

**QUALITY ASSURANCE AUDIT REPORT  
Executive Summary**

**North Texas Commission  
Ambient Air and Meteorological Monitoring**

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**Conducted:**

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## EXECUTIVE SUMMARY

On November 30<sup>th</sup> through December 4<sup>th</sup>, 2015, 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 three sites: Wichita Falls, Gainesville, and Lancaster. These sensors were realigned and found to be within the audit objective. Following realignment, there is no further field action required.

The wind direction sensors were outside of the audit guidance of  $\pm 3^\circ$  for linearity at Decatur and Flower Mound. Although the maximum total error was less than  $5^\circ$  at these sites, it is recommended that these sensors be replaced.

The wind speed sensor bearings were outside of the audit guidance of 0.5 g-cm for the torque test at Dish and Benbrook. It is recommended that new bearings be installed at these sites.

Out of the 48 compounds being analyzed, six 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, while isoprene and 2-methylhexane were outside of audit parameters at only one site. These audit results are comparable historically to other AECOM auto-GC audits. 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 a 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 January 12, 2016.

<b>Compound Name</b>	<b>Concentration (ppb-v)</b>	<b>Lab Results (ppb-v)</b>	<b>% Recovery</b>
Propylene	6.97	4.8	<b>68.9%</b>
Freon-12 (Dichlorodifluoromethane)	3.37	3.31	98.3%
Chloromethane (Methyl Chloride)	3.43	3.31	96.4%
Vinyl Chloride	3.47	3.05	88.0%
1,3-Butadiene	6.80	6.06	89.1%
Bromomethane	3.33	3.12	93.6%
Freon-11 (Trichlorofluoromethane)	3.50	3.24	92.6%
1,1-Dichloroethene	3.43	3.07	89.4%
Methylene Chloride (Dichloromethane)	3.43	3.09	90.0%
1,1-Dichloroethane	3.43	3.12	90.9%
Hexane	10.17	9.32	91.7%
Chloroform	3.33	3.09	92.7%
1,2-Dichloroethane	3.50	3.07	87.7%
1,1,1-Trichloroethane	3.47	3.13	90.3%
Benzene	3.53	2.92	82.6%
Carbon tetrachloride	3.43	3.14	91.5%
Cyclohexane	3.47	2.74	79.0%
1,2-Dichloropropane	3.53	3.09	87.5%
Trichloroethylene	3.47	3.09	89.1%
Heptane	3.53	3.06	86.6%
c-1,3-Dichloropropene	3.67	3.19	87.0%
t-1,3-Dichloropropene	3.60	3	83.3%
1,1,2-Trichloroethane	3.53	3.03	85.8%
Toluene	3.57	2.88	80.7%
1,2-Dibromoethane	3.50	3.06	87.4%
Tetrachloroethylene	3.50	2.94	84.0%
Chlorobenzene (alpha-chlorotoluene)	3.57	2.95	82.7%
Ethylbenzene	3.53	2.88	81.5%
p-Xylene & m-Xylene	6.87	5.74	83.6%
Styrene	3.50	2.79	79.7%
o-Xylene	3.53	2.79	79.0%
1,1,2,2-Tetrachloroethane	3.53	3	84.9%
4-Ethyltoluene (p-Ethyltoluene)	3.37	2.35	<b>69.8%</b>
1,3,5-Trimethylbenzene	3.40	2.6	76.5%
1,2,4-Trimethylbenzene	3.40	2.57	75.6%
2,2,4-Trimethylpentane	3.43	2.94	85.6%
Propane	3.37	2.67	79.3%
1-Butene	3.37	3.07	91.2%
Butane	3.37	3	89.1%
1-Pentene	3.37	3.14	93.3%
Pentane	3.33	2.96	88.8%
1-Hexene	3.17	1.95	<b>61.6%</b>

Below are the audit standard results for all network GCs:

