

QUALITY ASSURANCE AUDIT REPORT

North Texas Commission
Ambient Air and Meteorological Monitoring

Prepared for:

North Texas Commission
8445 Freeport Parkway
Irving, TX 75063

Prepared by:

AECOM
9400 Amberglen Boulevard (78729)
P.O. Box 201088
Austin, TX 78720-1088

Conducted:

May 2017

EXECUTIVE SUMMARY

On May 22nd through May 25th, 2017, an audit team from the AECOM ambient air group in Austin, Texas conducted performance and technical system audits of the North Texas Commission (NTC) ambient air monitoring network, providing an independent assessment of the monitoring program.

The monitoring program at NTC consists of continuous gas chromatographs (GC), volatile organic compound (VOC) canister collection systems, and meteorological sensors including wind speed, wind direction, temperature, and barometric pressure.

The performance audit results indicate acceptable responses for measurement systems with the exceptions summarized below.

The wind direction sensors were found to be outside the total maximum error specification of $\pm 5^\circ$ at six sites: Benbrook, Bowie, Decatur, Godley, Lancaster, and Rushing. These sensors were realigned and found to be within the audit objective. Following realignment, there is no further field action required.

The wind direction sensor was outside of the audit guidance of $\pm 3^\circ$ for linearity at Mineral Wells with the zero point included. However, linearity was within the audit guidance once the zero point was omitted. Regardless, it is recommended that a new sensor be installed at this site.

The wind direction sensor bearings were outside of the audit guidance of 6.3 g-cm for the torque test at Mansfield and Godley. It is recommended that new bearings be installed at these sites.

The wind speed sensor bearings were outside of the audit guidance of 0.3 g-cm for the torque test at Mansfield and Godley. It is recommended that new bearings be installed at these sites.

The wind speed sensors at Mansfield and Rushing were outside of the audit guideline of 0.4 mph for the sensor response at the initial zero mph input. It is recommended that new sensors be installed at these sites.

The ambient temperature sensor responses at Bowie and Mansfield were within audit guidelines of $\pm 0.9^\circ\text{F}$. However, the aspirator fans were not operational. It is recommended that new aspirator fans be installed at these sites.

Out of the 48 compounds being analyzed, seven compounds (ethylene, propylene, acetylene, styrene, 1,2,3-trimethylbenzene, and n-undecane) were found to be outside of the audit objective of 70% - 130% recovery at several sites. In addition, the following sites had GC compound recoveries outside of the audit specification:

Locations	Compounds
Decatur	isoprene
Flower Mound	n-decane
Kennedale	n-propylbenzene
Mansfield	n-decane, 1,3,5-trimethylbenzene, and 1,2,4-trimethylbenzene

These audit results are comparable historically to other AECOM auto-GC audits. CVS recoveries surrounding these compounds were within their criteria during the time period that the audits were performed. No problems were identified in the quality control procedures at any of these sites that would indicate a persistent measurement error.

Technical systems audit results demonstrate satisfactory operational procedures for collecting valid data.

At least once per quarter, a canister prepared by a quality assurance team member with known concentrations of selected VOCs is sent to the GD Air Testing Laboratory to evaluate the performance of their lab. Below are GD air's most recent performance evaluation canister results analyzed on May 20, 2017.

