

Attachment 1

National Ambient Air Quality Standards (NAAQS)

National Ambient Air Quality Standards

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. **Primary standards** set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. **Secondary standards** set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants. They are listed below. Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$).

Pollutant	Primary Stds.	Averaging Times	Secondary Stds.
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour ⁽¹⁾	None
	35 ppm (40 mg/m^3)	1-hour ⁽¹⁾	None
Lead	1.5 $\mu\text{g}/\text{m}^3$	Quarterly Average	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 $\mu\text{g}/\text{m}^3$)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM ₁₀) Particles with aerodynamic diameter of 10 microns or less	Revoked ⁽²⁾	Annual ⁽²⁾ (Arith. Mean)	
	150 $\mu\text{g}/\text{m}^3$	24-hour ⁽³⁾	
Particulate Matter (PM _{2.5}) Particles with aerodynamic diameter of 2.5 microns or less	15.0 $\mu\text{g}/\text{m}^3$	Annual ⁽⁴⁾ (Arith. Mean)	Same as Primary
	35 $\mu\text{g}/\text{m}^3$	24-hour ⁽⁵⁾	
Ozone	0.08 ppm	8-hour ⁽⁶⁾	Same as Primary
	0.12 ppm	1-hour ⁽⁷⁾ (Applies only in limited areas)	Same as Primary
Sulfur Oxides	0.03 ppm	Annual (Arith. Mean)	-----
	0.14 ppm	24-hour ⁽¹⁾	-----
	-----	3-hour ⁽¹⁾	0.5 ppm (1300 $\mu\text{g}/\text{m}^3$)

- (1) Not to be exceeded more than once per year.
- (2) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM₁₀ standard in 2006 (effective December 17, 2006).
- (3) Not to be exceeded more than once per year on average over 3 years.
- (4) To attain this standard, the 3-year average of the weighted annual mean PM_{2.5} concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.
- (5) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (effective December 17, 2006).
- (6) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
- (7)
 - (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1 , as determined by appendix H.
 - (b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

Attachment 2

ASPECT Report

Preliminary Report for Airborne Data Collected
In Support of US EPA Region VII
ChemCentral Fire,
Kansas City, Missouri

Background

At approximately 20:30 GMT (14:30 local) on 7 February 2007 a large explosion and resulting fire occurred at the ChemCentral facility located east of downtown Kansas City, Missouri. The Region 7 emergency operations center requested that the ASPECT aircraft be dispatched to assist in the response.

Initial reports from the facility were sparse but information and plant personnel reported that the fire may have started in drums containing unknown chemicals. These minor fires touched off larger explosions including reported 30,000 gallon tankers. The resulting fire generated a plume that was visible for miles. It is also reported that schools in the area have been evacuated and the rail yard near the fire has been shut down. At the current time there are no reports of injuries.

Recent EPCRA Tier II reports indicated that the facility had contained relatively large quantities of several compounds including various industrial solvents, several alcohols (including methanol), and mineral spirits.

Due to the time and low light condition that the ASPECT aircraft was on station, no visible images were collected. A representative aerial image for the site was obtained from Google Earth and is given in Figure 2.

