

QUALITY ASSURANCE AUDIT REPORT

North Texas Commission
Ambient Air and Meteorological Monitoring

Prepared for:

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EXECUTIVE SUMMARY

On October 23rd through October 31st, 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 (auto-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: Bowie, Mansfield, and Mineral Wells. The wind direction sensors at Bowie, Mansfield, and Mineral Wells were realigned and found to be within the audit objective. Following realignment, there is no further field action required.

The wind direction sensor bearings were outside of the audit guidance of 6.3 g-cm for the torque test at Dish. It is recommended that new bearings be installed or a new sensor be installed at Dish.

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. However, all other inputs from 4.2 mph to 54.3 mph were within audit guidelines.

Out of the 48 compounds being analyzed, eight compounds (ethylene, propylene, acetylene, styrene, 1,3,5-trimethylbenzene, 1,2,3-trimethylbenzene, n-decane, 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 auto-GC compound recoveries outside of the audit specification:

Locations	Compounds
Flower Mound	isoprene
Godley	1,2,4-trimethylbenzene
Kennedale	n-propylbenzene
Mansfield	M&P-xylene, n-propylbenzene, 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.

A performance evaluation (PE) sample is prepared by the AECOM QA group on a quarterly basis and submitted to the VOC laboratory for analysis. This performance evaluation sample contained known (spiked) concentrations of the target VOCs. A review of the sample recoveries for the spiked target VOCs shows that three of the compounds were not within the range of expected values. Two compounds were below the acceptable sample recovery: ethene (0%) and 1-hexene (62.4%). The recovery for one compound was found above the acceptable sample recovery, 1,2,4-trimethylbenzene (154.5%). The percent recovery for ethene and other C2 compounds can be problematic for lower concentrations due to the lab's instrument detection limit being higher than the theoretical input. Hexene was also lower than other target compounds and historically has been a problematic compound for VOC work and typically has lower recoveries. The PE results for 1,2,4-trimethylbenzene are typically within the acceptable range as are the lab's calibration checks for this compound. We will continue to evaluate this compound in our PE samples and work with the lab to resolve any discrepancies. AECOM QA staff shared the performance evaluation results with the VOC laboratory, and no other corrective action was taken. Below are GD Air's most recent performance evaluation canister results during the fourth quarter of 2017.

Compound	Known Concentration (ppb-v)	Lab Results (ppb-v)	Percent Recovery
1,1,1-Trichloroethane	3.43	2.73	79.5%
1,1,2,2-Tetrachloroethane	3.5	2.86	81.7%
1,1,2-Trichloroethane	3.5	2.87	82.0%
1,1-Dichloroethane	3.43	2.73	79.5%
1,1-Dichloroethene	3.43	3.07	89.4%
1,2,4-Trimethylbenzene	3.37	5.2	154.5%
1,2-Dibromoethane	3.5	3.01	86.0%
1,2-Dichloroethane	3.47	2.66	76.7%
1,2-Dichloropropane	3.5	2.88	82.3%
1,3,5-Trimethylbenzene	3.37	4.36	129.5%
1,3-Butadiene	6.8	6.84	100.6%
1-Butene	3.57	3.14	88.0%
1-Hexene	3.33	2.08	62.4%
1-Pentene	3.57	3.44	96.4%
2,2,4-Trimethylpentane	3.3	3.48	105.5%
4-Ethyltoluene (p-Ethyltoluene)	3.33	4.06	121.8%
Benzene	3.53	3.22	91.1%
Bromomethane	3.3	2.67	80.9%
c-1,3-Dichloropropene	3.53	3.15	89.2%
Carbon tetrachloride	3.43	2.74	79.8%
Chlorobenzene	3.53	2.8	79.2%
Chloroform	3.4	2.71	79.7%
Chloromethane (Methyl Chloride)	3.47	2.77	79.9%
Cyclohexane	3.47	2.75	79.3%
Dichlorodifluoromethane (Freon-12)	3.37	2.8	83.2%
Ethane	3.63	2.77	76.2%
Ethene	3.63	0	0.0%
Ethylbenzene	3.5	3.84	109.7%
Methylene Chloride (Dichloromethane)	3.37	2.78	82.6%
m-Xylene & p-Xylene	6.8	7.6	111.8%
n-Butane	3.57	3.11	87.2%
n-Heptane	3.5	3.22	92.0%
n-Hexane	10.3	9.22	89.5%
n-Pentane	3.53	3.08	87.2%
o-Xylene	3.5	3.91	111.7%
Propane	3.57	3.06	85.8%
Propylene	7.17	6.35	88.6%
Styrene	3.47	4.5	129.8%
t-1,3-Dichloropropene	3.53	3.39	95.9%
Tetrachloroethene	3.53	2.71	76.7%
Toluene	3.53	3.15	89.2%
Trichloroethene	3.47	2.9	83.7%
Trichlorofluoromethane (Freon-11)	3.53	2.81	79.5%
Vinyl Chloride	3.47	2.92	84.2%

