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Tank 241-C-110 Vapor Sampling and Analysis Tank Characterization Report (WHC-SD-WM-ER-464)		ECN No.

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7. Abstract

Tank 241-C-110 headspace gas and vapor samples were collected and analyzed to help determine the potential risks to tank farm workers due to fugitive emissions from the tank. The drivers and objectives of waste tank headspace sampling and analysis are discussed in "Program Plan for the Resolution of Tank Vapor Issues" (Osborne and Huckaby 1994). Tank 241-C-110 was vapor sampled in accordance with "Data Quality Objectives for Generic In-Tank Health and Safety Issue Resolution (Osborne et al., 1994).

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Tank 241-C-110 Vapor Sampling and Analysis Tank Characterization Report

X.0 INTRODUCTION

Tank C-110 headspace gas and vapor samples were collected and analyzed to help determine the potential risks to tank farm workers due to fugitive emissions from the tank. The drivers and objectives of waste tank headspace sampling and analysis are discussed in *Program Plan for the Resolution of Tank Vapor Issues* (Osborne and Huckaby 1994). Tank C-110 was vapor sampled in accordance with *Data Quality Objectives for Generic In-Tank Health and Safety Issue Resolution* (Osborne et al. 1994). Results presented here represent the best available data on the headspace constituents of tank C-110.

Tank C-110 is the first tank in a 3-tank cascade with tanks C-111 and C-112, and is connected to tank C-111 via a 7.4-cm (2.9-in.) inside diameter, 7.6-m (25-ft) long cascade line. Tanks C-111 and C-112 are connected by a similar cascade line. Since these cascade lines connect the headspaces of these tanks, gases and vapors originating from the wastes in tank C-111 or tank C-112 may be transferred to tank C-110 (unless the cascade lines are obstructed). However, headspace data, as discussed in Sections X.2.4 and X.3.4, indicate that the inter-tank exchange of gases and vapors has little effect on the headspace composition of tank C-110.

The cascade of tanks C-110, C-111, and C-112 is passively ventilated, which means that the tanks are allowed to exhale air, waste gases, and vapors as the barometric pressure falls, and inhale ambient air as the barometric pressure rises. Each of these tanks has its own filtered breather riser. Barometric pressure typically rises and falls on a diurnal cycle, producing an average daily exchange of air equal to about 0.46 % of each tank headspace (Huckaby 1994). Changes in the concentrations of tank headspace constituents due to barometric pressure changes are consequently very slow.

X.1 SAMPLING EVENT

Headspace gas and vapor samples were collected from tank C-110 using the vapor sampling system (VSS) on August 18, 1994 by WHC Sampling and Mobile Laboratories (WHC 1995). Sample collection and analysis were performed as directed by the sample and analysis plan (WHC 1995, Appendix A). The tank headspace temperature was determined to be 21.9 °C. Air from the tank C-110 headspace was withdrawn via a 7.3 m-long heated sampling probe mounted in riser 1, and transferred via heated tubing to the VSS sampling manifold. All heated zones of the VSS were maintained at approximately 50 °C. All samples were collected between 11:50 a.m. and 3:35 p.m.

Sampling media were prepared and analyzed by WHC, Oak Ridge National Laboratories (ORNL), Pacific Northwest Laboratories (PNL), and Oregon Graduate

Institute of Science and Technology (OGIST) through a contract with Sandia National Laboratories. The 39 tank air samples and 2 ambient air control samples collected are listed in Table X-1 by analytical laboratory. Table X-1 also lists the 14 trip blanks provided by the laboratories.

A general description of vapor sampling and sample analysis methods is given by Huckaby (1995a). The sampling equipment, sample collection sequence, sorbent trap sample air flow rates and flow times, chain of custody information, and a discussion of the sampling event itself are given in WHC 1995 and references therein.

X.2 INORGANIC GASES AND VAPORS

Analytical results of sorbent trap and SUMMA™,[1] canister tank air samples for selected inorganic gases and vapors are given in Table X-2 in parts per million by volume (ppmv) in dry air. Inorganic analyte sorbent traps were prepared and analyzed by PNL. SUMMA™ canisters were analyzed for inorganic analytes by OGIST and PNL. Because analyses by OGIST were generally more sensitive (i.e., OGIST instrumentation provided lower detection limits), the results reported by OGIST are more definitive than results reported by PNL. In Table X-2, PNL SUMMA™ sample results are placed in square brackets. Reports by PNL (Ligotke et al. 1995) and OGIST (Rasmussen 1994a) describe sample preparation and analyses.

X.2.1 Ammonia, Hydrogen, and Nitrous Oxide

The reported ammonia concentration, 124 ppmv, is about 5 times the National Institute of Occupational Safety and Health (NIOSH) 8-hr recommended exposure limit (REL) of 25 ppmv for ammonia (NIOSH 1995). Ammonia has been observed in virtually all of the passively ventilated waste tanks sampled to date, at concentrations ranging from about 3 ppmv in tank C-108 (Lucke et al. 1995), to 1040 ppmv in BY-108 (McVeety et al. 1995).

The concentration of hydrogen in tank C-110 was determined by OGIST to be 12 ppmv, and is among the lowest measured in any of the passively ventilated waste tanks. Hydrogen in the waste tanks is of concern as a fuel. Given that the lower flammability limit (LFL) for hydrogen in air is about 4 % by volume, the 12 ppmv hydrogen concentration in tank C-110 corresponds to only about 0.03 % of its LFL. At this level, hydrogen is not a flammability concern in tank C-110.

The nitrous oxide concentration in tank C-110, at an average of 9.4 ppmv in OGIST SUMMA™ samples and 21 ppmv in 2 PNL SUMMA™ samples, is also relatively low compared to other waste tanks sampled to date. It is less than the NIOSH 8-hr REL of 25 ppmv for nitrous oxide (NIOSH 1995). Nitrous oxide, also known as laughing gas, has been detected in other passively ventilated waste tanks

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[1] SUMMA is a trademark of Molectrics, Inc., Cleveland, Ohio.

at average concentrations as high as 763 ppmv in tank C-103 (Huckaby and Story 1994).

X.2.2 Carbon Monoxide and Carbon Dioxide

Carbon monoxide in the tank C-110 headspace, measured to be 0.7 ppmv, is below the NIOSH 8-hr REL of 35 ppmv for carbon monoxide. In ambient air it typically ranges from 0.05 to 0.15 ppmv. Because different analytical methods have been used to measure carbon monoxide in the waste tanks sampled to date, the information on carbon monoxide has varied from tank to tank. However, elevated waste tank headspace carbon monoxide concentrations are common, and are thought to be due to the decomposition of organic waste in the tanks. Carbon monoxide has not been measured at very high levels in any of the waste tanks, the highest level measured to date was 26.7 ppmv in tank C-103 (Huckaby and Story 1994).

The carbon dioxide concentration in the tank C-110 headspace, measured to be an average 42 ppmv by OGIST and 94 ppmv by PNL, is significantly lower than it is in ambient air. Carbon dioxide is normally present in the ambient air at a concentration of 350 to 400 ppmv, and is typically lower than ambient in the waste tank headspaces. The 2 ambient air samples collected at the start of the tank C-110 gas and vapor sampling event, for example, were measured to have an average 402 ppmv of carbon dioxide (Ligotke et al. 1995).

Carbon dioxide introduced by air exchange with the atmosphere is readily absorbed by caustic supernatant and interstitial liquids of the waste tanks, and converted to carbonate in solution. Like the carbon monoxide measurements, because different analytical methods have been used to measure carbon dioxide in the waste tank samples, the information on waste tank carbon dioxide varies. The carbon dioxide concentration of the tank C-110 headspace is typical of other waste tanks sampled to date, and the discrepancy between the 2 laboratories analyses is not significant in terms of worker health or safety.

X.2.3 Nitric Oxide, Nitrogen Dioxide, Water and Tritium

Nitric oxide and nitrogen dioxide concentrations in the tank C-110 headspace were determined to be 0.08 and $\leq$ 0.06 ppmv, respectively. These are acid gases that would have very low equilibrium concentrations above the high pH sludge in tank C-110. The measurable presence of nitric oxide is not uncommon in the waste tank headspaces, and may be due to its formation from oxygen and nitrogen in the radiation field of the headspace. The NIOSH 8-hr REL is 25 ppmv for nitric oxide, and the 15-minute short term exposure limit (STEL) for nitrogen dioxide is 1 ppmv.

The water vapor concentration of tank C-110 was determined to be about 12.4 mg/L, at the measured tank headspace temperature of 21.9 °C and pressure of 990.8 mbar (743.3 torr), (WHC 1995). This equates to a water vapor partial pressure of 16.9 mbar (12.6 torr), to a dew point of 14.8 °C, and to a relative humidity of 64 %.

Silica gel sorbent traps were used to sample for tritium. It is assumed that tritium produced by the waste combines with hydroxide ions to form tritium-substituted water. Evaporation of the tritium-substituted water would then result in airborne radioactive contamination. Silica gel sorbent traps adsorb virtually all (normal and tritium-substituted) water vapor from the sampled tank air, and are analyzed at the WHC 222-S laboratory. Radiochemical analysis of the silica gel trap indicated the total activity of the headspace to be less than 50 pCi/L (WHC 1995).

X.2.4 Discussion of Inorganic Gases and Vapors

Aside from water vapor, the most abundant waste constituents in the tank C-110 headspace are ammonia, hydrogen, and nitrous oxide. These have been detected in most tank headspaces sampled to date, and are usually the dominate waste species.

The relative standard deviations of the inorganic gas and vapor results given in the last column in Table X-2 are good for the methods used at the concentrations reported. Relative standard deviations range from less than 1 % for OGIST measurement of hydrogen, to about 38 % for nitric oxide results. The poor precision of the nitric oxide results is due to the fact that the sample results were very near the background contamination level in the sorbent traps. Because the precision reported depends both on sampling parameters (e.g., sample flow rate and flow time for sorbent traps) and analytical parameters (e.g., sample preparation, dilutions, etc.), small relative standard deviations suggest proper control was maintained both in the field and in the laboratories.

