

ON LOCATION

CUTTING EDGE HYDRODEMOLITION

ASSIGNMENT:

Environment friendly
removal of 140 m³ of
concrete with recycling
of the water in Manitoba,
Canada

AQUAJET



Concrete removal & Recirculation of water

HYDRODEMOLITION APPLICATION

Location: Keeyask Generating Station, Manitoba, Canada.
Duration: 53 days.
Material demolished: 140 m³ of concrete.
Water Recycled: Estimated 1,325,000 gallons (5,016 m³).
Equipment: Aqua Cutter 710V, EcoClear.

Canadian contractor pushes limits of Hydrodemolition

More than 400 miles north of Winnipeg, the Keeyask Generation Project is being constructed on the lower Nelson River. The 695-megawatt hydroelectric generating station, scheduled for completion in 2021, will be a source of renewable energy, producing an average of 4,400 gigawatt hours of electricity each year. The energy produced will be integrated into Manitoba Hydro's electric system for use in Manitoba and to export to other jurisdictions. Throughout its construction, now in its seventh year, the project has managed a number of location-specific challenges.

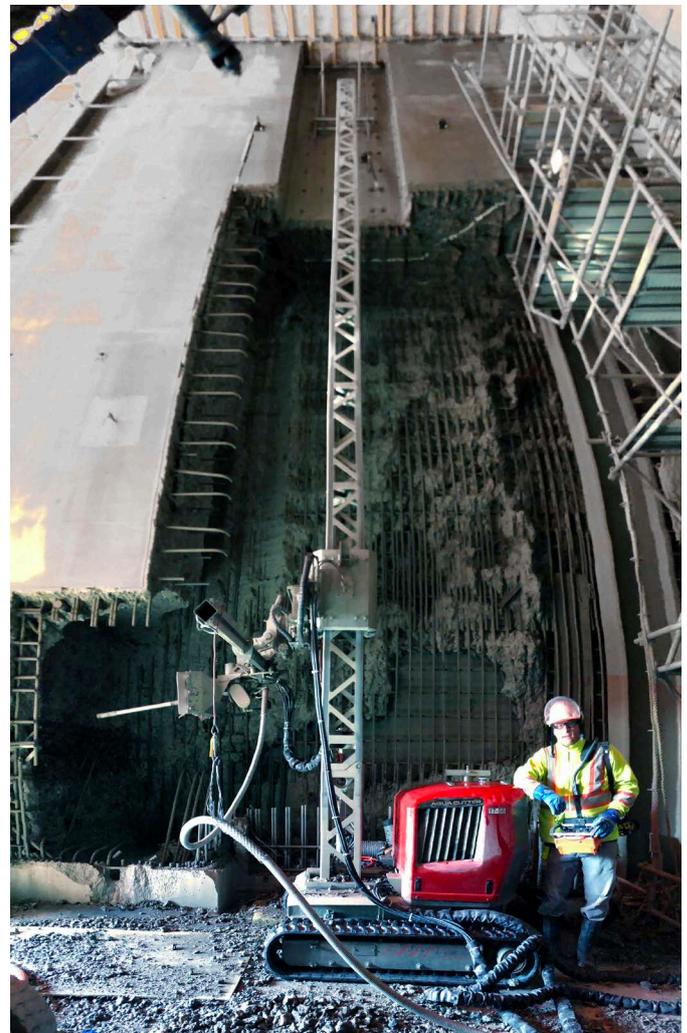
One such challenge occurred in 2017 when water in a 24-inch pipe in the intake froze, damaging an 8-foot-thick concrete pier. To minimize impact to the overall project, Keeyask managers opted to use Hydrodemolition to remove the damaged section. The job required a specialized contractor, one able to leverage all of their experience and equipment to overcome environmental and logistical challenges, while delivering quality results.

Water Blasting & Vacuum Services Inc., a Canadian industrial cleaning specialist, secured the contract based on a plan that provided not only the efficiency to complete the 4,944-cubic-foot (140-cubic-meter) removal work on time, but recycled nearly 80% of the water. With Aquajet's industry-leading technology, combined with years of experience, Water Blasting & Vacuum Services pushed the boundaries of Hydrodemolition to work deeper and cleaner than any Canadian project to date.

