STS 130 Return Samples: Assessment of Air Quality aboard the Shuttle (STS-130) and International Space Station (20A)

Space Shuttle: The toxicological assessments of 3 grab sample canisters (GSCs) from the Shuttle are reported in Table 1. Analytical methods have not changed from earlier reports. The recoveries of the 3 surrogates (^{13}C-acetone, fluorobenzene, and chlorobenzene) from the 3 Shuttle GSCs averaged 96, 90, and 85 %, respectively. Based on the end-of-mission sample, the Shuttle atmosphere was acceptable for human respiration.

Table 1. Analytical Summary of Shuttle Samples

Sample Location	Date of Sample	NMVOCs [a] (mg/m^3)	Freon 218 (mg/m^3)	T Value[b] (units)	Alcohols (mg/m^3)	Formaldehyde ($\mu g/m^3$)
Preflight	2/07/10 @ 2045	0.3	0	0.00	0.3	--
Preflight	2/07/10 @ 2341	1.6	0	0.02	1.6	--
Mid-deck (end mission)	2/21/10	2.9	35	0.12	0.9	--
Guideline		*25*	*none*	*1.0*	*none*[c]	*<120*

[a] Non-methane volatile organic hydrocarbons, excluding Freon 218

[b] Based on 7-day SMACs and calculated excluding CO_2, formaldehyde, and siloxanes.

[C] There is no value here because water is not recovered from humidity condensate on Shuttle as it is on ISS.

International Space Station: The toxicological assessment of 10 GSCs from the ISS is shown in Table 2. The recoveries of the 3 surrogates (as listed above) from the ISS GSCs averaged 91, 83 and 74%, respectively. The low recovery of chlorobenzene was due to analytical interference from high levels of Freon 218. Results of one GSC sample (1/04/10) were not reported due to problems with surrogate recoveries. Formaldehyde-badges were not returned on this flight.

Table 2. Analytical Summary of ISS Results

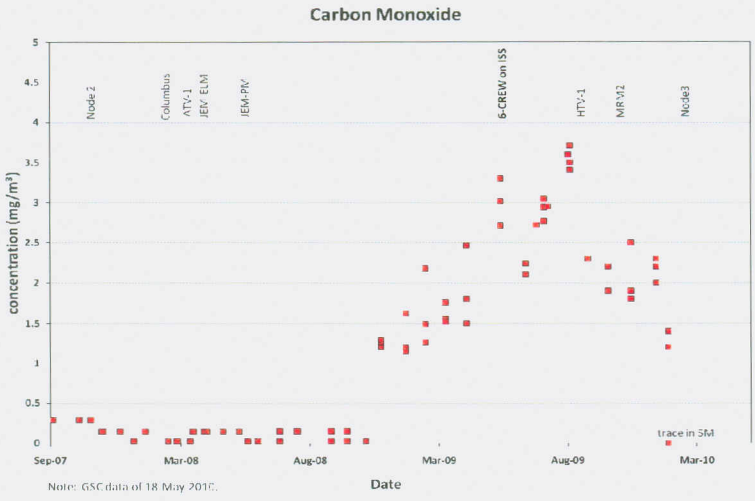
Module/Sample	Approx. Date	NMVOCs[a] (mg/m^3)	Freon 218 (mg/m^3)	T Value[b] (units)	Alcohols (mg/m^3)	Formaldehyde ($\mu g/m^3$)
MRM2 (first entry)	11/13/09	130	18	7.6	21	--
SM	11/29/09	6	110	1.0	4	--
Lab	11/29/09	6	110	2.0[c]	4	--
Columbus	11/29/09	7	110	1.0	5	--
Lab	1/04/10	12	110	2.3[c]	8	--
JEM	1/04/10	10	110	1.1	7	--
SM	1/21/10	12	59	1.8[c]	8	--
Lab	1/21/10	6	79	1.4[c]	5	--
Columbus	1/21/10	7	84	1.4[c]	5	--
Node 3 (first entry)	2/13/10	12	46	2.6	8	--
Guideline		*<25*	*none*	*<1.0*	*<5*	*<120*

[a] Non-methane volatile organic hydrocarbons, excluding Freon 218

[b] Based on 180-d SMACs and calculated excluding CO_2, formaldehyde, and siloxanes.

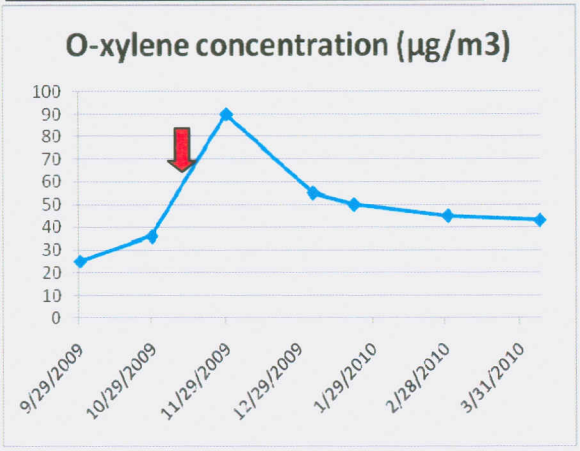
[c] Higher T value is due to traces of propenal, an irritant.

Carbon Monoxide Accumulation aboard ISS: Before August 2009 the nominal concentrations of CO had been increasing gradually (see figure to the left). The results from samples returned on this flight indicate that the CO concentrations have continued to drop since that time; however, they have not returned to pre-October 2008 levels (<0.5 mg/m^3). In any case, these changes are well below the 180-day SMAC for CO, which is 17 mg/m^3. There is no threat to crew health. The source of additional CO is unknown.



Quality: The figure to the left shows changes in average o-xylene concentrations before and after hatch opening (red arrow) to the MRM2. The first-entry sample of that module showed high levels of o-xylene (30 mg/m^3 on 11/13/2009), and the figure shows evidence that slightly elevated concentrations were evident 16 days later on 11/29/2009. The last two points are from preliminary data on samples returned on a later flight. The 180-day SMAC for o-xylene is 37 mg/m3.

