Rogers Pass Tunnel Ventilation

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Abstract:

The Canadian Pacific Railway (CP Rail) is constructing a 14.7km tunnel through Mount MacDonald in Glacier National Park, British Columbia, as part of the Rogers Pass Project to reduce grades and increase capacity on its main line. The tunnel is single-track and will serve diesel locomotive operations. It will be the longest diesel rail tunnel in North America.

The purpose of the new tunnel is to reduce grades and avoid a potentially serious bottleneck for rail traffic through the Selkirk Range of the Canadian Rockies. Existing traffic through this portion of Glacier National Park is via the 8.0km Connaught Tunnel, a 0.95% grade single-track tunnel serving bi-directional traffic. Although the tunnel itself has only a moderate grade, the west-bound approach grades to this tunnel are much higher, on the order of 2.2%, and require the use of locomotive pushers to move heavy laden coal and freight trains through this portion of the park. This procedure is costly and time consuming. With increased traffic forecast, continuing the use of pushers would make the tunnel and its approach grades a bottleneck. The railway is therefore constructing a second tunnel. East-bound traffic would run through the existing tunnel, and west-bound traffic would run through the 0.7% grade new tunnel. At the completion of the project, trains will be able to run from Calgary to Vancouver over grades not higher than 1.0%. This in turn will reduce the required hauling capacity over the entire route to approximately 0.8KW (for traction) per trailing tonne, less than half of the current required capacity.

The ventilation concept for long diesel rail tunnels requires a cooling cycle as the train progresses through the tunnel followed by a purge cycle to clear smoke and diesel pollutants before another train enters the tunnel. Due to the tunnel's length, however, the standard portal-to-portal ventilation concept could not be readily applied without excessively restricting the frequency of traffic. Accordingly, a unique system had to be developed to meet the railway's traffic operating requirements.

The tunnel extends below two mountains, so that the greatest overburdens occur to each side of the mid-tunnel region. This unusual overburden permitted the location of an economically feasible ventilation shaft near the mid-point of the tunnel. The somewhat skewed alignment in the vicinity of the shaft also permitted a ventilation building atop the shaft to be located in a region safe from avalanches.

Keywords: Fan operation; Gates; Dampers; Emergency operation; Train frequency; Evaluation of power; Anti-stall feature; Testing.