STS 112/9A: Assessment of Air Quality in the International Space Station (ISS) and Space Shuttle Based on Samples Returned in October 2002

The toxicological assessments of grab sample canisters (GSCs) and formaldehyde badges returned aboard STS-112 are reported. Analytical methods have not changed from earlier reports. Surrogate standard recoveries from the GSCs were 83-126%. One GSC sample leaked after acquisition because of a bad valve. Recoveries from lab and trip controls for formaldehyde analyses ranged from 86 to 89%.

The two general criteria used to assess air quality are the total-non-methane-volatile organic hydrocarbons (NMVOCs) and the total T-value (minus the CO_2 and formaldehyde contributions). Control of atmospheric alcohols is important to the water recovery system engineers; hence total alcohols (including acetone) are also shown for each sample. Because formaldehyde is quantified from sorbent badges, its concentration is listed separately. These indices of air quality are summarized below (OFP=octafluoropropane or Freon 218):

Sample Location	Date	NMVOCs - OFP (mg/m^3)	OFP (mg/m^3)	T Value[a] (units)	Alcohols (mg/m^3)	Formaldehyde (mg/m^3)
Lab GSC	6/20/02	10.2	n/a[b]	0.65	6.1	**0.059**
FGB GSC	6/20/02	12.1	n/a	**1.13**	7.5	ns[c]
SM GSC	6/20/02	14.1	n/a	**1.25**	8.4	0.031
Lab GSC	7/17/02	10.2	n/a	**1.15**	5.3	**0.064**
FGB GSC	7/17/02	9.5	n/a	0.97	6.2	ns
SM GSC	7/17/02	10.2	n/a	0.98	6.1	0.038
Lab	8/06/02	*sample invalid due to leaky valve*				**0.062**
SM	8/06/02	*sample not taken due to 9A launch delay*				0.025
Lab GSC	9/10/02	7.3	n/a	0.83	3.6	**0.065[d]**
SM	9/10/02	*sample not taken due to 9A launch delay*				0.025[d]
Shuttle Preflight	10/02/02	0.5	n/a	0.02	0.1	ns
Shuttle Middeck	10/18/02	8.2	n/a	0.43	5.8	ns
Acceptable Guideline:		<25	85000	<1	<5	0.050

[a] Formaldehyde and CO2 not included in T calculation.
[b] n/a = not in analysis plan
[c] ns = no sample
[d] Possible mix up in sample locations makes these data uncertain

The table shows that the air quality in general was acceptable for crew respiration; however, certain values shown in bold require further explanation. The T values that were slightly above the guideline of 1.0 were due to relatively high concentrations of methylcyclosiloxanes in the samples. These compounds primarily cause injury to the respiratory system (not irritation) and reproductive toxicity. Thus, they act independently of other compounds comprising the T value and when their contribution is removed, each T value falls below 1.0. The formaldehyde values of 0.06 mg/m^3 found in the Lab samples are cause for concern and are under review by the Environmental Contingency Action Core Team. A comparison of the intermodular concentrations listed in table 1(enclosure) for the following pollutants suggests excellent mixing: methanol, acetaldehyde, acetone, dichloromethane, ethyl acetate, n-butanol, and xylenes.

Enclosures
1: Analytical Results of STS-112/9A GSC Samples
2: T Values of STS-112/9A GSC Samples

