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# Summer Entrance Employee Air Monitoring

**Yellowstone National Park**  
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## Abstract

Employee exposure evaluations were performed on July 5<sup>th</sup>, 6<sup>th</sup>, and again on July 11<sup>th</sup> and 12<sup>th</sup>, 2005 at Yellowstone National Park's West Entrance station in kiosk A and B. Area and personal samples were collected for the following contaminants:

- Noise
- Carbon monoxide
- Aromatic hydrocarbons
- Elemental and organic carbon
- Respirable dust
- Nitrogen oxides
- Volatile organic compounds (VOC)
- Aldehydes

All exposures to the above air contaminants and noise were below the Occupational Safety and Health Administrations (OSHA) Permissible Exposure Limits (PEL). There were two contaminants with levels above the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs).

- Instantaneous carbon monoxide peaks
- Formaldehyde levels in kiosk A on July 11<sup>th</sup> and kiosk B on July 12<sup>th</sup>

The noise and air sampling performed in the summer were completed in the same kiosks (A and B), and the analytes were collected using the same methods as the *Yellowstone Winter Use Personal Exposure Monitoring* study. The winter study was prepared by Terry Spear, Ph.D. from Montana Tech of The University of Montana, and Dale Stephenson, Ph.D. from Boise State University. The winter samples were collected at the West Entrance on January 15-17, 2005, and February 19-21, 2005.

The winter study used a Thermo-Electron® (MIE) DataRAM™ and a TSI® P-trak™ ultra-fine particle counter for real time respirable particulate matter samples. The summer study did use real time particle samples, but like the winter study, the summer study collected integrated samples for respirable particulate matter. All other analytes were collected using the same method as the winter study. The sampling methods were from the National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods (NMAM).

## Summary

Noise collected by dosimeters in the summer showed the employee's exposure below the OSHA PEL. Sound levels were also collected using a real time sound level meter as the vehicles passed through the entrance and noise levels were below OSHA's ceiling limit of 115 decibels. The average noise level in kiosks A and B for the summer was 57.75 dBA. The average noise level in kiosks A and B for the winter was 43.6 dBA. Both average noise levels were below OSHA's PEL.

The carbon monoxide levels in the summer were below all OSHA, NIOSH, and American Conference of Governmental Industrial Hygienists (ACGIH) 8-hour time weighted average (TWA) exposure limits. The OSHA time weighted average PEL is 50 ppm, the NIOSH time weighted average REL is 35 ppm, and the ACGIH time weighted average TLV is 25 ppm. All sampling showed time weighted averages were 0 ppm. One area of concern was four of the twelve carbon monoxide samples had a peak above the NIOSH ceiling limit of 200 ppm. The average carbon monoxide level in the winter was 0.95 ppm with the maximum peak of 33.6 ppm.

All aromatic hydrocarbon samples taken in the summer were less than the limit of detection for the analytical method. The results from the winter study showed similar results with nine out of ten of the samples under the limit of detection. One winter sample showed a toluene level of 0.73 ppm, below OSHA's PEL of 50 ppm.

Elemental, organic, and total carbon samples were sampled in both kiosks each day. All samples were below the previous proposed exposure limits as well as the current Mine Safety and Health Administration (MSHA) standard of  $160\mu\text{g}/\text{m}^3$  for total carbon. The MSHA standard was used because there are no other regulatory agencies with established limits for carbon. The summer average for total carbon in  $\mu\text{g}/\text{m}^3$  was 33.93 compared to the winter average of 44.38.

Five samples for respirable particulates were taken over the four days of sampling. The gravimetric analysis showed all results below the limit of detection for the analytical method. The winter study showed the same results with all 13 samples below the limit of detection for the analytical method.

A total of eight samples were collected and analyzed for nitrogen dioxide ( $\text{NO}_2$ ) and nitric oxide (NO). The results showed all employee exposures below the established exposure limits of 3 ppm for  $\text{NO}_2$  and 25 ppm for NO. The winter sampling results showed all employee exposures to NO and  $\text{NO}_2$  below the exposure limits.

Volatile organic compounds were sampled each of the four days in July. All exposure levels were either below the limit of detection for the instrument or they were below the established OSHA PELs, NIOSH RELs, ACGIH TLVs and/or ATSDR MRLs. There aren't established exposure limits for all the compounds reported in the results. The results from the winter study were also under the limit of detection and the established exposure levels.

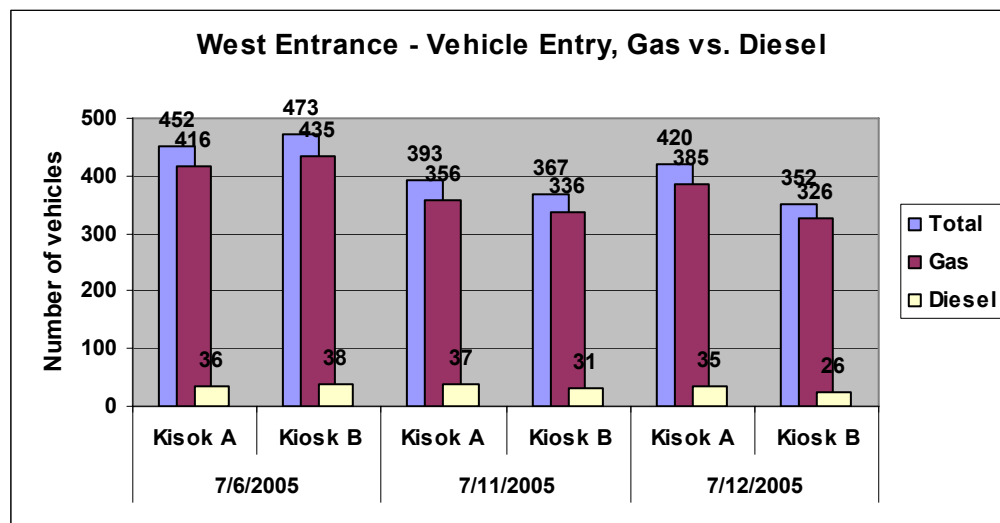
Six samples were collected and analyzed for aldehyde exposure. Five of the six exposures were below the OSHA PEL. The formaldehyde levels on July 11<sup>th</sup> and 12<sup>th</sup> were a concern. The levels were 0.015 ppm and 0.024 ppm respectively. The NIOSH recommended exposure limit as a time weighted average is 0.016 ppm. The aldehyde results from the winter study were below the limit of detection.

## Results and Discussion

### I. West Entrance

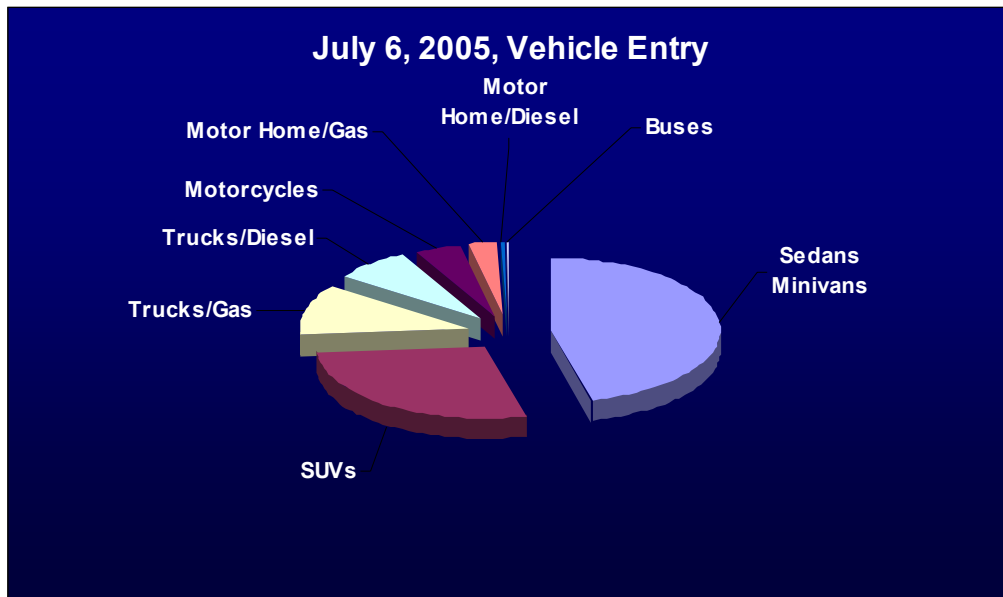
The vehicles passing through the West Entrance were categorized by engine types (gas or diesel), and by vehicle type (Sedan/Van, SUV, Bus, Truck, Motorcycle, or Motor home) on July 6<sup>th</sup>, 11<sup>th</sup>, and 12<sup>th</sup>. The majority of vehicles that passed through kiosks A and B at the West Entrance during this three day sampling period had gasoline engines (92%, 91%, and 91% respectively). The chart below compares the engine types.

