



Air Quality Investigation Hopeland and Chinchilla March 2015

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Summary

The Queensland Government conducted an air sampling program in the Hopeland and Chinchilla areas after a soil sampling program in the area identified the presence of certain gases associated with combustion by-products, such as carbon monoxide, in the soil. The air sampling program tested for two of the subsoil gases – carbon monoxide and hydrogen sulphide – as well as potential combustion by-products such as volatile organic compounds (VOCs) and phenolic compounds. In total, the monitoring program encompassed testing for the possible presence of 127 individual air pollutants.

Testing was conducted at a total of six residential properties and four community locations over the course of the monitoring program. A mix of indoor and outdoor air samples were collected.

No carbon monoxide or hydrogen sulfide was detected in indoor or outdoor air at any of the sampling sites.

A total of 40 individual VOC compounds were detected. None of the VOC compounds detected were present at concentrations above the relevant air quality guideline or criteria for protection of human health and wellbeing. Many of the VOC compounds detected are known to be components of household and agricultural products.

Phenol was the only phenolic compound found to be present in ambient air, at concentrations well below the criterion for protection of human health and wellbeing. Similar to VOCs, phenol is a common ingredient in many household and agricultural products.

The monitoring program did not find any evidence of subsoil gases leading to unsafe levels of air pollutants in the community. This suggests that any surface emissions that may be occurring are likely to be gradual and quickly diluted by surrounding air to very low levels.

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Introduction

The Queensland Government has been conducting soil sampling in the Hopeland area south-east of Chinchilla, on the Darling Downs. At a number of locations particular gases, such as carbon monoxide, have been identified in the soil at depths below two metres. The gases present are by-products formed during combustion processes and are not associated with coal seam gas development.

In response to these findings, the Department of Environment and Heritage Protection (EHP) initiated an air sampling program in March 2015 to investigate if the gases found in the soil could be detected at the surface or in the air.

The Department of Science, Information Technology and Innovation (DSITI) was commissioned by EHP to conduct the air monitoring investigation in March 2015 to gather information on air quality at residential dwellings in the Hopeland and community areas in Chinchilla to assist with an assessment of any potential risk to human health. This report details the results of the monitoring undertaken between 4 March and 25 March 2015.

Monitoring study design

To measure the impact of possible air emissions from the soil on surrounding air quality, the DSITI air monitoring investigation at Hopeland and in community areas in Chinchilla collected data on levels of carbon monoxide, hydrogen sulfide, volatile organic compounds (VOCs) and phenolic compounds. Carbon monoxide and hydrogen sulphide were two of the gases found during the sub-soil testing. VOCs is a term given to a wide range of organic chemical compounds, some of which can pose a hazard to human health. Testing for VOCs and phenolic compounds was included as these compounds are potential by-products of combustion processes. In total, the monitoring program encompassed testing for 127 possible individual air pollutants. The DSITI monitoring program consisted of the following stages:

Stage 1:

- 4 to 5 March: Carbon monoxide measured instantaneously by hand-held instrument
- 4 to 5 March: Total VOCs measured instantaneously by hand-held instrument
- 4 to 6 March: VOCs sampling using summa canisters for subsequent laboratory analysis

Stage 2:

- 5 to 19 March: VOCs sampling using passive diffusion samplers for subsequent laboratory analysis
- 5 to 19 March: Hydrogen sulfide sampling using passive diffusion samplers for subsequent laboratory analysis

Stage 3:

- 16 – 25 March: Phenolic compounds sampling using passive diffusion samplers for subsequent laboratory analysis

Stage 1 monitoring was conducted at six residential locations. At each location measurement of carbon monoxide and total VOCs was conducted over a 20 minute period, both inside and outside each residence. Fifteen samples for individual VOC compounds analysis were collected – one inside and one outside each of the six residences, and three additional samples within the grounds of three local schools in Hopeland and Chinchilla.

Carbon monoxide was measured using a hand-held electrochemical sensor instrument. The instrument was capable of measuring instantaneous carbon monoxide concentrations down to one part per million (ppm).

Total VOCs were measured using a hand-held instrument fitted with a photo-ionisation detector. The instrument was capable of measuring the total concentration of all VOC compounds present in the air down to 230 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) every ten seconds.