Compound Name	Audit Conc (ppbc)	Benbrook		Decatur		Dish		Eagle Mountain	
		GC Response ppbc	%Rec	GC Response ppbc	%Rec	GC Response ppbc	%Rec	GC Response ppbc	%Rec
Ethane	8.3	8.4	100.8%	7.2	86.3%	7.3	87.2%	7.5	89.6%
Ethylene	8.3	6.7	80.8%	5.3	63.8%	4.9	59.3%	6.0	72.6%
Propane	12.0	12.8	106.8%	11.2	93.3%	11.2	93.7%	11.3	94.4%
Propylene	12.4	9.3	75.6%	7.7	62.2%	7.6	61.1%	7.9	63.7%
Iso-Butane	16.2	19.0	117.8%	16.4	101.5%	15.3	94.6%	16.2	100.1%
N-Butane	16.0	19.3	120.9%	16.8	105.3%	15.5	96.7%	16.2	101.2%
Acetylene	8.3	6.8	81.5%	6.5	78.3%	6.1	73.5%	6.0	72.5%
Trans-2-Butene	16.0	18.9	118.1%	16.6	103.7%	15.4	96.2%	15.8	98.9%
1-Butene	16.2	19.2	118.6%	16.3	101.2%	15.3	94.6%	16.8	103.9%
Cis-2-Butene	17.3	20.1	116.1%	17.6	101.7%	16.3	94.2%	16.6	96.3%
Cyclopentane	20.6	24.1	116.8%	20.9	101.4%	19.5	94.5%	21.0	102.0%
Iso-Pentane	21.4	25.6	119.6%	22.2	103.7%	20.4	95.3%	21.6	100.9%
N-Pentane	20.4	24.6	120.5%	21.3	104.4%	19.8	96.9%	20.7	101.7%
1,3-Butadiene	16.8	19.8	118.0%	16.9	100.6%	15.0	89.3%	16.9	100.4%
Trans-2-Pentene	21.0	24.4	116.4%	20.4	97.2%	18.3	87.2%	20.8	99.2%
1-Pentene	20.6	23.8	115.3%	19.2	93.4%	16.2	78.4%	19.4	94.0%
Cis-2-Pentene	22.0	25.4	115.4%	19.6	89.2%	18.4	83.7%	21.3	96.7%
2,2-Dimethylbutane	25.2	30.1	119.6%	23.9	94.9%	22.4	88.9%	26.0	103.1%
2-Methylpentane	24.5	29.1	118.8%	24.1	98.4%	23.2	94.7%	24.8	101.2%
Isoprene	20.8	21.2	102.1%	15.5	74.7%	15.3	73.3%	16.0	77.1%
n-Hexane	25.2	25.6	101.5%	23.2	92.2%	24.7	98.2%	28.3	112.2%
Methylcyclopentane	25.4	24.3	95.4%	21.1	82.8%	20.9	82.0%	21.6	85.0%
2,4-Dimethylpentane	29.7	30.8	103.9%	29.6	99.8%	28.5	96.0%	30.4	102.3%
