



KONGSBERG

# M3 SONAR® CASE STUDY

## SURVEY OF DEBRIS ACCUMULATION AT A NUCLEAR POWER PLANT

### THE COMPANY

Bruce Power is Canada's first private nuclear generator located on the shores of Lake Huron in Ontario, Canada. Two generating stations, Bruce A and Bruce B, use a once-through cooling process to condense the generated steam and produce a combined total of 6,300 MW of electricity. There are four units per station, and each unit has three large cooling water pumps that draw water through an offshore velocity cap and intake tunnel. Water enters a ~1.3 ha reservoir at each station.



Bruce Power, located 250 km northwest of Toronto, Ontario

### THE SITUATION

To date, divers have been used to clean out the pump wells individually on an as needed basis. This has been required more often in recent years as a result of accumulation of mussel shells due to the invasive Dreissenid Mussel which were not present in the lake when the station was designed. Current equipment is able to handle a portion of the debris, but as it accumulates, more extensive cleaning is required.

Bruce Power wanted to develop a preventative maintenance program and therefore sought to find out the following information:

1. Generate a detailed overview of the reservoir base to understand the dynamics in order to predict the rate of accumulation and avoid extensive loading.
2. Identify areas of accumulation for regular maintenance planning purposes.

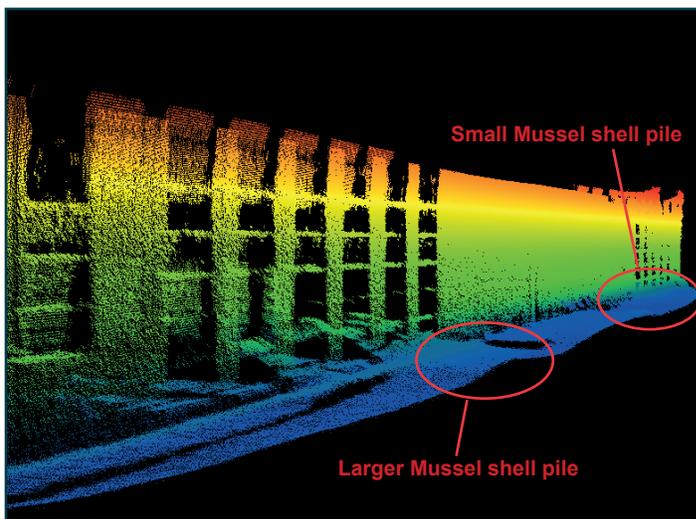
"We were very impressed with the data we received from Mesotech's M3 Sonar®. The information is very important as we ensure ongoing safe plant operations and continue our dedication to increased public safety."

**Dr. Cherie-Lee Fietsch, Environmental Scientist at Bruce Power**

### THE SOLUTION

Bruce Power turned to Kinectrics Inc. and Milne Technologies to assist in providing a detailed and comprehensive bathymetric survey of the reservoir to identify potential sediment accumulation. Kinectrics Inc. and Milne Technologies deployed Kongsberg Mesotech's M3 Multimode Multibeam Sonar System to provide a solution.

The M3 Sonar® is the only instrument in its price point that produces high-quality imaging records and 3D bathymetric datasets using the same sonar head. For imaging, detection of small objects out to 150 m combined with a 120° to 140° field of view allows the operator to see the complete underwater picture in real-time. For bathymetric surveying a narrow 3° beam is used to generate 3D point clouds.



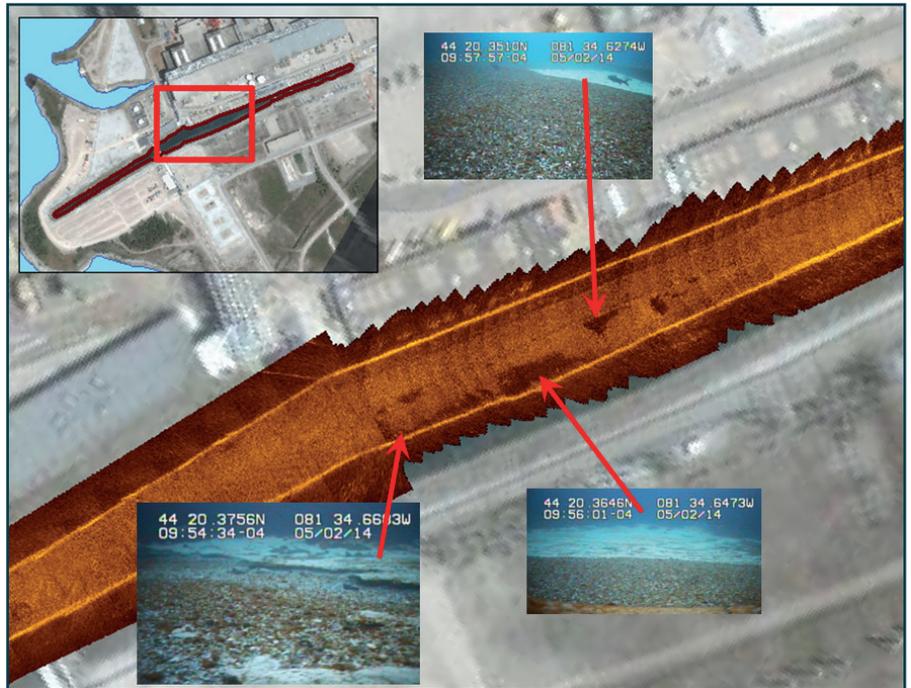
Detailed bathymetry (profiling and fast-profiling modes) of the intake channel, forebay bottom and forebay walls.