General Observations about ISS Air



This is a limited set of samples on which to perform an air quality assessment. However, based on these samples and past experience with ISS air quality assessments, we have no reason to believe that nominal ISS air is unsafe to breathe. Past observations of sporadic elevations of propenal have recurred. We must continue to be vigilant when dealing with nominal atmospheres in ISS. Based on high pollution levels at first entry, unmanned modules require special attention when the crew first enters.

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Chief Toxicologist

Enclosures
Table 1A: Analytical concentrations of compounds found in the STS-130 GSCs
Table 1B: Analytical concentrations of compounds found in 20A GSCs
Table 2A: T-values of the compounds in table 1A
Table 2B: T-values of the compounds in table 1B

TABLE 1
ANALYTICAL RESULTS OF
STS-130 GRAB SAMPLE CONTAINER AIR SAMPLES

CHEMICAL CONTAMINANT	CONCENTRATION (mg/m3)		
	AA04853 MIDDDECK SN 1068 02/21/10 @ 21:49 GMT	AA04850 PREFLIGHT SN 1063 02/07/10 @20:45 EST	AA04851 PREFLIGHT SN 1045 02/07/10 @23:41 EST
TARGET COMPOUNDS (TO-14/POLAR)* **			
FREON12	<0.025	<0.025	<0.025
CHLOROMETHANE	0.037	<0.025	<0.025
FREON114	<0.025	<0.025	<0.025
METHANOL	0.15	0.22	1.6
ACETALDEHYDE	0.066	<0.025	TRACE
VINYLCHLORIDE	<0.025	<0.025	<0.025
BROMOMETHANE	<0.025	<0.025	<0.025
ETHANOL	0.51	0.051	TRACE
CHLOROETHANE	<0.025	<0.025	<0.025
ACETONITRILE	<0.025	<0.025	<0.025
PROPENAL	<0.025	<0.025	<0.025
ACETONE	0.19	0.036	0.033
PROPANAL	TRACE	TRACE	TRACE
ISOPROPANOL	0.027	TRACE	<0.025
FREON11	<0.025	<0.025	<0.025
FURAN	<0.025	<0.025	<0.025
ACRYLONITRILE	<0.025	<0.025	<0.025
PENTANE	TRACE	<0.025	<0.025
2-METHYL-2-PROPANOL	<0.025	<0.025	<0.025
METHYLACETATE	<0.025	<0.025	<0.025
1,1-DICHLOROETHENE	<0.025	<0.025	<0.025
DICHLOROMETHANE	TRACE	<0.025	<0.025
3-CHLOROPROPENE	<0.025	<0.025	<0.025
FREON113	<0.025	<0.025	<0.025
N-PROPANOL	<0.025	<0.025	<0.025
1,1-DICHLOROETHANE	<0.025	<0.025	<0.025
BUTANAL	<0.025	<0.025	<0.025
2-BUTANONE	<0.025	<0.025	<0.025
CIS-1,2-DICHLOROETHENE	<0.025	<0.025	<0.025
2-METHYLFURAN	<0.025	<0.025	<0.025
ETHYLACETATE	<0.025	<0.025	<0.025
HEXANE	<0.025	<0.025	<0.025
CHLOROFORM	<0.025	<0.025	<0.025
2-BUTENAL	<0.025	<0.025	<0.025
1,2-DICHLOROETHANE	<0.025	<0.025	<0.025
1,1,1-TRICHLOROETHANE	<0.025	<0.025	<0.025
N-BUTANOL	<0.025	<0.025	<0.025
BENZENE	<0.025	<0.025	<0.025
CARBONTETRACHLORIDE	<0.025	<0.025	<0.025
2-PENTANONE	<0.025	<0.025	<0.025
2-METHYLHEXANE	<0.025	<0.025	<0.025

2,3-DIMETHYLPENTANE	<0.025	<0.025	<0.025
PENTANAL	<0.025	<0.025	<0.025
3-METHYLHEXANE	<0.025	<0.025	<0.025
1,2-DICHLOROPROPANE	<0.025	<0.025	<0.025
1,4-DIOXANE	<0.025	<0.025	<0.025
TRICHLOROETHENE	<0.025	<0.025	<0.025
2,5-DIMETHYLFURAN	<0.025	<0.025	<0.025
N-HEPTANE	<0.025	<0.025	<0.025
4-METHYL2-PENTANONE	<0.025	<0.025	<0.025
CIS-1,3-DICHLOROPROPENE	<0.025	<0.025	<0.025
2-PENTENAL	<0.025	<0.025	<0.025
TRANS-1,3-DICHLOROPROPENE	<0.025	<0.025	<0.025
1,1,2-TRICHLOROETHANE	<0.025	<0.025	<0.025
TOLUENE	<0.025	<0.025	<0.025
HEXANAL	<0.025	<0.025	<0.025
MESITYLOXIDE	<0.025	<0.025	<0.025
1,2-DIBROMOETHANE	<0.025	<0.025	<0.025
BUTYLACETATE	<0.025	<0.025	<0.025
OCTANE	<0.025	<0.025	<0.025
TETRACHLOROETHENE	<0.025	<0.025	<0.025
CHLOROBENZENE	<0.025	<0.025	<0.025
ETHYLBENZENE	<0.025	<0.025	<0.025
M/P-XYLENES	<0.025	<0.025	<0.025
2-HEPTANONE	<0.025	<0.025	<0.025
CYCLOHEXANONE	<0.025	<0.025	<0.025
HEPTANAL	<0.025	<0.025	<0.025
STYRENE	<0.025	<0.025	<0.025
1,1,2,2-TETRACHLOROETHANE	<0.025	<0.025	<0.025
O-XYLENE	<0.025	<0.025	<0.025
NONANE	<0.025	<0.025	<0.025
1,3,5-TRIMETHYLBENZENE	<0.025	<0.025	<0.025
1,2,4-TRIMETHYLBENZENE	<0.025	<0.025	<0.025
1,3-DICHLOROBENZENE	<0.025	<0.025	<0.025
1,4-DICHLOROBENZENE	<0.025	<0.025	<0.025
1,2-DICHLOROBENZENE	<0.025	<0.025	<0.025
1,2,4-TRICHLOROBENZENE	<0.025	<0.025	<0.025
HEXACHLORO-1,3-BUTADIENE	<0.025	<0.025	<0.025