Benzene	25.0	23.7	95.0%	21.3	85.3%	21.7	87.1%	22.3	89.2%
Cyclohexane	25.0	24.7	98.8%	22.5	90.1%	22.5	90.3%	24.0	96.1%
2-Methylhexane	30.0	25.8	86.0%	23.1	77.0%	23.4	78.1%	23.9	79.7%
2,3-Dimethylpentane	30.0	31.9	106.4%	30.3	101.0%	29.9	99.7%	32.1	107.2%
3-Methylhexane	29.4	28.3	96.1%	26.3	89.6%	26.3	89.5%	28.3	96.4%
2,2,4-Trimethylpentane	33.6	33.5	99.7%	31.1	92.6%	30.7	91.4%	31.6	94.0%
n-Heptane	29.4	27.9	94.9%	26.3	89.4%	26.3	89.4%	27.0	91.7%
Methylcyclohexane	29.4	28.7	97.5%	26.6	90.3%	26.5	90.2%	26.7	90.7%
2,3,4-Trimethylpentane	33.0	30.4	92.3%	28.7	87.1%	29.2	88.5%	29.5	89.5%
Toluene	29.1	25.3	86.8%	25.1	86.1%	25.5	87.7%	24.8	85.2%
2-Methylheptane	33.3	30.1	90.4%	29.1	87.5%	29.3	88.2%	29.8	89.4%
3-Methylheptane	33.3	30.7	92.3%	29.3	88.0%	29.7	89.2%	30.0	90.2%
n-Octane	33.0	30.7	93.2%	29.0	88.0%	29.2	88.5%	29.3	88.7%
Ethylbenzene	33.3	28.1	84.4%	27.1	81.4%	27.6	83.1%	27.4	82.4%
M&P-Xylene	66.6	54.3	81.6%	53.0	79.6%	54.0	81.1%	53.6	80.5%
Styrene	32.6	23.6	72.5%	23.8	73.0%	24.6	75.4%	23.0	70.4%
O-Xylene	32.6	28.8	88.2%	27.6	84.5%	28.0	85.8%	28.1	86.0%
N-Nonane	36.7	32.2	87.6%	30.7	83.5%	31.6	86.1%	32.1	87.5%
Isopropylbenzene	35.6	31.1	87.3%	29.7	83.4%	30.2	84.8%	30.6	86.0%
n-Propylbenzene	35.3	29.3	83.0%	28.9	82.0%	29.2	82.8%	29.2	82.7%
1,3,5-Trimethylbenzene	36.4	28.0	76.9%	29.0	79.8%	27.5	75.6%	29.0	79.8%
1,2,4-Trimethylbenzene	36.0	27.6	76.6%	27.6	76.6%	28.1	78.0%	28.4	78.8%
n-Decane	40.8	31.9	78.2%	31.0	75.9%	32.9	80.5%	33.1	81.2%
1,2,3-Trimethylbenzene	34.9	25.5	72.9%	23.4	66.9%	25.3	72.5%	25.5	73.0%
n-Undecane	43.6	29.9	68.6%	26.1	59.9%	27.9	64.1%	29.6	68.0%