As discussed briefly in Section X.0, it is possible that gases and vapors generated by the waste in tanks C-111 and C-112 could be transferred to tank C-110 via the cascade lines. Table X-3 lists the concentrations of inorganic gases and vapors in tanks C-110, C-111, and C-112, along with limited sampling data. If a significant exchange of gases and vapors were taking place, the headspace compositions of these 2 tanks would be expected to be either very similar, or all constituents detected in one tank would be at equal or higher concentration in the other tank. Consideration of the data in Table X-3 indicates that any transfer of gases and vapors between these tanks is probably negligible. Specifically, ammonia and carbon monoxide are at much higher concentrations in tank C-110 than in tank C-111, while nitric oxide and nitrous oxide are at much lower concentrations in tank C-110 than in tank C-111.

X.3 ORGANIC VAPORS

Organic vapors in the tank C-110 headspace were sampled using SUMMA™ canisters, which were analyzed at PNL, and triple sorbent traps (TSTs), which were analyzed by ORNL. Both laboratories used a gas chromatograph (GC) equipped with a mass spectrometer (MS) detector to separate, identify, and quantitate the analytes. Descriptions of sample device cleaning, sample

preparations, and analyses are given by Jenkins et al. (1994) and Ligotke et al. (1995). Quantitative measurements of methane and the total organic vapor concentration by the U.S. Environmental Protection Agency (EPA) task order 12 (TO-12) method was also performed by OGIST (EPA 1988, Rasmussen 1994a).

SUMMA™ sample results should be considered to be the primary organic vapor data for tank C-110. ORNL analyses of TST samples from this and other waste tanks generally agree with, support, and augment the SUMMA™ sample results. However, because certain WHC quality assurance requirements were not satisfied by ORNL, the quality assurance assessment of ORNL by Hendrickson (1995) should be reviewed before results unique to the TST samples are used for decision making.

X.3.1 Positively Identified Organic Analytes

Positive identification of organic analytes using the methods employed by PNL and ORNL involves matching the GC retention times and MS data from a sample with that obtained from the analysis of standards. The concentration of an analyte in the sample is said to be quantitatively measured if the response of the GC/MS has been established at several known concentrations of that analyte (i.e., the GC/MS has been calibrated for that analyte), and the MS response to the analyte in the sample is between the lowest and highest responses to the known concentrations (i.e., the analyte is within the calibration range).

ORNL and PNL were assigned different lists of organic compounds, or target analytes, to positively identify and measure quantitatively. The ORNL target analyte list was derived from a review of the tank C-103 headspace constituents by a panel of toxicology experts (Mahlum et al. 1994). The PNL target analyte list included 39 compounds in the Environmental Protection Agency (EPA) task order 14 (TO-14) method, which are primarily halocarbons and common industrial solvents (EPA 1988), plus 14 analytes selected mainly from the toxicology panel's review of tank C-103.

Table X-4 lists the organic compounds positively identified and quantitated in SUMMA™ samples. Analysis for methane was performed by OGIST (Rasmussen 1994a), and other SUMMA™ analyses were performed according to the EPA TO-14 methodology by PNL (EPA 1988, Ligotke et al. 1995). Of the 39 TO-14 target analytes, only trichlorofluoromethane measured to be above the 0.005 ppmv quantitation limit of the analyses. Averages reported are from analyses of 3 SUMMA™ canister samples.

Jenkins et al. (1994) report the positive identification of 25 of 27 target analytes in TST samples. 1,1-Dichloroethene and dibutyl butylphosphonate were the only TST target analytes not detected in the TST samples. The average concentrations of the target analytes, from the analysis of 4 TSTs, are given in Table X-5. The concentration of tributyl phosphate reported in Table X-5 probably underestimates the actual concentrations in the tank headspace. The volatility of this compound is very low, and it is thought to be adsorbed by glass fiber filters used during sampling to protect samples from radiolytic particulates.

Both PNL and ORNL report target analyte concentrations in ppmv of analyte in dry air. The results given may be corrected for the measured water vapor content of tank C-110 to obtain concentration in ppmv of analyte in moist tank air by multiplying the dry-air ppmv concentrations by 0.983.

Ten target analytes were common to both TST and SUMMA™ analyses. Table X-6 lists these, and their reported average concentrations in TST and SUMMA™ samples. Results from these 2 sampling and analytical methods are in very good agreement for acetone, acetonitrile, propanenitrile, and butanenitrile. The 6 remaining compounds listed in Table X-6 were reported as being below 0.005 ppmv in SUMMA™ samples. Three of these compounds were determined to be above 0.005 ppmv in TST samples, though none are at levels of concern. Benzene, propanenitrile, and acetonitrile have the lowest NIOSH RELs of the identified compounds in Table X-5, being 0.1, 6, and 20 ppmv, respectively.

The most abundant analytes in Tables X-4 and X-5 are methane, 1-butanol, butanal, acetone, and n-tridecane, each of which was measured to be above 0.1 ppmv. At the reported concentrations, the target analytes do not individually or collectively represent a flammability hazard.

X.3.2 Tentatively Identified Organic Analytes

In addition to the target analytes, the ORNL and PNL analytical procedures allow the tentative identification of other organic compounds. Tentative identification of analytes was performed by comparing the MS molecular fragmentation patterns with a library of known MS fragmentation patterns. This method allows an organic analyte to be identified (with reasonable certainty) as an alkane, a ketone, an aldehyde, etc., and may also determine its molecular weight. The method usually does not, however, allow the unambiguous identification of structural isomers, and this ambiguity increases with analyte molecular weight. Many analytes can be tentatively identified with reasonable confidence without having to inject each into the GC/MS to determine their GC retention times or specific MS patterns.

By the nature of the sampling devices, virtually all organic vapors present in the tank headspace are collected by both TST and SUMMA™ samples. Analyses of the samples are designed to recover, separate, and identify the organic vapors in the samples. TSTs are not good for collecting highly volatile compounds (i.e., molecules more volatile than propane), but are quite good for most others. In contrast, the recovery of very low volatility compounds (i.e., molecules with more than about 15 carbon atoms) and some polar compounds with moderate volatility (i.e., butanal) from SUMMA™ samples has been problematic.

The list of tentatively identified compounds recovered from SUMMA™ samples, with estimated concentrations, is given in Table X-7. Compounds are listed in Table X-7 in the order by which they eluted chromatographically, and only non-zero results are included in the reported averages.

The list of tentatively identified compounds detected in TST samples, and their estimated concentrations, is given in Table X-8. Compounds are listed

in Table X-8 according to the order by which the eluted chromatographically. The averages reported by ORNL in Table X-8 are all 4-sample averages, and if an analyte was not detected in a sample, its concentration in that sample was considered to be zero for averaging purposes. Estimated concentrations are in mg/m^3, based on dry air at 0 °C and 1.01 bar.

Because the list of tentatively identified organic compounds in TST samples is particularly long and difficult to analyze, the list has been sorted alphanumerically by compound name in Table X-9. Table X-10 gives the same list, sorted in order of decreasing estimated concentration. Numbers in the first columns of Tables X-9 and X-10 (Cmpd #) identify the location of the compound in Table X-8.

The ORNL and PNL methods used to tentatively identify and estimate concentrations are described by Jenkins et al. (1994) and Ligotke et al. (1995), respectively, and should be reviewed before this data is used for decision making. Concentrations given in Tables X-7 and X-8 should be considered rough estimates. Results in Tables X-7 and X-8 are presented in terms of observed chromatographic peaks, and are not adjusted for the occurrence of split peaks or the assignment of the same identity to different peaks (e.g., Cmpd # 155, 164, and 172 in Table X-8). In these instances, the estimated concentration of a compound appearing in more than 1 peak is simply the sum of the individual peak estimates.

X.3.3 Total Nonmethane Organic Compounds

OGIST measured the total nonmethane organic compound (TNMOC) concentration in 3 SUMMA™ canister samples using the EPA TO-12 method (Rasmussen 1994a). The sample mean was 22.3 mg/m^3, with a standard deviation of 0.4 mg/m^3. Summation of the positively and tentatively identified organic compounds observed in TST samples gives an estimate of 22.6 mg/m^3, in very good agreement with the TO-12 measurement (Jenkins et al. 1994).

As indicated in Table X-3, tank C-110 has a much higher measured TNMOC concentration than either tanks C-111 or C-112. TO-12 method TNMOC measurements of other waste tanks have ranged from as high as 5,000 mg/m^3 in tank C-103 (Rasmussen and Einfeld 1994), to as low as 0.18 mg/m^3 in tank C-111 (Rasmussen 1994b), while the TNMOC concentration of clean ambient air ranges from about 0.03 to 0.1 mg/m^3.

X.3.4 Discussion of Organic Analytes

The organic compounds listed in Tables X-4 through X-8 may be classified as either 1) organic compounds added to tank C-110 as waste that are still evaporating, or 2) organic compounds that have been generated by reactions of the original waste.

The first category encompasses all organic compounds that were placed into the tank as waste. It includes the tentatively identified alkyl-substituted cyclic, semivolatile branched, and semivolatile straight-chain alkanes. These

were used as diluents of tributyl phosphate in various plutonium extraction processes. The semivolatile straight-chain alkanes (i.e., n-undecane, n-dodecane, n-tridecane, n-tetradecane, and n-pentadecane) are often referred to in Hanford site literature as the normal paraffinic hydrocarbons (NPHs).

Many of the semivolatile alkanes found in tank C-110 are cyclic or branched. Examination of Table X-9 indicates many alkyl-substituted cyclopentanes, cyclohexanes, decahydronaphthalenes, and branched alkanes. These are also prominent in Table X-10, where the tentatively identified organic compounds in TST samples have been ranked by their estimated concentrations. By contrast, there are other 241-C farm tanks, notably tank C-102 (Huckaby 1995b), in which the semivolatile alkane character is heavily dominated by the NPHs.

