

TO-15 and TO14A Full Scan GC/MS Volatile Organic Compounds

Method TO-15 is used for measuring volatile organic compounds collected in SUMMA canisters by Full Scan GC/MS. The difference between TO-14 and TO-15 is the method of water management. The TO-14 method uses a Nafion dryer to remove water, and TO-15 uses a sorbent trap to remove water. An aliquot of sample is run through a concentrator onto a sorbent trap or a cryotrap depending on the method. The sample is desorbed and cryofocused on the GC column. The samples are analyzed by GC/MS full scan or by selected ion monitoring (SIM). Method TO-15 does not specify a target list of compounds.

The EAS modifications to the method include the target list, limit of quantitation, and QC criteria. EAS also runs TO-15 with no modification for a special target group.

Note: The calibration criteria, LCS criteria, and LCD criteria used in writing EPA TO-15 was based on a 16 compound target list which does not contain any oxygenated compounds. The EAS modifications (and other labs) to these parameters are based on a substantially larger list that contains oxygenate and SVOC compounds which can have RSD values greater than 30%. These criteria are listed by compound in Table 13.7b

TO-15 and TO-14A Sample Collection Criteria

Parameter	EAS TO-15 & TO-14A Modified	TO-15 & TO-14A Method
Canister Holding Times	30 days 14 days DTSC Soil Gas	30 days from sampling date DTSC Soil Gas
Tedlar Bag	72 hours	
Canister Certification	Certification <RL by full scan GC/MS	Certification <0.2 ppbv
Passive Flow Regulator	Certification <RL with the Canister	

Canisters and flow regulators are batch certified unless individual certification is requested. It is recommended that canisters and flow regulators be individually certified for low level analysis, or soil gas analysis.

Table 13.7a
Summary of QC Criteria for TO-15 and TO-14A Modified

The following Table lists the QC Criteria for the EAS TO-15 Method. The EAS Compound list is almost 100 compounds and includes the TO-14 compound list, the “Standard” TO-15 compound list, and an Extended list containing 8260 compounds that are not on the regular TO-15 list.

Parameter	EAS TO-15 Modified	TO-15 Method
BFB Tune	Daily (24 hour) 12 hours if Required	Daily (24 hour)
Tuning Criteria with BFB	TO-15 Tune Criteria	TO-15 Tune Criteria
Initial Calibration	Five points minimum See Table 13.7b 90% compounds meet criteria	5 points minimum RSD < 30% TO-14 List 2 Compounds can exceed criteria by 10%
Calibration Check Sample (CCS)	After Initial Calibration Same Percent RSD as Initial Calibration	After Initial Calibration Same Percent RSD as Initial Calibration
Continuing Calibration Verification (CCV)	Daily (24 hours) See Table 13.7b 90% compounds meet criteria	Daily (24 hours) 10 ppbv Std Same Percent RSD as Initial Calibration
Internal Standard (IS)	Pentafluorobenzene 1,4-Difluorobenzene RT < 0.5 min daily std. Response 60% to 140%	Pentafluorobenzene Chlorobenzene-d5 1,4-Difluorobenzene RT < 0.33 min daily std. Response 60% to 140%
Surrogate	Toluene-d8 70-130% recovery	Toluene-d8 70-130% recovery
Method Blank	Humidified Air <RL	Humidified Air <RL
Laboratory Control Spike	1 per Daily Analytical Batch 70-130% for LCS list See Table 13.7b	1 per Daily Batch 70-130% for LCS list
Duplicate Lab Control Dup Sample Dup	Duplicate with each 20 samples <30% for LCS spike list See Table 13.7b	1 Duplicate with each 20 samples <25% for LCS spike list

