

## Oceanographic Systems Laboratory, WHOI: Tunnel Inspection Vehicle

### The Water That Got Away

The WHOI Tunnel Inspection Vehicle (TIV) was built in 2004 to inspect a 45 mile section of the Delaware Aqueduct and to, ultimately, find its leaks. This was the first time that the tunnel was inspected while in use.

### What were the challenges?

- Acoustic Tracking of AUV in tunnel : What are the acoustic properties of a deep, drilled-in-rock, concrete-lined aqueduct?
- Optical Imaging: What is the best camera and light configuration for imaging the walls of the tunnel?
- Vehicle Navigation: How do we insure that the AUV will fly in the center of the tunnel and not bounce off the walls?
- Launch and Recovery of AUV: How do we launch the AUV through small openings in 1000' deep vertical shafts at both launch sites?



Tight Fit!



Historic view of the empty tunnel (water supply) from the 1930's in NY. The same tunnel was surveyed with a REMUS while filled with water in 2004. (NYCDEP)

### Imaging

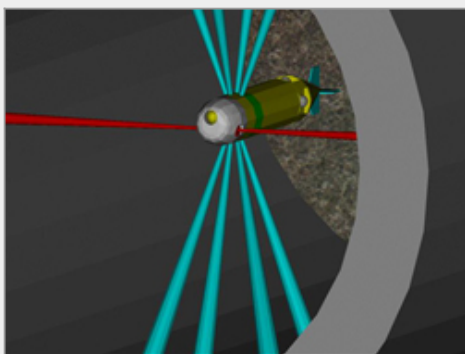
TIV contained 5 high resolution digital cameras and four strobe lights for illumination. Approximately 186,000 digital still images were taken, each containing telemetry information to indicate the exact position of the image to facilitate finding the location of any leaks.



Historic look at the NYC Tunnel's water supply that was surveyed in the 1930s without water. In 2004 REMUS AUV surveyed all 45 miles wet. (NYCDEP)

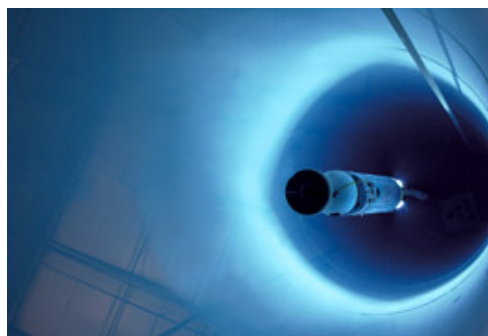
### Vehicle Navigation

- ADCP beams were used to determine center of the tunnel
- Ring Laser Gyrocompass provided attitude of vehicle
- Vehicle navigated with respect to that position



Last updated: November 30, 2012

### Related Multimedia



Tunnel Simulation Run  
» [View Video \(Media Player\) LAN](#)

### Related Links

» [Tunnel Inspection WHOI Link](#)

» [What's that swimming in the water supply](#)  
NY Times article

Copyright ©2007 Woods Hole Oceanographic Institution, All Rights Reserved.

Mail: Woods Hole Oceanographic Institution, 266 Woods Hole Road, Woods Hole, MA 02543, USA.

E-Contact: [info@whoi.edu](mailto:info@whoi.edu); press relations: [media@whoi.edu](mailto:media@whoi.edu), tel. (508) 457-2000

Problems or questions about the site, please contact [webdev@whoi.edu](mailto:webdev@whoi.edu)