Compound	Known Concentration (ppb-v)	Lab results (ppb-v)	Percent Recovery
1,1,1-Trichloroethane	2.85	2.48	86.9%
1,1,2,2-Tetrachloroethane	2.91	1.92	66.0%
1,1,2-Trichloroethane	2.91	2.31	79.4%
1,1-Dichloroethane	2.85	2.35	82.4%
1,1-Dichloroethene	2.85	2.65	92.9%
1,2,4-Trimethylbenzene	2.80	1.35	48.3%
1,2-Dibromoethane	2.91	2.24	77.0%
1,2-Dichloroethane	2.88	2.31	80.2%
1,2-Dichloropropane	2.91	2.26	77.7%
1,3,5-Trimethylbenzene	2.80	1.59	56.8%
1,3-Butadiene	5.65	5.26	93.1%
1-Butene	2.96	2.66	89.7%
1-Hexene	2.77	1.46	52.7%
1-Pentene	2.96	2.99	100.9%
2,2,4-Trimethylpentane	2.74	2.54	92.6%
4-Ethyltoluene (p-Ethyltoluene)	2.77	1.44	52.0%
Benzene	5.75	5.01	87.1%
Bromomethane	2.74	2.69	98.1%
c-1,3-Dichloropropene	2.94	2.50	85.1%
Carbon tetrachloride	2.85	2.52	88.3%
Chlorobenzene (alpha-chlorotoluene)	2.94	2.07	70.5%
Chloroform	2.83	2.49	88.1%
Chloromethane (Methyl Chloride)	2.88	2.80	97.2%
Cyclohexane	2.88	2.14	74.3%
Dichlorodifluoromethane (Freon-12)	2.80	2.68	95.8%
Ethane	3.02	1.80	59.6%
Ethene	3.02	1.52	50.3%
Ethylbenzene	2.91	1.95	67.0%
Methylene Chloride (Dichloromethane)	2.80	2.42	86.5%
m-Xylene & p-Xylene	5.65	3.84	68.0%
n-Butane	2.96	2.76	93.1%
n-Heptane	2.91	2.02	69.4%
n-Hexane	11.36	11.20	98.6%
n-Pentane	5.71	6.13	107.4%
o-Xylene	2.91	1.82	62.6%
Propane	2.96	3.15	106.3%
Propylene	5.95	5.59	93.9%
Styrene	2.88	1.79	62.1%
t-1,3-Dichloropropene	2.94	2.76	94.0%
Tetrachloroethene	2.94	2.10	71.5%
Toluene	5.72	4.96	86.7%
Trichloroethene	2.88	2.33	80.9%
Trichlorofluoromethane (Freon-11)	2.94	2.67	90.9%
Vinyl Chloride	2.88	2.71	94.1%

Below are the audit standard results for all network GCs:

