

Environmental Engineering

Waste Management

Cache Creek landfill expansion is a multi-layered project

SHANNON MONEO
CORRESPONDENT

When the 40-hectare Cache Creek landfill doubles in size over the next few years, a sophisticated nine-layer system will protect the surrounding soil and water.

"Landfills used to get such a bad rap. This will not be a hole with garbage," said Russ Black, general manager of Wastech Services, the Coquitlam company operating the landfill.

"Technology has evolved dramatically over the last 20 years. New landfills are incredibly engineered. This one will be extremely well-designed."

While waste reduction is promoted as the long-term solution for garbage disposal, the Cache Creek landfill, which opened in 1989 (taking garbage from Greater Vancouver and B.C.'s Thompson-Nicola region), is growing by 49 hectares because of demand.

With an original closing date of about 2010, the \$100-million expansion will bump up the dump's life by 17 to 25 years, adding roughly 12.6-million tonnes of capacity.

Whistler expressed interest in sending its trash to the landfill, said Black, a UBC engineering graduate with more than 22 years of experience.

Phase one is building a seven-hectare annex, connecting to the existing landfill and adding two years of capacity.

The remaining 42 hectares will likely be built over about six years in roughly seven-hectare tracts.

Tenders will be posted for liner installation and engineering services in the final quarter of 2010, Black said.

The crucial component is the liner.



WASTECH SERVICES

The expansion of the landfill will increase the dump's life by 17 to 25 years. The existing landfill can be seen on the right side of the road.

Known as a double composite liner with a leak detection system, Cache Creek's exceeds regulatory requirements. It will cover the entire site and be more than a metre deep.

Starting from the top down, garbage will be placed atop pit run gravel.

Below that is a geotextile mat, used to prevent small soil and particles from moving down.

The third layer will be drain rock, serving to collect leachate.

Next comes another geotextile mat, followed by protective cushioning.

Below that is the first high-density polyethylene (HDPE) geomembrane liner.

Stable and strong HDPE has an estimated

half-life of 350 years in a buried state, according to RAM Lining Systems.

One advantage is that HDPE is easily seamed on site using a thermal process.

Next is a geosynthetic clay liner (GCL), a thin clay liner (four to six millimetres) between two layers of a geotextile that protects the bentonite clay.

The big selling point of GCL is that if there's a leak in the HDPE layer above, it reacts with the bentonite clay below, creating a chemical reaction which causes the liquid to harden like concrete, in effect creating a self-repairing seal, Black said.

GCL installation is quicker than traditional compacted clay liners because the material is

in one big roll. Freeze-thaw cycles also have less of an impact on GCL, according to an Ohio State University study.

Below the first GCL is a second HDPE layer, bottomed-off by a second GCL.

A double composite liner system such as this one normally costs double a single liner system, Black said,

But thanks to economies of scale, he predicted that Cache Creek's double system would cost around \$35 per square metre versus about \$20 per square metre for a single liner.

There will also be a separate leachate collection system that uses an electronic sensing system to detect leaks, one further safeguard for the nearby Bonaparte River.

To ensure contaminants don't reach the aquifer, 12 new 20-metre to 100-metre-deep wells have been drilled around the Bonaparte River, augmenting the existing dozen wells, all of which are monitored.

One natural advantage is that the extension will sit on bedrock where in this case it creates a natural hydraulic capping system that dramatically slows leachate movement.

Cache Creek enjoys a second asset as a landfill - its dry climate.

If the same amount of garbage was dumped in a soggy Lower Mainland landfill, it would generate as much leachate in one day as the Cache Creek facility does in a year, Black said.

Still, Wastech, whose parent company is Vancouver-based Belcorp Industries, spends \$500,000 annually on water monitoring.

Two decades of data have shown the landfill is performing well, Black said.

Additional construction over the next two to three years involves a \$20-million liquid natural gas (LNG) facility.