Table 13.7b
Method TO-15 and TO-14A QC Criteria

Component	Initial Calibration %D	CCV %D	LCS %R	Precision %D
Freon 12	<30%	<30%	70-130	<30%
Chloromethane	<30%	<30%	70-130	<30%
Freon 114	<30%	<30%	70-130	<30%
Vinyl chloride	<30%	<30%	70-130	<30%
Bromomethane	<30%	<30%	70-130	<30%
Chloroethane	<30%	<30%	70-130	<30%
Trichlorofluoromethane	<30%	<30%	70-130	<30%
1,1-Dichloroethene	<30%	<30%	70-130	<30%
Dichloromethane	<30%	<30%	70-130	<30%
Freon 113	<30%	<30%	70-130	<30%
1,1-Dichloroethane	<30%	<30%	70-130	<30%
c-1,2-Dichloroethene	<30%	<30%	70-130	<30%
Chloroform	<30%	<30%	70-130	<30%
1,2-Dichloroethane	<30%	<30%	70-130	<30%
1,1,1-Trichloroethane	<30%	<30%	70-130	<30%
Benzene	<30%	<30%	70-130	<30%
Carbon Tetrachloride	<30%	<30%	70-130	<30%
1,2-Dichloropropane	<30%	<30%	70-130	<30%
Trichloroethene	<30%	<30%	70-130	<30%
c-1,3-Dichloropropene	<30%	<30%	70-130	<30%
t-1,3-Dichloropropene	<30%	<30%	70-130	<30%
1,1,2-Trichloroethane	<30%	<30%	70-130	<30%
Toluene	<30%	<30%	70-130	<30%
1,2-Dibromoethane	<30%	<30%	70-130	<30%
Tetrachloroethene	<30%	<30%	70-130	<30%
Chlorobenzene	<30%	<30%	70-130	<30%
Ethylbenzene	<30%	<30%	70-130	<30%
m & p-Xylenes	<30%	<30%	70-130	<30%
Styrene	<30%	<30%	70-130	<30%
o-Xylene	<30%	<30%	70-130	<30%
1,1,2,2-Tetrachloroethane	<30%	<30%	70-130	<30%
1,3,5-Trimethylbenzene	<30%	<30%	70-130	<30%
1,2,4-Trimethylbenzene	<30%	<30%	70-130	<30%
1,3-Dichlorobenzene	<30%	<30%	70-130	<30%
1,4-Dichlorobenzene	<30%	<30%	70-130	<30%
1,2-Dichlorobenzene	<30%	<30%	70-130	<30%
1,2,4-Trichlorobenzene	<30%	<30%	70-130	<30%
Hexachlorobutadiene	<50%	<50%	50-150	<50%

Component	Initial Calibration %D	CCV %D	LCS %R	Precision %D
1,3-Butadiene	<40%	<40%	60-140	<40%
2-Butanone	<40%	<40%	60-140	<40%
Acetone	<40%	<40%	60-140	<40%
Carbon Disulfide	<40%	<40%	60-140	<40%
3-Chloroprene	<40%	<40%	60-140	<40%
Bromoform	<40%	<40%	60-140	<40%
Methyl isobutyl ketone	<40%	<40%	60-140	<40%
2-Hexanone	<40%	<40%	60-140	<40%
Bromodichloromethane	<40%	<40%	60-140	<40%
Dibromochloromethane	<40%	<40%	60-140	<40%
Vinyl acetate	<40%	<40%	60-140	<40%
t-1,2-Dichloroethene	<40%	<40%	60-140	<40%
Benzylchloride	<50%	<50%	50-150	<50%
4-Ethyltoluene	<40%	<40%	60-140	<40%
Methyl t-butyl ether	<40%	<40%	60-140	<40%
Cyclohexane	<40%	<40%	60-140	<40%
2,2-Dichloropropane	<40%	<40%	60-140	<40%
Hexane	<40%	<40%	60-140	<40%
Methacrylonitrile	<40%	<40%	60-140	<40%
Heptane	<40%	<40%	60-140	<40%
n-Propylbenzene	<40%	<40%	60-140	<40%
Isopropylbenzene	<40%	<40%	60-140	<40%
2,2,4-Trimethylpentane	<40%	<40%	60-140	<40%
TO-15 Extended Compounds				
1,1,1,2-Tetrachloroethane	<40%	<40%	60-140	<40%
Bromochloromethane	<40%	<40%	60-140	<40%
Ethyl acetate	<40%	<40%	60-140	<40%
Octane	<40%	<40%	60-140	<40%
Nonane	<40%	<40%	60-140	<40%
Decane	<40%	<40%	60-140	<40%
1,1-Dichloropropene	<40%	<40%	60-140	<40%
1,2,3 Trichloropropane	<40%	<40%	60-140	<40%
1,3-Dichloropropane	<40%	<40%	60-140	<40%
Dibromomethane	<40%	<40%	60-140	<40%
Methyl methacrylate	<40%	<40%	60-140	<40%
1,4-Dioxane	<40%	<40%	60-140	<40%
Di-isopropyl ether	<40%	<40%	60-140	<40%
Isobutyl Alcohol	<40%	<40%	60-140	<40%
n-Butylbenzene	<40%	<40%	60-140	<40%
sec-Butylbenzene	<40%	<40%	60-140	<40%
tert-butylbenzene	<40%	<40%	60-140	<40%