TARGET COMPOUNDS (TOXIC)			
1,3-BUTADIENE	<0.025	<0.025	<0.025
ETHYLENE OXIDE	<0.025	<0.025	<0.025
CARBON DISULFIDE	<0.025	<0.025	<0.025
2-METHYL-2-PROPENAL	<0.025	<0.025	<0.025
3-BUTEN-2-ONE	<0.025	<0.025	<0.025
2-ETHOXYETHANOL	<0.025	<0.025	<0.025
DIMETHYLDISULFIDE	<0.025	<0.025	<0.025
OCTAMETHYLCYCLOTETRASILOXANE	*	*	*

NON-TARGET COMPOUNDS			
OCTAFLUOROPROPANE**	35	<0.025	<0.025
SULFURHEXAFLUORIDE	0.10	<0.025	<0.025
BROMOTRIFLUOROMETHANE	1.8	<0.025	<0.025

C5-ALKANE	TRACE	TRACE	<0.025
HEXAMETHYLCYCLOTRISILOXANE	*	*	*
DECAMETHYLCYCLOPENTASILOXANE	*	*	*

TOTAL ALCOHOLS PLUS ACETONE	**0.88**	**0.32**	**1.6**

TARGET COMPOUNDS (GC)* **			
CARBON MONOXIDE	3.9	< 0.57	< 0.57
METHANE	18	< 1.6	< 1.6
HYDROGEN	9.6	< 0.41	< 0.41
CARBON DIOXIDE	4500	960	1400

TOTAL CONCENTRATION (NON-METHANE HYDROCARBONS)	**38**	**0.34**	**1.6**

TOTAL CONCENTRATION MINUS OFP (NON-METHANE HYDROCARBONS)	**2.9**	**0.34**	**1.6**

***Present, subject to large, random variability, therefore not quantifiable**

** Measurements are calibrated by one-point calibration

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

TRACE: Amount detected is sufficient for compound identification only.