See LANDFILL, Pg.5

Innovation

Heat pump industry gets direction expansion technology

KORKY KOROLUK
CORRESPONDENT

The Canadian geothermal industry got a boost recently with the announcement that heat pumps employing a technology called direct expansion now qualify for grant money under the federal EcoEnergy program.

The program specifies that to qualify for grants, geothermal systems must comply with CSA standard C-448.

That posed a problem for manufacturers and suppliers of direct expansion systems because they had been excluded from the

standard.

However, after an intensive effort by the industry, the Canadian Standards Association amended C-448 to include direct expansion systems, and Natural Resources Canada followed that with the announcement that those systems would qualify for EcoEnergy grants.

The grant program runs until the spring of 2011.

Denis Tanguay, president of the Canadian Geo-Exchange Coalition, the industry's trade association, said he is pleased with the announcement, but it did leave him wondering.

"It has always been and always will be a puzzle as to why this particular technology (was) explicitly excluded from the C-448 standard," he said.

Direct expansion, or DX, systems were developed in Canada and are sold in other countries as well.

They use a gaseous refrigerant instead of glycol in their ground loops, which are made of copper instead of high-density polyethylene.

They require no circulating pump, and are often more efficient than conventional heat-pump systems.

As well, the boreholes

needed are much shallower than those required by other ground-source systems.

Regulations dictate that people working with refrigerants be certified refrigeration technicians.

DX installers, therefore, must have a refrigeration ticket, not just a geothermal installers' course.

With DX systems excluded from the grant program, sales suffered, Tanguay said, and added that many contractors have suffered financially as a result.

But, with grants now available, he said he expected sales to improve.

Geothermal contractors

say using their systems for heating and cooling will usually save somewhere close to 50 per cent in annual operation costs.

The International Ground Source Heat Pumps Association calls geothermal technology one of the most efficient residential heating and cooling systems available, with heating efficiencies 50 to 70 per cent higher than other heating systems, and cooling efficiencies 20 to 40 per cent higher than conventional air conditioners.

Still, the geothermal industry has failed thus far to capture the public

imagination or the investment dollars that solar and wind power have.

It still represents less than one per cent of the residential market, largely because of high up-front costs.

Residential installations totalled about \$85 million in 2007, Tanguay said, and 2008 showed an increase of about 65 per cent.

He suggested that might represent about half the total installations, but could provide no figures for commercial installations because they weren't part of the EcoEnergy program, and so were not certified by his association.



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Environmental Engineering

Power Generation

Swiss lawsuit repercussions not likely to be felt in Canada

JESSICA KRIPPENDORF
CORRESPONDENT

A Swiss geologist was recently acquitted of criminal charges after a geothermal power generation project he was working on set off a series of earthquakes causing \$9 million in damages, but it's unlikely to happen in B.C.

Although B.C.'s seismic potential and plentiful geothermal resources might sound like a cocktail for a similar disaster, experts say the province has more to lose by opting out of geothermal power generation.

Traditional geothermal systems draw hot water from wells drilled two to three kilometers into the earth and use it to generate hydro electricity.

The term is often inaccurately used to describe geothermal systems, which harness solar energy from the earth's crust for heating residential and commercial buildings.

The \$60 million Swiss Deep Heat Mining Project was an Enhanced Geothermal System (EGS) with wells five kilometers deep.

Water is injected into the rock, fracturing it to release heat and using the steam to generate hydro.

The risk for similar problems in B.C. is low, said Ruben Arellano, energy projects director for Vancouver-based environmental engineer Hemmera Energy.

He said the province has different geology and its resources aren't located near population centers.

"Switzerland and B.C. are entirely different tectonic settings. The Swiss case was drilling through a tectonically active area, and B.C. has less of those," said Arellano.

"When you consider the

depth of expertise we have here and the relatively few populated areas in B.C., I think the risk of such an event can be managed."

Ian Moes, a lawyer with Vancouver-based construction law firm Kuhn & Co, said Canada's Criminal Code doesn't specifically address induced seismic activity, although Subsection 180 addresses nuisance behaviour that endangers the lives, safety, or health of the public, or causes physical injury.