Halogenated compounds, such as trichlorofluoromethane, may also have been placed into the waste tanks as waste. The origin of these is unknown, but they are commonly detected as headspace constituents by both TST and SUMMA™ sample analyses.

The tentatively identified cyclosiloxanes (i.e., Cmpd # 19 and 51 in Table X-8) may also be in this category. Small quantities of siloxanes may have been introduced to the waste tank through their use as process surfactants or the disposal of contaminated hydraulic fluids. They may also be present in the headspace due to their use in liquid traps at the tank's breather riser. These compounds are frequently detected at very low levels in blanks, so it is also possible these are laboratory contaminants.

The second category includes all organic compounds that have been generated via radiolytic and chemical reactions of the waste. The majority of volatile compounds listed in Tables X-4 through X-8 fall into this category, including the alcohols, aldehydes, ketones, nitriles, alkenes, and volatile alkanes, all of which have been associated with the degradation of the semivolatile alkanes. While both larger and smaller molecules are generated from the waste, the most abundant of these in the headspace are the smaller, short-chain volatile compounds.

Ambient air SUMMA™ samples collected at the start of the tank C-110 sampling event indicate both acetonitrile and n-tridecane were present at trace levels in the atmosphere upwind of tank C-110. Because these compounds were at much higher concentrations in the tank headspace than in the ambient air, their presence in the ambient air is thought to have a negligible effect on tank C-110.

The organic vapors in tank C-110 clearly indicate the presence of semivolatile alkanes associated with tributyl phosphate and their degradation products. Comparisons of data for tanks C-110 and C-111 suggest that the organic vapor in tank C-110 comes primarily from the waste in tank C-110, and could not be transferred from tank C-111 via the cascade line between these tanks (see Table X-3 and Huckaby 1995c). The organic vapor concentrations in tank C-110 are typical for a tank containing semivolatile alkanes and tributyl phosphate.

Table X-1
Tank C-110 Gas and Vapor Sample Type and Number

Laboratory	Sampling Device	Nominal Sample Volume (L)	Target Analytes	Number of Samples
Oak Ridge National Laboratories	Triple Sorbent Trap	0.5 and 2.0	Organic vapors	8 tank air samples + 2 trip blanks
Oregon Graduate Institute of Science and Technology	SUMMA™ canister	6.0	Hydrogen, Methane, Nitrous Oxide, Carbon Dioxide, Carbon Monoxide, Organic vapors	3 tank air samples
Pacific Northwest Laboratories	Acidified Carbon Sorbent Trap	3.0	Ammonia	6 tank air samples + 3 trip blanks
	Triethanolamine Sorbent Trap	3.0	Nitrogen Dioxide	6 tank air samples + 3 trip blanks
	Oxidation bed + Triethanolamine Sorbent Trap	3.0	Nitric Oxide	6 tank air samples + 3 trip blanks
	Silica Gel Sorbent Trap	3.0	Water vapor	6 tank air samples + 3 trip blanks
	SUMMA™ canister	6.0	Organic vapors	3 tank air samples + 2 ambient air samples
WHC 222-S Laboratory	Silica Gel Sorbent Trap	1.0	Tritium-Substituted Water Vapor	1 tank air sample

Table X-2
Tank C-110 Inorganic Gas and Vapor Concentrations[1]

Compound	CAS[2] number	Sample Type	Number of samples	Average (ppmv)	Standard Deviation (ppmv)	RSD[3] (%)
Ammonia, NH_3	7664-41-7	Sorbent Trap	6	124	3	2.4
Carbon Dioxide, CO_2	124-38-9	SUMMA™	3	42 [94]	0.3 [4]	0.6 [4]
Carbon Monoxide, CO	630-08-0	SUMMA™	3	0.7 [< 12]	0.1 [--]	14 [--]
Hydrogen, H_2	1333-74-0	SUMMA™	3	12 [< 94]	0.1 [--]	1 [--]
Nitric Oxide, NO	10102-43-9	Sorbent Trap	6	0.08	0.03	38
Nitrogen Dioxide, NO_2	10102-44-0	Sorbent Trap	6	≤ 0.06	--	--
Nitrous Oxide[4], N_2O	10024-97-2	SUMMA™	3	9.4 [21]	2.4 [1.4]	26 [7]
Water Vapor, H_2O	7732-18-5	Sorbent Trap	6	17,000 (12.4 mg/L)	1,000 (0.7 mg/L)	6

1. SUMMA™ sample results from both OGIST and PNL are listed; PNL values are given in brackets.

2. CAS = Chemical Abstracts Service.

3. RSD = relative standard deviation.

4. Nitrous oxide was detected in only 2 PNL SUMMA™ samples. Relative difference and percent relative difference are given in place of standard deviation and relative standard deviation.

Table X-3
Comparison of Tank C-110, C-111, and C-112 Headspace Constituents[1]

Tank:	C-110[2]	C-111[3]	C-112[4]
Date sampled, (mo/day/yr)	8/8/94	9/13/94	8/11/94
Headspace temperature, (°C)	21.9	27	28
Ammonia, (ppmv)	124	5.6	22.7
Hydrogen, (ppmv)	12	12.4	204
Carbon dioxide, (ppmv)	42	198	102
Carbon monoxide, (ppmv)	0.7	0.10	0.92
Nitric oxide, (ppmv)	0.08	0.62	0.62
Nitrogen dioxide, (ppmv)	≤ 0.06	≤ 0.08	≤ 0.02
Nitrous oxide, (ppmv)	9.4	99.3	544
Water vapor, (mg/m^3)	12.4	22.2	22.3
Water vapor, (% relative humidity)	64	86	82
Ethanenitrile (acetonitrile), (ppmv)	0.17	0.0093	3.0
Propanone (acetone), (ppmv)	0.21	0.0080	0.078
1-Butanol, (ppmv)	0.73	0.0016	0.0044
n-Dodecane, (ppmv)	0.084	0.00054	0.00043
n-Tridecane, (ppmv)	0.15	0.0012	0.00060
Total nonmethane organic compounds by EPA TO-12 method, (mg/m^3)	22.2	0.18	3.4

1. For consistency in this table, individual organic analyte results are all from TST samples.

2. To be consistent with data from tanks C-111 and C-112, results for individual organic compounds given in this column are from TST samples.

3. Data are from Huckaby 1995c.

4. Data are from Huckaby 1995d.

Table X-4
Tank C-110 Positively Identified Organic Compounds in SUMMA™ Samples

Cmpd #	Compound	CAS[1] Number	Average (ppmv)	Standard Deviation (ppmv)	RSD[2] (%)
1	Ethanenitrile (acetonitrile)	75-05-8	0.24	0.01	3
2	Propanone (acetone)	67-64-1	0.22	0.01	3
3	Trichlorofluoromethane	75-69-4	0.024	0.0004	2
4	Propanenitrile	107-12-0	0.030	0.001	3
5	Propanol	71-23-8	0.020	0.002	8
6	2-Butanone	78-93-3	0.047	0.002	5
7	Tetrahydrofuran	109-99-9	0.013	0.0004	3
8	Butanenitrile	109-74-0	0.019	0.002	9
9	Cyclohexane	110-82-7	0.011	0.0003	3
10	n-Decane	124-18-5	0.008	0.001	8
11	Methane[3]	74-82-8	1.9	< 0.005	--

1. CAS = Chemical Abstract Service.

2. RSD = relative standard deviation.

3. Methane analyses are by OGIST (Rasmussen 1994a).

Table X-5
Tank C-110 Positively Identified Organic Compounds in TST Samples

Cmpd #	Compound	CAS[1] Number	Average (ppmv)	Standard Deviation (ppmv)	RSD[2] (%)
1	Ethanenitrile[3] (acetonitrile)	75-05-8	0.17	0.02	14
2	Propanone[3] (acetone)	67-64-1	0.21	0.02	9
3	Dichloromethane (methylene chloride)	75-09-2	0.0137	0.0136	99
4	Propanenitrile	107-12-0	0.034	0.001	3
5	Butanal[3]	123-72-8	0.65	0.50	65
6	n-Hexane[3]	110-54-3	0.0026	0.0007	31
7	Benzene[3]	71-43-2	0.016	0.026	185
8	1-Butanol[3]	71-36-3	0.73	0.07	10
9	Butanenitrile	109-74-0	0.012	0.002	12
10	2-Pentanone	107-87-9	0.018	0.004	23
11	n-Heptane	142-82-5	0.0030	0.0013	43
12	Toluene[3]	108-88-3	0.010	0.017	177
13	Pentanenitrile	110-59-8	0.0064	0.0006	15
14	2-Hexanone	591-78-6	0.0060	0.0008	12
15	n-Octane	111-65-9	0.0018	0.0007	46
16	Hexanenitrile	628-73-9	0.0055	0.0003	11
17	2-Heptanone	110-43-0	0.010	0.003	28
18	n-Nonane	111-84-2	0.0024	0.0004	25
19	Heptanenitrile	629-08-3	0.0059	0.0007	10
20	2-Octanone	111-13-7	0.0036	0.0014	33
21	Octanenitrile	124-12-9	0.0040	0.0007	16
22	Nonanenitrile	2243-27-8	0.0050	0.0012	25
23	n-Dodecane[3]	112-40-3	0.084	0.041	45
24	n-Tridecane[3]	629-50-5	0.15	0.07	46
25	Tributyl phosphate	126-73-8	0.0022	0.0022	100
Sum of positively identified compounds:			7.80	mg/m^3	