The air samples for individual VOC compound analysis were collected in evacuated summa canisters. Eleven of the canisters were fitted with a restrictor which metered the air flow into the canister over a 24 hour period. The remaining four samples were collected over a one minute period. The sealed canisters were sent for laboratory analysis using gas chromatography and mass spectrometry (GC/MS) in accordance with USEPA Compendium Method TO-15 *Determination of Volatile Organic Compounds (VOCs) in air collected in specially-prepared canisters and analyzed by Gas Chromatography/ Mass Spectrometry (GC/MS)*. This analysis was carried out by the Queensland Government Forensic and Scientific Services Laboratory. Only VOC compounds present at concentrations greater than 0.5 ppb were able to be measured by this method.

Stage 2 sampling was conducted at five residential locations and one community location. Seven samples were collected for individual VOC compound analysis; three indoor residential samples, three outdoor residential samples and one outdoor community sample. Five samples were collected for hydrogen sulfide analysis; two indoor residential samples, three outdoor residential samples and one outdoor community sample.

Stage 2 sampling was conducted over periods ranging from 11 to 13 days depending on the monitoring location. Passive diffusive samplers were used to collect airborne VOCs and hydrogen sulfide on adsorbent material, followed by the extraction of the adsorbed compounds and analysis. The passive samplers operated by diffusion of gas molecules through a permeable membrane and subsequent capture by adsorbing material positioned inside the permeable membrane. Following sampling the passive samplers were sealed and sent for laboratory analysis. The average gas concentration over the sampling period was calculated from the mass of compound collected, the sampling time and the rate of diffusion of the compound through the permeable membrane. Analysis was carried out by SGS Leeder Consulting laboratories in Melbourne. This sampling was capable of detecting the presence of VOC compounds at concentrations up to 25 times lower than that possible with the Stage 1 sampling; down to concentrations of around 0.02 ppb depending on the particular VOC compound. However, some VOCs such as pentane, chloromethane and methylene chloride which could be measured in the Stage 1 sampling could not be collected by the passive diffusion samplers because their high volatility meant they could not be retained by the adsorbent material.

The hydrogen sulfide passive diffusion samplers used in Stage 2 were capable of detecting hydrogen sulfide at concentrations down to 0.4 ppb.

Stage 3 sampling was conducted at five residential locations. Five samples were collected for phenolic compounds analysis; two indoor residential samples and three outdoor residential samples.

Sampling for phenolic compounds in Stage 3 was also conducted using passive diffusive samplers over periods ranging from 7 to 9 days depending on the monitoring location. Analysis of these samples was also carried out by SGS Leeder Consulting laboratories in Melbourne. This sampling was capable of detecting the presence of phenolic compounds at concentrations down to 0.002 ppb.

Results and discussion

Assessment of possible health impacts was performed by comparing measured pollutant concentrations against the relevant objective for protection of human health listed in the Queensland Environmental Protection (Air) Policy 2008 (EPP Air), or another recognised ambient air quality guideline in the event that an EPP Air objective was not available. Three recognised sources of environmental and human health guidelines/criteria were used to cover the full range of compounds detected in the samples. These were, in order of priority, the Queensland Environmental Protection (Air) Policy 2008 (EPP Air) air quality objectives, the Texas Commission on Environmental Quality Air Monitoring Comparison Values (AMCVs) and the Texas Commission on Environmental Quality Effects Screening Levels (ESLs).

EPP Air objectives are set to protect environmental values including the protection of human health and wellbeing.

AMCVs are chemical-specific air concentrations set to protect human health and welfare. Exposure to an air concentration at or below the AMCVs is not likely to cause adverse health effects in the general public, including sensitive subgroups such as children, the elderly, pregnant women, and people with pre-existing health conditions.

ESLs are based on data concerning health effects. They are not ambient air standards. If predicted or measured airborne levels of a constituent do not exceed the screening level, adverse health or welfare would not be expected to result. If ambient levels of constituents in air exceed the screening level, it does not necessarily indicate a problem, but a more in-depth review is necessary.