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

TABLE 1
ANALYTICAL RESULTS OF
20A RETURN GRAB SAMPLE CONTAINER AIR SAMPLES

CHEMICAL CONTAMINANT	CONCENTRATION (mg/m3)										
	AA04858 S/N 1048 MRM2 11/13/09 @ 12:11 GMT	AA04859 S/N 1084 SM 11/29/09 @ 08:14 GMT	AA04860 S/N 1075 LAB 11/29/09 @ 08:20 GMT	AA04861 S/N 1050 COLUMBUS 11/29/09 @ 08:22 GMT	AA04862 S/N 1090 LAB 01/04/10 @ 07:18 GMT	AA04863 S/N 1087 JEM 01/04/10 @ 07:26 GMT	AA04864 & S/N 1089 SM 01/04/10 @ 07:30 GMT	AA04865 S/N 1032 SM 01/21/10 @ 06:05 GMT	AA04866 S/N 1046 LAB 01/21/10 @ 06:12 GMT	AA04867 S/N 1057 COLUMBUS 01/21/10 @ 06:20 GMT	AA04868 S/N 1082 NODE 3 02/13/10 @ 02:25 GMT
TARGET COMPOUNDS (TO-14/POLAR)+++											
FREON12	0.030	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
CHLOROMETHANE	TRACE	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
FREON114	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
METHANOL**	0.57	0.54	0.46	***1.7***	0.48	0.42	&	0.33	0.36	0.41	***0.77***
ACETALDEHYDE	0.37	0.32	0.081	0.094	0.70	0.47	&	0.26	0.033	0.070	0.21
VINYLCHLORIDE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
BROMOMETHANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
ETHANOL *	**14**	**3.0**	**2.8**	**2.8**	**7.0**	**5.8**	**6.3**	**7.0**	**4.4**	**4.4**	**1.6**
CHLOROETHANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
ACETONITRILE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
PROPENAL	0.032	TRACE	0.034	TRACE	0.034	TRACE	&	0.026	TRACE	TRACE	0.035
ACETONE***	**4.5**	0.33	0.23	0.23	0.66	0.39	&	0.17	0.15	0.18	0.69
PROPANAL	0.31	0.16	0.051	0.035	0.34	0.21	&	0.069	0.054	0.032	0.085
ISOPROPANOL*	0.92	0.12	0.13	0.15	0.16	0.15	&	0.44	0.10	0.12	**4.2**
FREON11	0.33	0.079	0.027	<0.025	<0.025	<0.025	&	TRACE	<0.025	<0.025	0.080
FURAN	TRACE	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
ACRYLONITRILE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	TRACE	<0.025
PENTANE	0.052	0.066	0.039	0.026	TRACE	TRACE	&	0.028	0.026	TRACE	0.042
2-METHYL-2-PROPANOL	0.028	<0.025	<0.025	<0.025	<0.025	<0.025	&	TRACE	<0.025	<0.025	TRACE
METHYLACETATE	<0.025	0.044	0.040	0.047	0.026	TRACE	&	<0.025	<0.025	<0.025	<0.025
1,1-DICHLOROETHENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
DICHLOROMETHANE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	&	TRACE	TRACE	TRACE	0.232
3-CHLOROPROPENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
FREON113	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
N-PROPANOL	TRACE	0.051	0.084	0.042	0.055	0.045	&	0.032	0.026	0.030	0.027
1,1-DICHLOROETHANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
BUTANAL	0.17	0.060	<0.025	<0.025	0.17	0.093	&	<0.025	<0.025	<0.025	0.026
2-BUTANONE	0.032	0.031	0.026	TRACE	0.12	0.057	&	<0.025	TRACE	<0.025	0.19
CIS-1,2-DICHLOROETHENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2-METHYLFURAN	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
ETHYLACETATE *	**9.8**	0.097	0.084	0.081	0.073	0.063	&	0.056	0.027	0.030	TRACE
HEXANE	0.19	<0.025	<0.025	<0.025	TRACE	<0.025	&	<0.025	<0.025	<0.025	<0.025
CHLOROFORM	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2-BUTENAL	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,2-DICHLOROETHANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	0.22
1,1,1-TRICHLOROETHANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
N-BUTANOL	1.4	0.10	0.098	0.096	0.14	0.12	&	0.096	0.095	0.10	0.55
BENZENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
CARBONTETRACHLORIDE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2-PENTANONE	<0.025	TRACE	<0.025	<0.025	0.065	0.029	&	<0.025	<0.025	<0.025	<0.025
2-METHYLHEXANE #	**11**	TRACE	TRACE	TRACE	TRACE	TRACE	&	TRACE	TRACE	TRACE	<0.025
2,3-DIMETHYLPENTANE #	**9.1**	TRACE	TRACE	TRACE	TRACE	TRACE	&	TRACE	TRACE	TRACE	<0.025
PENTANAL	<0.025	0.038	TRACE	<0.025	0.12	0.065	&	<0.025	<0.025	<0.025	TRACE
3-METHYLHEXANE #	**18**	0.041	0.035	0.034	0.032	0.029	&	0.028	TRACE	TRACE	<0.025
1,2-DICHLOROPROPANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,4-DIOXANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
TRICHLOROETHENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2,5-DIMETHYLFURAN	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
N-HEPTANE*	**6.3**	TRACE	TRACE	TRACE	TRACE	<0.025	&	TRACE	<0.025	<0.025	<0.025
4-METHYL2-PENTANONE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
CIS-1,3-DICHLOROPROPENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2-PENTENAL	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
TRANS-1,3-DICHLOROPROPENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,1,2-TRICHLOROETHANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
TOLUENE	1.0	TRACE	TRACE	TRACE	TRACE	TRACE	&	TRACE	TRACE	TRACE	0.083
HEXANAL	0.038	0.027	<0.025	<0.025	0.085	0.048	&	<0.025	<0.025	<0.025	TRACE
MESITYLOXIDE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,2-DIBROMOETHANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
BUTYLACETATE	0.77	TRACE	<0.025	<0.025	TRACE	TRACE	&	TRACE	TRACE	TRACE	0.033
OCTANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
TETRACHLOROETHENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
CHLOROBENZENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
ETHYLBENZENE	0.048	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
M/P-XYLENES	0.18	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	0.026
2-HEPTANONE	<0.025	<0.025	<0.025	<0.025	0.045	TRACE	&	<0.025	<0.025	<0.025	TRACE
CYCLOHEXANONE	0.12	0.067	0.074	0.089	0.12	0.12	&	0.057	0.080	0.099	0.031
HEPTANAL	<0.025	0.029	<0.025	<0.025	0.099	0.059	&	<0.025	<0.025	<0.025	<0.025
STYRENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,1,2,2-TETRACHLOROETHANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
O-XYLENE *	**30**	0.11	0.079	0.079	0.067	0.059	&	0.044	0.050	0.058	TRACE
NONANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,3,5-TRIMETHYLBENZENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,2,4-TRIMETHYLBENZENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,3-DICHLOROBENZENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,4-DICHLOROBENZENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,2-DICHLOROBENZENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,2,4-TRICHLOROBENZENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
HEXACHLORO-1,3-BUTADIENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025

TARGET COMPOUNDS (TOXIC) ++++											
1,3-BUTADIENE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
ETHYLENE OXIDE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
CARBON DISULFIDE	TRACE	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	0.05
2-METHYL-2-PROPENAL	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	TRACE	<0.025	<0.025	TRACE
3-BUTEN-2-ONE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2-ETHOXYETHANOL	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
DIMETHYLDISULFIDE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
OCTAMETHYLCYCLOTETRASILOXANE	##	##	##	##	##	##	&	##	##	##	##