Component	Initial Calibration %D	CCV %D	LCS %R	Precision %D
i-Butylbenzene	<40%	<40%	60-140	<40%
p-Isopropyltoluene	<40%	<40%	60-140	<40%
Tetrahydrofuran	<40%	<40%	60-140	<40%
t-Butanol	<40%	<40%	60-140	<40%
2-Chlorotoluene	<40%	<40%	60-140	<40%
4-Chlorotoluene	<40%	<40%	60-140	<40%
2-Propanol (Isopropanol)	<40%	<40%	60-140	<40%

Method TO-15 Extended Special Compounds QC Criteria

The TO-15 Extended Special List includes compounds that require some special attention, either because of their polarity or because of they have low vapor pressure

Component	Initial Calibration %D	CCV %D	LCS %R	Precision %D
TO-15 Special				
Naphthalene	<40%	<50%	NA	NA
t-1,4-Dichloro-2-butene	<40%	<50%	NA	NA
1,2-Dibromo-3-chloropropane	<40%	<50%	NA	NA
Methanol	<40%	<50%	NA	NA
Acrylonitrile	<40%	<50%	NA	NA
Acetonitrile	<40%	<40%	NA	NA
Acrolein	<40%	<40%	NA	NA
Ethyl methacrylate	<40%	<40%	NA	NA
Methyl iodide	<40%	<40%	NA	NA
Propionitrile	<40%	<40%	NA	NA
Tetraethyl lead	<40%	<40%	NA	NA

Table 13.7c
Method TO-15 Compounds with MDL and RL

The TO-15 Compound List includes 63 volatile organic compounds. . See Table 13.7d for the TO-15 Low Level MDL and RL values. The TO-15 Extended List has 37 additional compounds to make a total of 100 VOC's.

	CAS	Compound	MDL ppbV	RL ppbv	MDL ug/m3	RL ug/m3
1	75-71-8	Dichlorodifluoromethane	0.4	0.7	2	4
2	74-87-3	Chloromethane	0.4	0.7	1	2
3	76-14-2	Freon 114	0.4	0.7	3	5
4	75-01-4	Vinyl chloride	0.4	0.7	1	2
5	106-99-0	1,3-Butadiene	0.4	0.7	1	2
6	74-83-9	Bromomethane	0.4	0.7	1	3
7	75-00-3	Chloroethane	0.4	0.7	1	2
8	75-69-4	Trichlorofluoromethane	0.4	0.7	2	4
9	67-64-1	Acetone	0.4	0.7	1	2
10	75-35-4	1,1-Dichloroethene	0.4	0.7	1	3
11	76-13-1	Freon 113	0.4	0.7	3	6
12	107-05-1	Allyl chloride	0.4	0.7	1	2
13	75-09-2	Methylene Chloride	0.4	0.7	1	3
14	75-15-0	Carbon disulfide	0.4	0.7	1	2
15	156-60-5	trans-1,2-Dichloroethene	0.2	0.4	1	1
16	1634-04-4	Methyl tert butyl ether	0.2	0.4	1	1
17	75-34-3	1,1-Dichloroethane	0.4	0.7	2	3
18	108-05-4	Vinyl acetate	0.4	0.7	1	3
19	78-93-3	2-Butanone	0.4	0.7	1	2
20	110-54-3	Hexane	0.2	0.4	1	1
21	141-78-6	Ethyl acetate	0.4	0.7	1	3
22	109-99-9	Tetrahydrofuran	0.4	0.7	1	2
23	156-59-2	cis-1,2-Dichloroethene	0.4	0.7	1	3
24	67-66-3	Chloroform	0.4	0.7	2	4
25	71-55-6	1,1,1-Trichloroethane	0.4	0.7	2	4
26	107-06-2	1,2-Dichloroethane	0.4	0.7	2	3
27	563-58-6	1,1-Dichloropropene	0.2	0.4	1	2
28	110-82-7	Cyclohexane	0.2	0.4	1	1
29	71-43-2	Benzene	0.4	0.7	1	2
30	56-23-5	Carbon tetrachloride	0.4	0.7	2	5
31	540-84-1	2,2,4-Trimethylpentane	0.2	0.4	1	2
32	142-82-5	n-Heptane	0.2	0.4	1	2