**Figure 1: Vehicle Entry, Gas vs. Diesel**

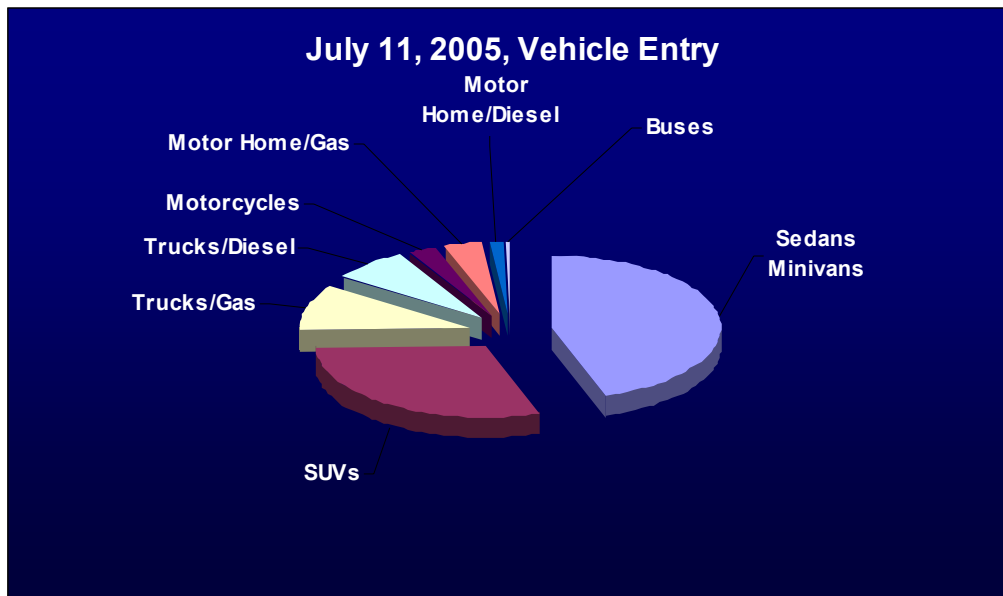


Vehicle types remained consistent on each sample date as approximately 46% were categorized as sedans and minivans. Sport utility vehicles passing through the station consisted of approximately 28% of the total vehicles. The vehicle type averaged for the three sample dates is illustrated in Figure 2, 3, and 4.

**Figure 2: July 6<sup>th</sup>, 2005 Vehicle Entry**

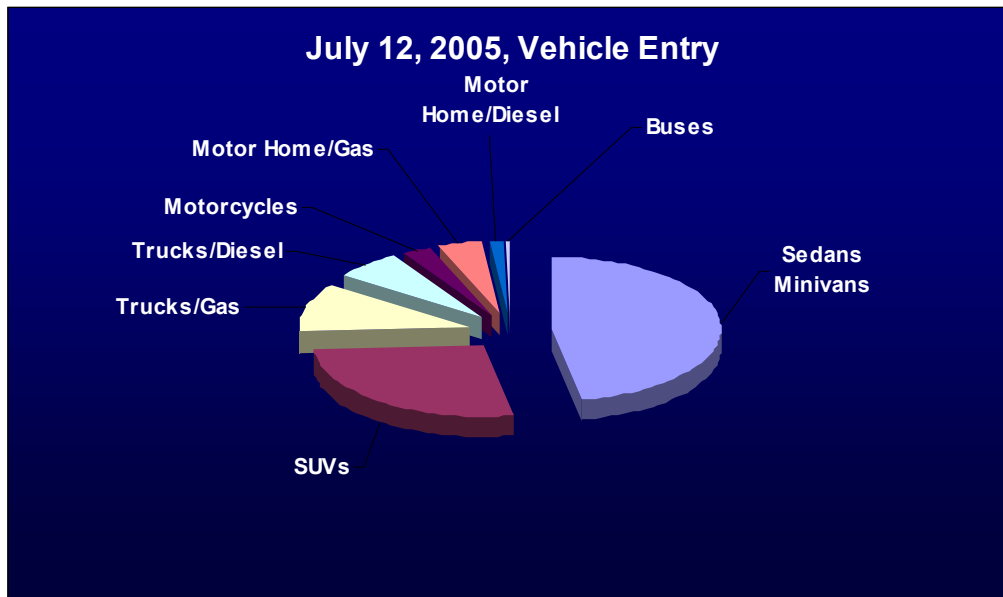


**Figure 3: July 11<sup>th</sup>, 2005 Vehicle Entry**





**Figure 4: July 12<sup>th</sup>, 2005 Vehicle Entry**



### **Air Monitoring Particulate Data**

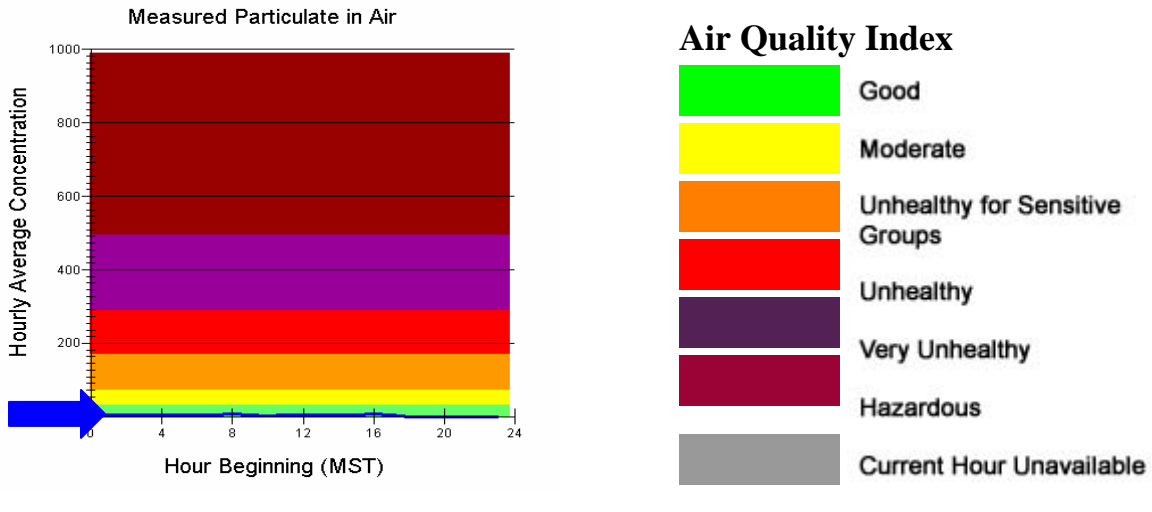
The Montana Department of Environmental Quality (DEQ) monitors air quality at different locations throughout the state. The purpose of the air quality monitoring is to monitor, assess and provide information on statewide ambient air quality conditions and trends as specified by the Montana and Federal Clean Air Acts.

(<http://www.deq.state.mt.us/AirMonitoring/index.asp>)

Data was available for three of the four sampling days. The average level, the blue line towards the bottom of the graphs, remained in the green level of the air quality index. The DEQ has labeled the green level “Good”, and it is defined as, “No health impacts are expected when air quality is in this range” (DEQ website).

**Figure 5: Air Monitoring Data**

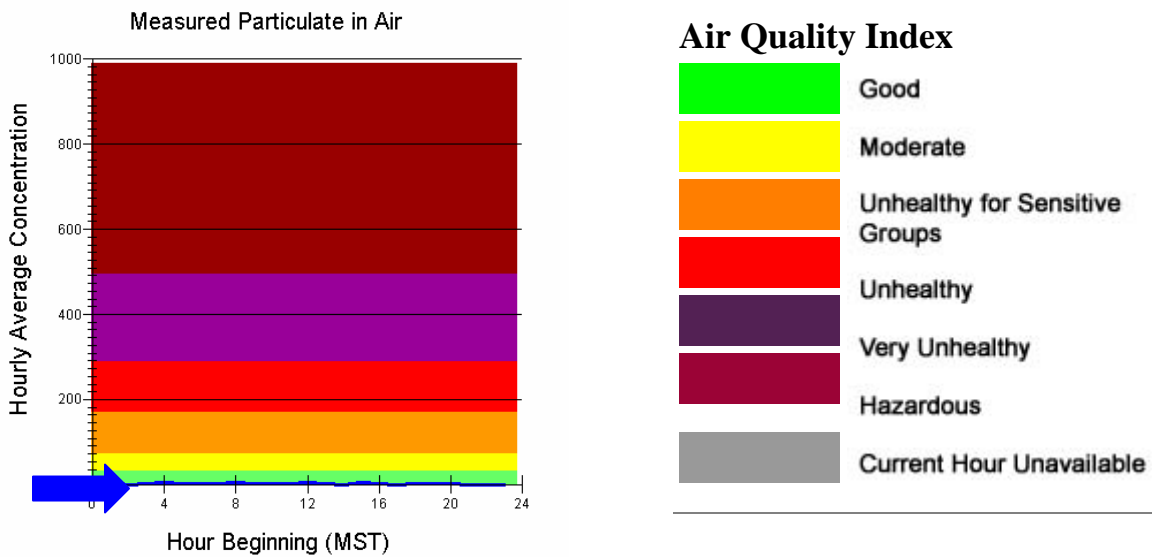
West Yellowstone Park Entrance Station 7/5/2005

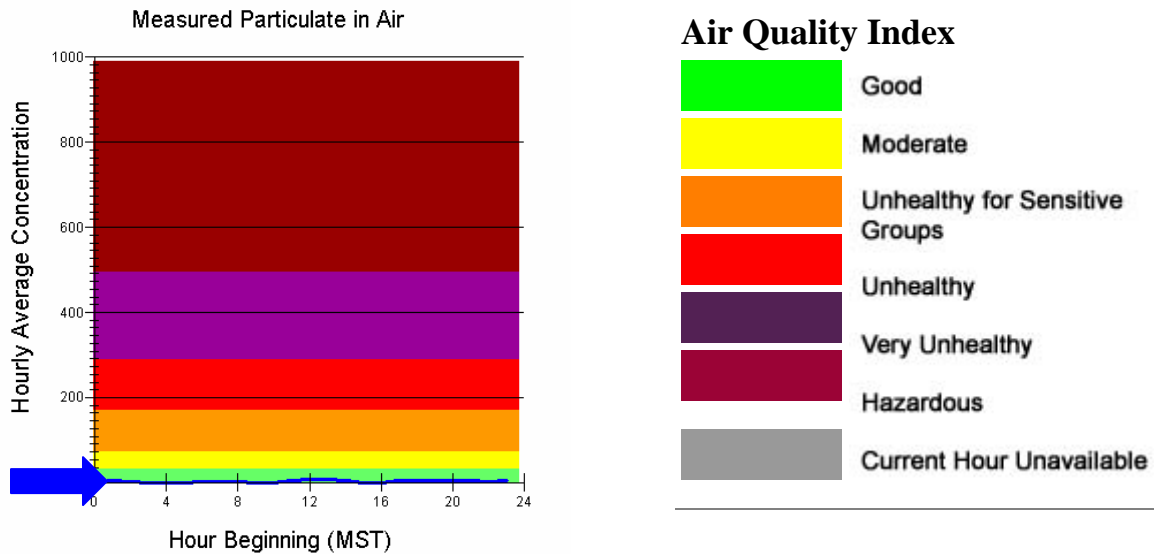


West Yellowstone Park Entrance Station 7/6/2005

Data was unavailable.