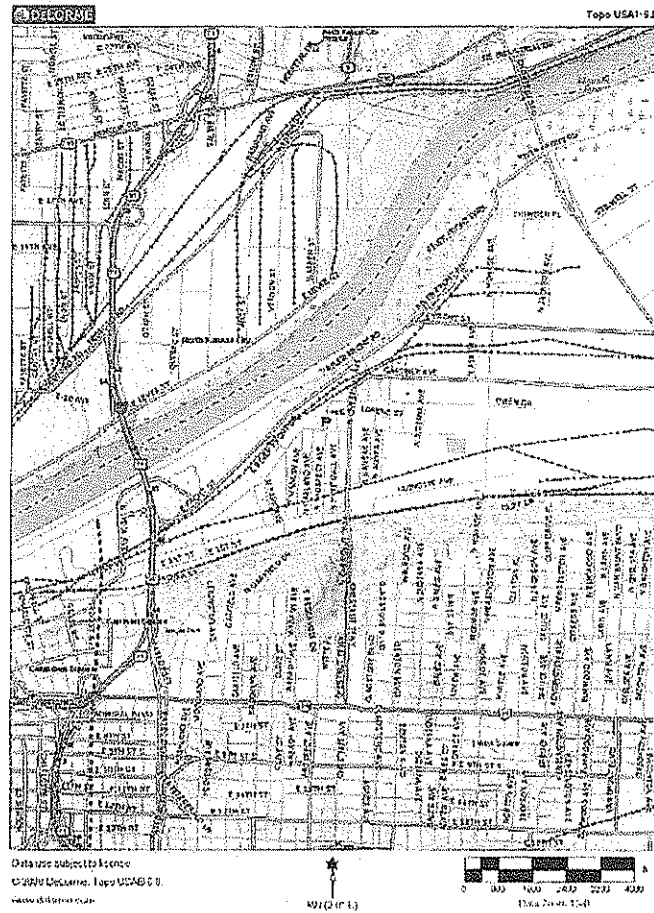


Figure 1. Site Map of the Chem Central

At 15:40 the aircraft was airborne from Waxahachie, Texas and reported a flight time of approximately 2 hours and 30 minutes. At 18:05 the aircraft called in and reported that they were about 10 minutes out from the target. The crew reported seeing smoke over Paola, Kansas which is approximately 50 miles to the south of downtown Kansas City. Near the target, the crew reported heavy black smoke rising to about 2000 feet AGL.