TABLE 1
ANALYTICAL RESULTS OF
ISS 9A/STS-112 CONTAINER AIR SAMPLES

CHEMICAL CONTAMINANT	CONCENTRATION (mg/m3)								
	AA03463 SN1038 Lab 6/20/2002 13:29GMT	AA03464 SN1039 FGB 6/20/2002 13:32GMT	AA03465 SN1033 Service Module 6/20/2002 13:34GMT	AA03466 SN1020 Lab 7/17/2002 07:47GMT	AA03467 SN1052 FGB 7/17/2002 07:49GMT	AA03468 SN1056 Service Module 7/17/2002 07:50GMT	AA03470 SN1074 Lab 9/10/2002 09:03GMT	AA03460 SN1005 Preflight 10/2/2002 10:31EDT	AA03462 SN1018 Middeck 10/2/2002 09:08GMT
TARGET COMPOUNDS (TO-14/POLAR)***									
FREON 12	0.27	0.28	0.30	0.07	0.07	0.08	TRACE	<0.05	TRACE
CHLOROMETHANE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	TRACE
FREON 114	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
METHANOL	0.52	0.55	0.54	0.59	0.71	0.59	0.46	TRACE	0.23
ACETALDEHYDE	0.24	0.30	0.30	0.26	0.17	0.29	0.20	TRACE	0.25
VINYL CHLORIDE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BROMOMETHANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ETHANOL	5.00	6.31	7.23	4.04	5.01	4.88	2.69	TRACE	5.11
CHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ACETONITRILE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE
PROPENAL	<0.02	TRACE_	TRACE_	TRACE_	TRACE_	TRACE_	TRACE_	<0.02	<0.02
ACETONE	0.23	0.26	0.26	0.28	0.25	0.34	0.21	TRACE	0.21
PROPANAL	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE
2-PROPANOL	0.24	0.21	0.19	0.20	0.11	0.15	0.18	TRACE	0.16
FREON 11	<0.05	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
FURAN	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ACRYLONITRILE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
PENTANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-METHYL-2-PROPANOL	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	TRACE
METHYL ACETATE	<0.05	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05	<0.05
1,1-DICHLOROETHENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DICHLOROMETHANE	0.17	0.15	0.16	0.25	0.24	0.24	0.18	<0.05	0.30
3-CHLOROPROPENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
FREON 113	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-PROPANOL	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	TRACE
1,1-DICHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BUTANAL	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE
2-BUTANONE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE
1,2-DICHLOROETHENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-METHYLFURAN	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ETHYL ACETATE	TRACE	TRACE	TRACE	0.06	0.08	0.08	TRACE	<0.05	<0.05
HEXANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CHLOROFORM	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-BUTENAL	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05	TRACE	<0.05	<0.05
1,2-DICHLOROETHANE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
1,1,1-TRICHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-BUTANOL	0.10	0.12	0.11	0.13	0.15	0.13	0.08	TRACE	TRACE
BENZENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CARBON TETRACHLORIDE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

CHEMICAL CONTAMINANT	CONCENTRATION (mg/m3)								
	AA03463 SN1038 Lab 6/20/2002 13:29GMT	AA03464 SN1039 FGB 6/20/2002 13:32GMT	AA03465 SN1033 Service Module 6/20/2002 13:34GMT	AA03466 SN1020 Lab 7/17/2002 07:47GMT	AA03467 SN1052 FGB 7/17/2002 07:49GMT	AA03468 SN1056 Service Module 7/17/2002 07:50GMT	AA03470 SN1074 Lab 9/10/2002 09:03GMT	AA03460 SN1005 Preflight 10/2/2002 10:31EDT	AA03462 SN1018 Middeck 10/2/2002 09:08GMT
2-PENTANONE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
PENTANAL	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE
1,2-DICHLOROPROPANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,4-DIOXANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TRICHLOROETHENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2,5-DIMETHYLFURAN	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4-METHYL-2-PENTANONE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
CIS-1,3-DICHLOROPROPENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-PENTENAL	<0.05	<0.05	TRACE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TRANS-1,3-DICHLOROPROPENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,1,2-TRICHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TOLUENE	TRACE	TRACE	TRACE	TRACE	0.06	0.05	TRACE	<0.05	TRACE
HEXANAL	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE
MESITYL OXIDE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,2-DIBROMOETHANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BUTYL ACETATE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
TETRACHLOROETHENE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05	<0.05
CHLOROBENZENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ETHYL BENZENE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
M- + P-XYLENES	TRACE	TRACE	TRACE	TRACE	0.05	0.05	TRACE	<0.05	<0.05
2-HEPTANONE	TRACE	<0.05	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
CYCLOHEXANONE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
HEPTANAL	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE
STYRENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,1,2,2-TETRACHLOROETHANE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
O-XYLENE	TRACE	TRACE	0.05	0.10	0.12	0.12	0.05	<0.05	<0.05
1,3,5-TRIMETHYLBENZENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,2,4-TRIMETHYLBENZENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,3-DICHLOROBENZENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,4-DICHLOROBENZENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,2-DICHLOROBENZENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,2,4-TRICHLOROBENZENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HEXACHLORO-1,3-BUTADIENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