West Yellowstone Park Entrance Station 7/11/2005





**Noise Results**

Summarized in the table below are the noise results for the west entrance employees. The results are below both the OSHA Engineering Standard for noise exposure (90 dBA 8-hr TWA) and the OSHA Hearing Conservation Standard (85 dBA 8-hr TWA). The summer results are listed in Table 1 and the winter results are listed in Table 2.

**Table 1: Summer Noise Dosimetry Results**

Date	Location	PEL <sup>1</sup>		HC <sup>2</sup>	
		8-hr TWA	% Dose	8-hr TWA	% Dose
7/5/2005	Kiosk A	60.1	1.291	70.5	5.471
7/5/2005	Kiosk B	54.5	0.614	58.1	1.012
7/6/2005	Kiosk A	61.5	1.422	73.6	7.589
7/6/2005	Kiosk B	60.5	1.268	72.7	6.811
7/11/2005	Kiosk A	59.0	1.105	72.5	7.207
7/11/2005	Kiosk B	58.4	0.951	70.6	5.121
7/12/2005	Kiosk A	51.1	0.345	63.7	1.988
7/12/2005	Kiosk B	56.9	0.810	63.6	2.050

<sup>1</sup> PEL- Dosimeter settings set to evaluate compliance with the OSHA Engineering Standard (threshold = 90dB; Exchange Rate = 5dB; Criterion Level = 90 dB; Time Constant = slow)

<sup>2</sup> HC- Dosimeter settings set to evaluate compliance with the OSHA Hearing Conservation Standard (threshold = 80dB; Exchange Rate = 5 dB; Criterion Level = 90dB; Time Constant = slow)

**Table 2: Winter Noise Dosimetry Results**

Date	Location	PEL <sup>1</sup>		HC <sup>2</sup>	
		8-hr TWA	% Dose	8-hr TWA	% Dose
1/15/2005	West Entrance Kiosk Attendants	67.0	4.000	75.0	12.500
1/16/2005		38.0	<1	57.0	1.000
2/19/2005		37.0	<1	56.0	1.000
2/20/2005		35.0	<1	55.0	1.000
2/21/2005		41.0	<1	60.0	2.000

1 PEL- Dosimeter settings set to evaluate compliance with the OSHA Engineering Standard (threshold = 90dB; Exchange Rate = 5dB; Criterion Level = 90 dB; Time Constant = slow)

2 HC-Dosimeter settings set to evaluate compliance with the OSHA Hearing Conservation Standard (threshold = 80dB; Exchange Rate = 5 dB; Criterion Level = 90dB; Time Constant = slow)

The average noise level for the summer noise dosimetry was 57.75 dB. The average noise level for the winter noise dosimetry was 43.6 dB. As vehicles were passing through the entrance in July, a sound level meter was used to determine the peak sound levels from different vehicles. While idling at the entrance gate, the highest noise levels were from diesel pickups ranging from 80 to 83 decibels. Diesel buses and motor homes produced noise levels in the same range. The next highest idling levels came from motorcycles, ranging from 70 to 75 decibels. When accelerating the noise levels from the diesel vehicles increased, ranging from 86 to 93 decibels with the motor homes at the upper end of the range. While the motorcycles accelerated the noise levels ranged from 78 to 90 decibels. An octave band filter was used while the diesel vehicles were idling in the entrance and the sound levels were highest in the 125, 250, 500, 1000, and 2000 frequency range.

### Carbon Monoxide

The results for the carbon monoxide monitoring are shown below in Table 3. None of the time weighted averages exceeded the permissible exposure limits. Four of the twelve samples had a peak greater than the NIOSH ceiling limit of 200 ppm. In the summer study the entrance employees noted most of the CO peaks occurred when either a motorcycle was idling at the gate or when an older vehicle, inefficiently burning fuel, was idling at the gate.

The summer results for carbon monoxide had similar time weighted averages as the winter study (ranging from 0 ppm to approximately 2 ppm) with all averages below all time weighted average exposure limits. The summer results showed carbon monoxide peaks greater than the winter carbon monoxide peaks.

**Table 3: Summer Carbon Monoxide (CO) levels**

Date	Location/Instrument	TWA	STEL	PEAK	NIOSH Ceiling	OSHA PEL (TWA)	NIOSH REL (TWA)	ACGIH TLV (TWA)
7/5/05	Kiosk A/I.S. M40	0	0	188	200	50	35	25
7/5/05	Kiosk A/MiniMAX Pro	0	1	37	200	50	35	25
7/5/05	Kiosk B/MiniMAX Pro	0	1	62	200	50	35	25

7/6/05	Kiosk A/MiniMAX Pro	0	2	250	200	50	35	25
7/6/05	Kiosk B/MiniMAX Pro	0	1	73	200	50	35	25
7/6/05	Kiosk B/I.S. M40	1	0	166	200	50	35	25
7/11/05	Kiosk A/MiniMAX Pro	0	1	65	200	50	35	25
7/11/05	Kiosk A/I.S. M40	0	0	102	20	50	35	25
7/11/05	Kiosk B/MiniMAX Pro	0	2	765	200	50	35	25
7/12/05	Kiosk A/MiniMAX Pro	0	0	633	200	50	35	25
7/12/05	Kiosk B/I.S. M40	1	0	104	200	50	35	25
7/12/05	Kiosk B/MiniMAX Pro	0	0	252	200	50	35	25

**Table 4: Winter CO levels**

Date	Location	Start	Stop	CO Avg (ppm)	CO 8 hr TWA	CO Peak (STEL)
1/15/05	Kiosk A	8:19 AM	1:03 PM	0.57	0.34	6.5 ppm @ 9:40 AM
1/16/05	Kiosk A	7:39 AM	12:57 PM	0.72	0.48	8.9 ppm @ 9:36 AM
2/19/05	Kiosk A	7:36 AM	12:50 PM	2.12	1.39	14.0 ppm @ 9:19 AM
2/19/05	Kiosk B	8:10 AM	12:32 PM	0.00	0.00	0.0 ppm @ 8:10 AM
2/20/05	Kiosk A	6:54 AM	2:03 PM	1.73	1.55	33.6 ppm @ 9:05 AM
2/21/05	Kiosk A	7:23 AM	12:35 PM	0.58	0.38	8.0 ppm @ 9:38 AM

### Aromatic Hydrocarbons

All aromatic hydrocarbon samples were below the limit of detection for the analytical method. The winter study showed total hydrocarbon levels between the limit of detection and 3.6 ppm. The table below shows the summer aromatic hydrocarbon levels followed by the winter levels. Refer to appendix B, Table 5B for all the total petroleum hydrocarbons sample results.

**Table 5: Summer Total Petroleum Hydrocarbon Levels**

Date	Laboratory Number	Sample Location	Total Petroleum Hydrocarbons mg/sample	Total Petroleum Hydrocarbons ppm
7/5/05	05I26118	Kiosk A	ND	<0.12
7/6/05	05I26119	Kiosk B	ND	<0.14
7/11/05	05I28379	Kiosk B	ND	<0.13
7/11/05	05I28380	Kiosk A	ND	<0.15
7/12/05	05I28381	Kiosk A	ND	<0.13
7/12/05	05I28382	Kiosk B	ND	<0.14

**Table 6: Winter Total Petroleum Hydrocarbon Levels**

Date	Laboratory Number	Sample Type	Total Petroleum Hydrocarbons mg/sample	Total Petroleum Hydrocarbons ppm
1/15/05	05I01355	TUBE	0.022	0.190
1/16/05	05I01357	TUBE	ND	<0.041
1/17/05	05I01358	TUBE	ND	<0.044
2/19/05	05I06976	TUBE	0.045	0.210
2/20/05	05I06977	TUBE	0.043	0.220
2/21/05	05I06973	TUBE	0.014	0.078
2/21/05	05I06974	TUBE	0.270	3.600
2/21/05	05I06972	TUBE	0.049	0.260

**Elemental, Organic, and Total Carbon**

A total of 15 samples for elemental, organic and total carbon were collected. The samples were collected using the NIOSH Manual of Analytical Methods – Method 5040 and the samples were analyzed for carbon using evolved gas analysis (EGA). There are currently no PELs, TLVs, or RELs for elemental or organic carbon, but MSHA does have a standard of 160  $\mu\text{g}/\text{m}^3$  for total carbon. All samples were below the ACGIH TLVs proposed in 1996 and 2001 as well as the current MSHA standard of 160  $\mu\text{g}/\text{m}^3$ .