Clear Advantage

Water Blasting & Vacuum Services began operations more than three decades ago providing household cleaning products, but quickly branched out to include high-pressure cleaning services for industrial, municipal and commercial entities when it recognized a need for innovative, customer-focused solutions in these applications. As industrial cleaning services grew to become a core market for the company, ensuring employee safety in increasingly hazardous environments encouraged management to explore robotic options.

"The safety of our team members has always been paramount," said Luc Laforge, president and owner of Water Blasting & Vacuum Services. "Many industrial



With Aquajet's industry-leading technology, combined with years of Hydrodemolition experience, Water Blasting & Vacuum Services Inc. pushed the boundaries of Hydrodemolition to work deeper and cleaner than any Canadian project to date, completing a 4,944-cubic-foot (140-cubic-meter) removal project on time and recycling nearly 80% of the water.



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cleaning applications require long hours in confined spaces and specialized PPE, like forced air systems and chemical protective suits. We wanted to take advantage of any opportunity where we could send in a machine instead of a person.”

While its first Hydrodemolition machines were bought used and converted in-house to meet the cleaning challenges of mills and other industrial facilities, the company quickly realized the benefits of working with an original equipment manufacturer to increase precision, safety and efficiency.

“Our old equipment kept the team safe and got the job done, but with most plants slowing down for routine maintenance during the same few months, we needed to find a way to maximize efficiency,” Laforge said.

With one of their pieces of Aquajet equipment — an Aqua Cutter 410A — Laforge saw an 80% increase in efficiency, taking a routine scrubber cleaning application from a 30-hour process to just five.

The power and efficiency of the 410A and additional Aquajet equipment, including a 710V, allowed Water Blasting & Vacuum Services to branch out into Hydrodemolition, hydromilling and other applications, greatly increasing the company’s service offerings. Over time, a reputation for delivering creative solutions and timely, high-quality results with minimal environmental impact propelled the company to the forefront of the Canadian Hydrodemolition industry — and opened the door for even more challenging projects.

Clear Choice

That reputation put Water Blasting & Vacuum Services on the shortlist for a

local hydroelectric company in need of a specialized solution for an unexpected concrete removal job that threatened to delay the project.

“This was a very intriguing project — the first of its kind,” said Maurice Lavoie, general manager at Water Blasting and Vacuum Services and site manager for the project. “The pier was solid concrete, 8 feet thick, 40 feet wide and 30 feet tall at the highest point. A portion of the structure needed to be removed and re-poured. No one in Canada — very few in the world — had used Hydrodemolition to vertically remove 8-foot-thick concrete. But that was just the start when it came to the complexities and challenges of this job.”

Location was another key challenge. The construction site was approximately 2,500 miles (4,000 kilometers) from the contractor’s headquarters in Edmundston, New Brunswick, and 450 miles (725 kilometers) north of Winnipeg, Manitoba. Limited access needed to be carefully factored into any proposed solution. While project managers could provide access to water, power or other general construction supplies, getting specialty equipment or replacement parts presented a time-consuming challenge. Contractors needed dependable equipment and a fully stocked toolbox to limit any unnecessary downtime.

“The project had a lot of challenges to overcome,” Lavoie said. “The remote location left us with no access to technicians or spare parts if something were to go wrong. On top of that, we would be dealing with subzero temperatures that could easily get down to 40 below. You had to have a lot of confidence in your team and your equipment to even submit a bid.”

Strict environmental controls also limited contractors’ application choices. The project partners, known as the Keeyask Hydropower Limited Partnership — which includes four Manitoba First Nations and Manitoba Hydro — had made



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The EcoClear water filtration system allowed Water Blasting & Vacuum Services to present a revolutionary solution to project managers — one that promised maximum productivity while minimizing resource consumption and protecting the environment.



Water Blasting & Vacuum Services created a closed loop with the EcoClear system and two 21,000-gallon tanks to provide water to the Aqua Cutter 710V. Over the course of the project, the EcoClear processed more than 1.3 million gallons of water.

environmental protection a cornerstone of the overall project. So, while the original brief specified Hydrodemolition as an acceptable process, the contractors would need to ensure all wastewater was properly collected and treated.

“Whatever technique we used, we had to ensure there would be no negative impact on the surrounding environment,” Lavoie said. “Limiting environmental impact is always an important part of any project for our company, but, when combined with this project’s remote location, we knew there would be additional challenges. From previous experience on a jobsite at the Muskrat Falls Generating Project in Labrador, we knew hauling water in and out was an option, but it was costly and inefficient. Treating the water onsite and reusing was the most economical and environmentally friendly solution. And with the Aquajet EcoClear we already had the right machine to make it work.”