No carbon monoxide could be detected in the indoor or outdoor air at any of the residences tested during Stage 1. Carbon monoxide concentrations did not exceed the instrument detection limit of one part per million (ppm). Levels of carbon monoxide were shown to be well below the EPP (Air) objective for carbon monoxide, which is a maximum concentration of 9 ppm averaged over an eight hour period.

No hydrogen sulfide was measured in the indoor or outdoor air at any of the residences or community locations tested during Stage 2. All indoor and outdoor hydrogen sulfide concentrations were all less than the minimum concentration of 0.4 ppb capable of being measured by the sampling technique. Hydrogen sulfide levels were significantly lower than the EPP (Air) objective, which is a maximum concentration of 110 ppb averaged over a 24-hour period.

Total VOCs measured with the hand-held monitor did not exceed the instrument detection limit of 230 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) at any of the locations tested during Stage 1. While there is currently no ambient air guideline for total VOCs, comparison of these findings against the

former National Health and Medical Research Council goal for total VOCs present in indoor air of 500 µg/m³ indicates that total VOCs concentrations were unlikely to be of concern.

The testing for individual VOCs was capable of determining concentrations of a broad range of VOC compounds, including aliphatic hydrocarbons (such as hexane), aromatic hydrocarbons (such as benzene, toluene and xylenes), and oxygenated compounds (such as acetone and similar ketones).

Measurement results for VOC compounds detected during Stage 1 and Stage 2 monitoring are summarised in Table 1. A total of 40 individual VOC compounds were detected. The number of VOC compounds detected at individual sampling locations ranged from 5 to 25.

It should be noted that the Stage 1 results from the summa canisters are from a 1-minute or 24-hour sampling period and the Stage 2 results from the passive diffusion samplers are from sampling periods ranging from 11 to 13 days, which may differ from the guideline/criteria averaging period (shown in the column 'Guideline/Criteria' in Table 1). For assessment purposes the individual VOC measurements have been compared against the guideline value for the most relevant averaging period. If the VOC concentration is less than this value, then it can be assumed that the guideline or criteria would be met. If, however, the levels of VOCs from the canister or passive diffusion sampler are higher than the guideline/criteria it does not necessarily mean that the guideline/criteria would not be met, just that meeting the guideline/criteria cannot be demonstrated due to the sampling period used.

None of the VOC compounds detected in the Stage 1 and Stage 2 monitoring were present at concentrations higher than the appropriate guideline/criteria value. At these levels it is unlikely that VOCs present in ambient air in the Hopeland and Chinchilla areas pose a health risk. It needs to be recognised that VOCs can come from a range of different sources. VOCs are components of many household and farming products, such as pressurised spray cans, nail polish remover, paints and paint stripper, vehicle fuels, agricultural chemicals to name a few.

Measurement results for phenolic compounds detected during the Stage 3 monitoring are summarised in Table 2. Phenol was the only phenolic compound detected in the Stage 3 sampling. Phenol concentrations were only seven per cent or less of the guideline/criteria value and, on this basis, would not be expected to pose a health risk. Phenol is found naturally in animal wastes and decomposing organic material, and is a common component of household and agricultural products such as disinfectants, liquid household cleaners, lubricating oils, paint and varnish removers and rubber adhesives.

Conclusion

The air monitoring investigation in the Hopeland and Chinchilla areas conducted between 4 March and 25 March 2015 found that levels of carbon monoxide, hydrogen sulfide, VOCs and phenolic compounds in the air in the community are all below relevant guidelines and criteria for protection of human health and wellbeing.

The monitoring program did not find any evidence of subsoil gases leading to unsafe levels of air pollutants in the community. This suggests that any surface emissions that may be occurring are likely to be gradual and quickly diluted by surrounding air to very low levels.

Table 1: Results for volatile organic compounds (VOCs) measured at concentrations greater than the Limit of Reporting in summa canister samples collected over 1 minute or 24 hour periods (Stage 1) and/or passive diffusion sample tubes over 11 to 13 day periods (Stage 2).