TARGET COMPOUNDS (TOXIC)									
1,3-BUTADIENE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ETHYLENE OXIDE	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CARBON DISULFIDE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	TRACE
2-METHYL-2-PROPENAL	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
3-BUTEN-2-ONE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05
2-ETHOXYETHANOL	<0.05	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05	<0.05	<0.05
DIMETHYLDISULFIDE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	<0.05	<0.05	<0.05
OCTAMETHYLCYCLOTETRASILOXANE	0.66	0.84	1.20	0.75	TRACE	0.55	0.72	TRACE	0.27

CHEMICAL CONTAMINANT	CONCENTRATION (mg/m3)								
	AA03463 SN1038 Lab 6/20/2002 13:29GMT	AA03464 SN1039 FGB 6/20/2002 13:32GMT	AA03465 SN1033 Service Module 6/20/2002 13:34GMT	AA03466 SN1020 Lab 7/17/2002 07:47GMT	AA03467 SN1052 FGB 7/17/2002 07:49GMT	AA03468 SN1056 Service Module 7/17/2002 07:50GMT	AA03470 SN1074 Lab 9/10/2002 09:03GMT	AA03460 SN1005 Preflight 10/2/2002 10:31EDT	AA03462 SN1018 Middeck 10/2/2002 09:08GMT
NON-TARGET COMPOUNDS									
BROMOTRIFLUOROMETHANE	0.088	0.088	0.097	BL	BL	BL	BL	BL	0.435
2-METHYL-PROPANE	0.032	0.038	0.034	0.027	0.025	0.027	0.015	BL	0.005
TRIMETHYLSILANOL	0.158	0.103	0.090	0.195	0.118	0.103	0.157	0.002	0.009
1,3-DIOXOLANE	0.025	0.021	0.019	0.035	0.029	0.019	0.031	BL	0.011
2-METHYL PROPANENITRILE	0.003	0.005	0.005	0.005	0.006	0.005	0.004	BL	BL
CARBONIC ACID, DIMETHYL ESTER	0.009	0.010	0.011	0.031	0.027	0.026	0.006	BL	BL
HEXAMETHYLCYCLOTRISILOXANE	1.009	1.342	1.964	1.457	0.621	0.903	1.037	0.095	0.391
2-ETHYL-1-HEXANOL	0.112	0.041	0.057	0.144	0.088	0.088	0.098	BL	0.033
LIMONENE	0.103	0.145	0.164	0.204	0.370	0.376	0.090	BL	0.005
DECAMETHYLCYCLOPENTASILOXANE	0.575	0.456	0.552	0.668	0.503	0.475	0.363	0.007	0.414
TOTAL ALCOHOLS PLUS ACETONE	**6.1**	**7.5**	**8.4**	**5.3**	**6.2**	**6.1**	**3.6**	**0.1**	**5.8**
TARGET COMPOUNDS (GC)* **									
CARBON MONOXIDE	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	3.0
METHANE	26	29	29	36	39	39	18	1.3	20
HYDROGEN	1.5	1.9	1.8	1.9	2.6	1.9	<0.7	<0.7	8.2
CARBON DIOXIDE	9300	8600	8800	11000	10000	9700	11000	910	7000
TOTAL CONCENTRATION (NON-METHANE HYDROCARBONS)	**10.2**	**12.1**	**14.1**	**10.2**	**9.5**	**10.2**	**7.3**	**0.5**	**8.2**

< : Value is less than the laboratory report detection limit.

