation asset management director for SaskPower.

It's just 0.22 per cent of Saskatchewan's nearly 4,500 MW generating capacity, but the province has set the goal of generating up to 50 per cent renewable energy by 2030.

“Adding this first utility scale solar project will allow us to get an understanding of how it operates on our grid. Certainly as you look towards the future the prices of solar and wind are coming down so I can see us adding lots more solar and wind in the future,” Opseth said.

The Highfield Solar Project will generate enough energy to power 2,000 homes and will cost roughly \$15 million according to Saturn Power Inc., the company who was awarded the contract.

“We're looking at doing a similar type process that will come out next year and then we're also looking at adding more solar through our customer programs and then through our partnership with the First Nations Power Authority,” Opseth added.

The Highfield Solar plant is expected to last decades as it could be 40 years before the panels need to be replaced.

Boundary Damsurpasses a safety milestone

Estevan Mercury - On May 14, SaskPower celebrated two years without a single lost-time injury at the coal-fired power station near Estevan.

“This reflects a lot of hard work by the 350 men and women working at Boundary Dam,” said SaskPower vice-president of power production Howard Matthews. “It also shows how SaskPower has made safety a core value in recent years.”

“We've put our money where our mouth is and we're achieving real results. Our employees continue to bring power to homes and businesses every day and they have to stay safe to keep you safe at home.”

“We tell farmers to be safe during seeding and to ‘come home safe tonight’ to their families. We also need to do the same for every employee at SaskPower.”

SaskPower continues to emphasize public and employee safety in all things, from recruitment to project planning and outage response. As part of the Canadian Electricity Association, SaskPower also collaborates with other utilities to make sure they share their lessons learned with others and bring new best practice back to Saskatchewan.

Calendar Of Events



2018 Canadian Crude Oil Conference

September 11 - 13, 2018
Lake Louise, AB
www.ccoconline.com

North American Mining Expo (NAME)

September 12 – 13, 2018
Sudbury, ON
www.northamericaminingexpo.com

IEEE Canada Electrical Power and Energy Conference (EPEC 2018)

October 10 – 11, 2018
Toronto, ON
epec2018.ieee.ca

2018 APEGBC Annual Conference and Annual General Meeting

October 18-20, 2018, Vancouver, BC
www.egbc.ca

Ingenium 2018 – EGM Professional Development Seminars and Annual General Business Meeting

October 18, 2018, Winnipeg, MN
www.enggeomb.ca

3rd International Convention on Geosciences and Remote Sensing

October 19-20, 2018 Ottawa, On
geosciences.conferenceseries.com

ACEC National Leadership Conference

October 21 – 23, 2018, Ottawa, ON
www.acec.ca/events_awards/conference/2018/about.html

APEGS Fall Professional Development Days

November 5 – 6, 2018, Saskatoon, SK
www.apegs.ca

ACEC-SK 2018 Awards of Distinction

November 20, 2018, Saskatoon, SK
www.acec-sk.ca

Saskatchewan Geological Open House

December 3 – 5, 2018, Saskatoon, SK
openhouse.sgshome.ca

Prairie Wood Solutions Conference

December 11, 2018, Calgary, AB
cwc.ca/event/prairie-wood-solutions-conference

SUMA Convention and Trade Show

February 3 – 6, 2019, Saskatoon, SK
suma.org/conventions

Did You Know?

Reading *The Professional Edge* counts as credits for reporting continuing professional development under the Informal Activity category.

Attending conferences also counts as credits under the Informal Activity category.