There were two different cassettes used for sampling carbon in the summer. Eight of the samples were a diesel particulate matter (DPM) cassette with a submicron impactor. The other seven cassettes were DPM cassettes without the impactor. The Submicron impactor screens out particles  $\geq 1.0 \mu\text{m}$ . The DPM cassettes with the impactor collected more elemental carbon, but they were lower compared to the cassette without the impactor for organic carbon and total carbon. A comparison of the two cassettes is shown below in Table 7. All values are averages and there were eight samples that had impactors and seven samples without impactors.

**Table 7: DPM Cassettes with and without Impactors**

DPM Cassette	Total Carbon ug/sample	Organic Carbon ug/m3	Elemental Carbon ug/m3	Total Carbon ug/m3
With Impactor (DC)	27.625	26.125	4.438	30.625
Without Impactor (DQ)	34.571	33.714	4.100	37.714

Overall the summer sampling results had a higher average, in  $\mu\text{g}/\text{m}^3$ , than the winter results in elemental carbon, but a lower average in organic and total carbon. The tables below show the summer and winter results for elemental, organic, and total carbon.

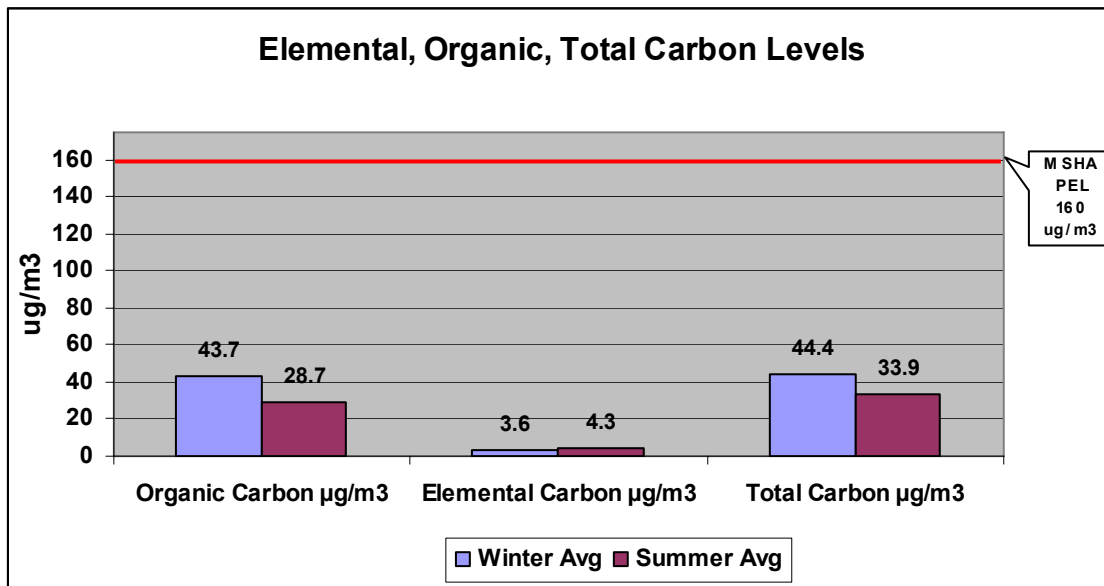
**Table 8: Summer Elemental and Organic Carbon Levels**

Date	Sample	Laboratory Number	Sample Location	Organic Carbon ug/sample	Elemental Carbon ug/sample	Total Carbon ug/sample	Organic Carbon ug/m3	Elemental Carbon ug/m3	Total Carbon ug/m3
7/5/05	DC75223	05I26105	Kiosk A	30	2.3	33	31.0	2.4	33.0
7/5/05	DC75165	05I26106	Kiosk B	29	6.1	35	30.0	6.3	36.0
7/5/05	DQ75237	05I26110	Kiosk A	41	2.1	43	45.0	2.4	47.0
7/5/05	DQ75229	05I26111	Kiosk B	59	7.2	66	59.0	7.2	66.0
7/6/05	DC76223	05I26107	Kiosk A	23	3.9	26	27.0	4.6	32.0
7/6/05	DC76165	05I26108	Kiosk B	25	3.2	28	29.0	3.8	33.0
7/6/05	DQ76237	05I26112	Kiosk B	26	2.9	29	32.0	3.5	35.0
7/11/05	DC711165	05I28360	Kiosk A	23	2.7	25	25.0	3.0	28.0
7/11/05	DC711223	05I28361	Kiosk B	17	4	21	20.0	4.6	24.0
7/11/05	DQ711229	05I28355	Kiosk A	27	2.6	29	30.0	2.9	33.0
7/11/05	DQ711237	05I28356	Kiosk B	22	3.2	25	25.0	3.7	29.0
7/12/05	DC712165	05I28363	Kiosk B	24	4.8	28	25.0	5.2	31.0
7/12/05	DC712223	05I28364	Kiosk A	20	5.1	25	22.0	5.6	28.0
7/12/05	DQ712229	05I28358	Kiosk A	21	4.7	25	22.0	5.1	27.0
7/12/05	DQ712237	05I28359	Kiosk B	21	3.7	25	23.0	3.9	27.0
			<b>Average</b>	<b>27.2000</b>	<b>3.9000</b>	<b>30.8667</b>	<b>29.6667</b>	<b>4.2800</b>	<b>33.9333</b>

**Table 9: Winter Elemental and Organic Carbon Levels**

Date	Sample	Laboratory Number	Sample Type	Organic Carbon ug/sample	Elemental Carbon ug/sample	Total Carbon ug/sample	Organic Carbon ug/m3	Elemental Carbon ug/m3	Total Carbon ug/m3
1/15/05	1153	05I01361	FILTER	14	ND	14	45.0	<4.3	45.0
1/15/05	1154	05I01362	FILTER	20	ND	20	43.0	<2.7	43.0
1/16/05	1163	05I01363	FILTER	37	ND	37	37.0	<1.3	37.0
1/16/05	1164	05I01364	FILTER	17	ND	17	41.0	<3.1	41.0
1/16/05	1165	05I01365	FILTER	31	ND	31	35.0	<1.5	35.0
1/17/05	1174	05I01360	FILTER	36	ND	36	38.0	<1.4	38.0
1/17/05	1175	05I01366	FILTER	39	ND	39	41.0	<1.4	41.0
2/19/05	2192	05I06965	FILTER	13	ND	13	16.0	<1.6	16.0
2/19/05	2194	05I06964	FILTER	47	ND	47	56.0	<1.6	56.0
2/20/05	2202	05I06967	FILTER	42	ND	42	49.0	<1.5	49.0
2/20/05	2204	05I06966	FILTER	15	ND	15	17.0	<1.5	17.0
2/21/05	2222	05I06969	FILTER	21	ND	21	47.0	<2.8	47.0
2/21/05	2224	05I06968	FILTER	40	1.4	41	46.0	1.6	48.0
2/21/05	2225	05I06970	FILTER	41	ND	41	47.0	<1.5	47.0
			<b>Average</b>	<b>29.5000</b>	<b>1.4000</b>	<b>29.5714</b>	<b>39.8571</b>	<b>1.6000</b>	<b>40.000</b>

**Figure 6: Carbon Levels: Winter vs. Summer**



### Respirable Particulate Matter

Five samples were collected for respirable particulate (PM<sub>4.0</sub>) using NMAM 0600. The samples were analyzed by gravimetric analysis and all results were below the limit of detection for the analytical method. The winter results were also below the limit of detection for the analytical method. The tables below show the data reported from the laboratory.

**Table 10: Summer Respirable Particulate Matter**

Date	Field Sample Number	Laboratory Number	Sample Location	Respirable Dust mg/sample	Respirable Dust mg/m <sup>3</sup>	Air Volume L
7/5/05	R75206	05I26114	Kiosk A	None Detected	<0.02	982.50
7/6/05	R76206	05I26115	Kiosk A	None Detected	<0.03	785.50
7/6/05	G76229	05I26116	Kiosk B	None Detected	<0.02	837.60
7/11/05	G711206	05I28373	Kiosk A	None Detected	<0.02	839.80
7/12/05	G712206	05I28375	Kiosk B	None Detected	<0.02	904.02

**Table 11: Winter Respirable Particulate Matter**

Date	Field Sample Number	Laboratory Number	Sample Type	Total Particulates mg/sample	Total Particulates mg/m <sup>3</sup>	Air Volume L
1/15/05	1156	05I01373	FILTER	None Detected	<0.03	662.40
1/15/05	1157	05I01374	FILTER	None Detected	<0.05	399.40
1/16/05	1166	05I01375	FILTER	None Detected	<0.03	635.10
1/16/05	1167	05I01376	FILTER	None Detected	<0.07	303.40



1/17/05	1176	05101377	FILTER	None Detected	<0.03	712.20
1/17/05	1177	05101378	FILTER	None Detected	<0.03	682.50
2/19/05	2191	05106984	FILTER	None Detected	<0.02	832.60
2/19/05	2197	05106985	FILTER	None Detected	<0.03	757.90
2/20/05	2201	05106983	FILTER	None Detected	<0.02	885.10
2/20/05	2207	05106982	FILTER	None Detected	<0.02	845.04
2/21/05	2227	05106981	FILTER	None Detected	<0.02	855.98

### Oxides of Nitrogen

Eight area samples were collected for nitrogen dioxide and nitric oxide. The samples were analyzed using visible absorption spectrophotometry for nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>). All samples were below occupational exposure limits for NO and NO<sub>2</sub>. The tables below show the summer and winter results and the charts following compare summer vs. winter levels as well as summer and winter levels vs. occupational exposure limits.