Compound Name	Audit Conc (ppbc)	Elm Fork		Everman		Flower Mound		Godley	
		GC Response ppbc	%Rec	GC Response ppbc	%Rec	GC Response ppbc	%Rec	GC Response ppbc	%Rec
Ethane	8.3	8.5	102.3%	8.2	98.5%	6.8	82.1%	7.0	84.6%
Ethylene	8.3	7.5	89.7%	6.6	79.8%	4.2	51.0%	5.4	64.7%
Propane	12.0	13.1	109.1%	12.5	104.6%	11.4	94.8%	11.0	91.3%
Propylene	12.4	10.1	81.8%	10.0	81.3%	7.5	60.8%	7.3	59.2%
Iso-Butane	16.2	18.1	112.2%	18.9	117.2%	15.7	96.9%	15.7	96.9%
N-Butane	16.0	18.3	114.2%	19.3	120.5%	15.9	99.4%	16.0	99.9%
Acetylene	8.3	7.4	88.4%	6.5	77.6%	6.3	76.0%	5.9	70.6%
Trans-2-Butene	16.0	17.1	106.8%	18.8	117.3%	15.8	98.9%	15.6	97.2%
1-Butene	16.2	17.9	110.7%	18.7	115.5%	15.5	95.8%	15.3	94.9%
Cis-2-Butene	17.3	18.9	109.4%	19.1	110.7%	16.4	95.1%	16.6	95.9%
Cyclopentane	20.6	22.9	111.3%	25.2	122.4%	20.1	97.8%	19.9	96.8%
Iso-Pentane	21.4	24.0	112.3%	25.0	117.0%	20.3	95.0%	21.3	99.6%
N-Pentane	20.4	23.5	115.3%	24.2	118.5%	20.2	99.1%	20.4	100.2%
1,3-Butadiene	16.8	18.5	109.9%	18.9	112.4%	14.1	84.0%	15.8	94.1%
Trans-2-Pentene	21.0	22.8	108.7%	22.9	109.0%	17.9	85.0%	18.9	90.1%
1-Pentene	20.6	22.3	108.0%	22.0	106.8%	15.5	75.1%	17.2	83.4%
Cis-2-Pentene	22.0	23.8	108.0%	19.0	86.2%	16.0	72.5%	18.9	86.0%
2,2-Dimethylbutane	25.2	27.5	109.1%	28.9	114.7%	22.0	87.4%	23.4	93.0%
2-Methylpentane	24.5	27.4	111.8%	28.2	115.2%	23.5	96.1%	23.6	96.4%
Isoprene	20.8	19.3	92.9%	15.3	73.5%	13.5	64.7%	15.4	73.8%
n-Hexane	25.2	26.6	105.7%	26.3	104.3%	24.3	96.3%	26.5	105.1%
Methylcyclopentane	25.4	25.8	101.5%	25.0	98.5%	20.7	81.6%	23.3	91.7%
2,4-Dimethylpentane	29.7	32.3	108.9%	30.1	101.5%	31.9	107.5%	32.5	109.5%
Benzene	25.0	25.6	102.6%	24.2	97.1%	22.3	89.3%	23.4	93.7%
Cyclohexane	25.0	25.4	101.8%	25.8	103.4%	23.8	95.5%	26.9	107.6%
2-Methylhexane	30.0	28.9	96.5%	25.5	85.2%	23.6	78.8%	23.4	78.3%
2,3-Dimethylpentane	30.0	33.3	111.3%	33.3	111.2%	33.2	110.7%	37.3	124.4%
3-Methylhexane	29.4	30.5	103.9%	28.2	95.8%	28.4	96.6%	31.5	107.2%
2,2,4-Trimethylpentane	33.6	35.5	105.6%	33.9	101.0%	32.8	97.8%	35.6	105.9%
n-Heptane	29.4	30.6	104.1%	28.7	97.7%	27.5	93.4%	29.5	100.4%
Methylcyclohexane	29.4	30.2	102.8%	29.0	98.6%	27.7	94.1%	30.8	104.7%
2,3,4-Trimethylpentane	33.0	33.2	100.8%	31.4	95.1%	30.2	91.7%	31.6	95.8%
Toluene	29.1	28.7	98.5%	27.2	93.3%	27.8	95.5%	26.5	91.1%
2-Methylheptane	33.3	33.9	101.9%	30.6	92.0%	30.3	91.0%	31.7	95.3%
3-Methylheptane	33.3	34.2	102.7%	31.2	93.8%	29.3	88.0%	32.7	98.3%
n-Octane	33.0	33.6	102.0%	30.3	92.0%	30.3	91.9%	31.8	96.5%
Ethylbenzene	33.3	31.6	94.8%	26.8	80.4%	28.1	84.5%	28.7	86.3%
M&P-Xylene	66.6	61.8	92.9%	52.0	78.1%	54.3	81.5%	56.9	85.6%
Styrene	32.6	26.9	82.5%	23.1	70.7%	22.9	70.1%	26.0	79.6%
O-Xylene	32.6	30.9	94.8%	28.0	85.7%	28.0	85.7%	31.8	97.5%
N-Nonane	36.7	35.5	96.6%	31.3	85.2%	31.8	86.7%	33.9	92.3%
Isopropylbenzene	35.6	34.8	97.5%	29.2	82.0%	29.9	83.8%	32.4	90.8%
n-Propylbenzene	35.3	33.5	94.9%	27.7	78.5%	29.0	82.2%	30.7	87.0%
1,3,5-Trimethylbenzene	36.4	31.9	87.6%	27.6	75.9%	29.0	79.7%	30.0	82.5%
1,2,4-Trimethylbenzene	36.0	32.3	89.6%	27.8	77.3%	26.7	74.2%	30.0	83.3%
n-Decane	40.8	36.0	88.1%	29.2	71.5%	31.3	76.7%	32.7	80.1%
1,2,3-Trimethylbenzene	34.9	30.0	85.8%	24.5	70.3%	22.4	64.1%	26.3	75.3%
n-Undecane	43.6	34.0	78.0%	28.1	64.6%	27.7	63.7%	29.0	66.6%