"This section could apply to deep drilling, however it would be pretty novel," he said.

"It is more likely that the offending company would be pursued in a private civil law

We would say the Swiss case was extreme bad luck."

**Alison Thompson
CanGEA**

suit for monetary damages."

There are no Canadian decisions regarding seismic activity on record.

Canada has already had 100 years of success with deep drilling techniques, said Alison

Thompson, chairperson and founder of Canadian Geothermal Energy Association (CanGEA).

"What do you think the oil and gas industry is doing? When you frack a well, you use the same technique," she said. "It isn't statistically impossible, but this isn't something unique to geothermal. We would say the Swiss case was extreme bad luck."

Despite having world-class resources, Canada's level of geothermal activity has remained eerily silent compared to other places in the world.

Thompson said it's been at a standstill in B.C. because the provincial government is not currently issuing permits or leases.

"We continue to work with industry on a weekly basis to

try and get the government to re-open the program," she said.

Meager Creek, B.C., west of Pemberton, is Canada's only geothermal site to hold an active lease.

It was originally drilled by BC Hydro in the 80s.

A project summary released by Western GeoPower Corp. in 2007 said exploration suggests a geothermal area of 4.5 to 7.5 square kilometres and an average temperature of 220 to 240 degrees Celsius, qualifying the project as having 100 MW or more of potential development capacity.

Western GeoPower Corp. merged with Polaris Geothermal, Inc., RAM Power Corp., and GTO Resources under the umbrella of RAM Power Corp., headquartered in Reno, Nevada in 2009.

RAM Power Corp. declined comment on the current status of the Meager Creek Project.

Jake Jacobs, media relations for Energy, Mines, & Petroleum Resources said the ministry will be holding a public disposition for geothermal rights in March 2010 and intends to hold two more later in the year.

"A growing interest in geo-

thermal energy resulted in the ministry reviewing how to move forward with geothermal tenuring," he said.

"The upcoming disposition is the start." In the meantime, B.C. is losing potential investment dollars.

"Most of the companies actively involved with geothermal power generation that are trading on the Toronto stock exchange are Canadian, and most tried to do work in B.C., which has the country's best assets," said Thompson.

"But, they eventually went elsewhere because there is only so much public money a

company can raise before the time has come and gone."

Unlike wind and solar power, which are cyclical and offer low production guarantees, geothermal power has 100 per cent capacity all the time and long-term environmental risks are low, said Arellano.

"If you imagine the earth as being the size of a balloon, the depth of drilling the industry is doing is not thicker than the skin of the balloon in terms of scale," he said.

"There is a whole lot of energy in the earth and we are just catching the 'burps and sneezes' so to speak."

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Landfill to produce LNG

Continued from Pg. 4

Once operating, it will fuel the 25 heavy-duty trucks that make the four-hour, one-way, trash-toting trip from Vancouver. LNG is produced by organic landfill waste and there's no shortage. Waste from the existing landfill will produce enough LNG for the fleet for 20 years, Black said.

When anaerobic bacteria work through food scraps, methane is a byproduct.

When collected, the gas is about 50 per cent methane with the balance CO₂ and organic contaminants.

Wastech's facility will clean the gas, producing a product that's 99 per cent methane. Once chilled and liquified, it will fuel the trucks. Wastech has tested engines from Vancouver's Westport Cummings to see how the fuel performs. Results have been good and two trucks have been converted to LNG.





Environmental Engineering

Remediation

New stormwater facility will protect Bow River

SAUL CHERNOS
CORRESPONDENT

Downtown Calgary will gain its first wetland stormwater treatment facility thanks to a \$6-million project to clean up derelict property close to two main waterways.

The East Village Stormwater Wetland will include park space, when landscaping is completed later this year.

It is being built on once-contaminated land next to historic Fort Calgary on the east end of the downtown, where the Bow and Elbow rivers meet.