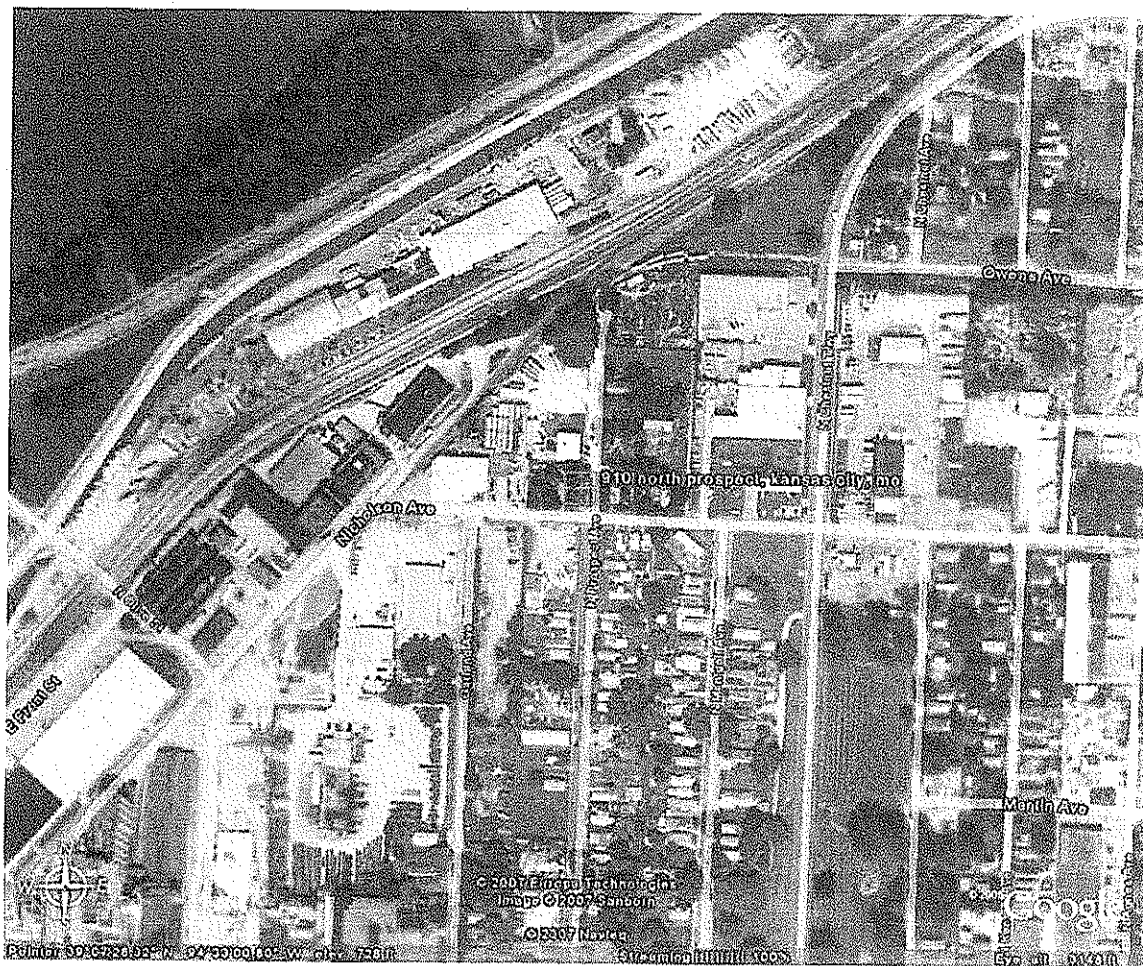


Figure 2. Google Earth Image, ChemCentral, Kansas City, Missouri.

Weather conditions during the data collection consisted of clear skies with a moderate visibility of 10 miles. Winds were reported from the north at about 5 kts. The surface temperature was -6°C with a relative humidity of 45 percent.

ASPECT System

The US EPA ASPECT system was used to collect airborne infrared (IR) images and data over the site. The ASPECT system is an emergency response aircraft permitting remote chemical detection in support of the first responder. The system consists of an airborne high speed Fourier transform infrared spectrometer (FTIR) couple with a wide-area IR line scanner. The ASPECT IR systems have the ability to detect compounds in both the 8 to 12 micron (800 to 1200 cm^{-1}) and 3 to 5 micron (2000 to 3200 cm^{-1}) regions. The 8 to 12 micron region is typically known as the atmospheric window region since the band is reasonably void of water and carbon dioxide influence. Spectrally, this region is used to detect carbon—non- carbon bonded compounds. The 3 to 5 micron

region is also free of water and carbon dioxide but typically does not have sufficient energy for use. This band does show use in high-energy environments such as fires. The Carbon – Hydrogen stretch is very common in this region.

Flight Status

The order to launch the aircraft was given at 2100 GMT (1500 local). The aircraft was observed on radar at 2140 (1540 local) with an estimated flight time of 2 hours 30 minutes. The aircraft arrived on-scene at 0010 GMT (1810 local) and collected 15 passes of data in two sorties. Flight information is summarized in Table 1 and 2. Flight maps for each sortie are given Figures 3A and 3B, respectively.