Volatile Organic Compound	Stage 1 sampling					Stage 2 sampling			Ambient Air Guideline/Criteria (Health)		
	1 minute samples		24 hour samples		Range (ppb)	11 to 13 day samples		Range (ppb)	Averaging Period	Guideline Value (ppb)	Source
	Compound detected	Compound not detected	Compound detected	Compound not detected		Compound detected	Compound not detected				
Alkanes											
Butane	0	4	4	7	5 to 1,000	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	92,000	Texas AMCV
									Annual	2,400	Texas AMCV
Cyclohexane	0	0	0	0	ND	2	5	0.06 to 0.10	1 Hour	1,000	Texas AMCV
									Annual	100	Texas AMCV
Decane	0	0	0	0	ND	7	0	0.04 to 0.11	1 Hour	1,750	Texas AMCV
									Annual	750	Texas AMCV
Dodecane	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	7	0	3.42 to 5.13	Annual	50	Texas ESL
Isobutane	0	4	3	8	2 to 500	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	33,000	Texas AMCV
									Annual	2,400	Texas AMCV
Heptane	0	0	0	0	ND	2	5	0.05	1 Hour	850	Texas AMCV
									Annual	85	Texas AMCV
Hexane	1	3	2	9	0.5 to 2.0	5	2	0.06 to 0.10	1 Hour	1,800	Texas AMCV
									Annual	190	Texas AMCV
2-Methylbutane	0	4	5	6	1.1 to 2.7	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	68,000	Texas AMCV
									Annual	8,000	Texas AMCV
Methylcyclohexane	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1	6	0.05	1 Hour	4,000	Texas AMCV
									Annual	400	Texas AMCV
Methylcyclopentane	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	2	5	0.03 to 0.04	1 Hour	750	Texas AMCV
									Annual	75	Texas AMCV
3-Methylpentane	0	0	0	0	ND	1	6	0.04	1 Hour	1,000	Texas AMCV
									Annual	100	Texas AMCV

Table 1 (cont): Results for volatile organic compounds (VOCs) measured at concentrations greater than the Limit of Reporting in summa canister samples collected over 1 minute or 24 hour periods (Stage 1) and/or passive diffusion sample tubes over 11 to 13 day periods (Stage 2).

Volatile Organic Compound	Stage 1 sampling					Stage 2 sampling			Ambient Air Guideline/Criteria (Health)		
	1 minute samples		24 hour samples		Range (ppb)	11 to 13 day samples		Range (ppb)	Averaging Period	Guideline Value (ppb)	Source
	Compound detected	Compound not detected	Compound detected	Compound not detected		Compound detected	Compound not detected				
Alkanes (continued)											
Nonane	0	0	0	0	ND	1	6	0.05	1 Hour	2,000	Texas AMCV
									Annual	200	Texas AMCV
Pentane	2	2	6	5	0.5 to 3.5	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	68,000	Texas AMCV
									Annual	8,000	Texas AMCV
Undecane	0	4	1	10	0.6	7	0	0.32 to 0.52	1 Hour	550	Texas AMCV
									Annual	55	Texas AMCV
Haloalkanes/alkenes											
Chloromethane	2	2	9	2	0.5 to 1.2	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	500	Texas AMCV
									Annual	50	Texas AMCV
Carbon tetrachloride	0	0	0	0	ND	7	0	0.06 to 0.07	1 Hour	20	Texas AMCV
									Annual	2	Texas AMCV
Methylene chloride	1	3	10	1	0.5 to 340	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	24 Hour	850	EPP Air
Trichlorofluoromethane	4	0	10	1	0.8 to 1.1	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	10,000	Texas AMCV
									Annual	1,000	Texas AMCV
Trichloromethane	0	0	0	0	ND	6	1	0.07 to 0.47	1 Hour	20	Texas AMCV
									Annual	2	Texas AMCV
Alcohols											
Butanol	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	2	5	0.05 to 0.08	Annual	20	Texas ESL
Ethanol	4	0	11	0	2.2 to 800	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Annual	1,000	Texas ESL

Table 1 (cont): Results for volatile organic compounds (VOCs) measured at concentrations greater than the Limit of Reporting in summa canister samples collected over 1 minute or 24 hour periods (Stage 1) and/or passive diffusion sample tubes over 11 to 13 day periods (Stage 2).