Clear Solution

The EcoClear water filtration system, in combination with Water Blasting & Vacuum Services’ extensive experience and expert logistics, allowed the contractor to present a revolutionary solution to project managers — one that promised maximum productivity while minimizing resource consumption and protecting the environment.

Water Blasting & Vacuum Services purchased the EcoClear system in 2017 as a more efficient and cost-effective alternative to hauling wastewater with vacuum trucks for off-site treatment. The system neutralizes water pH and reduces turbidity to allow safe release back into the environment. It has the capacity to move up to 88gpm, or about 5,238 gallons (20 cubic meters) per hour.

However, for the hydroelectric power project, rather than treating and releasing the water, Water Blasting & Vacuum Services proposed using the EcoClear as part of a closed loop system that would recycle the water back to its Aqua Cutter 710V. It would be the company’s first time using the EcoClear to recycle water on such a large scale, but Lavoie and his team were confident the EcoClear and 710V would make the perfect pair to tackle the challenging application.

“This project put our people and equipment to the test,” Lavoie said. “There were a lot of firsts, but we knew we had the experience and the support of the Aquajet team to take our plan from theory to reality.”

Clearing a Path

Water Blasting & Vacuum Services arrived at the jobsite in March 2018. With temperatures averaging -20.0 degrees Fahrenheit (-29 degrees Celsius) and dipping as low as -40 degrees Fahrenheit (-40 degrees Celsius) at times, a hoarding system and heaters had to be set up around the demolition site to provide shelter and keep the pumps operating. In addition to the EcoClear system and 710V, the contractor used a spreader bar and additional tower sections to maximize the Hydrodemolition robot’s reach from the standard 23 feet to 40 feet. An extension kit allowed the contractor to make a 12-foot-wide cut, as well. These enhancements greatly reduced the downtime frequent repositioning would have required. Additionally, Water Blasting & Vacuum Services employed additional lance sections to increase efficiency and allow the 8-foot depth the project required.

Steve Ouellette, lead supervisor at Water Blasting & Vacuum Services, was put in charge of the closed loop system with two 21,000-gallon tanks providing



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In addition to Aquajet's EcoClear system and 710V, Water Blasting & Vacuum Services used a spreader bar and additional tower sections to maximize the Hydrodemolition robot's reach to 40 feet. The team operated the Aqua Cutter daily for almost an entire 12-hour shift, working in 12-foot-wide sections to partially demolish the 30-foot-tall pier.

water to the Aqua Cutter 710V. Wastewater was directed to a low point then pumped to the EcoClear. Once the water was treated, it was pumped back to the holding tanks for reuse. In a 12-hour shift, Water Blasting & Vacuum Services removed an average of 141 cubic feet (4 cubic meters) of concrete and used an estimated 40,000 gallons of water. Of this, roughly 20% of the water was lost during the Hydrodemolition process due to evaporation and absorption into the concrete. However, Water Blasting & Vacuum Services was able to collect and recycle the remaining 80% — 32,000 gallons — with the EcoClear system. Over the course of the project, the EcoClear processed more than 1.3 million gallons of water.

Water Blasting & Vacuum Services worked with project managers to integrate demolition into the complex timeline of the overall project, completing the work in two multi-week phases. Lavoie and his team operated the Aqua Cutter daily for almost an entire 12-hour shift, working in 12-foot-wide sections to completely demolish the wall. A separate crew would come on at night to remove rebar and debris. The process repeated for approximately 41 days of blasting and a total of 53 days onsite.

Powering Through to New Opportunities

Water Blasting & Vacuum Services completed demolition in May 2018. Thanks to a revolutionary and expertly executed plan, as well as innovative equipment, the removal did not disrupt the timeline of the overall project.

"Projects like that are once in a lifetime," Laforge said. "Thanks to a dedicated team with the experience and daring to take on the impossible and innovative equipment, we were able to find a unique solution that allowed us to push the boundaries of Hydrodemolition and be part of such an important construction."