	CAS	Compound	MDL ppbV	RL ppbv	MDL ug/m3	RL ug/m3
33	78-87-5	1,2-Dichloropropane	0.4	0.7	2	3
34	123-91-1	1,4 Dioxane	0.7	1.5	3	5
35	79-01-6	Trichloroethene	0.4	0.7	2	4
36	75-27-4	Bromodichloromethane	0.2	0.4	1	3
37	108-10-1	4-Methyl-1-pentanone	0.2	0.4	1	2
38	10061-01-5	cis-1,3-Dichloropropene	0.4	0.7	2	3
39	108-88-3	Toluene	0.4	0.7	1	3
40	10061-02-6	trans-1,3-Dichloropropene	0.4	0.7	2	3
41	79-00-5	1,1,2-Trichloroethane	0.4	0.7	2	4
42	591-78-6	2-Hexanone	0.2	0.4	1	2
43	142-28-9	1,3-Dichloropropane	0.2	0.4	1	2
44	124-48-1	Dibromochloromethane	0.2	0.4	2	3
45	106-93-4	1,2-Dibromoethane	0.4	0.7	3	6
46	127-18-4	Tetrachloroethene	0.2	0.4	1	3
47	108-90-7	Chlorobenzene	0.4	0.7	2	3
48	100-41-4	Ethylbenzene	0.4	0.7	2	3
49	1330-20-7	m,p-Xylene	0.4	0.7	2	3
50	100-42-5	Styrene	0.4	0.7	2	3
51	75-25-2	Bromoform	0.1	0.2	1	2
52	95-47-6	o-Xylene	0.4	0.7	2	3
53	79-34-5	1,1,2,2-Tetrachloroethane	0.2	0.4	1	3
54	96-18-4	1,2,3-Trichloropropane	0.2	0.4	1	2
55	622-96-8	4-Ethyltoluene	0.2	0.4	1	2
56	108-67-8	1,3,5-Trimethylbenzene	0.4	0.7	2	4
57	95-63-6	1,2,4-Trimethylbenzene	0.4	0.7	2	4
58	541-73-1	1,3-Dichlorobenzene	0.2	0.4	1	2
59	100-44-7	Benzyl chloride	0.2	0.4	1	2
60	106-46-7	1,4-Dichlorobenzene	0.2	0.4	1	2
61	95-50-1	1,2-Dichlorobenzene	0.2	0.4	1	2
62	120-82-1	1,2,4-Trichlorobenzene	0.4	0.7	3	6
63	87-68-3	Hexachlorobutadiene	0.4	0.7	4	8

Table 13.7d
TO-15 Low Level Method, MDL and RL

The TO-15 Low Level Method is used to achieve the lowest possible MDL for the TO-15 compounds by full scan, and is used for samples in the range of 0.1 ppbv to 5 ppbv. The detection limits listed are for clean, ambient air samples that have no matrix effects, or canister dilution factor.

