

CADC Magazine

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New CSA Dive Standard Defaults to **MINIMUM 4 PERSON CREW FOR ALL DIVE OPERATIONS!**

INSIDE:

The Importance of Dive Equipment
Maintenance & Technical Training

The Blue Hole Belize Project

ROV Recovery of Tug *Samantha J*



Talk About Working Under Pressure: A Ground-Breaking Tunneling & Hyperbarics Operation in La Belle Province

CADC member companies embark on joint-venture tunnel project.

By Expertech Marine Inc. & ASI Group Ltd.

Alice is coming through La Belle Province, “and we all couldn’t be more excited,” says Marc-André Désy, CEO of Expertech Marine Inc. Let’s start off by clarifying that “Alice” is the name given to the impressive tunnel boring machine (TBM) responsible for Montreal’s REM Project, the Trudeau Airport Tunnel. Because the primary mission of a TBM is to dig through rock, Alice Evelyn Wilson (1881-1964), a Canadian geologist and pathologist, was the natural namesake choice, as she conducted many studies on the rocks and fossils in the St. Lawrence Lowlands and the Ottawa Valley. We trust she would be honoured to partake in this first-time challenge, facing all the province’s qualified companies and experts, to dig a 3.5-kilometre underground tunnel more than 30 metres below the surface.

What exactly is a tunnel boring machine? A TBM is like a mobile factory, which moves forward as the work progresses. This gigantic circular machine is over 100 metres long and includes several specialized items, a belt conveyor, a cockpit, and about 10 workers inside. To carry out this ground-breaking operation safely, every step of digging, evacuating the excavated material, and building the waterproof rings requires a hyperbaric intervention support.

With its extensive underwater commercial diving experience, Expertech Marine was ready to rise to the occasion but wanted to find a partner that could bring forth expertise on the tunnel aspects of the challenge. ASI Group Ltd. was the perfect fit. The Ontario-based company, which specializes in commercial diving, has completed hundreds of hyperbaric interventions since it started doing this kind of work in 2010, including nearly 600 interventions on the recent Evergreen Line tunnelling project in BC’s Lower Mainland.

ASI has also been on-site for some major tunnelling projects in Ontario, including the Toronto-York Spadina Subway Extension project and the Etobicoke Creek Trunk Sanitary Sewer, a micro-tunnelling project that passed underneath a main runway at Toronto Pearson International Airport.

Together, they will be providing all hyperbaric intervention support services, project management and planning, compressed air personnel, specialized hyperbaric equipment, hyperbaric consulting, and a hyperbaric physician, as

needed, to support and perform all planned hyperbaric intervention requirements. Anticipated intervention pressures will average 2.0 bar (66 fsw), however, lower pressures may be needed, so hyperbaric planning methods will be flexible and conducted to suit the given intervention pressure for hyperbaric needs.

How it works

The working time of the intervention depends on the pressures involved, and the amount of time compressed air workers can



PHOTO CREDIT: Expertech Marine Inc.

safely work under pressure is determined by the decompression table(s).

If a hyperbaric intervention is required, a hyperbaric tunnelling support team would be called in. The team working under pressure usually comprises three individuals: two repair technicians, plus a third attendant, who is responsible for communications and keeping an eye on the workers to ensure the pressurized environment they are working in is safe. At least two additional workers will stay in the non-pressurized portion of the tunnel and operate the man locks for the workers under pressure.

The process of passing personnel from a regular atmospheric environment to a pressurized space requires an air lock chamber that equalizes the different air pressures through a system of valves and gauges. The air lock chamber is fitted to the front of the TBM, allowing access to the working chamber. The procedure requires workers to enter the air lock chamber, which has two sets of sealing doors built in at opposite ends. Once they enter the air lock, the doors are closed, and air is pushed into the air lock until the pressure matches the air pressure outside of the machine. Once the

pressures are equalized, the second set of doors can be opened, and the workers can crawl out into the working chamber and begin performing their assigned duties.

“Putting people under pressure in the TBM is the same as putting divers underwater. Even though you’re not in the water, your body is still exposed to that over-pressurization,” says Scott Black, group manager for commercial diving and hyperbaric tunnel support at ASI Group. Black, who started his dive career with the Australian Navy and has over 30 years of experience, says the procedure requires quite a bit of pre-planning.

“If there’s going to be a hyperbaric intervention, it’s all pre-planned,” he says. “The machine will stop mining, and then we’ll make all the preparations and do all of our calculations. It may be a simple inspection, or it may be what they call a full tooling change up.”

What could go wrong?

Along with the constant danger of decompression sickness, hyperbaric intervention support workers also face the usual risks that come hand-in-hand

when working with any large and complex machinery, including bone breaks, strains, or lacerations. Specialized medical equipment is available in the airlock, and the attendant—also called a diver medical technician—has a higher level of medical training. Fortunately, Quebec is equipped with one of the best medical diving hyperbaric centres, and, additionally, a hyperbaric physician will be involved for this innovative and exciting process.

Being part of a hyperbaric tunnelling support team requires a set of specialized skills, including the mechanical qualifications needed to repair or inspect the TBM. It also requires fitness to handle a pressurized environment. Often, workers are certified commercial divers who are already qualified to work under hyperbaric conditions. Team members are equally suited to commercial dive jobs or hyperbaric tunnelling. 

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