Compound Name	Audit Conc (ppbc)	Kennedale		Mansfield		Rhome		Rushing		UTA Campus	
		GC Response ppbc	%Rec	GC Response ppbc	%Rec	GC Response ppbc	%Rec	GC Response ppbc	%Rec	GC Response ppbc	%Rec
Ethane	8.3	7.2	87.0%	6.4	76.8%	7.8	94.0%	8.4	100.6%	7.7	92.9%
Ethylene	8.3	6.0	71.9%	3.7	44.2%	6.5	77.5%	7.0	84.4%	5.8	69.9%
Propane	12.0	11.2	93.1%	10.7	89.0%	11.9	99.4%	12.7	105.7%	12.0	100.3%
Propylene	12.4	8.1	65.4%	6.5	52.9%	8.7	70.8%	9.2	74.4%	9.6	77.6%
Iso-Butane	16.2	15.6	96.7%	14.8	91.8%	16.3	100.8%	18.5	114.6%	17.9	110.8%
N-Butane	16.0	15.9	99.2%	15.4	96.2%	16.6	104.0%	19.1	119.2%	18.5	115.3%
Acetylene	8.3	5.3	64.1%	5.0	59.9%	6.4	77.5%	5.3	64.3%	7.1	84.9%
Trans-2-Butene	16.0	15.2	94.8%	14.7	91.9%	16.1	100.9%	17.9	112.1%	17.9	111.9%
1-Butene	16.2	15.2	94.3%	14.5	89.6%	16.2	100.4%	17.9	110.9%	18.2	112.5%
Cis-2-Butene	17.3	16.2	93.6%	15.7	90.6%	17.0	98.2%	19.1	110.5%	19.1	110.6%
Cyclopentane	20.6	19.8	95.9%	19.1	92.7%	20.8	100.8%	23.4	113.7%	23.0	111.4%
Iso-Pentane	21.4	20.8	97.0%	20.1	94.0%	21.2	99.3%	24.8	115.7%	24.7	115.4%
N-Pentane	20.4	20.2	98.9%	19.5	95.6%	21.0	102.8%	23.9	116.9%	23.4	114.5%
1,3-Butadiene	16.8	16.0	95.0%	15.3	91.1%	14.6	86.9%	18.6	110.5%	18.8	111.8%
Trans-2-Pentene	21.0	19.3	91.9%	18.6	88.6%	19.4	92.6%	22.5	106.9%	22.9	109.2%
1-Pentene	20.6	19.0	92.1%	17.8	86.4%	16.1	78.2%	21.4	104.0%	22.3	108.2%
Cis-2-Pentene	22.0	20.2	91.8%	19.0	86.4%	19.0	86.2%	23.0	104.4%	24.2	110.0%
2,2-Dimethylbutane	25.2	24.0	95.3%	23.5	93.1%	24.5	97.4%	28.2	111.9%	27.7	109.9%
2-Methylpentane	24.5	23.6	96.4%	22.4	91.5%	24.6	100.6%	27.6	112.9%	26.0	106.2%
Isoprene	20.8	17.1	82.2%	15.2	73.1%	15.2	72.9%	18.8	90.6%	20.2	96.9%
n-Hexane	25.2	21.4	85.0%	22.0	87.4%	23.2	92.1%	27.5	109.3%	24.8	98.4%
Methylcyclopentane	25.4	18.7	73.6%	20.6	81.2%	22.1	86.9%	22.6	89.0%	22.5	88.6%
2,4-Dimethylpentane	29.7	29.2	98.4%	28.5	95.9%	31.4	105.8%	33.8	113.8%	30.3	102.1%