	CAS	Compound	MDL ppbV	RL ppbv	MDL ug/m3	RL ug/m3
1	75-71-8	Dichlorodifluoromethane	0.10	0.25	0.50	1.24
2	74-87-3	Chloromethane	0.10	0.25	0.21	0.52
3	76-14-2	Freon 114	0.10	0.25	0.70	1.75
4	75-01-4	Vinyl chloride	0.10	0.25	0.26	0.64
5	106-99-0	1,3-Butadiene	0.10	0.25	0.22	0.55
6	74-83-9	Bromomethane	0.10	0.25	0.39	0.97
7	75-00-3	Chloroethane	0.10	0.25	0.26	0.66
8	75-69-4	Trichlorofluoromethane	0.10	0.25	0.56	1.41
9	67-64-1	Acetone	0.10	0.25	0.24	0.60
10	75-35-4	1,1-Dichloroethene	0.10	0.25	0.40	0.99
11	76-13-1	Freon 113	0.10	0.25	0.77	1.92
12	107-05-1	Allyl chloride	0.10	0.25	0.31	0.78
13	75-09-2	Methylene Chloride	0.10	0.25	0.35	0.87
14	75-15-0	Carbon disulfide	0.10	0.25	0.31	0.78
15	156-60-5	trans-1,2-Dichloroethene	0.05	0.13	0.20	0.50
16	1634-04-4	Methyl tert butyl ether	0.05	0.13	0.18	0.45
17	75-34-3	1,1-Dichloroethane	0.10	0.25	0.41	1.01
18	108-05-4	Vinyl acetate	0.10	0.25	0.35	0.88
19	78-93-3	2-Butanone	0.10	0.25	0.30	0.74
20	110-54-3	Hexane	0.05	0.13	0.18	0.44
21	141-78-6	Ethyl acetate	0.10	0.25	0.36	0.90
22	109-99-9	Tetrahydrofuran	0.10	0.25	0.30	0.74
23	156-59-2	cis-1,2-Dichloroethene	0.10	0.25	0.40	0.99
24	67-66-3	Chloroform	0.10	0.25	0.49	1.22
25	71-55-6	1,1,1-Trichloroethane	0.10	0.25	0.55	1.37
26	107-06-2	1,2-Dichloroethane	0.10	0.25	0.41	1.01
27	563-58-6	1,1-Dichloropropene	0.05	0.13	0.23	0.57
28	110-82-7	Cyclohexane	0.05	0.13	0.17	0.43
29	71-43-2	Benzene	0.10	0.25	0.32	0.80
30	56-23-5	Carbon tetrachloride	0.10	0.25	0.63	1.58
31	540-84-1	2,2,4-Trimethylpentane	0.05	0.13	0.23	0.59
32	142-82-5	n-Heptane	0.05	0.13	0.21	0.51

	CAS	Compound	MDL ppbV	RL ppbv	MDL ug/m3	RL ug/m3
33	78-87-5	1,2-Dichloropropane	0.10	0.25	0.46	1.16
34	123-91-1	1,4 Dioxane	0.20	0.50	0.72	1.81
35	79-01-6	Trichloroethene	0.10	0.25	0.54	1.35
36	75-27-4	Bromodichloromethane	0.05	0.13	0.34	0.84
37	108-10-1	4-Methyl-1-pentanone	0.05	0.13	0.21	0.51
38	10061-01-5	cis-1,3-Dichloropropene	0.10	0.25	0.45	1.14
39	108-88-3	Toluene	0.10	0.25	0.38	0.94
40	10061-02-6	trans-1,3-Dichloropropene	0.10	0.25	0.45	1.14
41	79-00-5	1,1,2-Trichloroethane	0.10	0.25	0.55	1.37
42	591-78-6	2-Hexanone	0.05	0.13	0.21	0.51
43	142-28-9	1,3-Dichloropropane	0.05	0.13	0.23	0.58
44	124-48-1	Dibromochloromethane	0.05	0.13	0.43	1.07
45	106-93-4	1,2-Dibromoethane	0.10	0.25	0.77	1.93
46	127-18-4	Tetrachloroethene	0.05	0.13	0.34	0.85
47	108-90-7	Chlorobenzene	0.10	0.25	0.46	1.15
48	100-41-4	Ethylbenzene	0.10	0.25	0.44	1.09
49	1330-20-7	m,p-Xylene	0.10	0.25	0.44	1.09
50	100-42-5	Styrene	0.10	0.25	0.43	1.07
51	75-25-2	Bromoform	0.02	0.06	0.26	0.64
52	95-47-6	o-Xylene	0.10	0.25	0.44	1.09
53	79-34-5	1,1,2,2-Tetrachloroethane	0.05	0.13	0.34	0.86
54	96-18-4	1,2,3-Trichloropropane	0.05	0.13	0.30	0.76
55	622-96-8	4-Ethyltoluene	0.05	0.13	0.25	0.62
56	108-67-8	1,3,5-Trimethylbenzene	0.10	0.25	0.49	1.23
57	95-63-6	1,2,4-Trimethylbenzene	0.10	0.25	0.49	1.23
58	541-73-1	1,3-Dichlorobenzene	0.05	0.13	0.30	0.75
59	100-44-7	Benzyl chloride	0.05	0.13	0.26	0.65
60	106-46-7	1,4-Dichlorobenzene	0.05	0.13	0.30	0.75
61	95-50-1	1,2-Dichlorobenzene	0.05	0.13	0.30	0.75
62	120-82-1	1,2,4-Trichlorobenzene	0.10	0.25	0.74	1.86
63	87-68-3	Hexachlorobutadiene	0.10	0.25	1.07	2.67