Volatile Organic Compound	Stage 1 sampling					Stage 2 sampling			Ambient Air Guideline/Criteria (Health)		
	1 minute samples		24 hour samples		Range (ppb)	11 to 13 day samples		Range (ppb)	Averaging Period	Guideline Value (ppb)	Source
	Compound detected	Compound not detected	Compound detected	Compound not detected		Compound detected	Compound not detected				
Alcohols (continued)											
Isobutyl alcohol	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1	6	0.06	1 Hour	500	Texas ESL
									Annual	50	Texas ESL
Isopropyl alcohol	4	0	9	2	0.6 to 6.1	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	2,000	Texas ESL
									Annual	200	Texas ESL
Carbonyls											
Acetone	4	0	11	0	1.3 to 51	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	11,000	Texas AMCV
									Annual	6,700	Texas AMCV
Acrolein	1	3	3	8	0.7 to 1.1	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	4.8	Texas AMCV
									Annual	1.2	Texas AMCV
Butyl acetate	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1	6	0.08	1 Hour	7,400	Texas AMCV
									Annual	990	Texas AMCV
Ethyl acetate	0	0	2	9	0.6 to 1.8	3	4	0.05 to 0.51	1 Hour	4,000	Texas AMCV
									Annual	400	Texas AMCV
Methyl ethyl ketone	2	2	6	5	0.5 to 2.5	1	6	0.03	1 Hour	20,000	Texas AMCV
									Annual	3,000	Texas AMCV
Vinyl acetate	0	4	5	6	0.5 to 1.4	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	40	Texas ESL
									Annual	4	Texas ESL
Aromatics											
Benzene	0	0	0	0	ND	7	0	0.03 to 0.09	Annual	3.0	EPP Air
1,4-Dichlorobenzene	0	0	0	0	ND	1	6	1.39	1 Hour	100	Texas ESL
									Annual	10	Texas ESL

Table 1 (cont): Results for volatile organic compounds (VOCs) measured at concentrations greater than the Limit of Reporting in summa canister samples collected over 1 minute or 24 hour periods (Stage 1) and/or passive diffusion sample tubes over 11 to 13 day periods (Stage 2).

Volatile Organic Compound	Stage 1 sampling					Stage 2 sampling			Ambient Air Guideline/Criteria (Health)		
	1 minute samples		24 hour samples		Range (ppb)	11 to 13 day samples		Range (ppb)	Averaging Period	Guideline Value (ppb)	Source
	Compound detected	Compound not detected	Compound detected	Compound not detected		Compound detected	Compound not detected				
Aromatics (continued)											
Ethylbenzene	0	0	0	0	ND	4	3	0.02 to 0.05	1 Hour	20,000	Texas AMCV
									Annual	450	Texas AMCV
n-Propylbenzene	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1	6	0.02	1 Hour	500	Texas AMCV
									Annual	50	Texas AMCV
Styrene	0	0	0	0	ND	1	6	0.02	1 week	60	EPP Air
Toluene	1	3	6	5	0.5 to 14	7	0	0.08 to 0.78	24 Hour	1,000	EPP Air
									Annual	100	EPP Air
1,2,4-Trichlorobenzene	0	0	0	0	ND	3	4	0.02 to 0.03	1 Hour	250	Texas AMCV
									Annual	25	Texas AMCV
Xylenes	0	4	1	10	0.5	7	0	0.03 to 0.20	24 Hour	250	EPP Air
									Annual	200	EPP Air
Naphthalene	0	4	1	10	0.5	0	7	ND	1 Hour	95	Texas AMCV
									Annual	9.5	Texas AMCV
Other compounds											
2-Propene nitrile	1	3	0	11	0.5	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	1 Hour	150	Texas ESL
									Annual	1	Texas ESL
Carbon disulfide	0	4	2	9	1.0 to 24	Not in scope of analysis	Not in scope of analysis	Not in scope of analysis	24 Hour	32	EPP Air

ND = not detected. For Stage 1 samples the limit of reporting was 0.5 ppb. The limit of reporting for naphthalene in Stage 2 samples was 0.04 ppb.

Table 2: Results for phenolic compounds measured at concentrations greater than the Limit of Reporting in passive diffusion sample tubes over 7 to 9 day periods (Stage 3).