1. CAS = Chemical Abstract Service.

2. RSD = relative standard deviation.

3. Two or more samples were outside calibration range.

Table X-6
Tank C-110 Comparison of Organic Compounds in TST and SUMMA™ Samples

Compound	CAS[1] Number	TST Average (ppmv)	SUMMA™ Average (ppmv)
1,1-Dichloroethene (vinylidene chloride)	75-35-4	< 0.00092	< 0.005
Dichloromethane (methylene chloride)	75-09-2	0.0137	< 0.005
Propanone (acetone)	67-64-1	0.21	0.22
Ethanenitrile (acetonitrile)	75-05-8	0.17	0.24
Propanenitrile	107-12-0	0.034	0.030
Butanenitrile	109-74-0	0.012	0.019
Benzene	71-43-2	0.016	< 0.005
Toluene	108-88-3	0.010	< 0.005
n-Hexane	110-54-3	0.0026	< 0.005
n-Heptane	142-82-5	0.0030	< 0.005

1. CAS = Chemical Abstract Service.

Table X-7
Tank C-110 Tentatively Identified Organic Compounds in SUMMA™ Samples

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard[2] Deviation (mg/m^3)
1	Ethanal[3] (acetaldehyde)	75-07-0	0.50	0.06
2	Propane[4]	74-98-6	0.39	--
3	Butanal	123-72-8	0.21	0.02
4	2-Pentanone	107-87-9	0.080	0.001
5	2-Heptanone, 6-methyl-[3]	928-68-7	0.070	< 0.01
6	Unknown C11 Alkane[3]		0.072	0.002
7	n-Undecane	1120-21-4	0.28	0.09
8	Unknown Alkane[3]		0.068	< 0.01
9	Unknown Methyl Decahydronaphthalene		0.085	0.021
10	Unknown C11 Alkene/Cycloalkane[3]		0.092	< 0.01
11	Unknown Methyl Decahydronaphthalene		0.10	0.03
12	n-Dodecane	112-40-3	0.59	0.13
13	Unknown C13 Alkane		0.22	0.05
14	Unknown C13 Alkene/Cycloalkane[3]		0.094	0.005
15	Unknown Alkane		0.17	0.04
16	n-Tridecane	629-50-5	0.55	0.15
17	Unknown Alkane		0.079	0.023
18	n-Tetradecane	629-59-4	0.30	0.11
19	Unknown Alkane		0.075	0.020
Sum of tentatively identified compounds:			3.65	

1. CAS = Chemical Abstract Service.

2. When the analyte was detected in only two samples, the entry is the relative difference (i.e., their difference divided by two).

3. Detected in only two samples.

4. Detected in only one sample.

Table X-8
Tank C-110 Tentatively Identified Organic Compounds in TST Samples in Order of Chromatographic Elution

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
1	methane, trichlorofluoro-	75-69-4	0.17	0.15
2	3-buten-2-one	78-94-4	0.015	0.031
3	2-butanone	78-93-3	0.26	0.13
4	pentane and others		0.13	0.12
5	2,3-dihydrofuran		0.025	0.028
6	furan, tetrahydro-	109-99-9	0.037	0.074
7	unknown		0.057	0.114
8	2-butenenitrile	4786-20-3	0.0044	0.0087
9	acetic acid and others	64-19-7	0.0059	0.0118
10	butanal, 3-methyl-	590-86-3	0.013	0.015
11	propane, 2-methyl-2-nitro-	594-70-7	0.021	0.014
12	cyclopentane	287-92-3	0.024	0.021
13	propane, 2-isocyanato-	1795-48-8	0.011	0.022
14	methylamine, n-(1-methy-butylidene)-	22431-09-0	0.0046	0.0091
15	2h-pyran-2-one, tetrahydro-5, 6-dimethyl-, trans-	24405-16-1	0.016	0.019
16	hexanal	66-25-1	0.038	0.023
17	cyclobutane, 1,2-diethyl-, trans-	19341-98-1	0.022	0.044
18	acetic acid, butyl ester	123-86-4	0.0049	0.0097
19	cyclotrisiloxane, hexamethyl-	541-05-9	0.0096	0.0192
20	hexamethylcyclotrisiloxane		0.023	0.046
21	nitric acid, butyl ester	928-45-0	0.0048	0.0096
22	cyclopentanone, 3-methyl-	1757-42-2	0.0060	0.0120
23	cyclobutanone, 2-ethyl-	10374-14-8	0.0054	0.0108
24	mixture		0.0060	0.0119

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
25	benzene, ethyl-	100-41-4	0.015	0.031
26	benzene, 1,2-dimethyl-	95-47-6	0.046	0.087
27	1-hexene, 5-methyl-	3524-73-0	0.015	0.018
28	heptane, 2,5-dimethyl-	2216-30-0	0.0047	0.0093
29	3-heptanone	106-35-4	0.021	0.016
30	styrene	100-42-5	0.016	0.033
31	benzene, 1,3-dimethyl-	108-38-3	0.019	0.037
32	heptanal	111-71-7	0.023	0.019
33	cyclopentanone, 2,4-dimethyl-	1121-33-1	0.0065	0.0129
34	bicyclo[4.1.0]heptane	286-08-8	0.0056	0.0112
35	bicyclo[2,2,1]heptane		0.010	0.012
36	heptane, 3-ethyl-2-methyl-	14676-29-0	0.015	0.010
37	1-pentyn-3-ol, 4-methyl- and others	565-68-4	0.011	0.022
38	bicyclo[2.2.1]heptane and others	279-23-2	0.0098	0.0116
39	c8-alkanone		0.21	0.06
40	nonane, 4-methyl-	17301-94-9	0.010	0.012
41	benzene, propyl-	103-65-1	0.0070	0.0140
42	1,1,2,3-tetramethylcyclohexane A		0.038	0.045
43	1,1,2,3-tetramethyl-cyclohexand B		0.034	0.040
44	2-octanol		0.026	0.030
45	benzene, 1-ethyl-2-methyl	611-14-3	0.011	0.022
46	3-buten-2-ol	598-32-3	0.17	0.06
47	cyclopropane, pentyl-	2511-91-3	0.022	0.026
48	cyclohexanal, 4-(1-methylethyl)-		0.016	0.011
49	cyclopentane, 1,2-dimethyl-3-(1-methylethyl)-c10h20 (140)		0.024	0.018
50	benzene, (1-methylethyl)-	98-82-8	0.0086	0.0173
51	cyclotetrasiloxane, octamethyl-	556-67-2	0.12	0.14

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
52	(Z)-2,3,4,5-tetramethyl-3-hexane		0.020	0.040
53	benzonitrile	100-47-0	0.019	0.037
54	cyclopentane, 1-butyl-2-ethyl-	72993-32-9	0.019	0.013
55	decane	124-18-5	0.27	0.03
56	cyclopentane, 2-isopropyl-1, 3,-dimethyl-		0.0071	0.0083
57	benzene, 1-propenyl-	637-50-3	0.022	0.043
58	hexanal	66-25-1	0.0032	0.0063
59	cyclopentane, 1-methyl-3-(2-methylpropyl)-	29053-04-1	0.0027	0.0055
60	cyclohexane, diethyl-	1331-43-7	0.0048	0.0096
61	c10-alkane and others		0.0081	0.0099
62	c6-cyclopentane		0.041	0.033
63	1-hexene, 5,5,-dimethyl-	7116-86-1	0.0045	0.0091
64	nonane, 2,6-dimethyl-	17302-28-2	0.23	0.04
65	heptane, 3,3-dimethyl-	4032-86-4	0.0046	0.0093
66	1-hexanol, 2-ethyl- and others	104-76-7	0.011	0.013
67	octane, 6-ethyl-2-methyl-	62016-19-7	0.030	0.025
68	benzene, (1,1-dimethylethyl)-	98-06-6	0.013	0.027
69	alkane and others		0.019	0.038
70	cyclohexane, (1-methylpropyl)-	7058-01-7	0.13	0.02
71	cyclopentane, 1-methyl-3-(2-methylpropyl)-	29053-04-1	0.065	0.007
72	cyclohexane, (1-methylpropyl)-		0.036	0.024
73	cyclohexane, cyclopropyl-	32669-86-6	0.067	0.009
74	1,1-dimethyl-2-propylcyclohexane		0.071	0.006
75	decane, 5-methyl-	13151-35-4	0.070	0.050
76	decane, 4-methyl-	2847-72-5	0.090	0.014
77	decane, 2-methyl-		0.24	0.03

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
78	decane, 3-methyl-	13151-34-3	0.054	0.108
79	naphthalene, decahydro-, trans-	493-02-7	0.019	0.037
80	nonane, 3,7-dimethyl-	17302-32-8	0.15	0.11
81	cyclohexane, 1,2-diethyl-1-methyl-		0.013	0.026
82	ethanone, 1-phenyl and cyclohexane, 1,2-diethyl-1-methyl-		0.045	0.054
83	bicyclo[2.2.2]octane, 1,2,3,6-tetramethyl-	62338-45-8	0.015	0.030
84	cyclohexane, 1,2-diethyl-1-methyl- and ethanone, 1-phenyl-	61141-79-5	0.018	0.036
85	formic acid, 2,6-dimethyl-5-hepten-2-ol ester		0.044	0.029
86	cyclohexane, 1,1,3,5-tetramethyl-, trans-	50876-31-8	0.0053	0.0105
87	5-undecene	4941-53-1	0.20	0.08
88	2-nonanone	821-55-6	0.083	0.057
89	mixture		0.019	0.038
90	cyclohexane, 1-ethyl-2-propyl-	62238-33-9	0.011	0.022
91	undecane	1120-21-4	0.95	0.25
92	c11-alkene		0.061	0.015
93	octane, 6-ethyl-2-methyl-	62016-19-7	0.019	0.038
94	cyclohexane, 2-butyl-1,1,3-trimethyl-	54676-39-0	0.065	0.044
95	undecane, 5-methyl-	1632-70-8	0.27	0.02
96	cyclohexene, 1-pentyl-	15232-85-6	0.041	0.029
97	undecane, 4-methyl-	2980-69-0	0.055	0.066
98	undecane, 2-methyl-	7045-71-8	0.39	0.26
99	undecane, 3-methyl-	1002-43-3	0.070	0.049
100	2-undecene, 8-methyl-, (Z)-	74630-44-7	0.016	0.018