Below are the audit standard results for all auto-GC systems:

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	7.8	8.2	105.7%	7.8	100.3%	6.9	89.2%	8.0	103.6%
Ethylene	7.8	5.9	75.9%	5.4	69.7%	5.1	65.1%	5.6	71.7%
Propane	12.0	11.8	98.4%	11.2	93.1%	10.9	91.2%	11.9	99.4%
Propylene	12.0	8.0	66.8%	8.0	66.7%	7.1	59.5%	7.1	59.4%
Iso-Butane	15.7	16.9	107.9%	16.5	105.1%	14.7	93.7%	17.0	108.3%
N-Butane	15.7	17.6	112.1%	16.7	106.4%	14.9	95.2%	17.1	109.1%
Acetylene	7.8	5.3	68.0%	6.0	77.7%	5.9	76.1%	6.4	82.4%
Trans-2-Butene	15.5	17.1	110.2%	16.2	104.4%	14.8	95.1%	16.7	107.6%
1-Butene	15.7	17.4	111.0%	16.2	103.4%	14.7	93.8%	16.6	105.9%
Cis-2-Butene	16.8	18.1	108.0%	17.5	104.2%	15.6	92.7%	17.4	103.6%
Cyclopentane	19.8	21.6	109.3%	20.7	104.6%	18.6	93.7%	21.8	110.1%
Iso-Pentane	20.6	24.2	117.6%	22.7	110.2%	20.3	98.7%	23.3	112.9%
N-Pentane	19.8	22.3	112.8%	21.1	106.3%	18.9	95.2%	22.3	112.6%
1,3-Butadiene	17.4	18.2	104.2%	16.4	94.0%	14.9	85.7%	17.0	97.2%
Trans-2-Pentene	20.4	21.8	106.8%	18.9	92.8%	18.1	88.8%	21.0	102.7%
1-Pentene	19.8	21.4	108.3%	16.7	84.1%	16.9	85.3%	19.2	97.2%
Cis-2-Pentene	21.2	22.8	107.6%	17.8	83.9%	18.9	89.0%	21.0	99.2%
2,2-Dimethylbutane	24.2	27.0	111.5%	20.1	83.0%	22.7	93.7%	24.5	101.3%
2-Methylpentane	23.5	26.0	110.5%	21.1	89.5%	22.5	95.7%	25.3	107.8%
Isoprene	20.2	18.2	90.0%	14.2	70.5%	15.0	74.0%	16.3	80.7%
n-Hexane	24.5	24.2	98.9%	22.6	92.2%	23.9	97.6%	21.8	88.9%
Methylcyclopentane	24.7	22.4	90.5%	20.6	83.2%	21.8	88.2%	21.2	85.6%
2,4-Dimethylpentane	28.6	30.8	107.8%	29.6	103.6%	28.6	100.3%	32.7	114.4%
Benzene	24.5	23.6	96.2%	22.2	90.8%	21.3	87.2%	20.8	84.9%
Cyclohexane	24.2	25.4	104.6%	22.6	93.4%	22.0	90.9%	23.5	97.1%
2-Methylhexane	28.8	24.3	84.2%	22.5	78.0%	24.1	83.6%	22.1	76.5%
2,3-Dimethylpentane	29.1	33.3	114.2%	30.1	103.5%	29.4	100.9%	33.9	116.5%
3-Methylhexane	28.3	30.0	106.0%	25.5	90.3%	26.3	93.0%	27.5	97.3%
2,2,4-Trimethylpentane	32.3	31.1	96.1%	29.4	91.1%	30.3	93.9%	31.7	98.1%
n-Heptane	28.6	26.0	91.2%	24.8	86.8%	26.2	91.7%	26.4	92.4%
Methylcyclohexane	28.6	27.2	95.3%	26.0	91.2%	26.2	91.9%	28.0	98.1%
2,3,4-Trimethylpentane	32.0	30.2	94.5%	29.0	90.5%	29.3	91.6%	31.0	96.8%
Toluene	29.1	26.2	90.1%	26.9	92.5%	25.3	86.8%	27.1	93.2%
2-Methylheptane	32.3	29.8	92.2%	29.5	91.2%	29.3	90.8%	31.4	97.2%
3-Methylheptane	32.0	28.9	90.3%	30.6	95.7%	29.5	92.3%	32.6	101.8%
n-Octane	32.3	29.2	90.4%	28.8	89.0%	29.1	90.1%	30.7	94.9%
Ethylbenzene	32.3	26.8	83.1%	27.1	83.8%	26.2	81.1%	27.1	84.0%
M&P-Xylene	64.6	51.9	80.3%	55.2	85.4%	50.5	78.1%	53.0	82.1%
Styrene	32.0	23.2	72.5%	22.7	70.9%	22.4	70.0%	22.6	70.8%
O-Xylene	32.0	27.8	86.8%	27.6	86.4%	25.3	79.1%	28.9	90.2%
N-Nonane	35.3	31.1	88.1%	30.5	86.3%	29.6	84.0%	32.3	91.6%
Isopropylbenzene	34.9	29.2	83.7%	28.6	81.9%	27.4	78.5%	31.1	89.1%
n-Propylbenzene	34.6	28.2	81.5%	27.0	78.2%	27.3	79.0%	30.0	86.9%
1,3,5-Trimethylbenzene	35.6	27.4	76.8%	26.4	74.0%	24.9	70.0%	31.8	89.1%
1,2,4-Trimethylbenzene	34.9	27.4	78.4%	25.1	71.9%	25.6	73.3%	30.9	88.6%
n-Decane	39.2	29.7	75.7%	28.9	73.7%	28.6	72.9%	35.2	89.9%
1,2,3-Trimethylbenzene	33.8	22.2	65.6%	20.7	61.3%	23.1	68.4%	27.7	81.8%
n-Undecane	41.8	26.3	63.0%	24.1	57.7%	27.8	66.5%	24.1	57.7%