Phenolic Compound	Stage 3 sampling			Ambient Air Guideline/Criteria (Health)		
	7 to 9 day samples		Range (ppb)	Averaging Period	Guideline Value (ppb)	Source
	Compound detected	Compound not detected				
Phenol	5	0	0.29 to 0.36	Annual	5	Texas ESL

Appendix

Appendix 1: List of all air pollutants tested for

The full range of 127 air pollutants tested for during the investigation is listed below. Compounds shown in bold italic type were present at concentrations greater than the minimum measurable concentration.

1-Butene	2-Methylhexane	Ethylbenzene
1-Hexene	2-Methylpentane	Ethyl tert-butyl ether
1-Methyl-1-ethylbenzene	2,2,4-Trimethylpentane	Heptane
1-Methyl-2-ethylbenzene	2,3,4-Trimethylpentane	Hexachlorobutadiene
1-Pentene	3-Ethyltoluene	Hexane
1,1-Dichloroethane	3-Methylheptane	Hydrogen sulfide
1,1-Dichloroethylene	3-Methylhexane	Isobutane
1,2-Dibromoethane	3-Methylpentane	Isobutyl alcohol
1,2-Dichlorobenzene	4-Ethyltoluene	Isooctane
1,2-Dichloroethane	Acetone	Isoprene
<i>cis</i> -1,2-Dichloroethylene	Acrolein	Isopropyl alcohol
<i>trans</i> -1,2-Dichloroethene	Allyl chloride	Methyl butyl ketone
1,2-Dichloropropane	Benzene	Methylcyclohexane
1,3-Butadiene	Benzyl chloride	Methylcyclopentane
1,3-Dichlorobenzene	Bromochloromethane	Methylene chloride
<i>cis</i> -1,3-Dichloropropene	Bromodichloromethane	Methyl ethyl ketone
<i>trans</i> -1,3-Dichloropropene	Bromoform	Methyl isobutyl ketone
1,3-Diethylbenzene	Bromomethane	Methyl methacrylate
1,4-Dichlorobenzene	Butane	Methyl tert-butyl ether
1,4-Diethylbenzene	Butanol	Naphthalene
1,4-Dioxane	Butyl acetate	Nonane
1,1,1-Trichloroethane	Carbon disulfide	Octane
1,1,2-Trichloroethane	Carbon monoxide	Pentane
1,1,2-Trichloro-1,2,2-trifluoroethane	Carbon tetrachloride	Phenol
1,2,3-Trimethylbenzene	Chlorobenzene	α -Pinene
1,2,4-Trichlorobenzene	Chloroethane	β -Pinene
1,2,4-Trimethylbenzene	Chloromethane	Propane
1,3,5-Trimethylbenzene	Cresol	Propylbenzene
1,1,2,2-Tetrachloroethane	Cumene	Propylene glycol methyl ether
<i>cis</i> -2-Butene	Cyclohexane	Propylene glycol methyl ether acetate
<i>trans</i> -2-Butene	Cyclohexanone	Styrene
2-Butoxyethanol	Cyclopentane	Tetrahydrofuran
2-Ethylhexanol	Cyclopropane	Toluene
2-Ethyltoluene	Decane	Tetrachloroethylene
<i>cis</i> -2-Pentene	Dibromochloromethane	Trichloroethylene
<i>trans</i> -2-Pentene	Dichlorodifluoromethane	Trichlorofluoromethane
2-Propene nitrile	Dichlorotetrafluoroethane	Trichloromethane
2,2-Dimethylbutane	Dimethylheptane	Undecane
2,3-Dimethylbutane	Dimethylphenol	Vinyl acetate
2,3-Dimethylpentane	Dodecane	Vinyl bromide
2,4-Dimethylpentane	Ethanol	Vinyl chloride
2-Methylbutane	Ethyl acetate	Xylenes
2-Methylheptane		

Minimum measurable concentrations are 1 ppm for carbon monoxide, 0.4 ppb for hydrogen sulfide, 0.5 ppb for Stage 1 VOC samples, typically 0.02 ppb for Stage 2 VOC samples and 0.002 ppb for Stage 3 samples