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
101	naphthalene, decahydro- 2-methyl-	2958-76-1	0.10	0.20
102	1-undecene, 7-methyl-	74630-42-5	0.080	0.012
103	cyclohexane, pentyl-	4292-92-6	0.055	0.110
104	methyl-decahydronaphthalene		0.60	0.03
105	1-undecene, 8-methyl-	74630-40-3	0.025	0.029
106	6-methylundecane	17302-33-9	0.50	0.06
107	undecane, 4-methyl-	2980-69-0	0.25	0.07
108	undecane, 2-methyl-	7045-71-8	0.48	0.12
109	undecane, 2,3-dimethyl-	17312-77-5	0.042	0.085
110	undecane, 3-methyl-	1002-43-3	0.26	0.06
111	c12-alkene		0.056	0.066
112	decane, 2,3,6-trimethyl-	62238-12-4	0.023	0.045
113	cyclododecane	294-62-2	0.13	0.02
114	cyclohexane, 1-methyl-3-pentyl-	54411-02-8	0.019	0.038
115	naphthalene and others	91-20-3	0.017	0.034
116	naphthalene, decahydro-2,3-dimethyl-	1008-80-6	0.0057	0.0114
117	cyclohexane, 1-methyl-4-(1-methylbutyl)-	54411-00-6	0.012	0.025
118	undecane, 2,6-dimethyl-	17301-23-4	0.36	0.22
119	dodecane and acetophenone, 2'-hydroxy-5'-methoxy		0.095	0.016
120	undecane, 3,7-dimethyl-	17301-29-0	0.024	0.048
121	alkene and acetophenone, 2'-hydroxy-5'methoxy-		0.033	0.066
122	cyclohexane, 2-butyl-1,1,3-trimethyl-	54676-39-0	0.13	0.12
123	alkene		0.0071	0.0142
124	naphthalene, decahydro-1,6-dimethyl-	1750-51-2	0.016	0.032

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
125	cyclohexane, (4-methylpentyl)-		0.090	0.181
126	cyclopentane, 1-hexyl-3-methyl-		0.13	0.15
127	undecane, 2,5-dimethyl	17301-22-3	0.025	0.049
128	undecane, 2,4-dimethyl	17312-80-0	0.019	0.038
129	cyclopentane, 1-hexyl-3-methyl-	61142-68-5	0.072	0.144
130	dodecane, 4-methyl-	6117-97-1	0.11	0.05
131	undecane, 2,10-dimethyl-	17301-27-8	0.22	0.11
132	tridecane, 4-methyl-	26730-12-1	0.26	0.16
133	dodecane, 4,6-dimethyl	61141-72-8	0.25	0.50
134	c6-cyclohexane		0.0063	0.0126
135	2-decyne & 6-methyl-8, 9(7H)dihydro-1,2,		0.031	0.063
136	1-tridecane	2437-56-1	0.025	0.050
137	3-tetradecene, (z)-	41446-67-7	0.062	0.124
138	c13-alkene		0.056	0.040
139	c9-cyclopentane		0.013	0.026
140	c13-alkane		0.012	0.025
141	tridecane. 5-,methyl-	25117-31-1	0.018	0.013
142	dodecane, 4,6-dimethyl-	61141-72-8	0.057	0.020
143	dodecane, 2,5-dimethyl-		0.17	0.08
144	cyclohexane,1-(cyclo-hexylmethyl)-2-ethyl	54934-93-9	0.0083	0.0166
145	c8-cyclohexane		0.019	0.037
146	1-tetradecene		0.046	0.025
147	tridecane, 6-methyl-		0.085	0.051
148	c7-cyclohexane		0.15	0.09
149	tridecane, 4-methyl-	26730-12-1	0.14	0.06
150	tridecane, 2-methyl-	1560-06-9	0.19	0.08
151	tridecane, 3-methyl-	6418-41-3	0.17	0.08

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
152	dodecane, 2,6,10-trimethyl-	3891-98-3	0.39	0.42
153	1,1'-bicyclohexyl, 2-methyl-,trans	50991-09-8	0.0054	0.0108
154	tetradecane	629-59-4	0.42	0.40
155	pentadecane	629-62-9	0.12	0.13
156	c7-cyclohexane		0.027	0.054
157	alkane		0.010	0.020
158	dodecane, 2,6,11-trimethyl	31295-56-4	0.034	0.067
159	c15-alkane		0.019	0.038
160	tridecane, 3-ethyl-	13286-73-2	0.066	0.102
161	c15-alkane		0.023	0.027
162	tridecane, 3-ethyl-		0.070	0.047
163	dodecane, 2-methyl-8-propyl	55045-07-3	0.21	0.42
164	pentadecane	629-62-9	0.063	0.125
165	hexadecane	544-76-3	0.031	0.062
166	c15-alkane		0.060	0.041
167	c15-alkane		0.069	0.017
168	pentadecane, 3-methyl	2882-96-4	0.016	0.032
169	hexadecane	544-76-3	0.024	0.028
170	2-dodecene, 4-methyl-	56851-45-7	0.011	0.013
171	3-tridecanone	1534-26-5	0.058	0.015
172	pentadecane	629-62-9	0.33	0.31
173	c9-cyclohexane		0.015	0.030
174	c9-cyclohexane		0.045	0.089
175	dodecane, 2-methyl-6-propyl-		0.011	0.007
176	alkane		0.0074	0.0148
177	tridecane, 5-propyl-		0.078	0.020
178	dodecane, 2-methyl-8-propyl-	55045-07-3	0.042	0.028
179	docosane, 7-hexyl	55373-86-9	0.015	0.030

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
180	c17-alkane		0.064	0.004
181	dodecane, 5,8-diethyl-	24251-86-3	0.029	0.002
182	5-undecanone, 2-methyl-	50639-02-6	0.073	0.007
183	4-undecanone	14476-37-0	0.021	0.041
184	cyclohexane, 1,2,4,5-tetraethyl-	61142-24-3	0.025	0.029
185	3-dodecanone	1534-27-6	0.023	0.002
186	hexadecane	544-76-3	0.16	0.03
187	1-butanone, 4-(dimethylamine)-1-phenyl	3760-63-2	0.0039	0.0078
188	phthlate		0.072	0.032
189	heptadecane, 3-methyl-		0.050	0.003
190	TBP and benzenamine, N-phenyl		0.013	0.026
191	decane 3-cyclohexyl-, 3-cyclohexyl-	13151-74-1	0.0018	0.0037
192	5-tridecanone	30692-16-1	0.020	0.002
193	mixture		0.0044	0.0088
194	1-tridecyn-4-ol	74646-37-0	0.0044	0.0033
195	heptadecane	629-78-7	0.035	0.005
196	c18-alkane		0.035	0.006
197	tetradecanoic acid	544-63-8	0.030	0.024
198	9H-fluoren-9-one	486-25-9	0.0042	0.0085
199	octadecane	593-45-3	0.0024	0.0048
200	alkane and benzaldehyde, 4-hydroxy-		0.0018	0.0037
201	siloxane		0.0035	0.0069
202	benzenesulfonamide, n-butyl-	3622-84-2	0.082	0.062
203	alkanoic acid		0.0010	0.0021
204	pentadecanoic acid	1002-84-2	0.018	0.012
205	1-hexadecanol	36653-82-4	0.0070	0.0112

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
206	heptadecane	629-78-7	0.00090	0.00180
207	9-hexadecenoic acid	2091-29-4	0.015	0.022
208	hexadecanoic acid	57-10-3	0.058	0.084
209	hexadecane, 2,6,10,14-tetramethyl-	638-36-8	0.0013	0.0025
210	1-hexadecanol	29354-98-1	0.0046	0.0092
211	hexadecanoic acid, 1-methylethyl ester	142-91-6	0.013	0.027
212	alkane		0.0037	0.0075
Sum of tentatively identified compounds:			14.83	

1. CAS = Chemical Abstract Service.

Table X-9
Tank C-110 Tentatively Identified Organic Compounds in TST Samples
Sorted Alphanumerically

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
52	(Z)-2,3,4,5-tetramethyl-3-hexane		0.020	0.040
102	1-undecene, 7-methyl-	74630-42-5	0.080	0.012
105	1-undecene, 8-methyl-	74630-40-3	0.025	0.029
210	1-hexadecanol	29354-98-1	0.0046	0.0092
187	1-butanone, 4-(dimethylamine)-1-phenyl	3760-63-2	0.0039	0.0078
27	1-hexene, 5-methyl-	3524-73-0	0.015	0.018
63	1-hexene, 5,5,-dimethyl-	7116-86-1	0.0045	0.0091
66	1-hexanol, 2-ethyl- and others	104-76-7	0.011	0.013
37	1-pentyn-3-ol, 4-methyl- and others	565-68-4	0.011	0.022
136	1-tridecane	2437-56-1	0.025	0.050
194	1-tridecyn-4-ol	74646-37-0	0.0044	0.0033
146	1-tetradecene		0.046	0.025
205	1-hexadecanol	36653-82-4	0.0070	0.0112
74	1,1-dimethyl-2-propylcyclohexane		0.071	0.006
153	1,1'-bicyclohexyl, 2-methyl-,trans	50991-09-8	0.0054	0.0108
43	1,1,2,3-tetramethyl-cyclohexand B		0.034	0.040
42	1,1,2,3-tetramethylcyclohexane A		0.038	0.045
100	2-undecene, 8-methyl-, (Z)-	74630-44-7	0.016	0.018
3	2-butanone	78-93-3	0.26	0.13
88	2-nonanone	821-55-6	0.083	0.057
170	2-dodecene, 4-methyl-	56851-45-7	0.011	0.013
8	2-butenenitrile	4786-20-3	0.0044	0.0087
44	2-octanol		0.026	0.030
135	2-decyne & 6-methyl-8, 9(7H)dihydro-1,2,		0.031	0.063

