Abstract: In this talk, I will describe some recent results involving our generalization of the classical Noether-Lefschetz Theorem, which considers the general surface of fixed degree in complex projective 3-space containing a specific base locus consisting of a point set together (possibly) with restrictions on multiplicity and tangent directions. Along the way I will introduce various notions of class group, both for the surface itself and for a ring associated to a point, which is singular in the interesting cases, on the surface. Our work has a surprising application to the construction of unique factorization domains.

While this is a sequel to my Sept. 6 talk in terms of content, my intent is to make this one self-contained and thus accessible (in some sense of the word) to those fortunate enough to have missed the first one.