Compound Name	Audit Conc (ppbc)	Benbrook		Decatur		Dish		Eagle Mountain	
		GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery
Ethane	8.6	7.22	83.5%	7.66	88.7%	6.84	79.2%	8.20	94.9%
Ethylene	8.6	4.91	56.8%	5.76	66.7%	5.91	68.4%	6.69	77.5%
Propane	12.2	12.13	99.1%	11.46	93.6%	10.58	86.5%	11.83	96.7%
Propylene	12.6	8.40	66.7%	8.45	67.1%	7.64	60.6%	8.39	66.5%
Iso-Butane	16.2	17.80	110.2%	16.07	99.5%	14.05	86.9%	17.68	109.4%
N-Butane	16.2	17.93	111.0%	16.32	101.0%	14.16	87.6%	17.75	109.8%
Acetylene	8.6	5.65	65.3%	7.23	83.7%	5.97	69.1%	6.50	75.2%
Trans-2-Butene	16.0	17.46	109.1%	16.05	100.3%	13.97	87.3%	17.32	108.2%
1-Butene	16.2	17.59	108.9%	15.93	98.6%	14.06	87.0%	17.33	107.3%
Cis-2-Butene	17.3	18.68	108.1%	16.96	98.1%	14.88	86.1%	18.05	104.5%
Cyclopentane	20.6	21.87	106.2%	20.59	100.0%	17.44	84.7%	22.79	110.6%
Iso-Pentane	21.4	23.73	110.9%	21.73	101.5%	18.79	87.8%	23.54	110.0%
N-Pentane	20.4	22.95	112.5%	21.02	103.0%	18.03	88.4%	23.30	114.2%
1,3-Butadiene	16.8	17.74	105.6%	15.70	93.5%	14.56	86.7%	18.25	108.6%
Trans-2-Pentene	21.2	21.81	102.9%	19.89	93.8%	17.70	83.5%	22.51	106.2%
1-Pentene	20.6	19.49	94.6%	16.77	81.4%	17.32	84.1%	21.73	105.5%
Cis-2-Pentene	22.0	21.28	96.7%	17.03	77.4%	18.22	82.8%	23.24	105.6%
2,2-Dimethylbutane	25.2	26.45	104.9%	24.23	96.1%	21.52	85.4%	26.78	106.3%
2-Methylpentane	24.5	26.75	109.3%	23.77	97.1%	21.72	88.7%	26.62	108.7%
Isoprene	20.8	16.77	80.6%	14.21	68.3%	15.41	74.1%	18.87	90.7%
n-Hexane	25.2	26.28	104.3%	23.54	93.4%	23.31	92.5%	20.16	80.0%
Methylcyclopentane	25.4	24.93	98.0%	22.08	86.8%	21.16	83.2%	20.22	79.5%
2,4-Dimethylpentane	29.7	31.57	106.4%	31.56	106.3%	27.65	93.1%	30.37	102.3%
Benzene	25.0	24.52	98.2%	24.07	96.4%	20.99	84.1%	20.07	80.4%
Cyclohexane	25.0	25.42	101.9%	23.78	95.3%	22.33	89.5%	22.38	89.7%
2-Methylhexane	30.0	27.20	90.8%	25.14	83.9%	24.20	80.8%	21.27	71.0%
2,3-Dimethylpentane	30.0	31.52	105.2%	31.42	104.9%	29.54	98.6%	32.02	106.9%
3-Methylhexane	29.4	28.01	95.3%	27.27	92.8%	26.28	89.4%	26.34	89.6%
2,2,4-Trimethylpentane	33.6	32.23	95.9%	32.12	95.6%	29.62	88.2%	30.27	90.1%
n-Heptane	29.4	28.53	97.0%	29.38	99.9%	25.69	87.4%	25.52	86.8%
Methylcyclohexane	29.4	29.14	99.1%	27.57	93.8%	25.84	87.9%	26.74	91.0%
2,3,4-Trimethylpentane	33.0	30.97	94.0%	31.00	94.0%	29.18	88.5%	29.52	89.6%
Toluene	29.1	25.49	87.5%	26.24	90.1%	24.98	85.8%	25.89	88.9%
2-Methylheptane	33.3	30.64	92.1%	31.35	94.2%	29.34	88.2%	30.20	90.7%
3-Methylheptane	33.3	31.61	95.0%	32.47	97.6%	29.49	88.6%	30.15	90.6%
n-Octane	33.0	30.22	91.7%	31.64	96.0%	29.03	88.1%	29.73	90.2%
Ethylbenzene	33.3	27.45	82.5%	29.99	90.1%	26.69	80.2%	26.14	78.5%
M&P-Xylene	66.6	52.08	78.3%	57.72	86.7%	51.52	77.4%	52.07	78.2%
Styrene	32.6	24.86	76.2%	25.83	79.1%	22.75	69.7%	22.01	67.4%
O-Xylene	32.6	27.63	84.7%	30.42	93.2%	25.75	78.9%	27.94	85.6%
N-Nonane	36.7	30.83	84.0%	33.68	91.7%	30.25	82.4%	31.43	85.6%
Isopropylbenzene	35.6	29.09	81.6%	32.01	89.8%	28.48	79.9%	30.12	84.5%
n-Propylbenzene	35.6	28.04	78.7%	30.92	86.7%	28.02	78.6%	28.99	81.3%
1,3,5-Trimethylbenzene	36.7	27.97	76.2%	31.50	85.8%	26.91	73.3%	30.06	81.9%
1,2,4-Trimethylbenzene	36.4	28.35	78.0%	30.21	83.1%	26.51	72.9%	28.78	79.2%
n-Decane	41.2	28.87	70.1%	33.63	81.6%	29.52	71.6%	32.69	79.3%
1,2,3-Trimethylbenzene	35.3	23.88	67.7%	24.50	69.5%	24.12	68.4%	26.20	74.3%
n-Undecane	43.6	27.74	63.7%	28.47	65.3%	27.65	63.5%	31.90	73.2%

