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Fuel Retention and Removal from the Carbon First-Wall in DIII-D[1] E.A. UNTERBERG, ORNL, S.L. ALLEN, LLNL, N.H. BROOKS, General Atomics — Experiments to determine the short-term retention of deuterium fuel (D) in a graphite first wall are done using a global particle balance. The global particle balance is calculated continuously through a discharge and shows a majority of the D wall retention occurs during the initial ohmic and L-mode phases. Typical wall uptake rates in these phases are $\sim$30$\pm$3.5 Torr-L/s which is $\sim$2% of the measured divertor ion flux. The continuous global particle balance is compared with a shot-integrated balance, and they agree to $\sim$5%. During the H-mode phase of typical ELM-y discharges, the uptake is near zero ($\sim \pm$5 Torr-L/s), which is $\leq$0.2% of divertor ion flux. This fluctuating retention rate leads to a wall inventory reduction during the H-mode phase that can be as much as 100% though typically $\sim$20-30%. A vacuum bake of first wall at 350°C after plasma operations recovered $\sim$80% of the retained D, and left $\sim$9% of the total fuel injected during the run-day in the first wall.

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