"Many residential subdivisions around Calgary have stormwater wetlands, wet ponds and dry ponds to catch sediment and other contaminants before they go into the Bow River, but there weren't any systems like that downtown," said Chris Ollenberger, president of the Calgary Municipal Land Corporation, an arms-length, municipally-owned developer.

The stormwater facility

won't collect rainwater from the entire downtown, but will connect to the entire East Village area Ollenberger said.

He described a series of constructed wetlands that will take rainwater from city streets and sewers, remove sediment and other contaminants and treat water before discharging it into the Bow River.

"There are two ponds linked through a series of pipes, with an overflow outlet into the Bow River," he explained.

"The first pond is a sedimentation forebay and will remove sand, grit and small rocks that flow through the stormwater system, and a larger pond will provide settlement for some of the smaller particles."

The five-acre wetlands will include plant species to absorb contaminants typical to streets, such as oil residue from cars.

Cigarette butts and other garbage will be removed through periodic dredging.

While wetlands construction is almost always a challenge, this one is particularly difficult as Fort Calgary dates back to 1875.

Ollenberger said it wasn't easy to clean up a mess left by subsequent users, which included a rail yard, garbage incinerator and manufacturing plants.

When crews working on the stormwater wetland conducted a routine archaeological assessment, they discovered significant remains of the Grand Trunk Railroad, including the foundations of a railway engine house and a turntable, a large, rotating piece of track used to redirect engines towards different destinations.

Many of the artifacts are less than a century old.

Crews found old bottles and a Model-T Ford.

A badly burned barn contained a pitchfork and hay, with newspapers dating it to about 1912.

"We had to document all of this and preserve it," he said.

"We worked with archaeologists on-site to determine what was historic and what wasn't."

Older artifacts were largely obliterated by the railway and subsequent users. However, crews found 3,000-year-old teepee rings, which are now in storage, with a view to including them in a planned public promenade along the Bow River.



CALGARY MUNICIPAL LAND CORPORATION

The East Village Stormwater Wetland, to include park space when landscaping is completed later this year, is being built on once-contaminated land next to historic Fort Calgary on the east end of the downtown, where the Bow and Elbow rivers meet.

"We can actually recreate them exactly as we found them in the ground, with some educational interpretive material," Ollenberger said.

While much attention was paid to items of historic value, crews encountered hazards that typically follow industrial uses of land.

Crews removed more than 50,000 cubic metres of debris and contaminated materials, including asbestos wallboard and rock close to

the Bow River, oil residues from the rail yard, and ash from the incinerator, which was operational in the early 1900s.

The developer needed to institute a risk-management protocol to manage the soil and groundwater.

"We had to test it regularly to make sure we weren't putting any contaminants back into the groundwater," he said.

Although most of the waste was solid and easily removed with conventional equipment, the riverbed is largely gravel.

"We had to keep the gravel under control at all times so that we didn't stir up the contaminated material and reintroduce them into groundwater," he said.

Crews used an impermeable geosynthetic clay liner to manage the wetlands and keep clean water separated from contaminated water.

They also capped material that was safe to leave in place, including some construction debris and contaminated

soil, to reduce off-site disposal and prevent any future accidental exposure.

The East Village Stormwater Wetland was a finalist in the 2008 Canadian Urban Institute Brownie Awards, in the category for sustainable remediation technologies and technological innovation.

Steven Rowe is a Toronto land-use planner, who helped the Institute co-ordinate the awards.

The judges were particularly impressed that the project used caps and other modern remediation technology and produced utility value in the stormwater facility and public amenity value in terms of parks space.

"It was in a category where other projects went a bit further in some of those ways, so it didn't end up being a winning project," he said.

"But it did deserve recognition. There's a trend towards multi-uses rather than just fencing things off for a single use, and this is what happened here."

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Environmental Engineering

Water Treatment

Vancouver company wins award for mine remediation

SAUL CHERNOS
CORRESPONDENT

Vancouver-based BioteQ Environmental Technologies has won recognition from the Prospectors and Developers Association of Canada for creating a process to treat acidic pollution and metals contamination from mines.

