The problem of classifying vertex algebras by strong generating type has recently received some attention. As a basic but nontrivial case, we consider the classification of vertex algebras of type $W(2,N)$, that is, vertex algebras with a strong generating set consisting of a Virasoro field, and a primary field of weight $N$. Well-known examples include the principal $W$-algebras of $sl_3$, $sp_4$, and $G_2$, which are of types $W(2,3)$, $W(2,4)$, and $W(2,6)$ respectively, the singlet algebras, and certain Virasoro minimal model extensions. We shall give the complete classification for $N \leq 7$, and also discuss some strong restrictions about what can occur in the general case. This is a joint work in progress with Andrew Linshaw and Dan Graybill. (Received September 15, 2019)