Compound Name	Audit Conc (ppbc)	Elm Fork		Everman		Flower Mound		Godley	
		GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery
Ethane	8.6	7.58	87.7%	7.57	87.6%	7.52	87.0%	7.28	84.3%
Ethylene	8.6	4.79	55.4%	5.47	63.3%	5.65	65.4%	4.30	49.7%
Propane	12.2	12.06	98.6%	11.98	97.9%	11.97	97.8%	10.92	89.2%
Propylene	12.6	8.05	63.9%	8.94	70.9%	8.39	66.6%	7.40	58.7%
Iso-Butane	16.2	17.07	105.6%	18.04	111.7%	14.98	92.7%	15.44	95.5%
N-Butane	16.2	17.07	105.6%	18.50	114.5%	15.31	94.8%	16.00	99.0%
Acetylene	8.6	6.16	71.3%	3.09	35.7%	5.33	61.6%	5.68	65.8%
Trans-2-Butene	16.0	17.16	107.2%	17.96	112.3%	14.91	93.2%	15.43	96.4%
1-Butene	16.2	17.00	105.2%	18.05	111.7%	15.22	94.2%	15.13	93.6%
Cis-2-Butene	17.3	17.98	104.0%	19.09	110.5%	16.03	92.8%	16.34	94.5%
Cyclopentane	20.6	21.91	106.4%	23.36	113.4%	19.16	93.0%	19.99	97.0%
Iso-Pentane	21.4	22.87	106.9%	24.50	114.5%	20.32	95.0%	21.12	98.7%
N-Pentane	20.4	22.44	110.0%	24.05	117.9%	19.19	94.1%	20.59	100.9%
1,3-Butadiene	16.8	17.26	102.7%	18.75	111.6%	15.68	93.4%	15.83	94.2%
Trans-2-Pentene	21.2	21.55	101.6%	23.20	109.4%	19.16	90.4%	19.56	92.3%
1-Pentene	20.6	20.08	97.5%	22.53	109.3%	18.85	91.5%	19.26	93.5%
Cis-2-Pentene	22.0	21.62	98.3%	24.08	109.5%	20.07	91.2%	19.16	87.1%
2,2-Dimethylbutane	25.2	26.21	104.0%	28.22	112.0%	23.31	92.5%	24.45	97.0%
2-Methylpentane	24.5	26.35	107.6%	27.76	113.4%	23.06	94.2%	23.84	97.4%
Isoprene	20.8	16.57	79.7%	20.35	97.8%	16.54	79.5%	14.85	71.4%
n-Hexane	25.2	24.62	97.7%	28.93	114.8%	25.81	102.4%	24.35	96.6%
Methylcyclopentane	25.4	23.18	91.1%	25.60	100.6%	19.89	78.2%	21.19	83.3%
2,4-Dimethylpentane	29.7	30.44	102.6%	32.87	110.7%	27.88	93.9%	30.19	101.7%
Benzene	25.0	24.12	96.6%	23.38	93.7%	21.16	84.8%	23.35	93.6%
Cyclohexane	25.0	24.19	96.9%	26.36	105.6%	22.01	88.2%	24.66	98.8%
2-Methylhexane	30.0	26.23	87.5%	25.56	85.3%	21.51	71.8%	23.20	77.4%
2,3-Dimethylpentane	30.0	31.39	104.8%	37.12	123.9%	31.73	105.9%	33.86	113.0%
3-Methylhexane	29.4	28.28	96.2%	31.04	105.6%	26.47	90.0%	28.38	96.5%
2,2,4-Trimethylpentane	33.6	32.16	95.7%	34.39	102.4%	29.45	87.6%	30.84	91.8%
n-Heptane	29.4	28.46	96.8%	29.52	100.4%	25.96	88.3%	27.40	93.2%
Methylcyclohexane	29.4	27.99	95.2%	31.25	106.3%	25.52	86.8%	27.33	93.0%
2,3,4-Trimethylpentane	33.0	31.63	96.0%	33.84	102.7%	28.84	87.5%	30.20	91.6%
Toluene	29.1	27.39	94.1%	29.47	101.2%	25.45	87.4%	26.83	92.1%
2-Methylheptane	33.3	31.54	94.8%	34.51	103.7%	29.42	88.4%	30.16	90.6%
3-Methylheptane	33.3	31.84	95.7%	34.53	103.7%	29.67	89.2%	30.63	92.1%
n-Octane	33.0	31.32	95.0%	33.00	100.1%	28.59	86.7%	29.99	91.0%
Ethylbenzene	33.3	28.60	85.9%	30.34	91.2%	26.20	78.7%	27.65	83.1%
M&P-Xylene	66.6	55.25	83.0%	62.96	94.6%	50.81	76.3%	53.79	80.8%
Styrene	32.6	25.76	78.9%	22.54	69.0%	22.34	68.4%	23.31	71.4%
O-Xylene	32.6	28.75	88.1%	33.01	101.1%	26.78	82.0%	28.00	85.8%
N-Nonane	36.7	32.91	89.6%	37.27	101.5%	29.65	80.7%	31.45	85.6%
Isopropylbenzene	35.6	30.33	85.1%	34.35	96.4%	27.75	77.9%	29.57	83.0%
n-Propylbenzene	35.6	29.41	82.5%	32.01	89.8%	26.83	75.3%	29.15	81.8%
1,3,5-Trimethylbenzene	36.7	27.81	75.7%	35.66	97.1%	25.82	70.3%	29.06	79.2%
1,2,4-Trimethylbenzene	36.4	28.48	78.3%	31.21	85.8%	26.49	72.9%	28.57	78.6%
n-Decane	41.2	30.66	74.4%	38.67	93.9%	28.37	68.9%	32.44	78.7%
1,2,3-Trimethylbenzene	35.3	24.61	69.8%	20.06	56.8%	21.91	62.1%	23.53	66.7%
n-Undecane	43.6	29.18	67.0%	40.19	92.3%	22.76	52.2%	24.72	56.7%