Compound Name	Audit Conc (ppbc)	Elm Fork		Everman		Flower Mound		Godley		Kennedale	
		GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery
Ethane	7.8	7.5	96.1%	6.9	88.8%	6.8	87.9%	7.5	96.1%	7.4	94.8%
Ethylene	7.8	5.3	68.2%	4.5	58.2%	4.3	55.7%	5.1	66.1%	6.4	82.9%
Propane	12.0	11.8	98.3%	11.5	95.9%	11.3	94.1%	11.7	97.7%	11.3	94.1%
Propylene	12.0	7.9	65.9%	8.0	67.0%	7.5	62.7%	8.2	68.3%	8.4	70.1%
Iso-Butane	15.7	16.7	106.2%	17.8	113.7%	15.2	97.1%	16.9	107.8%	15.3	97.5%
N-Butane	15.7	17.0	108.1%	18.0	114.8%	15.1	96.1%	17.1	109.0%	15.3	97.6%
Acetylene	7.8	6.8	87.9%	6.1	78.7%	5.8	74.9%	5.2	67.2%	5.6	72.8%
Trans-2-Butene	15.5	16.8	108.4%	17.7	113.9%	14.8	95.4%	16.3	104.9%	14.7	95.0%
1-Butene	15.7	16.7	106.2%	17.3	110.4%	15.1	96.3%	16.3	103.9%	14.7	94.0%
Cis-2-Butene	16.8	17.5	104.3%	18.5	110.4%	15.8	94.2%	17.3	102.8%	15.5	92.6%
Cyclopentane	19.8	20.3	102.7%	22.7	114.4%	19.0	95.9%	21.0	106.0%	19.0	95.8%
Iso-Pentane	20.6	23.3	112.9%	24.5	119.1%	20.9	101.6%	23.1	112.0%	20.9	101.5%
N-Pentane	19.8	21.6	109.0%	23.2	117.2%	19.2	97.1%	21.6	109.1%	19.4	98.2%
1,3-Butadiene	17.4	17.6	100.6%	17.7	101.6%	15.4	88.1%	16.9	97.0%	15.3	87.9%
Trans-2-Pentene	20.4	20.9	102.5%	21.5	105.2%	18.5	90.9%	20.4	99.8%	18.8	91.9%
1-Pentene	19.8	19.5	98.3%	18.5	93.3%	17.3	87.5%	19.1	96.3%	18.2	92.1%
Cis-2-Pentene	21.2	21.0	99.2%	20.8	98.1%	18.4	86.9%	20.9	98.4%	19.6	92.5%
2,2-Dimethylbutane	24.2	25.0	103.2%	25.4	105.0%	22.8	94.2%	25.2	103.8%	23.7	97.7%
2-Methylpentane	23.5	25.6	108.7%	25.5	108.4%	22.8	96.8%	24.3	103.3%	23.2	98.5%
Isoprene	20.2	16.5	81.6%	16.9	83.7%	13.8	68.1%	17.2	85.2%	16.4	81.4%
n-Hexane	24.5	23.4	95.5%	29.3	119.6%	26.0	106.2%	23.3	95.0%	22.4	91.7%
Methylcyclopentane	24.7	21.3	86.3%	24.8	100.2%	19.6	79.1%	23.0	93.0%	20.1	81.3%
2,4-Dimethylpentane	28.6	29.1	102.0%	30.2	105.9%	29.0	101.5%	27.5	96.4%	29.4	103.1%