Acid mine drainage is particularly deadly for plants, animals and wildlife. It is one of the major environmental issues facing the mining industry.

Brad Marchant, CEO of BioteQ, which counts Vale Inco and Xstrata Nickel among its high-profile clients, said the byproducts occur when mining disturbs rocks containing sulphide.

When sulphide is exposed to moisture, bacteria flourish and produce acid, which in turn dissolves residual metals in the rock, including copper, arsenic, lead, cadmium and zinc — often the very target of the mining activity.

“You get this cocktail that’s full of heavy metals and sulphuric acid,” Marchant explained.

“Traditionally, lime — generally calcium oxide and hydroxide — has been used to convert the metallic and acidic waste into a sludge. However, this requires long-term, secure storage, usually on-site, and leaves mining companies and landowners with ongoing costs and environmental liabilities.”

Marchant said BioteQ’s BioSulphide and ChemSulphide processes use biotechnology and some chemicals to remove individual metals, which are then sent for recycling.

A separate process, Sulfix, removes sulphate from the water so it can be discharged back into the local aquifer.

“We can sell the metals to a refinery and they can make copper wire, nickel ingots — whatever they



want,” Marchant said, adding the sulphate is a pH modifier and can be recycled for use as an ingredient in fertilizer.

“It’s a much more sustainable system. The products we recover help pay for the water treatment and we don’t leave any sludge behind.”

One BioteQ plant, at the Xstrata-owned Raglan nickel mine in northern Quebec, took four months to build in 2004 and is expected to operate for some time.

“Even after they shut the mine down, there will likely still be drainage to treat for a while,” he said.

BioteQ builds, owns and operates its water treatment plants, maintaining eight worldwide.

Individual contracts vary. Sometimes BioteQ earns all the revenues from the resale of by-products.

Other times, the parties share the proceeds through a joint venture, or the customer keeps everything and pays BioteQ a larger overall service fee.

“It depends a lot on the site and what our customer wants us to do,” Marchant said.

The Raglan plant is built to treat roughly 250 cubic metres of water per hour, putting it in low-to-middle range compared to other BioteQ facilities.

A plant at the now-closed

Wellington Oro mine site in Breckenridge, Colorado processes 35 cubic metres per hour, while one at the active Copper Queen site in Bisbee, Arizona has a capacity of 600 cubic metres per hour. BioteQ’s largest, at the Dexing Mine in China, handles 1,000 cubic metres per hour.

Marchant said the Raglan plant cost BioteQ just under \$2 million and the company charges \$1.12 for each cubic metre of water treated.

“We give Xstrata the nickel we recover, and that’s worth about 50 cents per cubic metre, so their net cost is about 62 cents.”

Factor in an additional 20 per cent for consumables such as power, and the cost comes to less than \$1 — about one-third of the price of lime treatment.

Joël Pagé, manager of sustainable development with Xstrata Nickel’s Raglan mine, said the treatment plant handles waste that is more pH neutral than acidic, but contains metals such as nickel and cobalt.

“We recuperate 5.6 tonnes of nickel from the BioteQ plant (yearly),” Pagé said.

Waste nickel is added to the concentrate mix sent for processing in Sudbury and later, in Norway.

“We’re one of the only mines in Quebec and Can-



BIOTEQ ENVIRONMENTAL TECHNOLOGIES

BioteQ’s water treatment at the Raglan Mine site in northern Quebec removes dissolved nickel from wastewater, producing a saleable nickel concentrate and water that is discharged back into the environment.

ada which uses this technology to recuperate nickel from their effluent.”

While BioteQ focuses on the mining sector, the company is looking at other opportunities, including coal and diesel-fired power plants, which produce gases containing metals as well as sulphur dioxide, and the oilsands and auto manufacturers.

“Anywhere there’s metals processing you have the same issue,” he said.

