1052-05-209   **Brendon Rhoades*** (`brhoades@mit.edu`). *The Cluster Monomial and Dual Canonical Bases of* $\mathbb{Z}[x_{11}, \ldots, x_{33}]$.

The polynomial ring $\mathbb{Z}[x_{11}, \ldots, x_{33}]$ has a basis called the dual canonical basis whose quantization facilitates the study of representations of the quantum group $U_q(\mathfrak{sl}_3(\mathbb{C}))$. On the other hand, $\mathbb{Z}[x_{11}, \ldots, x_{33}]$ inherits a basis from the cluster monomial basis of a geometric model of the type D_4 cluster algebra. We prove that these two bases are equal. As a side effect, we obtain an explicit factorization of every dual canonical basis element of $\mathbb{Z}[x_{11}, \ldots, x_{33}]$ into irreducible polynomials. This extends work of Skandera and proves a conjecture of Fomin and Zelevinsky. (Received August 28, 2009)