Benzene	24.5	23.5	96.0%	25.1	102.3%	20.9	85.4%	22.3	91.1%	20.5	83.6%
Cyclohexane	24.2	24.3	100.3%	27.5	113.6%	22.0	90.8%	23.4	96.6%	21.9	90.5%
2-Methylhexane	28.8	24.8	86.1%	25.2	87.3%	21.4	74.2%	24.3	84.2%	22.1	76.5%
2,3-Dimethylpentane	29.1	31.6	108.6%	35.5	122.0%	31.1	106.8%	29.6	101.6%	30.3	103.9%
3-Methylhexane	28.3	28.8	102.0%	29.5	104.4%	26.2	92.7%	27.4	97.0%	27.6	97.5%
2,2,4-Trimethylpentane	32.3	30.2	93.4%	32.7	101.2%	29.0	89.8%	29.4	91.1%	29.6	91.5%
n-Heptane	28.6	27.1	94.9%	29.2	102.4%	24.9	87.3%	26.0	91.1%	25.6	89.8%
Methylcyclohexane	28.6	26.7	93.4%	29.3	102.6%	25.6	89.8%	25.4	88.9%	26.8	93.8%
2,3,4-Trimethylpentane	32.0	30.2	94.4%	32.2	100.5%	28.0	87.6%	28.7	89.7%	28.4	88.7%
Toluene	29.1	26.1	89.5%	28.1	96.6%	24.0	82.4%	24.2	83.0%	26.2	90.1%
2-Methylheptane	32.3	29.9	92.6%	31.4	97.1%	28.3	87.6%	28.1	86.9%	29.4	90.8%
3-Methylheptane	32.0	31.0	96.7%	31.5	98.4%	28.7	89.6%	29.1	91.1%	31.2	97.5%
n-Octane	32.3	29.9	92.5%	31.5	97.4%	28.1	86.9%	27.3	84.5%	28.6	88.4%
Ethylbenzene	32.3	28.1	86.9%	27.8	86.1%	25.3	78.3%	24.4	75.5%	26.1	80.9%
M&P-Xylene	64.6	54.7	84.7%	53.9	83.5%	49.5	76.6%	46.9	72.5%	53.1	82.1%
Styrene	32.0	24.7	77.1%	23.6	73.6%	22.7	70.9%	21.9	68.6%	20.8	65.0%
O-Xylene	32.0	28.4	88.8%	29.8	93.0%	22.5	70.3%	24.5	76.6%	25.5	79.7%
N-Nonane	35.3	31.8	90.1%	34.1	96.7%	29.1	82.5%	27.4	77.7%	28.9	81.9%
Isopropylbenzene	34.9	30.8	88.1%	29.8	85.4%	27.2	77.9%	25.2	72.2%	28.5	81.7%
n-Propylbenzene	34.6	29.6	85.6%	27.3	79.1%	26.2	75.8%	24.5	70.9%	27.2	78.8%
1,3,5-Trimethylbenzene	35.6	29.0	81.5%	23.2	65.0%	23.7	66.5%	22.7	63.7%	31.0	86.9%
1,2,4-Trimethylbenzene	34.9	28.2	80.8%	27.4	78.4%	25.6	73.2%	24.4	70.0%	28.3	81.0%
n-Decane	39.2	31.1	79.4%	31.0	79.1%	27.6	70.4%	26.5	67.7%	31.0	79.0%
1,2,3-Trimethylbenzene	33.8	33.6	99.2%	22.4	66.1%	20.1	59.3%	18.4	54.3%	24.8	73.2%
n-Undecane	41.8	27.9	66.8%	31.8	76.2%	23.8	56.9%	23.6	56.4%	26.8	64.2%