Table 13.7e
TO-15 Extended List, MDL and RL

The TO-15 Extended List includes the 100 volatile organic compounds that are included in the TO-15 daily instrument calibration. Some of the oxygenated compounds such as methanol and some of the compounds with low vapor pressures such as naphthalene are not reported in the TO-15 Extended List analysis unless requested by the client in advance. These compounds are listed in the table in bold, and either require some special consideration during the collection and analysis or are not commonly requested.

	CAS	Compound	MDL ppbV	RL ppbv	MDL ug/m3	RL ug/m3
1	75-71-8	Dichlorodifluoromethane	0.4	0.7	2	4
2	67-56-1	Methanol	1.1	2.1	1	3
3	74-87-3	Chloromethane	0.4	0.7	1	1
4	76-14-2	Freon 114	0.4	0.7	3	5
5	75-01-4	Vinyl chloride	0.4	0.7	1	2
6	106-99-0	1,3-Butadiene	0.4	0.7	1	2
7	74-83-9	Bromomethane	0.4	0.7	1	3
8	75-00-3	Chloroethane	0.4	0.7	1	2
9	64-17-5	Ethanol	1.1	2.1	2	4
10	107-02-8	Acrolein	0.4	0.7	1	2
11	75-69-4	Trichlorofluoromethane	0.4	0.7	2	4
12	75-05-8	Acetonitrile	0.7	1.4	1	2
13	67-64-1	Acetone	0.4	0.7	1	2
14	67-63-0	2-propanol	0.4	0.7	1	2
15	75-65-0	t-Butanol	0.2	0.4	1	1
16	4227-95-6	Methyl iodide	0.2	0.4	1	2
17	75-35-4	1,1-Dichloroethene	0.4	0.7	1	3
18	107-13-1	Acrylonitrile	0.4	0.7	1	2
19	76-13-1	Freon 113	0.4	0.7	3	5
20	107-05-1	Allyl chloride	0.4	0.7	1	2
21	75-09-2	Methylene Chloride	0.4	0.7	1	2
22	75-15-0	Carbon disulfide	0.4	0.7	1	2
23	156-60-5	trans-1,2-Dichloroethene	0.2	0.4	1	1
24	1634-04-4	Methyl tert butyl ether	0.2	0.4	1	1
25	107-12-0	Propionitrile	0.4	0.7	1	2
26	75-34-3	1,1-Dichloroethane	0.4	0.7	1	3
27	637-92-3	Ethyl-tert-Butyl Ether	0.4	0.7	1	3
28	108-05-4	Vinyl acetate	0.4	0.7	1	3
29	78-93-3	2-Butanone	0.4	0.7	1	2
30	108-20-3	Diisopropyl ether	0.2	0.4	1	1

