

## Mount Macdonald Tunnel Ventilation System

The Mount Macdonald Tunnel Ventilation System allowed a major increase in the volume of traffic over Canada's t The NOVA Award was presented to the Mount Macdonald Tunnel Ventilation System for innovation in purging long tunnels of diesel locomotive heat and gases.

The Connaught Tunnel had been the Canadian Pacific Railroad's main route through the Canadian Rockies since 1916. By the late 1980's, however, the tunnel's steep approaches and single track created a serious bottleneck.

The decision to construct a new tunnel for westbound trains required overcoming a major obstacle: purging such a tunnel, up to nine miles long, of the heat and gases generated by trains with up to six locomotives pulling 110 heavily-loaded cars uphill. Conventional tunnel ventilation systems could not clear a tunnel fast enough to allow an economically viable flow of traffic.

To answer the challenge, Sam Levy and Norman Danziger of Parsons, Brinckerhoff, Quade and Douglas segmented the tunnel into two parts to ventilate the segments separately, with a ventilation shaft near mid-tunnel. A series of gates, at this shaft and the eastern entrance, and five fans are operated by computers at Canadian Pacific Rail offices on the West Coast.

When a train enters the tunnel, the eastern segment is closed and ventilated. As the train reaches mid-tunnel, the central gate opens for it to pass into the western segment, then closes when it has passed. While the train traverses the western segment, air in the eastern segment is cleaned. After the train exits, the western segment is purged. By this time, the eastern section can receive the next train.

The Mount Macdonald Tunnel Ventilation System has enabled Canadian Pacific Rail to increase the volume of traffic through its main transcontinental rail link-at a construction cost that was much lower than alternative methods.

The ventilation system for the nine-mile-long Mt. Macdonald Tunnel was the key to the economic viability of the project. The tunnel is partitioned with a system of automatically controlled gates and variable pitch fans that purge fumes quickly allows greatly increased traffic flow.ranscontinental rail line. The system is characterized by the partitioning of the tunnel with a system of multiple gates and variable pitch fans and dampers. These are interlocked in a pattern that automatically adjusts to train position and environmental conditions. The system is unmanned and operated under computer control.

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