TRACE: Amount detected is sufficient for compound identification only. Calculations are based on one-half of the laboratory report detection limit (1.1 mg/m3 for CO; 0.2 mg/m3 for CH4; 1.6 mg/m3 for H2; 0.05 mg/m3 for VOCs; and 0.02 mg/m3 for propenal.)

BL: Area below the search routine limit (<20% of the fluorobenzene peak area).

***Measurements are calibrated by multi-point initial calibration and verified by mid-point continuing calibration.

NOTE: High levels (above 1.5ppm) of Methanol, Ethanol, Acetone, Isopropanol and 2-Butanone are routinely reported based on calibrated GC-FID measurements.

TABLE 2
ANALYTICAL RESULTS OF
ISS 9A/STS-112 CONTAINER AIR SAMPLES

CHEMICAL CONTAMINANT	T-VALUE (180-d SMAC)							T-VALUE (7-d SMAC)	
	AA03463 SN1038 Lab 6/20/2002 13:29GMT	AA03464 SN1039 FGB 6/20/2002 13:32GMT	AA03465 SN1033 Service Module 6/20/2002 13:34GMT	AA03466 SN1020 Lab 7/17/2002 07:47GMT	AA03467 SN1052 FGB 7/17/2002 07:49GMT	AA03468 SN1056 Service Module 7/17/2002 07:50GMT	AA03470 SN1074 Lab 9/10/2002 09:03GMT	AA03460 SN1005 Preflight 10/2/2002 10:31EDT	AA03462 SN1018 Middeck 10/2/2002 09:08GMT
TARGET COMPOUNDS (TO-14/POLAR)* **									
FREON 12	0.00057	0.00061	0.00064	0.00015	0.00015	0.00016	0.00005	ND	0.00005
CHLOROMETHANE	0.00061	0.00061	0.00061	0.00061	0.00061	0.00061	0.00061	ND	0.00061
FREON 114	ND	ND	ND	ND	ND	ND	ND	ND	ND
METHANOL	0.05750	0.06085	0.05968	0.06536	0.07875	0.06609	0.05080	0.00278	0.02533
ACETALDEHYDE	0.05937	0.07460	0.07450	0.06421	0.04294	0.07266	0.04999	0.00625	0.06313
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETHANOL	0.00250	0.00316	0.00361	0.00202	0.00250	0.00244	0.00135	0.00001	0.00256
CHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
ACETONITRILE	0.00373	0.00373	0.00373	0.00373	0.00373	0.00373	0.00373	0.00373	0.00373
PROPENAL	ND	0.33333	0.33333	0.33333	0.33333	0.33333	0.33333	ND	ND
ACETONE	0.00437	0.00504	0.00504	0.00534	0.00490	0.00645	0.00399	0.00048	0.00410
PROPANAL	0.00694	0.00694	0.00694	0.00694	0.00694	0.00694	0.00694	0.00175	0.00175
2-PROPANOL	0.00158	0.00138	0.00125	0.00132	0.00071	0.00098	0.00121	0.00017	0.00105
FREON 11	ND	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	ND	ND
FURAN	ND	ND	ND	ND	ND	ND	ND	ND	ND
ACRYLONITRILE	0.00893	0.00893	0.00893	0.00893	0.00893	0.00893	0.00893	ND	ND
PENTANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-METHYL-2-PROPANOL	0.00021	0.00021	0.00021	0.00021	0.00021	0.00021	0.00021	ND	0.00017
METHYL ACETATE	ND	0.00021	0.00021	0.00021	0.00021	0.00021	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
DICHLOROMETHANE	0.01710	0.01539	0.01601	0.02531	0.02363	0.02363	0.01844	ND	0.00609
3-CHLOROPROPENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
FREON 113	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-PROPANOL	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026	0.00026	ND	0.00026
1,1-DICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
BUTANAL	0.00568	0.00568	0.00568	0.00568	0.00568	0.00568	0.00568	0.00141	0.00141
2-BUTANONE	0.00083	0.00083	0.00083	0.00083	0.00083	0.00083	0.00083	0.00083	0.00083
1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-METHYLFURAN	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETHYL ACETATE	0.00014	0.00014	0.00014	0.00034	0.00043	0.00043	0.00014	ND	ND
HEXANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-BUTENAL	0.01471	0.01471	0.01471	0.01471	ND	ND	0.01471	ND	ND
1,2-DICHLOROETHANE	0.02500	0.02500	0.02500	0.02500	0.02500	0.02500	0.02500	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND

CHEMICAL CONTAMINANT	T-VALUE (180-d SMAC)							T-VALUE (7-d SMAC)	
	AA03463 SN1038 Lab 6/20/2002 13:29GMT	AA03464 SN1039 FGB 6/20/2002 13:32GMT	AA03465 SN1033 Service Module 6/20/2002 13:34GMT	AA03466 SN1020 Lab 7/17/2002 07:47GMT	AA03467 SN1052 FGB 7/17/2002 07:49GMT	AA03468 SN1056 Service Module 7/17/2002 07:50GMT	AA03470 SN1074 Lab 9/10/2002 09:03GMT	AA03460 SN1005 Preflight 10/2/2002 10:31EDT	AA03462 SN1018 Middeck 10/2/2002 09:08GMT
N-BUTANOL	0.00261	0.00308	0.00281	0.00328	0.00363	0.00326	0.00207	0.00031	0.00031
BENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-PENTANONE	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	ND	ND
PENTANAL	0.00472	0.00472	0.00472	0.00472	0.00472	0.00472	0.00472	0.00118	0.00118
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-DIOXANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,5-DIMETHYLFURAN	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-METHYL-2-PENTANONE	0.00018	0.00018	0.00018	0.00018	0.00018	0.00018	0.00018	ND	ND
CIS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-PENTENAL	ND	ND	0.01190	ND	ND	ND	ND	ND	ND
TRANS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOLUENE	0.00042	0.00042	0.00042	0.00042	0.00092	0.00086	0.00042	ND	0.00042
HEXANAL	0.00410	0.00410	0.00410	0.00410	0.00410	0.00410	0.00410	0.00102	0.00102
MESITYL OXIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DIBROMOETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
BUTYL ACETATE	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	ND	ND
TETRACHLOROETHENE	0.00074	0.00074	0.00074	0.00074	0.00074	0.00074	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETHYL BENZENE	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	ND	ND
M- + P-XYLENES	0.00011	0.00011	0.00011	0.00011	0.00025	0.00023	0.00011	ND	ND
2-HEPTANONE	0.00109	ND	0.00109	0.00109	0.00109	0.00109	0.00109	ND	ND
CYCLOHEXANONE	0.00042	0.00042	0.00042	0.00042	0.00042	0.00042	0.00042	ND	ND
HEPTANAL	0.00357	0.00357	0.00357	0.00357	0.00357	0.00357	0.00357	0.00089	0.00089
STYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND
O-XYLENE	0.00011	0.00011	0.00024	0.00046	0.00057	0.00052	0.00024	ND	ND
1,3,5-TRIMETHYLBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-TRIMETHYLBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-TRICHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
HEXACHLORO-1,3-BUTADIENE	ND	ND	ND	ND	ND	ND	ND	ND	ND

TARGET COMPOUNDS (TOXIC)									
1,3-BUTADIENE	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETHYLENE OXIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND
CARBON DISULFIDE	0.00156	0.00156	0.00156	0.00156	0.00156	0.00156	0.00156	ND	0.00156