	CAS	Compound	MDL ppbV	RL ppbv	MDL ug/m3	RL ug/m3
31	110-54-3	Hexane	0.2	0.4	1	1
32	126-98-7	Methacrylonitrile	0.4	0.7	1	2
33	141-78-6	Ethyl acetate	0.4	0.7	1	3
34	74-97-5	Bromochloromethane	0.2	0.4	1	2
35	96-33-3	Methyl Acrylate	0.4	0.7	1	3
36	109-99-9	Tetrahydrofuran	0.4	0.7	1	2
37	78-83-1	Isobutyl alcohol	0.4	0.7	1	2
38	156-59-2	cis-1,2-Dichloroethene	0.4	0.7	1	3
39	594-20-7	2,2-Dichloropropane	0.4	0.7	2	3
40	67-66-3	Chloroform	0.4	0.7	2	3
41	71-55-6	1,1,1-Trichloroethane	0.4	0.7	2	4
42	107-06-2	1,2-Dichloroethane	0.4	0.7	1	3
43	563-58-6	1,1-Dichloropropene	0.2	0.4	1	2
44	110-82-7	Cyclohexane	0.2	0.4	1	1
45	71-43-2	Benzene	0.4	0.7	1	2
46	56-23-5	Carbon tetrachloride	0.4	0.7	2	5
47	540-84-1	2,2,4-Trimethylpentane	0.2	0.4	1	2
48	142-82-5	n-Heptane	0.2	0.4	1	1
49	78-87-5	1,2-Dichloropropane	0.4	0.7	2	3
50	123-91-1	1,4 Dioxane	0.7	1.4	3	5
51	74-95-3	Dibromomethane	0.2	0.4	1	3
52	79-01-6	Trichloroethene	0.4	0.7	2	4
53	75-27-4	Bromodichloromethane	0.2	0.4	1	2
54	80-62-6	Methyl methacrylate	0.2	0.4	1	1
55	108-10-1	4-Methyl-1-pentanone	0.2	0.4	1	1
56	10061-01-5	cis-1,3-Dichloropropene	0.4	0.7	2	3
57	108-88-3	Toluene	0.4	0.7	1	3
58	10061-02-6	trans-1,3-Dichloropropene	0.4	0.7	2	3
59	79-00-5	1,1,2-Trichloroethane	0.4	0.7	2	4
60	97-63-2	Ethyl methacrylate	0.2	0.4	1	2
61	591-78-6	2-Hexanone	0.2	0.4	1	1
62	142-28-9	1,3-Dichloropropane	0.2	0.4	1	2
63	111-65-9	Octane	0.2	0.4	1	2
64	124-48-1	Dibromochloromethane	0.2	0.4	2	3
65	106-93-4	1,2-Dibromoethane	0.4	0.7	3	6
66	127-18-4	Tetrachloroethene	0.2	0.4	1	2
67	108-90-7	Chlorobenzene	0.4	0.7	2	3
68	630-20-6	1,1,1,2-Tetrachloroethane	0.2	0.4	1	2
69	100-41-4	Ethylbenzene	0.4	0.7	2	3