NON-TARGET COMPOUNDS ++++											
OCTAFLUOROPROPANE++	18	110	110	110	110	110	&	59	79	84	46
SULFURHEXAFLUORIDE	0.059	0.16	0.17	0.17	0.17	0.18	&	TRACE	0.18	0.14	0.068
1,1,1,2-TERTRAFLUOROETHANE	0.078	0.20	0.22	0.18	0.18	0.17	&	0.18	0.15	0.16	0.13
CHLORODIFLUOROMETHANE	0.12	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
PROPENE	0.22	TRACE	TRACE	TRACE	0.036	TRACE	&	TRACE	TRACE	TRACE	TRACE
CARBONYLSULFIDE	0.24	TRACE	TRACE	TRACE	TRACE	TRACE	&	TRACE	TRACE	TRACE	0.20
ISOBUTANE +	*TRACE*	*TRACE*	*TRACE*	*TRACE*	*<0.025*	*<0.025*	&	*0.73*	*TRACE*	*<0.025*	*<0.025*
C5-ALKANE	<0.025	0.087	0.064	0.062	0.087	0.056	&	0.050	0.053	0.055	0.071
1,1-DICHLORO-1-FLUOROETHANE	0.60	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
ISOPRENE	0.031	0.11	0.10	0.10	0.15	0.16	&	0.096	0.11	0.13	0.046
TRIMETHYLSILANOL	0.58	0.26	0.30	0.34	0.33	0.38	&	1.2	0.25	0.34	1.7
3-METHYLPENTANE	0.10	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2-METHYL-1-PROPANOL	4.3	TRACE	TRACE	TRACE	TRACE	TRACE	&	TRACE	TRACE	TRACE	TRACE
C7-ALKANE	0.70	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2,4-DIMETHYLPENTANE	0.86	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
METHYLCYCLOPENTANE	0.29	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
2,2,3-TRIMETHYLBUTANE	0.27	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
3,3-DIMETHYLPENTANE	1.8	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
CYCLOHEXANE	0.48	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
C2-SUBSTITUTEDCYCLOPENTANE	0.73	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
C7-ALKANE	2.6	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
C2-SUBSTITUTEDCYCLOPENTANE	0.40	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
C2-SUBSTITUTEDCYCLOPENTANE	0.48	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
1,2-DIMETHYLCYCLOPENTANE	1.2	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
C2-SUBSTITUTEDCYCLOPENTANE	0.45	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
METHYLCYCLOHEXANE	0.97	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
ETHYLCYCLOPENTANE	0.25	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
HEXAMETHYLCYCLOTRISILOXANE	##	##	##	##	##	##	&	##	##	##	##
C8-KETONE	<0.025	<0.025	<0.025	<0.025	0.12	0.056	&	<0.025	<0.025	<0.025	<0.025
PINENE	0.39	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	0.028
2-ETHYL-1-HEXANOL	0.054	0.029	0.089	0.10	0.12	0.11	&	0.057	0.096	0.10	0.10
3-CARENE	0.065	<0.025	<0.025	<0.025	<0.025	<0.025	&	<0.025	<0.025	<0.025	<0.025
LIMONENE	0.035	0.068	0.069	0.077	0.031	0.032	&	TRACE	0.025	0.029	0.046
C9-KETONE	<0.025	<0.025	<0.025	<0.025	0.057	TRACE	&	<0.025	<0.025	<0.025	<0.025
C12-ALKANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	0.17	<0.025	<0.025	<0.025
C12-ALKANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	0.16	<0.025	<0.025	<0.025
C12-ALKANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	0.026	<0.025	<0.025	<0.025
C12-ALKANE	<0.025	<0.025	<0.025	<0.025	TRACE	<0.025	&	0.13	<0.025	<0.025	<0.025
C12-ALKANE	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	&	0.14	<0.025	<0.025	<0.025
DECAMETHYLCYCLOPENTASILOXANE	##	##	##	##	##	##	&	##	##	##	##

TOTAL ALCOHOLS PLUS ACETONE	**21**	**4.2**	**3.8**	**5.0**	**8.4**	**7.0**	**6.3**	**8.0**	**5.1**	**5.2**	**7.8**

TARGET COMPOUNDS (GC)+++											
CARBON MONOXIDE	2.5	2.5	1.9	1.8	2.3	2.2	2.0	TRACE	1.2	1.4	1.4
METHANE	TRACE	12	13	12	TRACE	TRACE	TRACE	8.8	11	11	TRACE
HYDROGEN	7.3	3.3	3.5	3.5	2.7	2.8	2.7	2.4	3.1	3.1	1.6
CARBON DIOXIDE	2600	5200	5300	5400	5100	6000	5300	5400	5300	5800	3600

TOTAL CONCENTRATION (NON-METHANE HYDROCARBONS)	**150**	**120**	**120**	**120**	**120**	**120**	**6.3**	**71**	**85**	**91**	**58**

TOTAL CONCENTRATION - OFP (NON-METHANE HYDROCARBONS)	**130**	**6.4**	**5.5**	**6.7**	**12**	**9.6**	**6.3**	**12**	**6.4**	**6.6**	**12**

& SAMPLE LEAKED DURING GC/MS ANALYSIS

*** FROM GC/FID RESULTS**

*****FROM GC RESULTS; MeOH Conc.=GC MeOH Conc.-(2* GC/MS ACETALDEHYDE Conc.)***

******FROM GC RESULTS; Acetone Conc.=GC Acetone Conc.- GC/MS Acetone C-13 Conc.)***

 # FROM GC/FID ANALYSIS, QUANTIFIED USING n-HEPTANE CALIBRATION

Present, subject to large, random variability, therefore not quantifiable

+ CORRECTED FOR ACETALDEHYDE

++ Measurements are calibrated by single-point calibration.

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

++++ Book B-values are used for quantitation. B-values are referenced in the book "Compilation of Mass Spectral Data" by A.

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

TRACE: Amount detected is sufficient for compound identification only.

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

Note: Number of decimal places in T-Values do not represent significant figures of measurements.

TABLE 2
ANALYTICAL RESULTS OF
STS-130 GRAB SAMPLE CONTAINER AIR SAMPLES

CHEMICAL CONTAMINANT	T-VALUE (7-d SMAC)		
	AA04853 MIDDDECK SN 1068 02/21/10 @ 21:49 GMT	AA04850 PREFLIGHT SN 1063 02/07/10 @20:45 EST	AA04851 PREFLIGHT SN 1045 02/07/10 @23:41 EST
TARGET COMPOUNDS (TO-14/POLAR)			
FREON12	ND	ND	ND
CHLOROMETHANE	0.00090	ND	ND
FREON114	ND	ND	ND
METHANOL	0.00170	0.00240	0.01733
ACETALDEHYDE	0.01660	ND	0.00313
VINYLCHLORIDE	ND	ND	ND
BROMOMETHANE	ND	ND	ND
ETHANOL	0.00026	0.00003	0.00001
CHLOROETHANE	ND	ND	ND
ACETONITRILE	ND	ND	ND
PROPENAL	ND	ND	ND
ACETONE	0.00360	0.00070	0.00064
PROPANAL	0.00114	0.00114	0.00114
ISOPROPANOL	0.00018	0.00008	ND
FREON11	ND	ND	ND
FURAN	ND	ND	ND
ACRYLONITRILE	ND	ND	ND
PENTANE	0.00007	ND	ND
2-METHYL-2-PROPANOL	ND	ND	ND
METHYLACETATE	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND
DICHLOROMETHANE	0.00026	ND	ND
3-CHLOROPROPENE	ND	ND	ND
FREON113	ND	ND	ND
N-PROPANOL	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND
BUTANAL	ND	ND	ND
2-BUTANONE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND
2-METHYLFURAN	ND	ND	ND
ETHYLACETATE	ND	ND	ND
HEXANE	ND	ND	ND
CHLOROFORM	ND	ND	ND
2-BUTENAL	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND
N-BUTANOL	ND	ND	ND
BENZENE	ND	ND	ND
CARBONTETRACHLORIDE	ND	ND	ND
2-PENTANONE	ND	ND	ND
2-METHYLHEXANE	ND	ND	ND
2,3-DIMETHYLPENTANE	ND	ND	ND
PENTANAL	ND	ND	ND
3-METHYLHEXANE	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
1,4-DIOXANE	ND	ND	ND