Sometimes, however, an old-fashioned lime plant makes more sense.

“When you have a very high flow and very low quantities of metal, just a few parts per million of metal, there’s really no advantage to recovering that metal,” Marchant said.

“The amount of sludge is so insignificant it wouldn’t make any sense.”

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Environmental Engineering

Demolition

Majority of Edmonton job isn't going anywhere

PETER KENTER
CORRESPONDENT

The \$160-million redevelopment of Edmonton's Northlands exhibition, sports and trade show facility requires significant demolition work.

The walls of the Sportex facility, built more than 40 years ago, came down in October — but most of the building is going nowhere.

Visco Demolition Contractors Ltd. of Edmonton is crushing the concrete and using it for aggregate to form a base for the new Agricom building being erected nearby.

"About a year-and-a-half ago, we were doing advance groundwork on the site and I started making them aware of the possibilities for crushing the concrete," said Ron Visser, general manager of Visco.

"When you imagine the logistical nightmare of demolition trucks leaving the site and trucks filled with new aggregate coming in, dedicating a small

amount of land to temporary storage of the concrete for crushing makes a lot of business sense."

The cinder block building covers more than 11,000 square metres and features steel support columns, metal decking, some wood framing — and lots of straw.

"I've seen straw on a couple of projects," said Visser.

"It was compressed and used as roof insulation.

"It still looks like it came off the field. The only place it has blackened is where the roof membrane has been leaking, but it's 99 per cent in perfect shape.

"It's a pain in the backside, because it floats in the air and clogs up the radiator fins."

All of the material — straw included — is either sorted or processed on site.

The aggregate is crushed to spec and delivered next door to the Agricom.

Metal is graded, then processed to the degree required by local mills.

Wood framing is chipped and mixed with straw, then



sold to a local power plant as fuel, which is almost purely combustible.

The concrete is so valuable, it's worth removing.

A decade ago, some concrete was re-used unprocessed in larger chunks, but supply exceeded demand and tipping fees began to rise.

In 1997, Visco purchased a plot of industrial land to stockpile the concrete, with the idea that — at very worst — it could use the material to even out the property's slopes and build a new facility there.

The stockpile became so huge that, as it approached 25 metres, the City of Edmonton requested the company place an airplane warning light on top.

"Over the years we were watching the aggregate pits in and around the city closing down because they were exhausted," he said.

"Many of the nearest aggregate pits are now a two-hour drive from Edmonton. Then, fuel prices skyrocketed."

As aggregate prices rose quickly from \$7 per tonne at the beginning of 2004 to \$13 per tonne in 2005, recycling the concrete into aggregate suddenly became more profitable.



DALE MACMILLAN

The Sportex facility built more than 40 years ago came down in October. The concrete removed by Visco Demolition Contractors is being used for aggregate to form the base for the new Agricom building being erected nearby.

When the price rose to \$24 per tonne by the end of 2005, the 600,000-tonne concrete mountain became a gold mine.

The company purchased a Nordberg LT105 portable crusher to process the material into aggregate.

"Turning concrete into aggregate is as much an art as a science," said Visser.

He and other members of the family-owned business

spent long hours perfecting the process of crushing concrete to spec.

By September of that year, they purchased a second crusher.

It's a capital-intensive business.

Visco also needed to purchase demolition hauling trucks, conveyors, loaders and weigh scales to support the endeavour.

A commercial blue box

program for other contractors helps to keep the feedstock coming.

With aggregate prices at \$29.50 per tonne in 2008, the market for the recycled product remains strong.

"On each of our demolition jobs, including Sportex, we now recycle 98.5 per cent of the material by weight," he said.

"Recycling has changed the way we do business."

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Environmental Engineering

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Engineering firm carving out a niche in Nunavut

DAN PELTON
CORRESPONDENT

Despite the downturn in the economy, several sectors are on the rise, including environmental engineering.

This type of engineer has become more urgent in a world where the fragility of the global ecosystem is becoming more apparent to more people.