# THE RESULTS

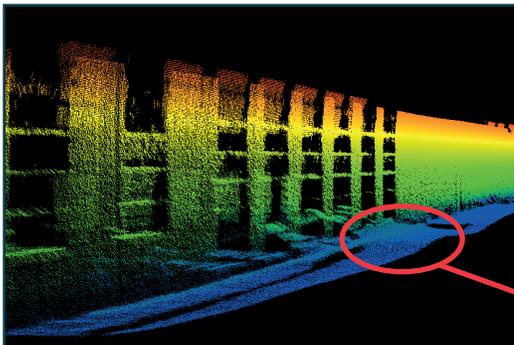
## M3 Sonar® + 2 days of work = 3 critical pieces of operations information

The data generated by the M3 Sonar® provided Bruce Power with critical information about the amount, distribution and potential rate of accumulation of material within the cooling water reservoir.

- The detailed maps and images allow Bruce Power staff to direct maintenance crews to specific areas of the reservoir where sediment removal is required.
- The images confirmed that the reservoir did not contain extensive debris at the time of survey and also documented where accumulation is likely to occur.
- The data confirmed that cooling water will be available as currently there is no risk of debris loading.

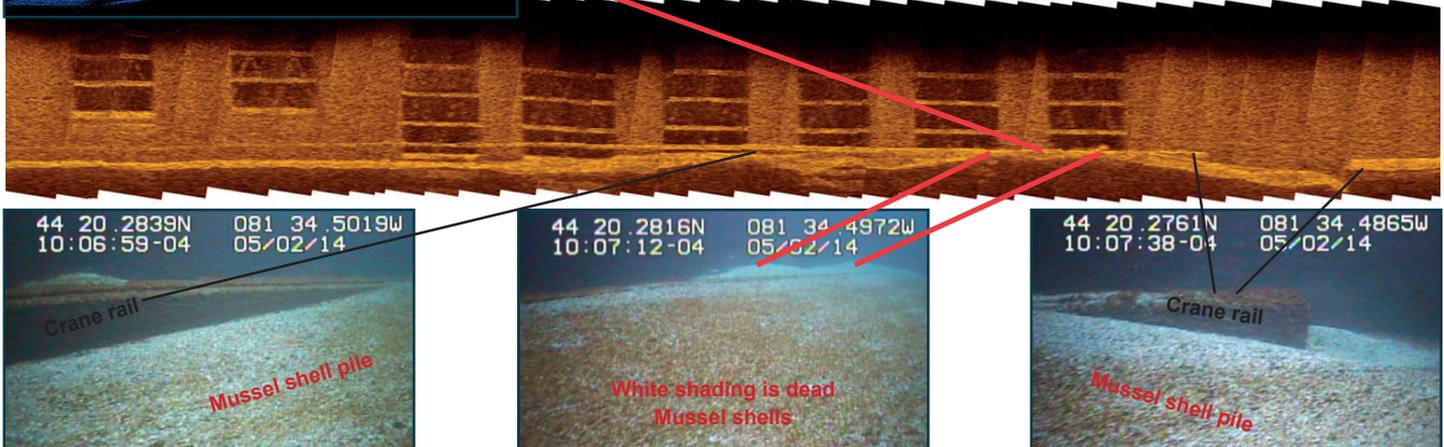


Horizontal forward-looking (eIQ mode) imaging surveys of the forebay bottom to identify accumulations of material (i.e. mussel shells) and to identify previous sediment removal sites. Inset photos show accumulation of mussel shells.



“The M3 has proven to be a valuable instrument because of its capability to provide both imaging and bathymetric data. It was the perfect sonar for this job.”

Scott Milne, Principal at Milne Technologies



Vertical sonar imaging (Kongsberg M3 eIQ mode) of the intake wall (Unit 3). Also shown are the maintenance pump intakes at far left of sonar image. Note accumulation of material in front of the first four intake ports. Note the gap within the crane rail is partially hidden in accumulated material at the far right of sonar image.