TRICHLOROETHENE	ND	ND	ND
2,5-DIMETHYLFURAN	ND	ND	ND
N-HEPTANE	ND	ND	ND
4-METHYL2-PENTANONE	ND	ND	ND
CIS-1,3-DICHLOROPROPENE	ND	ND	ND
2-PENTENAL	ND	ND	ND
TRANS-1,3-DICHLOROPROPENE	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND
TOLUENE	ND	ND	ND
HEXANAL	ND	ND	ND
MESITYLOXIDE	ND	ND	ND
1,2-DIBROMOETHANE	ND	ND	ND
BUTYLACETATE	ND	ND	ND
OCTANE	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
ETHYLBENZENE	ND	ND	ND
M/P-XYLENES	ND	ND	ND
2-HEPTANONE	ND	ND	ND
CYCLOHEXANONE	ND	ND	ND
HEPTANAL	ND	ND	ND
STYRENE	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
O-XYLENE	ND	ND	ND
NONANE	ND	ND	ND
1,3,5-TRIMETHYLBENZENE	ND	ND	ND
1,2,4-TRIMETHYLBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,2,4-TRICHLOROBENZENE	ND	ND	ND
HEXACHLORO-1,3-BUTADIENE	ND	ND	ND

TARGET COMPOUNDS (TOXIC)			
1,3-BUTADIENE	ND	ND	ND
ETHYLENE OXIDE	ND	ND	ND
CARBON DISULFIDE	ND	ND	ND
2-METHYL-2-PROPENAL	ND	ND	ND
3-BUTEN-2-ONE	ND	ND	ND
2-ETHOXYETHANOL	ND	ND	ND
DIMETHYLDISULFIDE	ND	ND	ND
OCTAMETHYLCYCLOTETRASILOXANE	*	*	*

NON-TARGET COMPOUNDS			
OCTAFLUOROPROPANE**	0.00041	ND	ND
SULFURHEXAFLUORIDE	0.00009	ND	ND
BROMOTRIFLUOROMETHANE	0.00016	ND	ND
C5-ALKANE	0.00007	0.00007	ND
HEXAMETHYLCYCLOTRISILOXANE	*	*	*
DECAMETHYLCYCLOPENTASILOXANE	*	*	*

TARGET COMPOUNDS (GC)			
CARBON MONOXIDE	0.06142	0.00000	0.00000
METHANE	0.00513	0.00000	0.00000
HYDROGEN	0.02817	0.00000	0.00000
CARBON DIOXIDE	0.34759	0.07415	0.10514

TOTAL T-VALUE	**0.46774**	**0.07857**	**0.12737**

***Present, but not included in total T-Value**

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

Note: Number of decimal places in T-Values do not represent significant figures of measurements.

