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The North Atlantic Deep Western Boundary Current (DWBC) was surveyed at the Blake Outer Ridge over 14 days in July and August 1992 to determine its volume transport and to investigate its bottom boundary layer (BBL). This site was chosen because previous investigations showed the DWBC to be strong and bottom-intensified on the ridge's flanks and to have a thick BBL. The primary instrument used was the Absolute Velocity Profiler, a free-falling velocity and conductivity—temperature—depth device. In two sections across the width of the DWBC, volume transports of 17 ± Sv and 18 ± 1 Sv were measured for all water flowing equatorward below a potential temperature of 6℃. Transport values were derived using both absolute velocities and AVP-referenced geostrophic velocities and were the same within experimental uncertainty. Good agreement was found between our results and historical ones when both were similarly bounded and referenced. Although this was a short-term survey, the mean of a 9-day time series of absolute velocity profiles was the same as the means of year-long current-meter records at three depths in the same location. A turbulent planetary BBL was found everywhere under the current. The thickness of the bottom mixed layer (BML), where concentrations of density, nutrients, and suspended sediments were vertically uniform, was asymmetrical across the current and up to 5 times thicker than the BBL. There was no velocity shear above the BBL within the thicker BMLs, and the across-slope density gradient was very small. The extra-thick BML is perhaps maintained by a combination of processes, including turbulence, downwelling Ekman transport, a weak up-slope return flow above the BBL, and buoyant convection from the BBL into the BML. The frictional bottom stress was mostly balanced by a down-stream change in the current's external potential energy evidenced by a drop in the velocity core of the current.

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