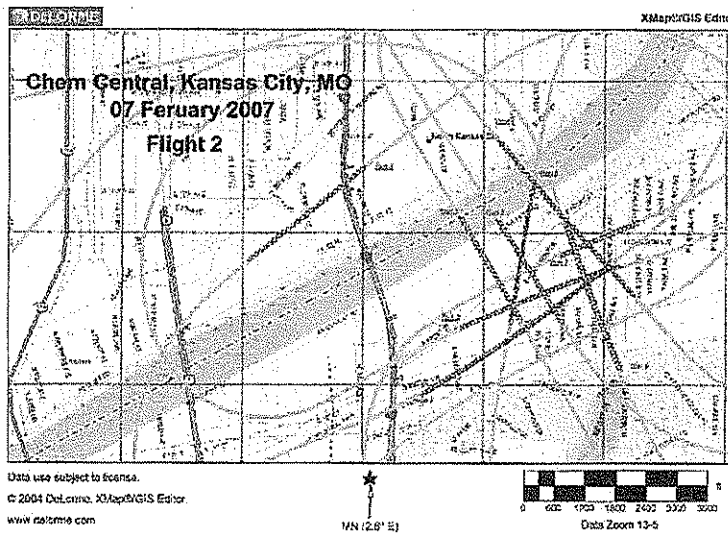
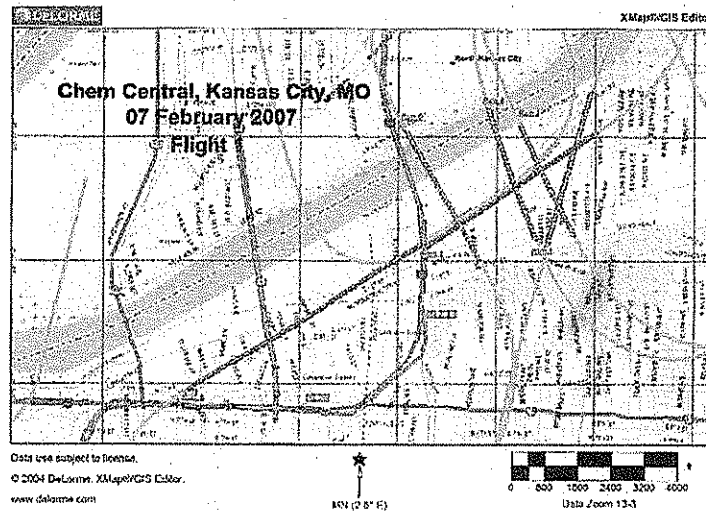
Table 1. Flight Status Sortie I – 07 February 2007

Run (log sheet run #)	Time (GMT)	Altitude (MSL Ft)	Heading (Deg)	L/S File (2007_02_07_...)	FTIR File (07...)	Comments
1	2350		---	---	---	System Test All OK
2	0008	3100	011	R_02	...A08	Plume at 4000 ft near Paola
3	0012	3000	051	R_03	...A12	Plume at 3000
4	0014	3000	150	R_04	...A14	
5	0017	3000	158	R_05	...A17	
6	0020	3000	146	R_06	...A20	
7	0022	3000	055	R_07	...A22	

Table 2. Flight Status Sortie I – 07 February 2007

Run (log sheet run #)	Time (GMT)	Altitude (MSL Ft)	Heading (Deg)	L/S File (2007_02_07_...)	FTIR File (07...)	Comments
1	0227	3000	---	R_01	...C27	16 cm-1 Gain 1
2	0229	3000	030	R_02	...C29	16 cm-1 Gain 1
3	0232	3000	062	R_03	...C32	16 cm-1 Gain 2
4	0235	3000	135	R_04	...C35	16 cm-1 Gain 2

5	0237	3000	185	R_05	...C37	4 cm-1 Gain 2
6	0239	3000	336	R_06	...C39	4 cm-1 Gain 2
7	0242	3000	054	R_07	...C42	4 cm-1 Gain 2
8	0245	3000	144	R_08	...C45	4 cm-1 Gain 1
9	0248	3000	146	R_09	...C48	16 cm-1 Gain 1



Figures 3A and 3B

Data Results

Line Scanner Data Results

A total of 15 data passes were made and an image was generated for each pass. A low gain setting was used for the first sortie due to the anticipated high thermal output of the fire. This gain setting did not produce the quality of images expected. Accordingly, lower blackbody settings and a higher gain setting was used on sortie two with much improved results. Figure 4 shows an IR image of the fire for Run 7, sortie 2. The hot fire is clearly evident in the upper portion of the image. No plume is evident in the image. Several elevated temperature features are present in the center of the image and are most likely a nearby operating facility. Other processed images showed similar results.



Figure 4 IR Image Run 7, Sortie 2, ChemCentral, Kansas City, Missouri

FTIR Data Results

Spectral data was collected using the FTIR for each pass. A spectral resolution of 16 wavenumbers was used for sortie 1 and a combination of 16 and 4 wavenumbers was used for sortie 2. The following is a table summarizing the data sets generated during the flight.