Compound Name	Audit Conc (ppbc)	Kennedale		Mansfield		Rhome		Rushing		UTA Campus	
		GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery
Ethane	8.6	8.45	97.8%	6.76	78.3%	7.94	91.9%	6.86	79.4%	7.04	81.4%
Ethylene	8.6	5.27	61.0%	5.05	58.5%	5.91	68.3%	5.84	67.6%	5.15	59.7%
Propane	12.2	10.71	87.5%	11.22	91.7%	12.33	100.7%	10.85	88.6%	10.89	89.0%
Propylene	12.6	7.45	59.1%	8.22	65.2%	7.88	62.5%	7.58	60.1%	7.66	60.8%
Iso-Butane	16.2	15.08	93.3%	15.98	98.9%	18.02	111.5%	15.79	97.7%	16.16	100.0%
N-Butane	16.2	15.25	94.3%	16.57	102.5%	17.89	110.7%	16.09	99.5%	16.66	103.1%
Acetylene	8.6	5.42	62.7%	6.19	71.6%	5.96	68.9%	5.06	58.6%	5.75	66.5%
Trans-2-Butene	16.0	14.97	93.5%	15.93	99.5%	17.66	110.4%	15.75	98.4%	16.37	102.3%
1-Butene	16.2	14.63	90.6%	15.65	96.8%	17.91	110.8%	15.41	95.4%	16.25	100.5%
Cis-2-Butene	17.3	15.55	90.0%	16.87	97.7%	18.62	107.7%	16.57	95.9%	17.38	100.6%
Cyclopentane	20.6	18.99	92.2%	20.53	99.7%	22.59	109.7%	19.92	96.7%	20.86	101.3%
Iso-Pentane	21.4	20.10	93.9%	21.53	100.6%	23.45	109.6%	20.77	97.0%	22.09	103.2%
N-Pentane	20.4	19.39	95.1%	21.03	103.1%	22.88	112.2%	20.22	99.1%	21.35	104.6%
1,3-Butadiene	16.8	15.28	90.9%	16.39	97.5%	17.56	104.5%	15.86	94.4%	16.97	101.0%
Trans-2-Pentene	21.2	18.48	87.2%	19.82	93.5%	21.30	100.5%	18.97	89.5%	20.59	97.1%
1-Pentene	20.6	18.20	88.4%	18.97	92.1%	19.24	93.4%	18.04	87.6%	20.32	98.7%
Cis-2-Pentene	22.0	19.42	88.3%	20.73	94.2%	21.37	97.1%	19.87	90.3%	21.17	96.2%
2,2-Dimethylbutane	25.2	23.61	93.7%	25.12	99.7%	26.32	104.4%	23.85	94.7%	25.68	101.9%
2-Methylpentane	24.5	22.98	93.9%	24.62	100.6%	26.56	108.5%	23.28	95.1%	24.64	100.7%
Isoprene	20.8	15.85	76.2%	17.50	84.1%	16.72	80.4%	15.65	75.2%	14.62	70.3%
n-Hexane	25.2	21.45	85.1%	22.55	89.5%	24.10	95.6%	22.85	90.7%	22.73	90.2%
Methylcyclopentane	25.4	19.65	77.3%	22.62	88.9%	22.60	88.8%	21.61	84.9%	21.34	83.9%
2,4-Dimethylpentane	29.7	27.57	92.9%	27.57	92.9%	32.07	108.1%	29.82	100.5%	29.88	100.7%