Compound Name	Audit Conc (ppbc)	Mansfield		Rhome		Rushing		UTA Campus	
		GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery	GC Response ppbc	% Recovery
Ethane	7.8	6.8	87.0%	7.6	97.4%	9.0	115.8%	7.6	98.1%
Ethylene	7.8	5.5	71.2%	5.8	75.0%	4.7	60.8%	4.6	59.2%
Propane	12.0	10.7	89.0%	11.5	95.6%	11.5	95.5%	11.5	95.6%
Propylene	12.0	7.6	63.0%	8.4	69.7%	8.0	66.8%	8.4	70.0%
Iso-Butane	15.7	15.8	100.5%	16.0	102.0%	17.1	108.8%	16.4	104.5%
N-Butane	15.7	15.9	101.7%	16.7	106.6%	17.3	110.6%	16.8	107.1%
Acetylene	7.8	5.7	73.2%	6.1	78.3%	3.9	50.7%	5.8	74.1%
Trans-2-Butene	15.5	15.0	96.9%	15.7	101.2%	16.2	104.1%	16.4	105.4%
1-Butene	15.7	14.9	95.2%	15.9	101.6%	16.1	102.6%	16.2	103.1%
Cis-2-Butene	16.8	15.8	94.1%	16.7	99.3%	17.1	101.8%	17.3	102.8%
Cyclopentane	19.8	19.5	98.6%	20.5	103.4%	20.9	105.5%	20.9	105.6%
Iso-Pentane	20.6	21.3	103.2%	22.4	108.9%	23.2	112.8%	23.1	112.0%
N-Pentane	19.8	20.0	101.2%	20.9	105.4%	21.3	107.7%	21.3	107.5%
1,3-Butadiene	17.4	14.2	81.6%	15.2	87.2%	16.7	95.6%	16.3	93.4%
Trans-2-Pentene	20.4	18.9	92.5%	19.1	93.8%	19.9	97.4%	20.2	99.2%
1-Pentene	19.8	17.5	88.2%	17.6	89.0%	19.1	96.3%	19.2	97.1%
Cis-2-Pentene	21.2	19.6	92.3%	19.2	90.4%	20.6	97.1%	19.4	91.5%
2,2-Dimethylbutane	24.2	23.9	98.5%	24.8	102.1%	23.5	96.8%	25.7	105.9%
2-Methylpentane	23.5	23.3	99.0%	24.4	103.7%	24.2	102.9%	24.7	105.2%
Isoprene	20.2	16.1	79.7%	15.1	74.7%	16.4	81.1%	15.1	74.6%
n-Hexane	24.5	20.9	85.5%	22.9	93.5%	24.0	98.2%	22.5	92.1%
Methylcyclopentane	24.7	20.9	84.5%	21.8	88.1%	21.2	85.7%	21.5	87.0%
2,4-Dimethylpentane	28.6	25.6	89.5%	30.9	108.1%	27.6	96.8%	29.8	104.5%