Run	Compound
1	System Test
2	Trimethylbenzene < 1 ppm Methanol < 1 ppm
3	Trimethylbenzene < 1 ppm Methanol < 1 ppm
4	Trimethylbenzene < 1 ppm Methanol < 1 ppm
5	Trimethylbenzene < 1 ppm Methanol < 1 ppm
6	Trimethylbenzene < 1 ppm Methanol < 1 ppm

Table 3 – FTIR data, Sortie 1

Run	Compound
1	Trimethylbenzene < 1 ppm Ammonia < 1 ppm
2	Trimethylbenzene < 1 ppm Ammonia < 1 ppm
3	Trimethylbenzene < 1 ppm Ammonia < 1 ppm
4	Trimethylbenzene < 1 ppm Ammonia < 1 ppm
5	Trimethylbenzene < 1 ppm Ammonia < 1 ppm
6	Trimethylbenzene < 1 ppm Ammonia < 1 ppm
7	Trimethylbenzene < 1 ppm Ammonia < 1 ppm
8	Trimethylbenzene < 1 ppm Ammonia < 1 ppm
9	Trimethylbenzene < 1 ppm Ammonia < 1 ppm

Table 4. – FTIR data, Sortie 2

As is evident in the FTIR data table, trimethylbenzene was observed in all of the spectra collected on both sorties with a typical spectra given in Figure 5. These detections were only obtained directly over the fire. The hot environment of the fire was acting as a hot background and permitted lower than normal (ambient temperature) detection limits to be obtained. A concentration of less than 1 ppm was estimated for these detections.

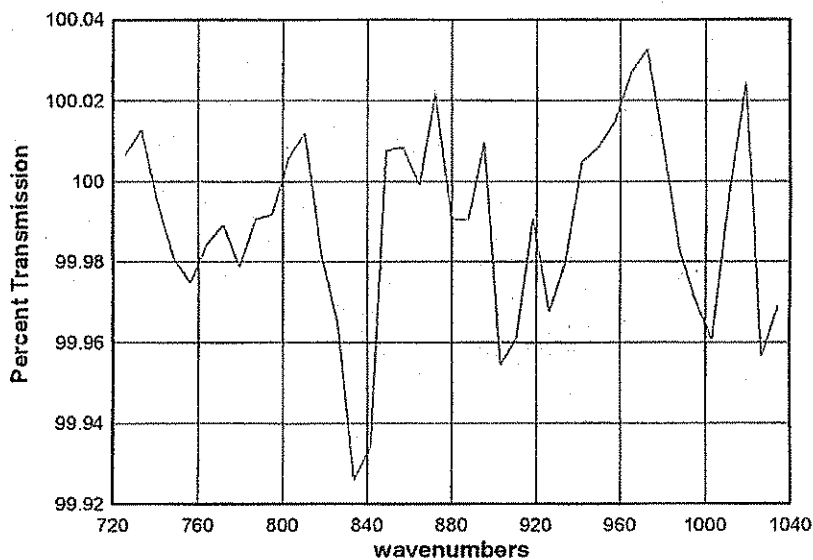


Figure 5. Trimethylbenzene, Sortie 1

Figure 6 shows 3 to 5 micron spectra over the fire. The sharp features of the spectra represent C-H stretching and indicate that a hydrocarbon is present and is being burned.