**Table 12: Oxides of Nitrogen – Summer**

Date	Field Sample Number	Laboratory Number	Sample Location	Nitrogen Dioxide ug/sample	Nitrogen Dioxide ppm	Nitric Oxide ug/sample	Nitric Oxide ppm
7/5/05	NO7501	05126095	Kiosk A	NR	NR	1.9	0.13
7/5/05	NO7504	05126096	Kiosk B	NR	NR	1.7	0.12
7/6/05	NO7601	05126097	Kiosk A	NR	NR	2.6	0.19
7/6/05	NO7604	05126098	Kiosk B	NR	NR	2.3	0.19
7/11/05	NO71101	05128365	Kiosk B	NR	NR	1.6	0.11
7/11/05	NO71104	05128366	Kiosk A	NR	NR	1.6	0.13
7/12/05	NO71201	05128367	Kiosk B	NR	NR	1.8	0.11
7/12/05	NO71204	05128368	Kiosk A	NR	NR	2.2	0.17
7/5/05	NO27501	05126100	Kiosk A	0.69	0.031	NR	NR
7/5/05	NO27504	05126101	Kiosk B	0.69	0.032	NR	NR
7/6/05	NO27601	05126102	Kiosk A	0.69	0.033	NR	NR
7/6/05	NO27604	05126103	Kiosk B	0.69	0.037	NR	NR
7/11/05	NO271101	05128369	Kiosk B	ND	<0.037	NR	NR
7/11/05	NO271104	05128370	Kiosk A	ND	<0.042	NR	NR
7/12/05	NO271201	05128371	Kiosk B	ND	<0.033	NR	NR
7/12/05	NO271204	05128372	Kiosk A	ND	<0.041	NR	NR

NR – Parameter not requested

**Table 13: Oxides of Nitrogen – Winter**

Date	Field Sample Number	Laboratory Number	Sample Type	Nitrogen Dioxide ug/sample	Nitrogen Dioxide ppm	Nitric Oxide ug/sample	Nitric Oxide ppm
1/15/05	1 BN	05I01351	TUBE	ND	<0.034	ND	<0.034
1/16/05	2 BW	05I01352	TUBE	ND	<0.0053	ND	<0.0053
1/17/05	3 BN	05I01353	TUBE	ND	<0.032	ND	<0.032
2/19/05	219NX	05I06961	TUBE	NR	NR	ND	<0.024
2/20/05	220NX	05I06959	TUBE	NR	NR	ND	<0.023
2/21/05	222NX	05I06957	TUBE	NR	NR	ND	<0.023
1/15/05	1 AN	05I01346	TUBE	ND	<0.034		
1/16/05	2 AN	05I01348	TUBE	ND	<0.031		
1/17/05	3 AN	05I01349	TUBE	ND	<0.031		
2/19/05	219N2	05I06960	TUBE	ND	<0.023	NR	NR
2/20/05	220N2	05I06958	TUBE	ND	<0.023	NR	NR
2/21/05	222N2	05I06956	TUBE	0.97	0.036	NR	NR

NR – Parameter not requested

Figures 7 and 8 compare the winter and summer nitrogen oxide levels to the OSHA limits.