TABLE 2
ANALYTICAL RESULTS OF
20A RETURN GRAB SAMPLE CONTAINER AIR SAMPLES

CHEMICAL CONTAMINANT	T-VALUE (180-d SMAC)										
	AA04858 S/N 1048 MRM2 11/13/09 @ 12:11 GMT	**AA04859 S/N 1084 SM 11/29/09 @ 08:14 GMT**	**AA04860 S/N 1075 LAB 11/29/09 @ 08:20 GMT**	**AA04861 S/N 1050 COLUMBUS 11/29/09 @ 08:22 GMT**	**AA04862 S/N 1090 LAB 01/04/10 @ 07:18 GMT**	**AA04863 S/N 1087 JEM 01/04/10 @ 07:26 GMT**	**AA04864 & S/N 1089 SM 01/04/10 @ 07:30 GMT**	**AA04865 S/N 1032 SM 01/21/10 @ 06:05 GMT**	**AA04866 S/N 1046 LAB 01/21/10 @ 06:12 GMT**	**AA04867 S/N 1057 COLUMBUS 01/21/10 @ 06:20 GMT**	**AA04868 S/N 1082 NODE 3 02/13/10 @ 02:25 GMT**
TARGET COMPOUNDS (TO-14/POLAR)											
FREON12	0.00006	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
CHLOROMETHANE	0.00030	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
FREON114	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
METHANOL **	0.00631	0.00602	0.00514	***0.01885***	0.00531	0.00470	&	0.00365	0.00395	0.00454	***0.00857***
ACETALDEHYDE	0.09220	0.08117	0.02037	0.02360	0.17596	0.11696	&	0.06485	0.00836	0.01750	0.05201
VINYLCHLORIDE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
ETHANOL *	**0.00691**	**0.00152**	**0.00138**	**0.00140**	**0.00348**	**0.00292**	**0.00316**	**0.00348**	**0.00219**	**0.00219**	**0.00079**
CHLOROETHANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
ACETONITRILE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
PROPENAL	1.58623	0.62500	1.68365	0.62500	1.70314	0.62500	&	1.32033	1.14956	1.07048	1.75701
ACETONE ***	**0.08618**	0.00631	0.00439	0.00446	0.01260	0.00747	&	0.00322	0.00281	0.00343	0.01332
PROPANAL	0.02818	0.01427	0.00467	0.00320	0.03119	0.01889	&	0.00629	0.00487	0.00292	0.00768
ISOPROPANOL *	0.00615	0.00077	0.00086	0.00097	0.00108	0.00103	&	0.00296	0.00066	0.00078	**0.02769**
FREON11	0.00042	0.00010	0.00003	ND	ND	ND	&	0.00002	ND	ND	0.00010
FURAN	0.17857	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
ACRYLONITRILE	ND	ND	ND	ND	ND	ND	&	ND	ND	0.00446	ND
PENTANE	0.00581	0.00736	0.00438	0.00287	0.00139	0.00139	&	0.00314	0.00294	0.00139	0.00467
2-METHYL-2-PROPANOL	0.00023	ND	ND	ND	ND	ND	&	0.00010	ND	ND	0.00010
METHYLACETATE	ND	0.00037	0.00033	0.00040	0.00021	0.00010	&	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
DICHLOROMETHANE	0.00125	0.00125	0.00125	0.00125	0.00125	0.00125	&	0.00125	0.00125	0.00125	0.02321
3-CHLOROPROPENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
FREON113	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
N-PROPANOL	0.00013	0.00052	0.00086	0.00043	0.00056	0.00046	&	0.00033	0.00026	0.00031	0.00028
1,1-DICHLOROETHANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
BUTANAL	0.01293	0.00460	ND	ND	0.01344	0.00712	&	ND	ND	ND	0.00198
2-BUTANONE	0.00106	0.00104	0.00086	0.00042	0.00399	0.00191	&	ND	0.00042	ND	0.00643
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2-METHYLFURAN	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
ETHYLACETATE *	**0.05442**	0.00054	0.00047	0.00045	0.00041	0.00035	&	0.00031	0.00015	0.00017	0.00007
HEXANE	0.01698	ND	ND	ND	0.00114	ND	&	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2-BUTENAL	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	0.13907
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
N-BUTANOL	0.03388	0.00251	0.00245	0.00240	0.00348	0.00298	&	0.00240	0.00236	0.00255	0.01365
BENZENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
CARBONTETRACHLORIDE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2-PENTANONE	ND	0.00018	ND	ND	0.00093	0.00042	&	ND	ND	ND	ND
2-METHYLHEXANE #	**0.89112**	0.00104	0.00104	0.00104	0.00104	0.00104	&	0.00104	0.00104	0.00104	ND
2,3-DIMETHYLPENTANE #	**0.75455**	0.00104	0.00104	0.00104	0.00104	0.00104	&	0.00104	0.00104	0.00104	ND
PENTANAL	ND	0.00238	0.00078	ND	0.00755	0.00408	&	ND	ND	ND	0.00078
3-METHYLHEXANE #	**1.48759**	0.00340	0.00290	0.00284	0.00269	0.00239	&	0.00231	0.00104	0.00104	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,4-DIOXANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2,5-DIMETHYLFURAN	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
N-HEPTANE *	**0.52750**	0.00104	0.00104	0.00104	0.00104	ND	&	0.00104	ND	ND	ND
4-METHYL2-PENTANONE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
CIS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2-PENTENAL	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
TRANS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
TOLUENE	0.06939	0.00083	0.00083	0.00083	0.00083	0.00083	&	0.00083	0.00083	0.00083	0.00551
HEXANAL	0.00209	0.00152	ND	ND	0.00473	0.00265	&	ND	ND	ND	0.00069
MESITYLOXIDE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,2-DIBROMOETHANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
BUTYLACETATE	0.00405	0.00007	ND	ND	0.00007	0.00007	&	0.00007	0.00007	0.00007	0.00017
OCTANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
ETHYLBENZENE	0.00096	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
M/P-XYLENES	0.00477	ND	ND	ND	ND	ND	&	ND	ND	ND	0.00071
2-HEPTANONE	ND	ND	ND	ND	0.00196	0.00054	&	ND	ND	ND	0.00054
CYCLOHEXANONE	0.00192	0.00112	0.00123	0.00149	0.00200	0.00192	&	0.00095	0.00134	0.00166	0.00052
HEPTANAL	ND	0.00138	ND	ND	0.00473	0.00282	&	ND	ND	ND	ND
STYRENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
O-XYLENE *	**0.81110**	0.00286	0.00214	0.00214	0.00181	0.00158	&	0.00119	0.00134	0.00156	0.00034
NONANE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,3,5-TRIMETHYLBENZENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,2,4-TRIMETHYLBENZENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,2,4-TRICHLOROBENZENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
HEXACHLORO-1,3-BUTADIENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
TARGET COMPOUNDS (TOXIC)											
1,3-BUTADIENE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
ETHYLENE OXIDE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
CARBON DISULFIDE	0.00078	ND	ND	ND	ND	ND	&	ND	ND	ND	0.00332
2-METHYL-2-PROPENAL	ND	ND	ND	ND	ND	ND	&	0.00735	ND	ND	0.00735
3-BUTEN-2-ONE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2-ETHOXYETHANOL	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
DIMETHYLDISULFIDE	ND	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
OCTAMETHYLCYCLOTETRASILOXANE	##	##	##	##	##	##	&	##	##	##	##