Benzene	24.5	19.6	80.1%	22.5	91.7%	20.7	84.6%	23.4	95.5%
Cyclohexane	24.2	21.3	87.9%	25.0	103.0%	23.5	96.9%	24.8	102.3%
2-Methylhexane	28.8	23.1	80.2%	23.4	81.0%	22.7	78.7%	24.2	83.9%
2,3-Dimethylpentane	29.1	26.0	89.3%	31.7	108.9%	30.6	105.0%	32.0	109.9%
3-Methylhexane	28.3	24.1	85.1%	28.9	102.1%	26.5	93.5%	28.2	99.7%
2,2,4-Trimethylpentane	32.3	27.1	83.8%	29.8	92.2%	28.6	88.4%	31.9	98.7%
n-Heptane	28.6	23.4	81.8%	25.7	90.1%	24.6	86.1%	27.9	97.9%
Methylcyclohexane	28.6	24.0	83.9%	29.0	101.4%	25.5	89.4%	27.0	94.7%
2,3,4-Trimethylpentane	32.0	26.6	83.1%	29.2	91.4%	29.5	92.3%	29.5	92.3%
Toluene	29.1	22.6	77.7%	23.2	79.6%	27.5	94.5%	25.8	88.6%
2-Methylheptane	32.3	26.1	80.7%	28.5	88.3%	30.1	93.2%	29.2	90.2%
3-Methylheptane	32.0	26.2	81.8%	30.1	94.0%	28.8	90.1%	29.4	91.9%
n-Octane	32.3	25.5	78.8%	28.9	89.4%	27.4	84.7%	29.1	89.9%
Ethylbenzene	32.3	23.6	73.1%	26.1	80.7%	25.0	77.4%	26.9	83.1%
M&P-Xylene	64.6	45.1	69.7%	50.0	77.3%	48.3	74.8%	51.6	79.9%
Styrene	32.0	19.2	60.1%	21.7	67.9%	21.1	65.9%	22.4	69.9%
O-Xylene	32.0	23.4	73.0%	26.9	84.2%	26.6	83.0%	27.5	85.8%
N-Nonane	35.3	26.7	75.7%	30.2	85.5%	30.2	85.6%	31.6	89.6%
Isopropylbenzene	34.9	25.3	72.3%	28.3	81.0%	27.1	77.6%	28.7	82.3%
n-Propylbenzene	34.6	23.9	69.3%	26.7	77.3%	25.9	74.9%	27.8	80.3%
1,3,5-Trimethylbenzene	35.6	22.5	63.0%	27.3	76.7%	26.5	74.3%	26.1	73.3%
1,2,4-Trimethylbenzene	34.9	22.1	63.3%	25.1	72.0%	26.8	76.7%	26.4	75.6%
n-Decane	39.2	25.4	64.8%	26.1	66.6%	28.6	73.0%	29.9	76.2%
1,2,3-Trimethylbenzene	33.8	18.3	54.1%	21.4	63.3%	21.6	63.8%	21.8	64.4%
n-Undecane	41.8	20.4	48.8%	24.5	58.7%	24.5	58.6%	24.2	57.9%