Benzene	25.0	20.15	80.7%	21.88	87.7%	23.43	93.9%	21.67	86.8%	22.93	91.9%
Cyclohexane	25.0	21.17	84.8%	22.83	91.5%	26.26	105.2%	23.87	95.6%	23.75	95.1%
2-Methylhexane	30.0	21.48	71.7%	25.01	83.5%	24.38	81.4%	22.04	73.6%	24.02	80.2%
2,3-Dimethylpentane	30.0	27.83	92.9%	28.02	93.5%	33.77	112.7%	32.07	107.1%	30.58	102.1%
3-Methylhexane	29.4	25.84	87.9%	26.20	89.1%	30.87	105.0%	26.58	90.4%	27.23	92.6%
2,2,4-Trimethylpentane	33.6	27.23	81.0%	29.40	87.5%	32.23	95.9%	30.31	90.2%	30.17	89.8%
n-Heptane	29.4	24.05	81.8%	25.82	87.8%	27.35	93.0%	25.58	87.0%	25.97	88.3%
Methylcyclohexane	29.4	25.11	85.4%	25.66	87.3%	29.51	100.4%	27.13	92.3%	26.47	90.0%
2,3,4-Trimethylpentane	33.0	26.58	80.6%	28.25	85.7%	30.60	92.8%	29.25	88.8%	29.27	88.8%
Toluene	29.1	24.19	83.1%	23.95	82.3%	24.16	83.0%	23.75	81.6%	26.12	89.7%
2-Methylheptane	33.3	26.46	79.5%	28.19	84.7%	30.03	90.2%	29.02	87.2%	29.19	87.7%
3-Methylheptane	33.3	27.33	82.1%	28.44	85.5%	31.45	94.5%	30.26	90.9%	29.29	88.0%
n-Octane	33.0	27.26	82.7%	27.99	84.9%	29.50	89.5%	29.21	88.6%	28.97	87.9%
Ethylbenzene	33.3	24.07	72.3%	25.32	76.1%	26.33	79.1%	26.69	80.2%	26.84	80.6%
M&P-Xylene	66.6	48.49	72.9%	48.30	72.6%	49.77	74.8%	51.76	77.8%	51.73	77.7%
Styrene	32.6	20.53	62.9%	22.08	67.7%	21.95	67.3%	21.24	65.1%	22.14	67.8%
O-Xylene	32.6	25.01	76.6%	23.56	72.2%	27.19	83.3%	28.64	87.7%	27.17	83.3%
N-Nonane	36.7	28.06	76.4%	28.51	77.6%	30.46	83.0%	31.60	86.1%	30.54	83.2%
Isopropylbenzene	35.6	25.62	71.9%	26.30	73.8%	29.30	82.2%	29.25	82.1%	29.00	81.4%
n-Propylbenzene	35.6	24.68	69.2%	25.60	71.8%	28.23	79.2%	28.05	78.7%	28.83	80.9%
1,3,5-Trimethylbenzene	36.7	25.87	70.4%	23.06	62.8%	29.70	80.9%	27.90	76.0%	28.40	77.3%
1,2,4-Trimethylbenzene	36.4	26.04	71.6%	24.85	68.3%	28.46	78.3%	27.65	76.0%	28.13	77.4%
n-Decane	41.2	28.97	70.3%	26.21	63.6%	31.13	75.6%	30.93	75.1%	30.35	73.7%
1,2,3-Trimethylbenzene	35.3	21.95	62.2%	20.17	57.2%	23.87	67.6%	23.51	66.6%	23.94	67.9%
n-Undecane	43.6	25.67	58.9%	23.25	53.4%	28.27	64.9%	27.68	63.5%	29.93	68.7%