And while Water Blasting & Vacuum Services waits for the next first-of-its-kind project, Laforge and his elite team plan to continue expanding their Hydrodemolition experience with innovative processes and cutting-edge equipment from Aquajet. ■



Aqua Cutter 710V / Ecoclear 20

EQUIPMENT USED

The Ecoclear 20 2.0

The EcoClear water treatment system is a state-of-the-art solution dedicated for filtering Hydrodemolition water on a completely new level. EcoClear enables the operator to safely discharge water back into the environment – without the need of an extra water reservoir, without the use of filters of any kind – and without pollution.

EcoClear is designed to work perfectly with our range of AQUA CUTTER robots. It's capable of handling an impressive flow rate up to 20 cubic meters per hour. With EcoClear you can neutralize elevated alkaline pH levels down to pH 6-9 while you have full control of the turbidity level down to 20-40 mg particles/liter. But that's not all. You can do all this without any kinds of filters or an extra water reservoir. Perfect for your operation, amazing for the environment.

EcoClear is powered by Siltbuster Ltd and consists of a number of water treatment chambers. In order to make this piece of water wonder work, EcoClear uses flocculation technology to remove the maximum amount of sludge from the water. The treatment unit is operator friendly, allowing you to take care of all particle sizes and weights. The whole process is easily monitored online and with the RECO control system. All in all, EcoClear is unique on the water treatment market.

The Aqua Cutter 710V evolution 2.0

The AQUA CUTTER 710V is the most versatile Hydrodemolition robot on the market, suitable for all kinds of operations. Our innovative design gives the operator freedom to reach all horizontal, vertical and overhead areas up to 7 meters without support. In other words, where most robots fail, the 710V will prevail.

Our unique 3D positioning system can perform wonders. The front power head gives the operator full freedom to efficiently reach all areas. One example is vertical operations along or against the surface. Due to a compact design the AQUA CUTTER 710V can be operated in tight and confined areas, with retained mobility.

For vertical and overhead operations the 710V has a hydraulically powered steel mast, constructed in sections. Therefore the robot doesn't carry any towers or protruding arms. The mast can operate at heights up to 7 meters without support, and even more with support. In default mode the robot has as powerful diesel engine. Hybrid drive with an electric motor is optional.



(Specifications)

ECOCLEAR

Capacity	20 m3/h (706 ft³/h)
pH outgoing water	6-9 pH
Turbidity outgoing water	20-40 mg/l
pH adjusters	Carbon dioxide (CO ₂)
Neat coagulation fluid	10-30 g/m3 (0,01-0,03 oz/ft³)
Neat flocculation fluid	1,5 -3,0 g/m3 (0,0015-0,003 oz/ft³)
Carbon Dioxide CO2	0,2-0,6 kg/m3 (0,2-0,6 oz/ft³)
Length (L1)	6,058 m (ISO 20')
Width (W1)	2,438 m (ISO 8')
Height (H1)	2,591 m (ISO 8,5')
Dry weight	6 ton (13 228 lbs)
Gross weight	18 ton (39 683 lbs)
Approx. dry weight	7500 kg (16 535 lbs)
Approx gross weight	18 000 kg (39 683 lbs)
Process tank volume	12 m3 (3 170 US gal)
Drive source	Electric 3-phase 15kW 400VAC 25A (Other on request)