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
5	2,3-dihydrofuran		0.025	0.028
15	2h-pyran-2-one, tetrahydro-5, 6-dimethyl-, trans-	24405-16-1	0.016	0.019
46	3-buten-2-ol	598-32-3	0.17	0.06
171	3-tridecanone	1534-26-5	0.058	0.015
2	3-buten-2-one	78-94-4	0.015	0.031
185	3-dodecanone	1534-27-6	0.023	0.002
29	3-heptanone	106-35-4	0.021	0.016
137	3-tetradecene, (z)-	41446-67-7	0.062	0.124
183	4-undecanone	14476-37-0	0.021	0.041
87	5-undecene	4941-53-1	0.20	0.08
192	5-tridecanone	30692-16-1	0.020	0.002
182	5-undecanone, 2-methyl-	50639-02-6	0.073	0.007
106	6-methylundecane	17302-33-9	0.50	0.06
207	9-hexadecenoic acid	2091-29-4	0.015	0.022
198	9H-fluoren-9-one	486-25-9	0.0042	0.0085
9	acetic acid and others	64-19-7	0.0059	0.0118
18	acetic acid, butyl ester	123-86-4	0.0049	0.0097
157	alkane		0.010	0.020
200	alkane and benzaldehyde, 4-hydroxy-		0.0018	0.0037
176	alkane		0.0074	0.0148
69	alkane and others		0.019	0.038
212	alkane		0.0037	0.0075
203	alkanoic acid		0.0010	0.0021
123	alkene		0.0071	0.0142
121	alkene and acetophenone, 2'-hydroxy-5'methoxy-		0.033	0.066
26	benzene, 1,2-dimethyl-	95-47-6	0.046	0.087

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
25	benzene, ethyl-	100-41-4	0.015	0.031
31	benzene, 1,3-dimethyl-	108-38-3	0.019	0.037
45	benzene, 1-ethyl-2-methyl	611-14-3	0.011	0.022
68	benzene, (1,1-dimethylethyl)-	98-06-6	0.013	0.027
57	benzene, 1-propenyl-	637-50-3	0.022	0.043
41	benzene, propyl-	103-65-1	0.0070	0.0140
50	benzene, (1-methylethyl)-	98-82-8	0.0086	0.0173
202	benzenesulfonamide, n-butyl-	3622-84-2	0.082	0.062
53	benzonitrile	100-47-0	0.019	0.037
38	bicyclo[2.2.1]heptane and others	279-23-2	0.0098	0.0116
83	bicyclo[2.2.2]octane, 1,2,3,6-tetramethyl-	62338-45-8	0.015	0.030
35	bicyclo[2,2,1]heptane		0.010	0.012
34	bicyclo[4.1.0]heptane	286-08-8	0.0056	0.0112
10	butanal, 3-methyly-	590-86-3	0.013	0.015
61	c10-alkane and others		0.0081	0.0099
92	c11-alkene		0.061	0.015
111	c12-alkene		0.056	0.066
140	c13-alkane		0.012	0.025
138	c13-alkene		0.056	0.040
167	c15-alkane		0.069	0.017
161	c15-alkane		0.023	0.027
166	c15-alkane		0.060	0.041
159	c15-alkane		0.019	0.038
180	c17-alkane		0.064	0.004
196	c18-alkane		0.035	0.006
134	c6-cyclohexane		0.0063	0.0126
62	c6-cyclopentane		0.041	0.033
148	c7-cyclohexane		0.15	0.09

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
156	c7-cyclohexane		0.027	0.054
39	c8-alkanone		0.21	0.06
145	c8-cyclohexane		0.019	0.037
139	c9-cyclopentane		0.013	0.026
174	c9-cyclohexane		0.045	0.089
173	c9-cyclohexane		0.015	0.030
17	cyclobutane, 1,2-diethyl-, trans-	19341-98-1	0.022	0.044
23	cyclobutanone, 2-ethyl-	10374-14-8	0.0054	0.0108
113	cyclododecane	294-62-2	0.13	0.02
48	cyclohexanal, 4-(1-methylethyl)-		0.016	0.011
125	cyclohexane, (4-methylpentyl)-		0.090	0.181
103	cyclohexane, pentyl-	4292-92-6	0.055	0.110
117	cyclohexane, 1-methyl-4-(1-methylbutyl)-	54411-00-6	0.012	0.025
122	cyclohexane, 2-butyl-1, 1,3-trimethyl-	54676-39-0	0.13	0.12
60	cyclohexane, diethyl-	1331-43-7	0.0048	0.0096
81	cyclohexane, 1,2-diethyl-1-methyl-		0.013	0.026
72	cyclohexane, (1-methylpropyl)-		0.036	0.024
86	cyclohexane, 1,1,3,5-tetramethyl-, trans-	50876-31-8	0.0053	0.0105
84	cyclohexane, 1,2-diethyl-1-methyl- and ethanone, 1-phenyl-	61141-79-5	0.018	0.036
114	cyclohexane, 1-methyl-3-pentyl-	54411-02-8	0.019	0.038
90	cyclohexane, 1-ethyl-2-propyl-	62238-33-9	0.011	0.022
94	cyclohexane, 2-butyl-1, 1,3-trimethyl-	54676-39-0	0.065	0.044
73	cyclohexane, cyclopropyl-	32669-86-6	0.067	0.009

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
184	cyclohexane, 1,2,4,5-tetraethyl-	61142-24-3	0.025	0.029
70	cyclohexane, (1-methylpropyl)-	7058-01-7	0.13	0.02
144	cyclohexane,1-(cyclo-hexylmethyl)-2-ethyl	54934-93-9	0.0083	0.0166
96	cyclohexene, 1-pentyl-	15232-85-6	0.041	0.029
12	cyclopentane	287-92-3	0.024	0.021
129	cyclopentane, 1-hexyl-3-methyl-	61142-68-5	0.072	0.144
49	cyclopentane, 1,2-dimethyl-3-(1-methylethyl)-c10h20 (140)		0.024	0.018
56	cyclopentane, 2-isopropyl-1, 3,-dimethyl-		0.0071	0.0083
54	cyclopentane, 1-butyl-2-ethyl-	72993-32-9	0.019	0.013
59	cyclopentane, 1-methyl-3-(2-methylpropyl)-	29053-04-1	0.0027	0.0055
71	cyclopentane, 1-methyl-3-(2-methylpropyl)-	29053-04-1	0.065	0.007
126	cyclopentane, 1-hexyl-3-methyl-		0.13	0.15
22	cyclopentanone, 3-methyl-	1757-42-2	0.0060	0.0120
33	cyclopentanone, 2,4-dimethyl-	1121-33-1	0.0065	0.0129
47	cyclopropane, pentyl-	2511-91-3	0.022	0.026
51	cyclotetrasiloxane, octamethyl-	556-67-2	0.12	0.14
19	cyclotrisiloxane, hexamethyl-	541-05-9	0.0096	0.0192
76	decane, 4-methyl-	2847-72-5	0.090	0.014
191	decane 3-cyclohexyl-, 3-cyclohexyl-	13151-74-1	0.0018	0.0037
75	decane, 5-methyl-	13151-35-4	0.070	0.050
77	decane, 2-methyl-		0.24	0.03
112	decane, 2,3,6-trimethyl-	62238-12-4	0.023	0.045
78	decane, 3-methyl-	13151-34-3	0.054	0.108
55	decane	124-18-5	0.27	0.03

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
179	docosane, 7-hexyl	55373-86-9	0.015	0.030
152	dodecane, 2,6,10-trimethyl-	3891-98-3	0.39	0.42
158	dodecane, 2,6,11-trimethyl	31295-56-4	0.034	0.067
143	dodecane, 2,5-dimethyl-		0.17	0.08
181	dodecane, 5,8-diethyl-	24251-86-3	0.029	0.002
142	dodecane, 4,6-dimethyl-	61141-72-8	0.057	0.020
119	dodecane and acetophenone, 2'-hydroxy-5'-methoxy		0.095	0.016
178	dodecane, 2-methyl-8-propyl-	55045-07-3	0.042	0.028
133	dodecane, 4,6-dimethyl	61141-72-8	0.25	0.50
130	dodecane, 4-methyl-	6117-97-1	0.11	0.05
175	dodecane, 2-methyl-6-propyl-		0.011	0.007
163	dodecane, 2-methyl-8-propyl	55045-07-3	0.21	0.42
82	ethanone, 1-phenyl and cyclohexane, 1,2-diethyl-1-methyl-		0.045	0.054
85	formic acid, 2,6-dimethyl-5-hepten-2-ol ester		0.044	0.029
6	furan, tetrahydro-	109-99-9	0.037	0.074
206	heptadecane	629-78-7	0.00090	0.00180
189	heptadecane, 3-methyl-		0.050	0.003
195	heptadecane	629-78-7	0.035	0.005
32	heptanal	111-71-7	0.023	0.019
28	heptane, 2,5-dimethyl-	2216-30-0	0.0047	0.0093
65	heptane, 3,3-dimethyl-	4032-86-4	0.0046	0.0093
36	heptane, 3-ethyl-2-methyl-	14676-29-0	0.015	0.010
169	hexadecane	544-76-3	0.024	0.028
186	hexadecane	544-76-3	0.16	0.03
209	hexadecane, 2,6,10,14-tetramethyl-	638-36-8	0.0013	0.0025

