Relative to other potential contaminants of concern, common munition constituents (TNT, RDX and HMX) are likely to present low ecological risk under expected exposure scenarios in the marine environment. These chemicals typically undergo extensive transformation upon contact with marine sediment, require relatively high concentrations to produce toxic effects, and have virtually no potential for trophic transfer from invertebrates to fish, and therefore, very low exposure likelihood to humans. Although TNT was the most toxic explosive evaluated in this study, high concentrations were required in order to induce effects (1 - 20 mg/L\(^{-1}\) or 23 - 674 mg/kg\(^{-1}\)). In addition, transformation via increasing amination of the parent compound occurred rapidly, thereby reducing the potential for exposure, as aminated transformation products were less toxic than the parent compound. RDX and HMX were consistently non-toxic to marine invertebrates, even near their solubility limits. LC50 values for fish for RDX (10 mg/L\(^{-1}\)) were comparable to those for freshwater fish. Significant lethal or sublethal effects were not observed for invertebrates in aqueous or sediment exposures. The relatively low toxicity of the munition constituents evaluated in this study corresponded with low bioaccumulation potential in an organisms’ tissues. The bioconcentration factors determined for fish and invertebrates were consistently low for all chemicals tested (BCF = less than 1 to 16 ml/g\(^{-1}\)). Effects concentrations are likely orders of magnitude higher than those to which environmental receptors of concern would experience in the vicinities of UXO in marine environments. Additionally, larger scale experiments, both spatially and temporally, were conducted to simulate more realistic exposure scenarios. These experiments used small fragments, or “chunks”, of Composition B in aquaria under a variety of conditions (e.g., exposed and buried, static and low flow). Even though experimental conditions represented worst-case scenarios in the field, bioaccumulation and toxicity in fish and invertebrates were low or non-detectable. The concentration of munition constituents in the vicinity of breached munitions is expected to be substantially lower than the corresponding concentrations utilized in the exposure scenarios in the laboratory studies.