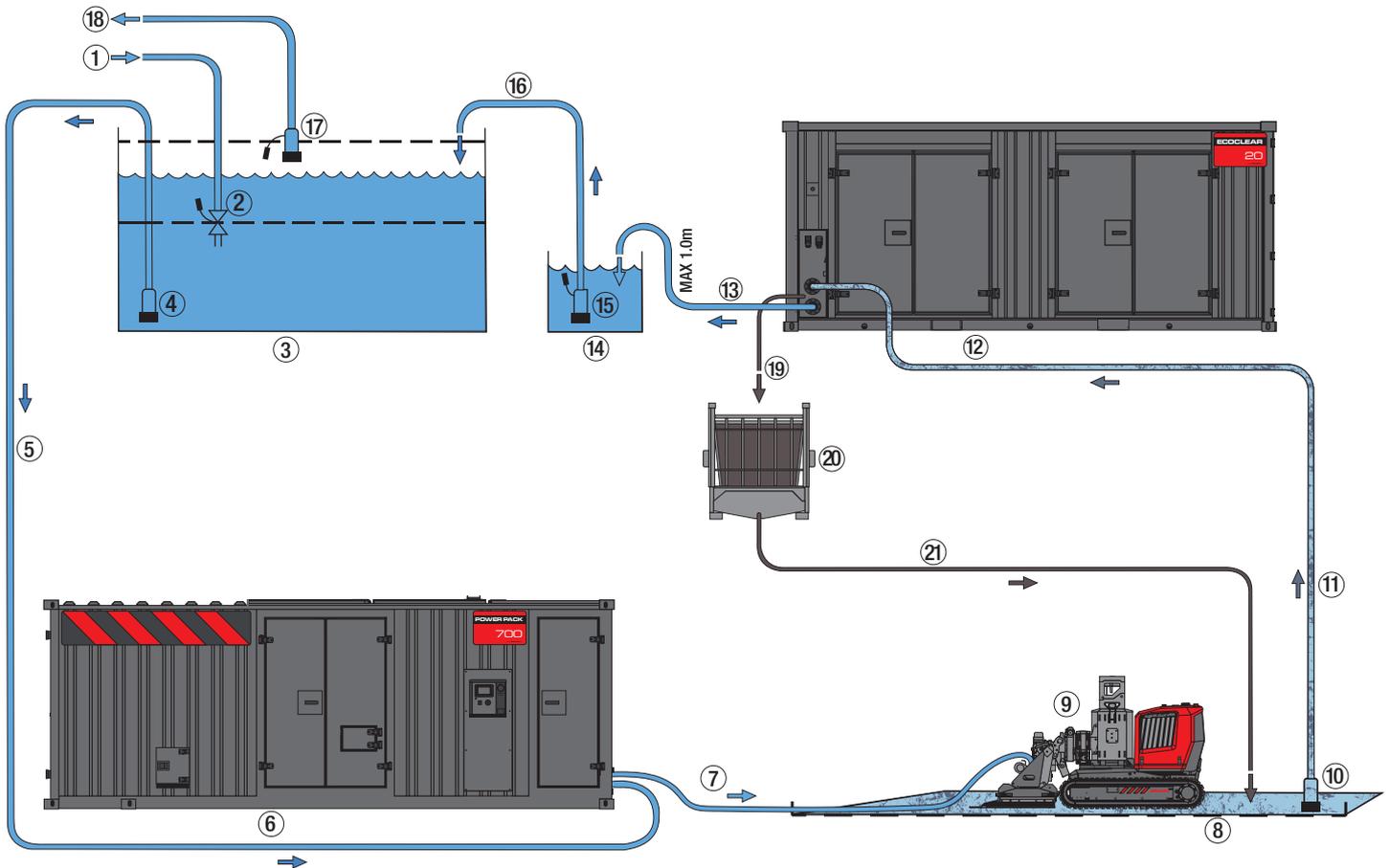
AQUA CUTTER 710V

Total weight	2350 kg (5181 lb)
Length	2,57-2,82 m (8,4-9,2 ft)
Min. width	1,03 m (3,4 ft)
Track width	1,03-1,63 m (3,4-5,4 ft)
Min. height	1,3/1,6 m (4,2/5,2 ft)
Operating height	7 m (23 ft)
Side reach	2 m (6,6 ft)
Lance angle	± 45°
Working width	0-2,45 m (0-8,0 ft)
Working width extended	0-4,45 m (0-14,6 ft)
Drive source	Diesel engine 18kW / 1600-2600 rpm (electric optional)



EcoClear 20

RECIRCULATION OF WATER



- 1 Water source (fresh water).
- 2 Float valve or manual filling valve.
- 3 Water reservoir.
- 4 Drain pump.
- 5 Fresh water hose to the Power Pack.
- 6 Power Pack.
- 7 High pressure hose.
- 8 Embankment for water collection.
- 9 Aqua Cutter robot.
- 10 Drain pump.
- 11 Waste water hose to the EcoClear.
- 12 EcoClear.
- 13 Outlet hose (max pressure height 1 m).
- 14 Catch tank (only needed if pressure height is more than 1 m).
- 15 Drain pump
- 16 Clear water hose from the EcoClear.
- 17 Drain pump.
- 18 Leftover water (fresh water).
- 19 Sludge hose (separated sludge from the EcoClear).
- 20 Dewatering bag frame with drip tray (optional).
- 21 Drain hose (dripped off water can be used for recirculation).

AQS-0N91