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
165	hexadecane	544-76-3	0.031	0.062
208	hexadecanoic acid	57-10-3	0.058	0.084
211	hexadecanoic acid, 1-methylethyl ester	142-91-6	0.013	0.027
20	hexamethylcyclotrisiloxane		0.023	0.046
16	hexanal	66-25-1	0.038	0.023
58	hexanal	66-25-1	0.0032	0.0063
1	methane, trichlorofluoro-	75-69-4	0.17	0.15
104	methyl-decahydronaphthalene		0.60	0.03
14	methylamine, n-(1-methy-butylidene)-	22431-09-0	0.0046	0.0091
89	mixture		0.019	0.038
193	mixture		0.0044	0.0088
24	mixture		0.0060	0.0119
79	naphthalene, decahydro-, trans-	493-02-7	0.019	0.037
116	naphthalene, decahydro-2, 3-dimethyl-	1008-80-6	0.0057	0.0114
115	naphthalene and others	91-20-3	0.017	0.034
124	naphthalene, decahydro-1, 6-dimethyl-	1750-51-2	0.016	0.032
101	naphthalene, decahydro- 2-methyl-	2958-76-1	0.10	0.20
21	nitric acid, butyl ester	928-45-0	0.0048	0.0096
64	nonane, 2,6-dimethyl-	17302-28-2	0.23	0.04
80	nonane, 3,7-dimethyl-	17302-32-8	0.15	0.11
40	nonane, 4-methyl-	17301-94-9	0.010	0.012
199	octadecane	593-45-3	0.0024	0.0048
67	octane, 6-ethyl-2-methyl-	62016-19-7	0.030	0.025
93	octane, 6-ethyl-2-methyl-	62016-19-7	0.019	0.038
168	pentadecane, 3-methyl	2882-96-4	0.016	0.032
164	pentadecane	629-62-9	0.063	0.125

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
172	pentadecane	629-62-9	0.33	0.31
155	pentadecane	629-62-9	0.12	0.13
204	pentadecanoic acid	1002-84-2	0.018	0.012
4	pentane and others		0.13	0.12
188	phthlate		0.072	0.032
11	propane, 2-methyl-2-nitro-	594-70-7	0.021	0.014
13	propane, 2-isocyanato-	1795-48-8	0.011	0.022
201	siloxane		0.0035	0.0069
30	styrene	100-42-5	0.016	0.033
190	TBP and benzenamine, N-phenyl		0.013	0.026
154	tetradecane	629-59-4	0.42	0.40
197	tetradecanoic acid	544-63-8	0.030	0.024
132	tridecane, 4-methyl-	26730-12-1	0.26	0.16
177	tridecane, 5-propyl-		0.078	0.020
162	tridecane, 3-ethyl-		0.070	0.047
151	tridecane, 3-methyl-	6418-41-3	0.17	0.08
160	tridecane, 3-ethyl-	13286-73-2	0.066	0.102
149	tridecane, 4-methyl-	26730-12-1	0.14	0.06
150	tridecane, 2-methyl-	1560-06-9	0.19	0.08
147	tridecane, 6-methyl-		0.085	0.051
141	tridecane. 5-,methyl-	25117-31-1	0.018	0.013
107	undecane, 4-methyl-	2980-69-0	0.25	0.07
98	undecane, 2-methyl-	7045-71-8	0.39	0.26
99	undecane, 3-methyl-	1002-43-3	0.070	0.049
97	undecane, 4-methyl-	2980-69-0	0.055	0.066
95	undecane, 5-methyl-	1632-70-8	0.27	0.02
91	undecane	1120-21-4	0.95	0.25
131	undecane, 2,10-dimethyl-	17301-27-8	0.22	0.11

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
108	undecane, 2-methyl-	7045-71-8	0.48	0.12
127	undecane, 2,5-dimethyl	17301-22-3	0.025	0.049
128	undecane, 2,4-dimethyl	17312-80-0	0.019	0.038
109	undecane, 2,3-dimethyl-	17312-77-5	0.042	0.085
120	undecane, 3,7-dimethyl-	17301-29-0	0.024	0.048
118	undecane, 2,6-dimethyl-	17301-23-4	0.36	0.22
110	undecane, 3-methyl-	1002-43-3	0.26	0.06
7	unknown		0.057	0.114

1. CAS = Chemical Abstract Service.

Table X-10
Tank C-110 Tentatively Identified Organic Compounds in TST Samples Sorted by Estimated Concentration

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
91	undecane	1120-21-4	0.95	0.25
104	methyl-decahydronaphthalene		0.60	0.03
106	6-methylundecane	17302-33-9	0.50	0.06
108	undecane, 2-methyl-	7045-71-8	0.48	0.12
154	tetradecane	629-59-4	0.42	0.40
152	dodecane, 2,6,10-trimethyl-	3891-98-3	0.39	0.42
98	undecane, 2-methyl-	7045-71-8	0.39	0.26
118	undecane, 2,6-dimethyl-	17301-23-4	0.36	0.22
172	pentadecane	629-62-9	0.33	0.31
95	undecane, 5-methyl-	1632-70-8	0.27	0.02
55	decane	124-18-5	0.27	0.03
3	2-butanone	78-93-3	0.26	0.13
132	tridecane, 4-methyl-	26730-12-1	0.26	0.16
110	undecane, 3-methyl-	1002-43-3	0.26	0.06
107	undecane, 4-methyl-	2980-69-0	0.25	0.07
133	dodecane, 4,6-dimethyl	61141-72-8	0.25	0.50
77	decane, 2-methyl-		0.24	0.03
64	nonane, 2,6-dimethyl-	17302-28-2	0.23	0.04
131	undecane, 2,10-dimethyl-	17301-27-8	0.22	0.11
163	dodecane, 2-methyl-8-propyl	55045-07-3	0.21	0.42
39	c8-alkanone		0.21	0.06
87	5-undecene	4941-53-1	0.20	0.08
150	tridecane, 2-methyl-	1560-06-9	0.19	0.08
46	3-buten-2-ol	598-32-3	0.17	0.06
1	methane, trichlorofluoro-	75-69-4	0.17	0.15
143	dodecane, 2,5-dimethyl-		0.17	0.08

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
151	tridecane, 3-methyl-	6418-41-3	0.17	0.08
186	hexadecane	544-76-3	0.16	0.03
148	c7-cyclohexane		0.15	0.09
80	nonane, 3,7-dimethyl-	17302-32-8	0.15	0.11
149	tridecane, 4-methyl-	26730-12-1	0.14	0.06
122	cyclohexane, 2-butyl-1, 1,3-trimethyl-	54676-39-0	0.13	0.12
113	cyclododecane	294-62-2	0.13	0.02
4	pentane and others		0.13	0.12
70	cyclohexane, (1-methylpropyl)-	7058-01-7	0.13	0.02
126	cyclopentane, 1-hexyl-3-methyl-		0.13	0.15
51	cyclotetrasiloxane, octamethyl-	556-67-2	0.12	0.14
155	pentadecane	629-62-9	0.12	0.13
130	dodecane, 4-methyl-	6117-97-1	0.11	0.05
101	naphthalene, decahydro- 2-methyl-	2958-76-1	0.10	0.20
119	dodecane and acetophenone, 2'-hydroxy-5'-methoxy		0.095	0.016
125	cyclohexane, (4-methylpentyl)-		0.090	0.181
76	decane, 4-methyl-	2847-72-5	0.090	0.014
147	tridecane, 6-methyl-		0.085	0.051
88	2-nonanone	821-55-6	0.083	0.057
202	benzenesulfonamide, n-butyl-	3622-84-2	0.082	0.062
102	1-undecene, 7-methyl-	74630-42-5	0.080	0.012
177	tridecane, 5-propyl-		0.078	0.020
182	5-undecanone, 2-methyl-	50639-02-6	0.073	0.007
129	cyclopentane, 1-hexyl-3-methyl-	61142-68-5	0.072	0.144
188	phthlate		0.072	0.032
74	1,1-dimethyl-2-propylcyclohexane		0.071	0.006
99	undecane, 3-methyl-	1002-43-3	0.070	0.049

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
162	tridecane, 3-ethyl-		0.070	0.047
75	decane, 5-methyl-	13151-35-4	0.070	0.050
167	c15-alkane		0.069	0.017
73	cyclohexane, cyclopropyl-	32669-86-6	0.067	0.009
160	tridecane, 3-ethyl-	13286-73-2	0.066	0.102
94	cyclohexane, 2-butyl-1, 1,3-trimethyl-	54676-39-0	0.065	0.044
71	cyclopentane, 1-methyl-3-(2-methylpropyl)-	29053-04-1	0.065	0.007
180	c17-alkane		0.064	0.004
164	pentadecane	629-62-9	0.063	0.125
137	3-tetradecene, (z)-	41446-67-7	0.062	0.124
92	c11-alkene		0.061	0.015
166	c15-alkane		0.060	0.041
208	hexadecanoic acid	57-10-3	0.058	0.084
171	3-tridecanone	1534-26-5	0.058	0.015
7	unknown		0.057	0.114
142	dodecane, 4,6-dimethyl-	61141-72-8	0.057	0.020
111	c12-alkene		0.056	0.066
138	c13-alkene		0.056	0.040
103	cyclohexane, pentyl-	4292-92-6	0.055	0.110
97	undecane, 4-methyl-	2980-69-0	0.055	0.066
78	decane, 3-methyl-	13151-34-3	0.054	0.108
189	heptadecane, 3-methyl-		0.050	0.003
146	1-tetradecene		0.046	0.025
26	benzene, 1,2-dimethyl-	95-47-6	0.046	0.087
174	c9-cyclohexane		0.045	0.089
82	ethanone, 1-phenyl and cyclohexane, 1,2-diethyl-1-methyl-		0.045	0.054

