## Accuracy, Precision and Linearity Testing:

- Four ethanol in water simulator solutions are prepared over a concentration range that will provide nominal vapor concentrations of the following amounts: 0.020, 0.080, 0.160 and 0.400g/210L.
- These solutions will be certified by Headspace GC-FID.
- The instrument will be tested over the four ethanol concentrations using an external simulator containing simulator solution.
- An Accuracy and Precision test sequence (n=10 for each solution) will be used.
- All four solutions will be run on the same day, in random order.
- More than one set of replicates of the 4 concentrations may be run on a single day, however, if one concentration is run, then all four concentrations must be run on the same day, by the same analyst.
- This will continue until 10 replicates of the four concentrations have been run by multiple analysts over inter- and intra- day analyses.
- The results will be statistically analyzed for accuracy, precision and linearity.
    - Accuracy: How close is the reported value to the known concentration?
    - Precision: How close are the 10 replicates to each other?
    - Linearity: Do the reported results form a straight line when plotted versus their known concentrations?
- All values are expected to be within 10% of the GC certified value (accuracy). All values are expected to be within ±0.002 of the mean (precision). The resulting linearity is expected to have a generated $R^2$ value of 1 ±0.010 (linearity).
- The acceptance range is based upon the current performance requirements for evidentiary breath testing equipment as stated in the Rules and Regulations 23 VSA Section 1203.
- Should the performance of the instruments not meet the acceptable criteria, the instrument will be returned to the manufacturer for repair or replacement.

**Interference Testing:**

- Solutions of interfering compounds will be put into external simulators.
- The instrument will run a standard breath test sequence testing the air/vapor from the external simulator.
- Air will be forced through the simulator into the breath sample tube.
- Interfering compounds should be detected. Should the instrument not detect interfering compounds, the instrument will be returned to the manufacturer for repair or replacement.

**Mouth Alcohol:**

- Non-drinking volunteer subjects to swish with mouth wash containing ~5% alcohol prior to sample delivery.
- Breath tested at ~3 minute intervals until such time as no mouth alcohol is detected or 15 minutes, which ever comes last.

**Breath Volume:**

- A syringe will be used to deliver a known quantity of air to the sample chamber via the subject test tube. Accuracy at 1.5L to ±0.2L. N=10.
- Volumes ranging from 1.3L to 2.0 at 0.1 intervals will be tested, N=10.
- Should an instrument fail to accept a sample of greater than 1.5L or accept a sample that is less than 1.5L, the instrument will be returned to the manufacturer for repair or replacement.

**Radio Frequency Interference:**

- Radio frequency sensitivity will be set to just below maximum, when interference detection is no longer reported at ambient values.
- Radio will be keyed at different times during a subject test sequence.

- RFI detected should be reported each time the radio is keyed. Instrument should not report false changes in voltage detection because of RFI.

**Calibration Stability:**

- The Calibration factors will be printed at the beginning and end of testing.
- Calibration factors printed after simulated power failures using a variable transformer.
    - Total power failure
    - Brown-out
    - Power spike
- All menu options will be explored to ensure accuracy.