instrument might affect release of the product lots in question. The extent to which the instrument would impact the product is a good indicator of risk. A more conservative extension of the calibration interval can then be made, if appropriate.

**Recommendations & Rationale for Recommendations**
Risk Assessment Tool -Failure Mode and Effects Analysis (FMEA) is the tool of choice that is recommended for calibration interval change analysis. Its use enables identification of potential failure modes and assignment of numerical ranking using probability, severity and detectability of the risk (Tables I, II, III, respectively). Risk Assessment -Identification, analyses, and evaluation of potential risks

The impact of an instrument calibration failure from the standpoint of probability, severity, and detectability may be determined through the integration and factoring of multiple parameters associated with each criterion as illustrated in Tables I -III. This section will provide additional narrative description in support of the contents in each table which contain guidance on how these parameters can impact the risk of experiencing an out-of-tolerance (OOT) condition for an instrument.

- **Probability**
  The probability (or likelihood) of instrument failure may be attributed to:
  a) design and construction,
  b) the environment it is exposed to, and
  c) how it is used.
  Knowledge of the effects of design and construction can be gained through a review of the maintenance history of the instrument, comparing it to similarly designed instruments, and by knowing the age of the instrument (period of time in use). For each of these parameters, if the data and relevant information is not known, the risk should be assumed to be high.

The following criteria may be used to determine risk ranking for failure probability.
Refer to **Table I** below.

1) History – There are three (3) possible scenarios illustrated in table where instrument history may be used to determine risk ranking for failure probability.

   Specifically
   (i) Availability of recorded history of an instrument in its current location,
   (ii) Availability of history of identical instrumentation of the same make and model in the same area, and \
   (iii) Availability of history of similar instrumentation in a similar environment. Risk ranking is determined by the length of recorded history available for an instrument, the number of available instruments for use in data gathering, and the typical interval between observed failures (mean time between failures, MTBF). When the number of instruments in place combined with the use history (e.g. >2 years) is sufficient to have observed most, if not all potential modes of failures (MTBF is long i.e., >24 months), the risk should be considered low.

The absence of historical records, lack of identical or similar instruments to benchmark, and if the MTBF is <24 months would indicate a higher risk. If there is less than 2 years of historical records, and the number of identical or similar instruments is considered less than sufficient, i.e., <3 and <10 for