**Figure 7: Nitric Oxide**

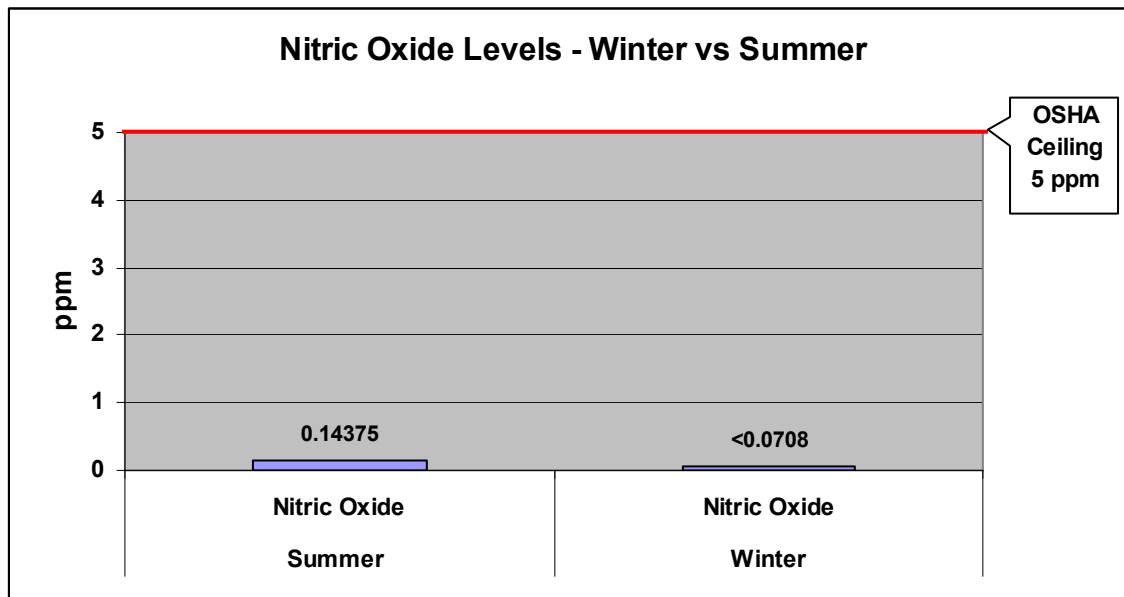


Figure 8: Nitrogen Dioxide

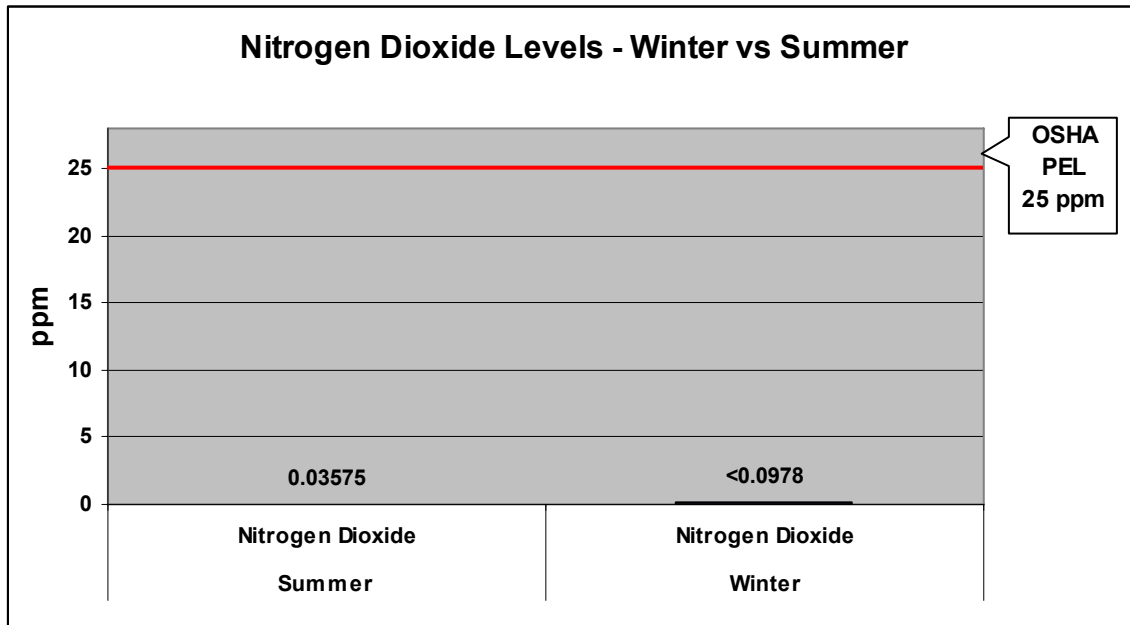


Figure 9: July 5<sup>th</sup> and 6<sup>th</sup>, 2005 - Nitric Oxide vs. PEL

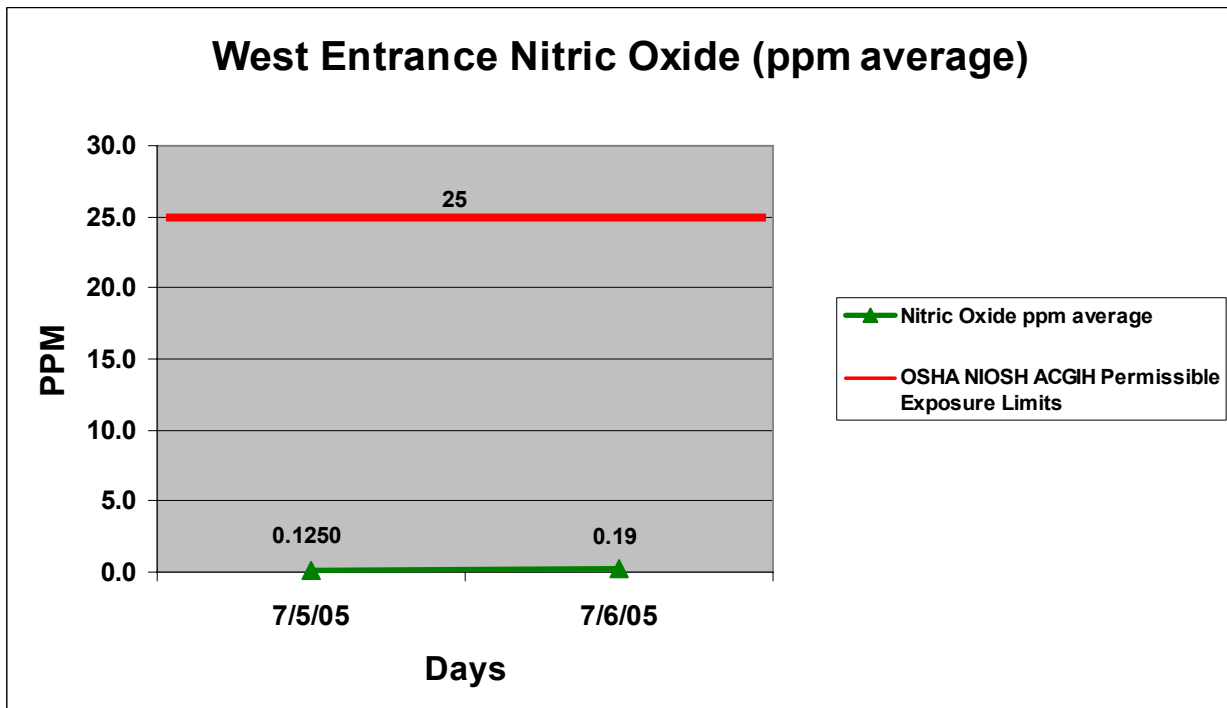


Figure 10: July 11<sup>th</sup> and 12<sup>th</sup>, 2005 - Nitric Oxide vs. PEL

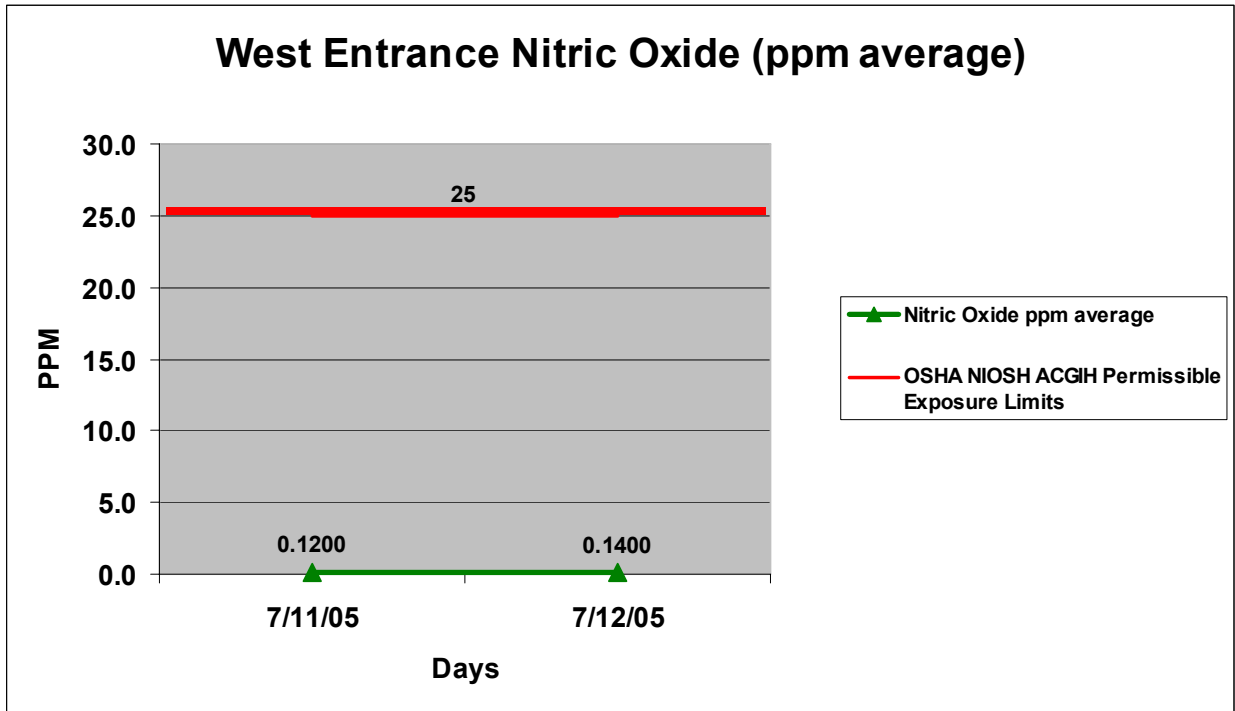


Figure 11: July 5<sup>th</sup> and 6<sup>th</sup>, 2005 – Nitrogen Dioxide vs. Exposure Limits

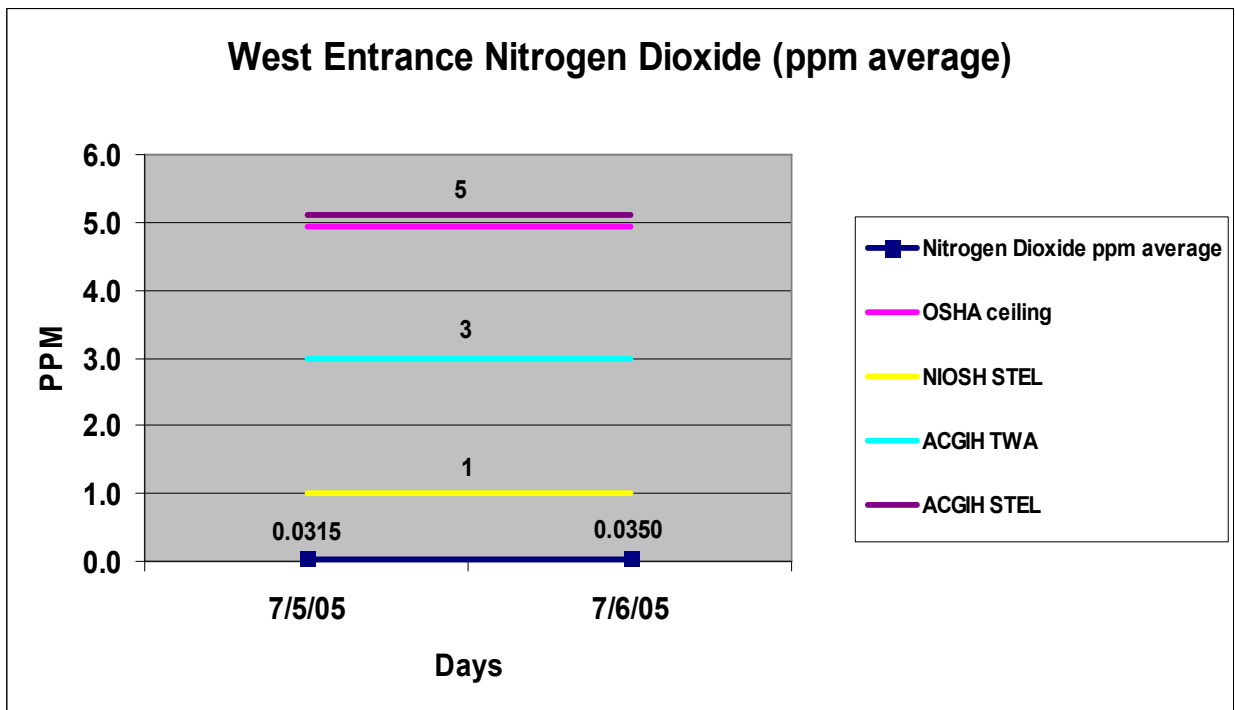
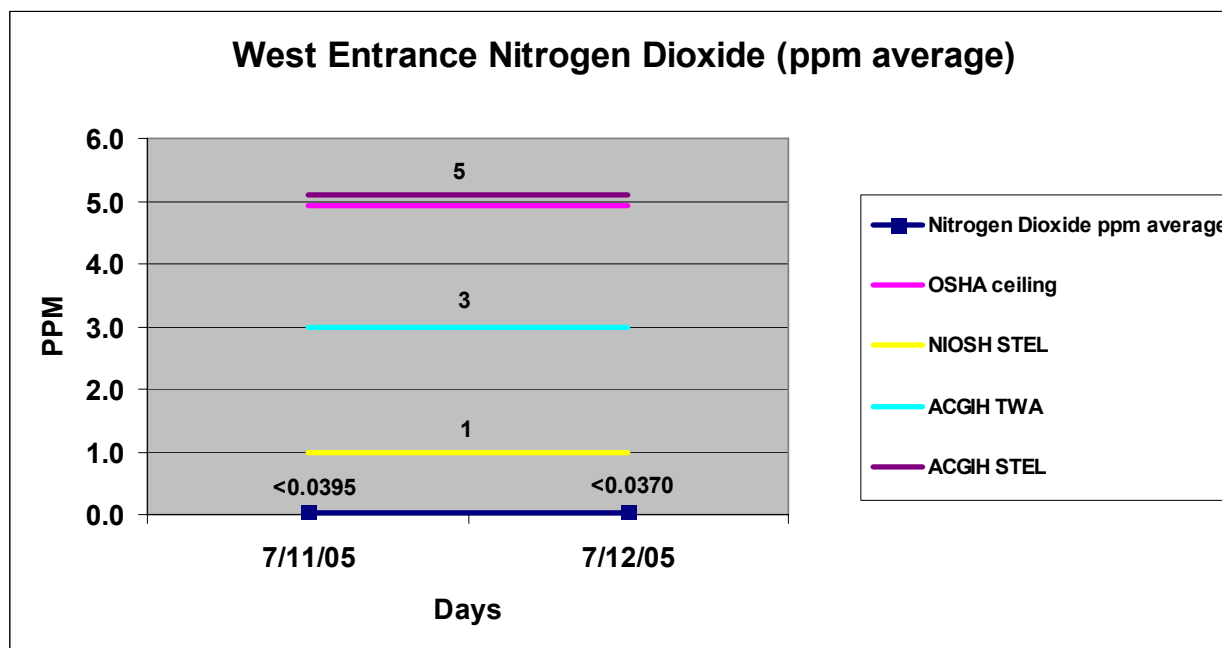


Figure 12: July 11<sup>th</sup> and 12<sup>th</sup>, 2005, Nitrogen Dioxide vs. Exposure Limits



### Volatile Organic Compounds (VOC)

A total of four VOC samples were collected, one on each day, and the results are shown in the following table. The sampling media consisted of 400ml stainless steel mini-canisters with a sampling regulator allowing for an 8-hour sample. This sampling method produces the best chance to capture extremely low levels of contaminants in the air. Therefore the results will be compared to ATSDR MRLs, which are more conservative than OSHA, NIOSH, and ACGIH.