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
85	formic acid, 2,6-dimethyl-5-hepten-2-ol ester		0.044	0.029
178	dodecane, 2-methyl-8-propyl-	55045-07-3	0.042	0.028
109	undecane, 2,3-dimethyl-	17312-77-5	0.042	0.085
96	cyclohexene, 1-pentyl-	15232-85-6	0.041	0.029
62	c6-cyclopentane		0.041	0.033
42	1,1,2,3-tetramethylcyclohexane A		0.038	0.045
16	hexanal	66-25-1	0.038	0.023
6	furan, tetrahydro-	109-99-9	0.037	0.074
72	cyclohexane, (1-methylpropyl)-		0.036	0.024
195	heptadecane	629-78-7	0.035	0.005
196	c18-alkane		0.035	0.006
158	dodecane, 2,6,11-trimethyl	31295-56-4	0.034	0.067
43	1,1,2,3-tetramethyl-cyclohexand B		0.034	0.040
121	alkene and acetophenone, 2'-hydroxy-5'methoxy-		0.033	0.066
165	hexadecane	544-76-3	0.031	0.062
135	2-decyne & 6-methyl-8, 9(7H)dihydro-1,2,		0.031	0.063
67	octane, 6-ethyl-2-methyl-	62016-19-7	0.030	0.025
197	tetradecanoic acid	544-63-8	0.030	0.024
181	dodecane, 5,8-diethyl-	24251-86-3	0.029	0.002
156	c7-cyclohexane		0.027	0.054
44	2-octanol		0.026	0.030
136	1-tridecane	2437-56-1	0.025	0.050
105	1-undecene, 8-methyl-	74630-40-3	0.025	0.029
5	2,3-dihydrofuran		0.025	0.028
127	undecane, 2,5-dimethyl	17301-22-3	0.025	0.049
184	cyclohexane, 1,2,4,5-tetraethyl-	61142-24-3	0.025	0.029

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
12	cyclopentane	287-92-3	0.024	0.021
120	undecane, 3,7-dimethyl-	17301-29-0	0.024	0.048
49	cyclopentane, 1,2-dimethyl-3-(1-methylethyl)-c10h20 (140)		0.024	0.018
169	hexadecane	544-76-3	0.024	0.028
112	decane, 2,3,6-trimethyl-	62238-12-4	0.023	0.045
161	c15-alkane		0.023	0.027
185	3-dodecanone	1534-27-6	0.023	0.002
20	hexamethylcyclotrisiloxane		0.023	0.046
32	heptanal	111-71-7	0.023	0.019
47	cyclopropane, pentyl-	2511-91-3	0.022	0.026
17	cyclobutane, 1,2-diethyl-, trans-	19341-98-1	0.022	0.044
57	benzene, 1-propenyl-	637-50-3	0.022	0.043
29	3-heptanone	106-35-4	0.021	0.016
11	propane, 2-methyl-2-nitro-	594-70-7	0.021	0.014
183	4-undecanone	14476-37-0	0.021	0.041
192	5-tridecanone	30692-16-1	0.020	0.002
52	(Z)-2,3,4,5-tetramethyl-3-hexane		0.020	0.040
93	octane, 6-ethyl-2-methyl-	62016-19-7	0.019	0.038
89	mixture		0.019	0.038
159	c15-alkane		0.019	0.038
31	benzene, 1,3-dimethyl-	108-38-3	0.019	0.037
69	alkane and others		0.019	0.038
53	benzonitrile	100-47-0	0.019	0.037
145	c8-cyclohexane		0.019	0.037
79	naphthalene, decahydro-, trans-	493-02-7	0.019	0.037
54	cyclopentane, 1-butyl-2-ethyl-	72993-32-9	0.019	0.013
128	undecane, 2,4-dimethyl	17312-80-0	0.019	0.038

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
114	cyclohexane, 1-methyl-3-pentyl-	54411-02-8	0.019	0.038
204	pentadecanoic acid	1002-84-2	0.018	0.012
141	tridecane. 5-,methyl-	25117-31-1	0.018	0.013
84	cyclohexane, 1,2-diethyl-1-methyl- and ethanone, 1-phenyl-	61141-79-5	0.018	0.036
115	naphthalene and others	91-20-3	0.017	0.034
100	2-undecene, 8-methyl-, (Z)-	74630-44-7	0.016	0.018
30	styrene	100-42-5	0.016	0.033
124	naphthalene, decahydro-1, 6-dimethyl-	1750-51-2	0.016	0.032
168	pentadecane, 3-methyl	2882-96-4	0.016	0.032
15	2h-pyran-2-one, tetrahydro-5, 6-dimethyl-, trans-	24405-16-1	0.016	0.019
48	cyclohexanal, 4-(1-methylethyl)-		0.016	0.011
207	9-hexadecenoic acid	2091-29-4	0.015	0.022
25	benzene, ethyl-	100-41-4	0.015	0.031
2	3-buten-2-one	78-94-4	0.015	0.031
173	c9-cyclohexane		0.015	0.030
83	bicyclo[2.2.2]octane, 1,2,3,6-tetramethyl-	62338-45-8	0.015	0.030
36	heptane, 3-ethyl-2-methyl-	14676-29-0	0.015	0.010
179	docosane, 7-hexyl	55373-86-9	0.015	0.030
27	1-hexene, 5-methyl-	3524-73-0	0.015	0.018
68	benzene, (1,1-dimethylethyl)-	98-06-6	0.013	0.027
190	TBP and benzenamine, N-phenyl		0.013	0.026
10	butanal, 3-methyly-	590-86-3	0.013	0.015
139	c9-cyclopentane		0.013	0.026
211	hexadecanoic acid, 1-methylethyl ester	142-91-6	0.013	0.027

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
81	cyclohexane, 1,2-diethyl-1-methyl-		0.013	0.026
140	c13-alkane		0.012	0.025
117	cyclohexane, 1-methyl-4-(1-methylbutyl)-	54411-00-6	0.012	0.025
66	1-hexanol, 2-ethyl- and others	104-76-7	0.011	0.013
170	2-dodecene, 4-methyl-	56851-45-7	0.011	0.013
13	propane, 2-isocyanato-	1795-48-8	0.011	0.022
37	1-pentyn-3-ol, 4-methyl- and others	565-68-4	0.011	0.022
45	benzene, 1-ethyl-2-methyl	611-14-3	0.011	0.022
90	cyclohexane, 1-ethyl-2-propyl-	62238-33-9	0.011	0.022
175	dodecane, 2-methyl-6-propyl-		0.011	0.007
157	alkane		0.010	0.020
35	bicyclo[2,2,1]heptane		0.010	0.012
40	nonane, 4-methyl-	17301-94-9	0.010	0.012
38	bicyclo[2.2.1]heptane and others	279-23-2	0.0098	0.0116
19	cyclotrisiloxane, hexamethyl-	541-05-9	0.0096	0.0192
50	benzene, (1-methylethyl)-	98-82-8	0.0086	0.0173
144	cyclohexane,1-(cyclo-hexylmethyl)-2-ethyl	54934-93-9	0.0083	0.0166
61	c10-alkane and others		0.0081	0.0099
176	alkane		0.0074	0.0148
123	alkene		0.0071	0.0142
56	cyclopentane, 2-isopropyl-1, 3,-dimethyl-		0.0071	0.0083
205	1-hexadecanol	36653-82-4	0.0070	0.0112
41	benzene, propyl-	103-65-1	0.0070	0.0140
33	cyclopentanone, 2,4-dimethyl-	1121-33-1	0.0065	0.0129
134	c6-cyclohexane		0.0063	0.0126

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
22	cyclopentanone, 3-methyl-	1757-42-2	0.0060	0.0120
24	mixture		0.0060	0.0119
9	acetic acid and others	64-19-7	0.0059	0.0118
116	naphthalene, decahydro-2, 3-dimethyl-	1008-80-6	0.0057	0.0114
34	bicyclo[4.1.0]heptane	286-08-8	0.0056	0.0112
153	1,1'-bicyclohexyl, 2-methyl-,trans	50991-09-8	0.0054	0.0108
23	cyclobutanone, 2-ethyl-	10374-14-8	0.0054	0.0108
86	cyclohexane, 1,1,3,5-tetramethyl-, trans-	50876-31-8	0.0053	0.0105
18	acetic acid, butyl ester	123-86-4	0.0049	0.0097
60	cyclohexane, diethyl-	1331-43-7	0.0048	0.0096
21	nitric acid, butyl ester	928-45-0	0.0048	0.0096
28	heptane, 2,5-dimethyl-	2216-30-0	0.0047	0.0093
210	1-hexadecanol	29354-98-1	0.0046	0.0092
14	methylamine, n-(1-methy-butylidene)-	22431-09-0	0.0046	0.0091
65	heptane, 3,3-dimethyl-	4032-86-4	0.0046	0.0093
63	1-hexene, 5,5,-dimethyl-	7116-86-1	0.0045	0.0091
193	mixture		0.0044	0.0088
8	2-butenenitrile	4786-20-3	0.0044	0.0087
194	1-tridecyn-4-ol	74646-37-0	0.0044	0.0033
198	9H-fluoren-9-one	486-25-9	0.0042	0.0085
187	1-butanone, 4-(dimethylamine)-1-phenyl	3760-63-2	0.0039	0.0078
212	alkane		0.0037	0.0075
201	siloxane		0.0035	0.0069
58	hexanal	66-25-1	0.0032	0.0063

Cmpd #	Compound	CAS[1] Number	Average (mg/m^3)	Standard Deviation (mg/m^3)
59	cyclopentane, 1-methyl-3-(2-methylpropyl)-	29053-04-1	0.0027	0.0055
199	octadecane	593-45-3	0.0024	0.0048
200	alkane and benzaldehyde, 4-hydroxy-		0.0018	0.0037
191	decane 3-cyclohexyl-, 3-cyclohexyl-	13151-74-1	0.0018	0.0037
209	hexadecane, 2,6,10,14-tetramethyl-	638-36-8	0.0013	0.0025
203	alkanoic acid		0.0010	0.0021
206	heptadecane	629-78-7	0.00090	0.00180

1. CAS = Chemical Abstract Service.

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