NON-TARGET COMPOUNDS											
OCTAFLUOROPROPANE++	0.00022	0.00129	0.00132	0.00124	0.00129	0.00125	&	0.00069	0.00093	0.00099	0.00055
SULFURHEXAFLUORIDE	0.00005	0.00014	0.00014	0.00014	0.00014	0.00015	&	0.00001	0.00015	0.00011	0.00006
1,1,1,2-TERTRAFLUOROETHANE	0.00075	0.00196	0.00211	0.00174	0.00173	0.00163	&	0.00172	0.00140	0.00153	0.00128
CHLORODIFLUOROMETHANE	0.00003	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
PROPENE	0.00025	0.00001	0.00001	0.00001	0.00004	0.00001	&	0.00001	0.00001	0.00001	0.00001
CARBONYLSULFIDE	0.01962	0.00104	0.00104	0.00104	0.00104	0.00104	&	0.00104	0.00104	0.00104	0.01629
ISOBUTANE +	*0.00005*	*0.00005*	*0.00005*	*0.00005*	*ND*	*ND*	&	*0.00305*	*0.00005*	*ND*	*ND*
C5-ALKANE	ND	0.00965	0.00708	0.00692	0.00970	0.00625	&	0.00558	0.00585	0.00606	0.00789
1,1-DICHLORO-1-FLUOROETHANE	0.00401	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
ISOPRENE	0.01030	0.03607	0.03458	0.03476	0.05050	0.05328	&	0.03202	0.03689	0.04478	0.01534
TRIMETHYLSILANOL	0.14592	0.06398	0.07387	0.08593	0.08347	0.09413	&	0.29861	0.06278	0.08501	0.41864
3-METHYLPENTANE	0.00006	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2-METHYL-1-PROPANOL	0.03529	0.00010	0.00010	0.00010	0.00010	0.00010	&	0.00010	0.00010	0.00010	0.00010
C7-ALKANE	0.05867	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2,4-DIMETHYLPENTANE	0.02780	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
METHYLCYCLOPENTANE	0.00567	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
2,2,3-TRIMETHYLBUTANE	0.00137	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
3,3-DIMETHYLPENTANE	0.05853	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
CYCLOHEXANE	0.00230	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
C2-SUBSTITUTEDCYCLOPENTANE	0.02423	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
C7-ALKANE	0.21960	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
C2-SUBSTITUTEDCYCLOPENTANE	0.01327	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
C2-SUBSTITUTEDCYCLOPENTANE	0.01598	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
1,2-DIMETHYLCYCLOPENTANE	0.03029	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
C2-SUBSTITUTEDCYCLOPENTANE	0.01515	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
METHYLCYCLOHEXANE	0.01609	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
ETHYLCYCLOPENTANE	0.00624	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
HEXAMETHYLCYCLOTRISILOXANE	##	##	##	##	##	##	&	##	##	##	##
C8-KETONE	ND	ND	ND	ND	0.00468	0.00216	&	ND	ND	ND	ND
PINENE	0.00281	ND	ND	ND	ND	ND	&	ND	ND	ND	0.00020
2-ETHYL-1-HEXANOL	0.00102	0.00054	0.00169	0.00192	0.00223	0.00216	&	0.00107	0.00180	0.00197	0.00192
3-CARENE	0.06511	ND	ND	ND	ND	ND	&	ND	ND	ND	ND
LIMONENE	0.00030	0.00059	0.00060	0.00067	0.00027	0.00028	&	0.00011	0.00022	0.00026	0.00040
C9-KETONE	ND	ND	ND	ND	0.00196	0.00043	&	ND	ND	ND	ND
C12-ALKANE	ND	ND	ND	ND	ND	ND	&	0.00329	ND	ND	ND
C12-ALKANE	ND	ND	ND	ND	ND	ND	&	0.00312	ND	ND	ND
C12-ALKANE	ND	ND	ND	ND	ND	ND	&	0.00050	ND	ND	ND
C12-ALKANE	ND	ND	ND	ND	0.00024	ND	&	0.00250	ND	ND	ND
C12-ALKANE	ND	ND	ND	ND	ND	ND	&	0.00268	ND	ND	ND
DECAMETHYLCYCLOPENTASILOXANE	##	##	##	##	##	##	&	##	##	##	##

TARGET COMPOUNDS (GC)											
CARBON MONOXIDE	0.14615	0.14419	0.11214	0.10594	0.13676	0.12909	0.11951	0.01684	0.06839	0.08218	0.08342
METHANE	0.00023	0.00342	0.00358	0.00345	0.00023	0.00023	0.00023	0.00251	0.00308	0.00311	0.00023
HYDROGEN	0.02133	0.00981	0.01030	0.01018	0.00790	0.00825	0.00785	0.00701	0.00902	0.00912	0.00475
CARBON DIOXIDE	0.20147	0.40124	0.40413	0.41895	0.39321	0.46471	0.40750	0.41648	0.40527	0.44980	0.28012

TOTAL T-VALUE	**7.82421**	**1.44430**	**2.39486**	**1.36917**	**2.68453**	**1.57709**	**0.53825**	**2.22712**	**1.78350**	**1.80528**	**2.90778**

TOTAL T-VALUE - OFP	**7.82399**	**1.44301**	**2.39354**	**1.36793**	**2.68324**	**1.57584**	**0.53825**	**2.22643**	**1.78257**	**1.80428**	**2.90723**

& SAMPLE LEAKED DURING GC/MS ANALYSIS

*** FROM GC/FID RESULTS**

****FROM GC RESULTS; MeOH Conc.=GC MeOH Conc.-(2* GC/MS ACETALDEHYDE Conc.)***

******FROM GC RESULTS; Acetone Conc.=GC Acetone Conc.- GC/MS Acetone C-13 Conc.)***

 # FROM GC/FID ANALYSIS, QUANTIFIED USING n-HEPTANE CALIBRATION

Present, subject to large, random variability, therefore not quantifiable

+ CORRECTED FOR ACETALDEHYDE

++ Measurements are calibrated by single-point calibration.

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

++++ Book B-values are used for quantitation. B-values are referenced in the book "Compilation of Mass Spectral Data" by A.

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

TRACE: Amount detected is sufficient for compound identification only.

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

Note: Number of decimal places in T-Values do not represent significant figures of measurements.