All the compounds reported fell below all established Minimal Risk Levels (MRL) from The Agency for Toxic Substances and Disease Registry (ATSDR) for both the summer and winter studies.

Table 14: Volatile Organic Compounds identified by EPA Method TO-15

	7/5/2005	7/6/2005	7/11/2005	7/12/2005	
	Kiosk A	Kiosk B	Kiosk A	Kiosk B	PPB
	Result	Result	Result	Result	Average
Dichlorodifluoromethane	0.51	0.51	ND	0.33	<b>0.450</b>
Chloromethane	0.87	0.76	1.8	1.2	<b>1.158</b>
Freon 114	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND
Freon 11	0.29	0.32	0.25	0.22	<b>0.270</b>
cis-1,2-Dichloroethene	ND	0.17	ND	ND	<b>0.170</b>

Carbon Disulfide	ND	ND	ND	ND	ND
Freon 113	ND	0.13	ND	ND	<b>0.130</b>
Acetone	20	51	83	25	<b>44.750</b>
Methylene Chloride	1.1	0.53	0.46	0.21	<b>0.575</b>
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND
Vinyl Acetate	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND
2-Butanone	3.5	9.5	6.1	ND	<b>6.367</b>
Chloroform	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND
Benzene	2.1	1.7	4	3	<b>2.700</b>
1,2-Dichloroethane	ND	ND	ND	ND	ND
Trichloroethene	ND	0.51	ND	ND	<b>0.510</b>
1,2-Dichloropropane	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone	1.4	0.46	0.26	8.9	<b>2.755</b>
Toluene	21	5	17	7.9	<b>12.725</b>
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND
Tetrachloroethene	0.12	0.97	0.13	ND	<b>0.407</b>
2-Hexanone	0.16	0.19	ND	ND	<b>0.175</b>
Dibromochloromethane	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND
Ethylbenzene	0.67	0.68	0.89	0.93	<b>0.793</b>
m,p-Xylene	2.5	2.3	3.8	4.3	<b>3.225</b>
o-Xylene	0.87	0.86	1.2	1.3	<b>1.058</b>
Styrene	0.5	0.32	0.24	0.23	<b>0.323</b>
Bromoform	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND
Benzyl Chloride	ND	0.11	ND	ND	<b>0.110</b>
4-Ethyl toluene	0.14	0.29	0.21	0.34	<b>0.245</b>
1,3,5-Trimethylbenzene	ND	0.19	0.16	0.28	<b>0.210</b>
1,2,4-Trimethylbenzene	0.42	0.74	0.73	1.1	<b>0.748</b>
1,3-Dichlorobenzene	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	0.18	ND	ND	<b>0.180</b>
1,2-Dichlorobenzene	ND	0.14	ND	ND	<b>0.140</b>
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND
Methyl t-Butyl Ether	ND	ND	ND	ND	ND
Propene	0.62	2.4	ND	0.31	<b>1.110</b>
1, 3-Butadiene	ND	0.22	ND	0.31	<b>0.265</b>
Ethyl Acetate	0.14	0.4	0.47	ND	<b>0.337</b>
Hexane	1.8	1	0.96	1.4	<b>1.290</b>
Tetrahydrofuran	0.25	ND	ND	ND	<b>0.250</b>

Cyclohexane	0.55	ND	ND	ND	<b>0.550</b>
Heptane	0.45	0.39	0.39	0.4	<b>0.408</b>

**Table 15: ATSDR Minimal Risk Levels (MRLs) December 2004**

Analyte	ATSDR Minimal Risk Levels (MRLs) December 2004
Dichlorodifluoromethane	
Chloromethane	<b>Inh</b> Acute-0.5ppm, Int-0.2ppm, Chr-.05ppm
Freon 114	
Vinyl Chloride	<b>Inh</b> Acute-0.5ppm, Int-0.3ppm, <b>Oral</b> Chr-0.003 mg/kg/day
Bromomethane	<b>Inh</b> Acute-0.05ppm, Int-0.05ppm, Chr-0.005ppm, <b>Oral</b> Int-0.003 mg/kg/day
Chloroethane	<b>Inh</b> Acute-15ppm
Freon 11	
cis-1,2-Dichloroethene	<b>Oral</b> Acute-1 mg/kg/day, Int-0.3 mg/kg/day
Carbon Disulfide	<b>Inh</b> Chr-0.3ppm, <b>Oral</b> Acute-0.01 mg/kg/day
Freon 113	
Acetone	<b>Inh</b> Acute-26ppm, Int-13ppm, Chr-13ppm, <b>Oral</b> Int-2 mg/kg/day
Methylene Chloride	<b>Inh</b> Acute-0.6ppm, Int-0.3ppm, Chr-0.3ppm, <b>Oral</b> Acute-0.2 mg/kg/day, Chr-0.06 mg/kg/day
trans-1,2-Dichloroethene	<b>Inh</b> Acute-0.2ppm, Int-0.2ppm, <b>Oral</b> Int-0.2 mg/kg/day
1,1-Dichloroethane	
Vinyl Acetate	<b>Inh</b> Int-0.01ppm
1,1-Dichloroethene	<b>Inh</b> Int-0.02ppm, <b>Oral</b> Chr-0.009 mg/kg/day
2-Butanone	
Chloroform	<b>Inh</b> Acute-0.1ppm, Int-0.05ppm, Chr-0.02ppm, <b>Oral</b> Acute-0.3mg/kg/day, Int-0.1mg/kg/day, Chr-0.01mg/kg/day
1,1,1-Trichloroethane	<b>Inh</b> Acute-2ppm, Int-0.7ppm, <b>Oral</b> Int-20mg/kg/day
Carbon Tetrachloride	<b>Inh</b> Int-0.03ppm, Chr-0.03ppm, <b>Oral</b> Acute-0.05mg/kg/day, Int-0.02mg/kg/day
Benzene	<b>Inh</b> Acute-0.05ppm, Int-0.004ppm
1,2-Dichloroethane	<b>Inh</b> Chr-0.6ppm, <b>Oral</b> Int-0.2mg/kg/day
Trichloroethene	<b>Inh</b> Acute-2ppm, Int-0.1ppm, <b>Oral</b> Acute-0.002mg/kg/day
1,2-Dichloropropane	<b>Inh</b> Acute-0.05ppm, Int-0.007ppm, <b>Oral</b> Acute-0.1mg/kg/day, Int-0.07mg/kg/day, Chr-0.09mg/kg/day
Bromodichloromethane	<b>Oral</b> Acute-0.04mg/kg/day, Chr-0.02mg/kg/day
cis-1,3-Dichloropropene	<b>Inh</b> Int-0.003ppm, Chr-0.002ppm
4-Methyl-2-Pentanone	
Toluene	<b>Inh</b> Acute-1ppm, Chr-0.08ppm, <b>Oral</b> Acute-0.8mg/kg/day, Int-0.02mg/kg/day
trans-1,3-Dichloropropene	
1,1,2-Trichloroethane	<b>Oral</b> Acute-0.3mg/kg/day, Int-0.04mg/kg/day
Tetrachloroethene	<b>Inh</b> Acute-0.2ppm, Chr-0.04ppm, <b>Oral</b> Acute-0.05mg/kg/day
2-Hexanone	
Dibromochloromethane	
1,2-Dibromoethane	
Chlorobenzene	<b>Oral</b> Int-0.4mg/kg/day
Ethylbenzene	<b>Inh</b> Int-1.0ppm
m,p-Xylene	<b>Inh</b> Acute-1.0ppm, Int-0.7ppm, Chr-.0.1ppm <b>Oral</b> Int-0.2mg/kg/day
o-Xylene	<b>Inh</b> Acute-1.0ppm, Int-0.7ppm, Chr-.0.1ppm <b>Oral</b> Int-0.2mg/kg/day
Styrene	<b>Inh</b> Chr-0.06ppm, <b>Oral</b> Int-0.2mg/kg/day
Bromoform	<b>Oral</b> Acute-0.7mg/kg/day, Int-0.2mg/kg/day, Chr-0.2mg/kg/day

1,1,2,2-Tetrachloroethane	<b>Inh</b> Int-0.4ppm, <b>Oral</b> Int-0.6mg/kg/day
Benzyl Chloride	
4-Ethyl toluene	
1,3,5-Trimethylbenzene	
1,2,4-Trimethylbenzene	
1,3-Dichlorobenzene	<b>Oral</b> Acute-0.4mg/kg/day, Int-0.03mg/kg/day
1,4-Dichlorobenzene	<b>Inh</b> Acute-2ppm, Int.-0.1ppm, Chr-0.02ppm, <b>Oral</b> Int-0.07mg/kg/day
1,2-Dichlorobenzene	<b>Oral</b> Acute-0.8mg/kg/day, Int-0.4mg/kg/day, Chr.-0.4mg/kg/day
1,2,4-Trichlorobenzene	
Hexachlorobutadiene	<b>Oral</b> Int-0.0002mg/kg/day
Methyl t-Butyl Ether	<b>Inh</b> Acute-2ppm, Int-0.7ppm, Chr-0.7ppm, <b>Oral</b> Acute-0.4mg/kg/day, Int-0.3mg/kg/day
Propene	
1, 3-Butadiene	
Ethyl Acetate	
Hexane	<b>Inh</b> Acute-Chr-0.6ppm
Tetrahydrofuran	
Cyclohexane	
Heptane	

Table 16 compares the winter volatile organic compound sampling results to the summer results. The analytical results for the compounds listed below were reported below the limit of detection and are not shown in Table 16.