	CAS	Compound	MDL ppbV	RL ppbv	MDL ug/m3	RL ug/m3
70	1330-20-7	m,p-Xylene	0.4	0.7	2	3
71	111-84-2	Nonane	0.2	0.4	1	2
72	100-42-5	Styrene	0.4	0.7	2	3
73	75-25-2	Bromoform	0.1	0.2	1	2
74	95-47-6	o-Xylene	0.4	0.7	2	3
75	79-34-5	1,1,2,2-Tetrachloroethane	0.2	0.4	1	2
76	96-18-4	1,2,3-Trichloropropane	0.2	0.4	1	2
77	110-57-6	t-1,4-Dichloro-2-butene	0.2	0.4	1	2
78	95-49-8	2-Chlorotoluene	0.2	0.4	1	2
79	106-43-4	4-Chlorotoluene	0.2	0.4	1	2
80	103-65-1	n-Propylbenzene	0.2	0.4	1	2
81	98-82-8	Isopropylbenzene	0.2	0.4	1	2
82	622-96-8	4-Ethyltoluene	0.2	0.4	1	2
83	108-67-8	1,3,5-Trimethylbenzene	0.4	0.7	2	4
84	124-18-5	Decane	0.2	0.4	1	2
85	98-06-6	tert-butyl benzene	0.2	0.4	1	2
86	95-63-6	1,2,4-Trimethylbenzene	0.4	0.7	2	4
87	538-93-2	i-Butylbenzene	0.2	0.4	1	2
88	135-98-8	sec-butylbenzene	0.2	0.4	1	2
89	541-73-1	1,3-Dichlorobenzene	0.2	0.4	1	2
90	99-87-6	Isopropyltoluene	0.2	0.4	1	2
91	100-44-7	Benzyl chloride	0.2	0.4	1	2
92	106-46-7	1,4-Dichlorobenzene	0.2	0.4	1	2
93	104-51-8	n-Butylbenzene	0.2	0.4	1	2
94	95-50-1	1,2-Dichlorobenzene	0.2	0.4	1	2
95	96-12-8	1,2-Dibromo-3-chloropropane	0.2	0.4	2	3
96	78-00-2	Tetraethyl lead	0.1	0.2	1	2
97	120-82-1	1,2,4-Trichlorobenzene	0.4	0.7	3	6
98	91-20-3	Naphthalene	0.1	0.2	1	1
99	87-61-6	1,2,3-Trichlorobenzene	0.2	0.4	1	3
100	87-68-3	Hexachlorobutadiene	0.4	0.7	4	8

Table 13.7f
TO-15 Express List, MDL and RL

This is a list of common air pollutants that can be analyzed quickly at a cost savings over the normal TO-14 or TO-15 Target Lists.

	CAS	Compound	MDL ppbV	RL ppbv	MDL ug/m3	RL ug/m3
1	75-01-4	Vinyl chloride	0.5	1.0	1.3	2.6
2	75-35-4	1,1-Dichloroethene	0.5	1.0	2.0	4.0
3	76-13-1	Freon 113	0.5	1.0	3.8	7.7
4	75-09-2	Methylene Chloride	0.5	1.0	1.7	3.5
5	75-34-3	1,1-Dichloroethane	0.5	1.0	2.0	4.1
6	156-59-2	cis-1,2-Dichloroethene	0.5	1.0	2.0	4.0
7	67-66-3	Chloroform	0.5	1.0	2.4	4.9
8	71-55-6	1,1,1-Trichloroethane	0.5	1.0	2.7	5.5
9	107-06-2	1,2-Dichloroethane	0.5	1.0	2.0	4.1
10	71-43-2	Benzene	0.5	1.0	1.6	3.2
11	56-23-5	Carbon tetrachloride	0.5	1.0	3.2	6.3
12	78-87-5	1,2-Dichloropropane	0.5	1.0	2.3	4.6
13	79-01-6	Trichloroethene	0.5	1.0	2.7	5.4
14	10061-01-5	cis-1,3-Dichloropropene	0.5	1.0	2.3	4.5
15	108-88-3	Toluene	0.5	1.0	1.9	3.8
16	10061-02-6	trans-1,3-Dichloropropene	0.5	1.0	2.3	4.5
17	79-00-5	1,1,2-Trichloroethane	0.5	1.0	2.7	5.5
18	106-93-4	1,2-Dibromoethane	0.5	1.0	3.9	7.7
19	127-18-4	Tetrachloroethene	0.3	0.5	1.7	3.4
20	108-90-7	Chlorobenzene	0.5	1.0	2.3	4.6
21	100-41-4	Ethylbenzene	0.5	1.0	2.2	4.4
22	1330-20-7	m,p-Xylene	0.5	1.0	2.2	4.4
23	95-47-6	o-Xylene	0.5	1.0	2.2	4.4
24	108-67-8	1,3,5-Trimethylbenzene	0.5	1.0	2.5	4.9
25	95-63-6	1,2,4-Trimethylbenzene	0.5	1.0	2.5	4.9