Benzene	25.0	20.9	83.8%	21.3	85.2%	21.4	85.6%	21.7	86.8%	24.3	97.4%
Cyclohexane	25.0	22.4	89.8%	22.1	88.3%	24.2	96.9%	25.7	102.9%	24.4	97.6%
2-Methylhexane	30.0	20.5	68.4%	23.3	77.8%	22.8	76.2%	22.2	74.2%	23.9	79.6%
2,3-Dimethylpentane	30.0	30.6	102.2%	29.1	97.0%	31.6	105.4%	36.3	121.2%	31.2	104.3%
3-Methylhexane	29.4	27.2	92.4%	25.8	87.8%	28.2	95.8%	29.5	100.2%	27.2	92.6%
2,2,4-Trimethylpentane	33.6	28.9	85.9%	31.0	92.3%	32.1	95.6%	34.0	101.1%	33.3	99.0%
n-Heptane	29.4	23.8	81.1%	25.9	88.2%	27.0	91.7%	27.3	92.7%	27.7	94.1%
Methylcyclohexane	29.4	24.3	82.6%	26.1	88.9%	27.8	94.5%	29.3	99.7%	28.0	95.3%
2,3,4-Trimethylpentane	33.0	26.5	80.3%	29.0	88.0%	29.1	88.4%	32.1	97.3%	29.6	89.9%
Toluene	29.1	25.9	89.0%	25.1	86.1%	24.2	83.0%	27.7	95.2%	26.7	91.6%
2-Methylheptane	33.3	28.3	85.1%	29.1	87.5%	29.4	88.3%	32.9	98.9%	29.7	89.2%
3-Methylheptane	33.3	29.9	89.8%	28.7	86.3%	30.3	91.1%	32.9	98.8%	29.6	89.0%
n-Octane	33.0	27.8	84.2%	29.3	88.9%	30.4	92.2%	31.1	94.5%	29.9	90.7%
Ethylbenzene	33.3	25.3	76.1%	26.6	80.0%	27.0	81.2%	28.9	86.8%	28.2	84.6%
M&P-Xylene	66.6	52.3	78.6%	52.7	79.1%	52.7	79.2%	60.9	91.4%	55.3	83.1%
Styrene	32.6	21.7	66.4%	23.9	73.3%	23.1	70.8%	21.2	65.0%	25.2	77.2%
O-Xylene	32.6	27.3	83.7%	28.2	86.5%	27.3	83.7%	32.3	98.8%	28.8	88.1%
N-Nonane	36.7	30.1	82.0%	32.4	88.2%	30.8	84.0%	34.9	95.0%	31.9	86.7%
Isopropylbenzene	35.6	28.4	79.6%	30.0	84.3%	31.2	87.5%	33.8	94.9%	31.5	88.5%
n-Propylbenzene	35.3	26.7	75.6%	29.1	82.4%	28.9	81.9%	31.7	89.7%	30.1	85.3%
1,3,5-Trimethylbenzene	36.4	29.2	80.4%	29.6	81.5%	27.0	74.3%	36.1	99.2%	29.6	81.3%
1,2,4-Trimethylbenzene	36.0	28.5	79.3%	29.7	82.5%	28.4	78.8%	32.8	91.1%	29.9	83.0%
n-Decane	40.8	32.1	78.7%	33.8	82.9%	32.6	79.9%	37.6	92.2%	33.0	81.0%
1,2,3-Trimethylbenzene	34.9	25.8	73.7%	24.9	71.2%	26.4	75.7%	29.7	85.1%	27.3	78.2%
n-Undecane	43.6	28.1	64.4%	29.1	66.7%	29.2	67.1%	36.8	84.6%	30.2	69.2%