CHEMICAL CONTAMINANT	T-VALUE (180-d SMAC)							T-VALUE (7-d SMAC)	
	AA03463 SN1038 Lab 6/20/2002 13:29GMT	AA03464 SN1039 FGB 6/20/2002 13:32GMT	AA03465 SN1033 Service Module 6/20/2002 13:34GMT	AA03466 SN1020 Lab 7/17/2002 07:47GMT	AA03467 SN1052 FGB 7/17/2002 07:49GMT	AA03468 SN1056 Service Module 7/17/2002 07:50GMT	AA03470 SN1074 Lab 9/10/2002 09:03GMT	AA03460 SN1005 Preflight 10/2/2002 10:31EDT	AA03462 SN1018 Middeck 10/2/2002 09:08GMT
2-METHYL-2-PROPENAL	0.01471	0.01471	0.01471	0.01471	0.01471	0.01471	0.01471	ND	ND
3-BUTEN-2-ONE	0.05814	0.05814	0.05814	0.05814	0.05814	0.05814	0.05814	ND	ND
2-ETHOXYETHANOL	ND	0.08333	0.08333	0.08333	0.08333	ND	ND	ND	ND
DIMETHYLDISULFIDE	0.12500	0.12500	0.12500	0.12500	0.12500	0.12500	ND	ND	ND
OCTAMETHYLCYCLOTETRASILOXANE	0.05528	0.06988	0.09970	0.06292	0.00208	0.04610	0.06034	0.00009	0.00096
NON-TARGET COMPOUNDS									
BROMOTRIFLUOROMETHANE	0.00001	0.00001	0.00001	BL	BL	BL	BL	BL	0.00004
2-METHYL-PROPANE	0.00013	0.00016	0.00014	0.00011	0.00011	0.00011	0.00006	BL	0.00002
TRIMETHYLSILANOL	0.00427	0.00278	0.00242	0.00526	0.00318	0.00279	0.00423	0.00006	0.00025
1,3-DIOXOLANE	0.00070	0.00058	0.00052	0.00098	0.00080	0.00054	0.00085	BL	0.00031
2-METHYL PROPANENITRILE	0.00047	0.00063	0.00066	0.00067	0.00082	0.00073	0.00050	BL	BL
CARBONIC ACID, DIMETHYL ESTER	0.00000	0.00000	0.00000	0.00001	0.00001	0.00001	0.00000	BL	BL
HEXAMETHYLCYCLOTRISILOXANE	0.11216	0.14911	0.21822	0.16190	0.06895	0.10033	0.11517	0.00105	0.00434
2-ETHYL-1-HEXANOL	0.00212	0.00077	0.00108	0.00271	0.00166	0.00165	0.00185	BL	0.00062
LIMONENE	0.00018	0.00026	0.00029	0.00036	0.00066	0.00067	0.00016	BL	0.00001
DECAMETHYLCYCLOPENTASILOXANE	0.03834	0.03040	0.03680	0.04456	0.03356	0.03168	0.02418	0.00004	0.00276
TARGET COMPOUNDS (GC)* **									
CARBON MONOXIDE	ND	ND	ND	ND	ND	ND	ND	ND	0.27273
METHANE	0.00684	0.00760	0.00760	0.00947	0.01026	0.01036	0.00483	0.00034	0.00526
HYDROGEN	0.00235	0.00558	0.00533	0.00559	0.00765	0.00558	ND	ND	0.02412
CARBON DIOXIDE	0.71538	0.66446	0.67830	0.84615	0.76923	0.74751	0.83057	0.07000	0.53846
TOTAL T-VALUE	**1.36671**	**1.79501**	**1.92645**	**2.00803**	**1.74268**	**1.72673**	**1.66129**	**0.09240**	**0.96634**

ND : Value is less than the laboratory report detection limit.
BL: Area below the search routine limit (< 20% of the fluorobenzene peak area).
Note: Number of decimal places in T-Values do not represent significant figures of measurements.
***Measurements are calibrated by multi-point initial calibration and verified by mid-point continuing calibration.