Improving systematic predictions of beta-delayed neutron emission probabilities\textsuperscript{1} E.A. MCCUTCHAN, A.A. SONZOGNI, T.D. JOHNSON, NNDC, Brookhaven National Laboratory — The probability for neutron emission following $\beta$ decay, $P_n$, is a crucial property for a wide range of physics and applications including nuclear structure, astrophysics, the control of nuclear reactors, and the post-processing and handling of nuclear fuel. Despite much experimental effort, knowledge of $P_n$ values is lacking in very neutron-rich nuclei, requiring predictions from either systematics or theoretical models. Traditionally, systematic predictions \textsuperscript{[1]} were made by investigating the $P_n$ value as a function of the $Q$ value of the decay and the neutron separation energy. Here, we will present a new form of systematic studies utilizing the well-known relationship between the $P_n$ value and the half-life of the decay. It will be shown that such systematics provide more robust predictions of $P_n$ values compared with earlier prescriptions, are applicable to all known $\beta$-delayed neutron emitters across the nuclear chart, and are a general feature of not only the data, but also the theoretical models.


\textsuperscript{1}This work was supported by the DOE Office of Nuclear Physics under Contract No. DE-AC02-98CH10946.

E.A. McCutchan
NNDC, Brookhaven National Laboratory

Date submitted: 03 Jul 2012
Electronic form version 1.4