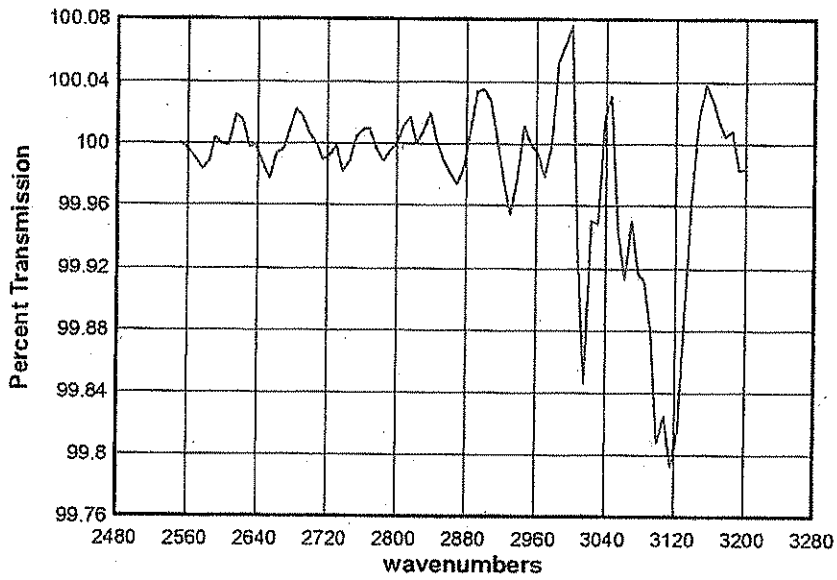


Figure 6. C-H Stretch, Sortie 1

Figure 7 shows spectra for ammonia collected on the second sortie. Again this is a very weak detection and a concentration of less than 1 ppm is estimated for ammonia. The source of ammonia is unknown but may be as a result of building materials being combusted.

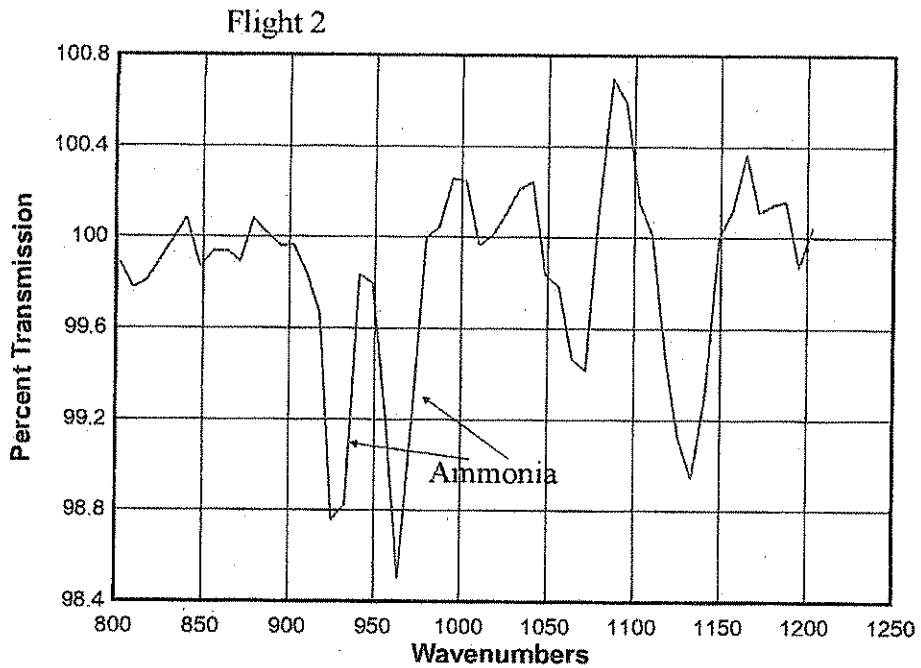


Figure 7. Ammonia Spectra, Sortie 2

Conclusion

The ASPECT aircraft was utilized to obtain IR imagery and spectral data over the fire and downwind areas from the ChemCentral fire in Kansas City. Analysis of the collected data showed low concentration levels of trimethylbenzene, methanol, and ammonia. Trimethylbenzene and methanol are consistent with the Tier II reports for the facility. The low level of these compounds (less than 1 ppm) was only observed over the fire. No detections were made in the downwind areas of the fire. The detection of ammonia may be a byproduct of burning building materials or may be a fugitive from a nearby source. Irrespective, the ammonia detections were estimated at below 1 ppm.

The detection limit for the ASPECT system is based on two factors and includes the difference in temperature or radiance between the target gas and background and the absorptivity of the target gas. A typical temperature difference of 10°C will result in a detection limit of 5 ppm using methanol as an example. The data collected over the ChemCentral fire had a temperature difference of over 100 degrees. This resulted in a lower detection limits. Since these high differences have not been run in calibrations, this uncertainty is captured in the reported detection as less than 1 ppm for all compounds. Actual concentration levels are likely much lower.