Jim Wallis, a geoscientist with R.J. Burnside & Associates Ltd. in Orangeville, Ont. and a 20-year veteran of the business, noted significant changes in the roles of environmental engineers in the construction industry over the last two decades.

In 1990, he pointed out, to get a development started required little more than the approval of local government and a zoning change.

These days, provinces are intervening through their respective environment ministries.

Environmental assessments are usually required.

Before the spade breaks ground, a number of issues must be looked at including what species could be at risk and the long-term effects on the ground and surface water.

Wallis said that public consultation is becoming more prevalent.

"There is a lot more public awareness and interest in participating (in construction developments). I call it the David Suzuki influence," he said.

For a long time, the relationship between the environmentalist and the developer was perceived as an automatic feud.

Wallis contended that there is now a stronger sense of co-operation.

"Most conscientious developers know that it's better to do it once and do it right," he said.

"They don't want to leave a legacy that has to be cleaned up and be a financial burden to the next generation.

"Every dollar you spend (for environmental engineering) now saves you \$10 in clean-up costs tomorrow. Put it this way— you can pay me now, or pay me a lot more later."

Founded in 1970, R.J. Burnside & Associates provides services in the areas of integrated water resources, environmental sciences,

transportation, structural engineering, building sciences and geomatics.

The type of proactive engineering work it does can be quite challenging.

This is especially true up North in Nunavut, where an affiliate, Nuna Burnside, has been providing engineering services for building and landfill construction.

With no road or rail access to the various sites in Nunavut, a contractor must make arrangements to have equipment shipped out of either Hay River, N.W.T., Montreal or Quebec City by May in order to get it to its destination by August.

The contractor then has about a six week window of opportunity to use the equipment before stopping for winter and waiting for the next construction season, which is about four months long.

There's also the challenge of dealing with territorial regulation agencies that, for the most part, are staffed by people on two-to-three-year contracts, who leave once the contract is up.

"It makes the regulatory agencies ineffective and very challenged," said Wallis.

"Things that are supposed to happen quickly take a lot longer."

Nevertheless, all work done must be in compliance with the Canadian Environmental Assessment Act.

Thus, Nuna Burnside has to deal with such problems as accurately monitoring ground water in ground that is in a state of perma-frost and making sure that everything is done on time, in a small time frame.

Still, it's apparent that the demand for skilled environmental engineers should increase in a world that is getting more ecologically savvy and health conscious.

After all, gone are the days when a tradesman washed his hands with PCBs, for its degreasing qualities.

Such a practice is not only illegal, but anyone doing it might be considered insane.

Wallis pointed to greenbelts being legislated in cities.

Not only are they a pleasant place to take a stroll, but he said more people are acknowledging that trees play a vital role in controlling air pollution and keeping the urban climate more temperate.

As for the future of environmental engineering, Wallis figures one of its goals will be to monitor and maintain non-point-source pollution.

This would be the more subtle polluters such as fertilizers and other toxic materials that pollute, but not on such a visible scale as factories.

"Once we've targeted the obvious polluters, we will go after these," he said.

"That will be our next focus."



R.J. BURNSIDE & ASSOCIATES

Nuna Burnside, a Nunavut-based affiliate of R.J. Burnside & Associates, provides building and landfill construction services in the northern territory. Lack of road access to various sites means that equipment must frequently be flown in by contractors.

WHAT GOES UP MUST BRING COSTS DOWN

No matter how high a building reaches, it's the bottom line that's most important. In that spirit, BC Hydro created the High Performance Building Program. Proven to be happier, healthier places to work and live, High Performance Buildings also enjoy enhanced marketability, higher asset value, and lower turnover. And we'll be there from the beginning, advising you on building design, lighting design and appliance packages, as well as offering financial assistance on initial cost barriers. So while we're helping developers save energy, you'll also be enjoying some additional savings of your own.

If you're in the planning stages of a new project, we'd like to tell you more about how we can help get you started on a High Performance Building.

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