



## NIOSH – AAC Inter-laboratory Validation Study for Select VOCs in Entech Silonite® canisters

### OBJECTIVE

- Evaluate recoveries of seventeen polar and non-polar volatile organic compounds (VOCs) from evacuated canisters at ppb- and ppm-levels.
- This data will be used to support development of a method for incorporation into the NIOSH Manual of Analytical Methods and an ASTM international standard for preparation of VOC calibration standards and sample analysis using pre-concentration coupled with gas chromatography/mass spectrometry (GC/MS).

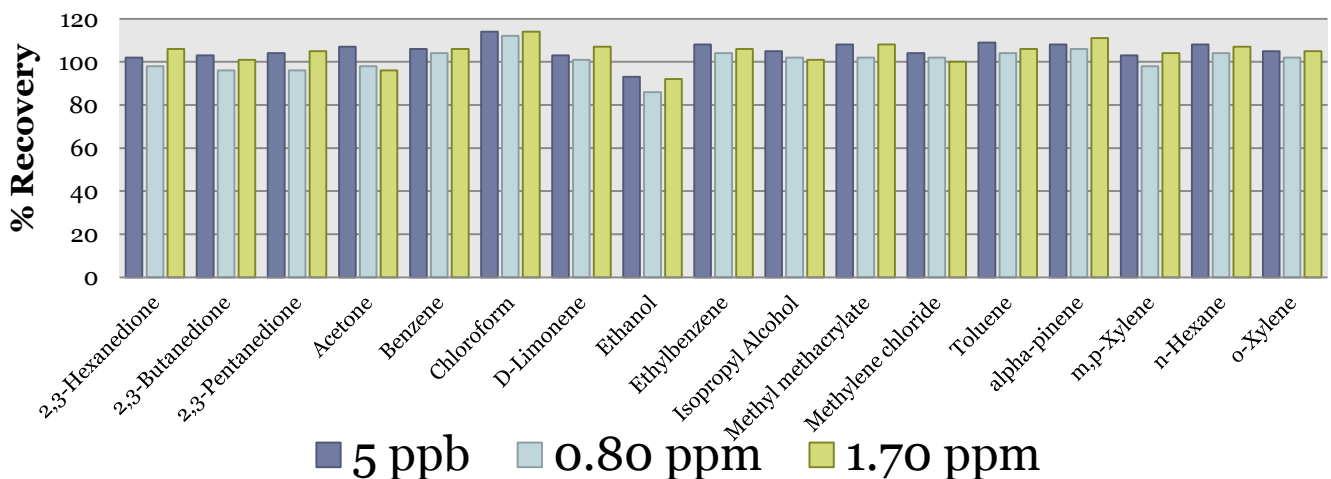
### TEST PROTOCOL

- NIOSH Laboratory provided the following test materials:
  - Independently certified calibration standard
  - Nine 450 mL canisters spiked with low ppm-level concentrations of analytes: three replicates of 0.80, 1.30, and 1.70 ppm
  - Nine 6 L canisters spiked with low ppb-level concentrations of analytes: three replicates of 5, 10, and 15 ppb
  - One laboratory blank
- Analysis was performed by AAC Laboratory using an Entech 7100 pre-concentrator coupled with an Agilent 6890 GC and 5973 MSD.

### SUMMARY

- Percent recoveries were calculated for each analyte at each concentration level. Average percent recoveries were calculated for the three replicate canisters at each concentration level (Table 1).
- The percent coefficient of variation was calculated at each concentration level (Table 2).
- The figure below displays average percent recoveries at the 5 ppb, 0.80 ppm, and 1.70 ppm levels. Similar recoveries were obtained for the remaining concentration levels but are omitted due to limited space.

### % Recovery of VOCs from Evacuated Canisters





**Table 1:** Average percent recoveries of three replicate canisters at each concentration level

	5 ppb (%)	10 ppb (%)	15 ppb (%)	0.80 ppm (%)	1.30 ppm (%)	1.70 ppm (%)
2,3-Hexanedione	102	105	98	98	105	106
2,3-Butanedione	103	105	101	96	102	101
2,3-Pentanedione	104	108	104	96	106	105
Acetone	107	106	101	98	103	96
Benzene	106	106	105	104	105	106
Chloroform	114	116	113	112	114	114
D-Limonene	103	105	104	101	105	107
Ethanol	93	97	99	86	94	92
Ethylbenzene	108	107	103	104	104	106
Isopropyl Alcohol	105	109	108	102	110	101
Methyl methacrylate	108	111	108	102	107	108
Methylene chloride	104	102	99	102	99	100
Toluene	109	107	105	104	105	106
alpha-pinene	108	108	106	106	109	111
m,p-Xylene	103	103	103	98	102	104
n-Hexane	108	108	105	104	107	107
o-Xylene	105	105	103	102	103	105

**Table 2:** Percent coefficient of variation (Std Dev/Mean x 100%)

	5 ppb (%)	10 ppb (%)	15 ppb (%)	0.80 ppm (%)	1.30 ppm (%)	1.70 ppm (%)
2,3-Hexanedione	2	1	15	6	5	1
2,3-Butanedione	1	1	3	2	3	3
2,3-Pentanedione	2	1	8	3	5	4
Acetone	1	2	1	5	5	2
Benzene	1	1	1	1	1	0
Chloroform	1	1	1	1	1	1
D-Limonene	1	2	1	2	2	1
Ethanol	2	0	1	7	5	5
Ethylbenzene	1	1	1	2	1	2
Isopropyl Alcohol	11	6	3	6	2	4
Methyl methacrylate	2	1	2	1	3	2
Methylene chloride	1	1	2	2	1	1
Toluene	1	2	1	1	1	2
alpha-pinene	2	2	1	2	1	1
m,p-Xylene	1	1	1	1	2	1
n-Hexane	1	1	0	2	1	0
o-Xylene	1	2	1	1	1	2