Freon 114	cis-1,3-Dichloropropene
Vinyl Chloride	trans-1,3-Dichloropropene
Bromomethane	1,1,2-Trichloroethane
Chloroethane	Dibromochloromethane
cis-1,2-Dichloroethene	1,2-Dibromoethane
Freon 113	Chlorobenzene
trans-1,2-Dichloroethene	Bromoform
1,1-Dichloroethane	1,1,2,2-Tetrachloroethane
Vinyl Acetate	Benzyl Chloride
1,1-Dichloroethene	1,3-Dichlorobenzene
1,1,1-Trichloroethane	1,2-Dichlorobenzene
Carbon Tetrachloride	1,2,4-Trichlorobenzene
1,2-Dichloroethane	Hexachlorobutadiene
1,2-Dichloropropane	Methyl t-Butyl Ether
Bromodichloromethane	



**Table 16: Winter & Summer VOC Results**

Analyte	WINTER											PPB	SUMMER				PPB	
	1/15/05	1/16/05	1/16/05	1/17/05	2/7/05	2/19/05	2/19/05	2/20/05	2/20/05	2/21/05	2/21/05		7/5/05	7/6/05	7/11/05	7/12/05		
	#1 mini can	116 G	116 SM	117 G	MC27	219KA	219OB	220KA	220R	222KA	222AI		MC75KA	MC76KB	MC711KA	MC712KB		
	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Avg	Result	Result	Result	Result	Avg	
Dichlorodifluoromethane	0.47	0.52	3.2	0.4	1.6	0.96	0.45	0.55	ND	ND	ND	<b>1.019</b>	0.51	0.51	ND	0.33	<b>0.450</b>	
Chloromethane	2.8	ND	1.5	1.2	1.5	1.5	0.52	0.71	0.58	ND	ND	<b>1.289</b>	0.87	0.76	1.8	1.2	<b>1.158</b>	
Freon 11	ND	0.26	0.97	0.22	0.35	0.8	0.37	0.37	0.2	ND	ND	<b>0.443</b>	0.29	0.32	0.25	0.22	<b>0.270</b>	
Carbon Disulfide	ND	0.35	ND	ND	ND	0.66	0.35	ND	0.29	ND	ND	<b>0.413</b>	ND	ND	ND	ND	ND	
Acetone	11	6.2	ND	33	270	20	8.8	19	11	1.2	1.3	<b>38.150</b>	20	51	83	25	<b>44.750</b>	
Methylene Chloride	1.5	0.47	4.4	0.38	1.7	0.8	0.67	0.42	0.32	ND	ND	<b>1.184</b>	1.1	0.53	0.46	0.21	<b>0.575</b>	
2-Butanone	17	3.5	17	5.3	48	3.6	ND	2.9	2.1	ND	ND	<b>12.425</b>	3.5	9.5	6.1	ND	<b>6.367</b>	
Chloroform	ND	ND	ND	ND	0.17	0.6	0.27	0.21	0.16	ND	ND	<b>0.282</b>	ND	ND	ND	ND	ND	
Benzene	0.86	2.2	2.4	0.38	2.2	1.4	0.82	0.69	1	ND	ND	<b>1.328</b>	2.1	1.7	4	3	<b>2.700</b>	
Trichloroethene	ND	ND	0.22	0.22	0.26	1.1	0.26	0.21	0.18	ND	ND	<b>0.350</b>	ND	0.51	ND	ND	<b>0.510</b>	
4-Methyl-2-Pentanone	1.4	2.3	3.8	4.4	1.7	0.79	ND	ND	ND	ND	ND	<b>2.398</b>	1.4	0.46	0.26	8.9	<b>2.755</b>	
Toluene	6.5	69	6.2	2.8	7.1	4.3	15	22	1.9	ND	ND	<b>14.978</b>	21	5	17	7.9	<b>12.725</b>	
Tetrachloroethene	1.1	0.24	0.73	ND	0.5	0.52	0.53	ND	ND	ND	ND	<b>0.603</b>	0.12	0.97	0.13	ND	<b>0.407</b>	
2-Hexanone	ND	ND	ND	ND	ND	0.64	ND	2	ND	ND	ND	<b>1.320</b>	0.16	0.19	ND	ND	<b>0.175</b>	
Ethylbenzene	1	45	1.1	0.35	11	1	8.2	14	0.5	ND	ND	<b>9.128</b>	0.67	0.68	0.89	0.93	<b>0.793</b>	
m,p-Xylene	4.1	220	4.8	1.5	30	3.5	35	67	2.3	ND	ND	<b>40.911</b>	2.5	2.3	3.8	4.3	<b>3.225</b>	
o-Xylene	1.5	110	1.7	0.63	7.5	1.3	18	34	0.72	ND	ND	<b>19.483</b>	0.87	0.86	1.2	1.3	<b>1.058</b>	
Styrene	5.7	0.55	1.4	0.43	0.46	0.78	0.28	0.49	0.22	ND	ND	<b>1.146</b>	0.5	0.32	0.24	0.23	<b>0.323</b>	
4-Ethyl toluene	0.25	34	0.39	ND	0.72	0.88	2.7	0.28	0.2	ND	ND	<b>4.928</b>	0.14	0.29	0.21	0.34	<b>0.245</b>	
1,3,5-Trimethylbenzene	0.27	51	0.41	ND	1.2	0.57	3.4	15	0.19	ND	ND	<b>9.005</b>	ND	0.19	0.16	0.28	<b>0.210</b>	
1,2,4-Trimethylbenzene	0.89	220	1.7	0.61	3.1	1	12	64	0.43	ND	ND	<b>33.748</b>	0.42	0.74	0.73	1.1	<b>0.748</b>	
1,4-Dichlorobenzene	ND	ND	ND	ND	0.24	0.46	0.22	0.21	0.16	ND	ND	<b>0.258</b>	ND	0.18	ND	ND	<b>0.180</b>	
													<b>Propene</b>	0.62	2.4	ND	0.31	<b>1.110</b>
													<b>1, 3-Butadiene</b>	ND	0.22	ND	0.31	<b>0.265</b>
													<b>Ethyl Acetate</b>	0.14	0.4	0.47	ND	<b>0.337</b>
													<b>Hexane</b>	1.8	1	0.96	1.4	<b>1.290</b>
													<b>Tetrahydrofuran</b>	0.25	ND	ND	ND	<b>0.250</b>
													<b>Cyclohexane</b>	0.55	ND	ND	ND	<b>0.550</b>
													<b>Heptane</b>	0.45	0.39	0.39	0.4	<b>0.408</b>

WINTER	1/15/05	1/16/05	1/16/05	1/17/05	2/7/05	2/19/05	2/19/05	2/20/05	2/20/05	2/21/05	2/21/05	average
Total Petroleum Hydrocarbon	34	630	70	18	0	30	92	220	17	0.43	ND	<b>111.143</b>

SUMMER	
Did not report Total Petroleum Hydrocarbon	NA

## Aldehydes

Six samples for aldehyde exposure were collected by following NMAM 2539. All samples were analyzed by gas chromatography/mass spectrometry (GC/MS) for the following compounds: acetaldehyde, acrolien, butyraldehyde, formaldehyde, heptanal, hexanal, iso-valeraldehyde, propionaldehyde, and valeraldehyde. There were two formaldehyde samples of concern. On July 11<sup>th</sup>, 2005 in kiosk A the formaldehyde level was 0.015 ppm. While this level falls below OSHA's PEL of 0.75 ppm, it is only 0.001 less than NIOSH's time weighted average recommended exposure limit of 0.016 ppm. On July 12<sup>th</sup>, 2005 the formaldehyde level in kiosk B was 0.024 ppm. This level is below OSHA's PEL, but it exceeds NIOSH's REL. All other aldehyde samples were below the limit of detection for the analytical method.

The results from the winter study showed all aldehyde samples below the established exposure limits.

**Table 17: Summer Aldehyde Results**

Date	Sample	Acetaldehyde ppm	Acrolien ppm	Butyraldehyde ppm	Formaldehyde ppm	Heptanal ppm	Hexanal ppm	Iso-valeraldehyde ppm	Propionaldehyde ppm	Valeraldehyde ppm
7/5/05	Kiosk A	<0.0083	<0.0065	<0.0051	<0.012	<0.0032	<0.0036	<0.0042	<0.0063	<0.0042
7/5/05	Kiosk B	<0.0080	<0.0063	<0.0049	<0.012	<0.0031	<0.0035	<0.0041	<0.0060	<0.0041
7/6/05	Kiosk A	<0.0094	<0.0074	<0.0058	<0.014	<0.0036	<0.0042	<0.0048	<0.0072	<0.0048
7/6/05	Kiosk B	<0.0093	<0.0073	<0.0057	<0.014	<0.0036	<0.0041	<0.0048	<0.0071	<0.0048
7/11/05	Kiosk A	<0.0088	<0.0069	<0.0054	<b>0.015</b>	<0.0034	<0.0039	<0.0045	<0.0067	<0.0045
7/12/05	Kiosk B	<0.0084	<0.0066	<0.0051	<b>0.024</b>	<0.0032	<0.0037	<0.0043	<0.0063	<0.0043

**Table 18: Winter Aldehyde Results**

Date	Sample	Acetaldehyde ppm	Acrolien ppm	Butyraldehyde ppm	Formaldehyde ppm	Heptanal ppm	Hexanal ppm	Iso-valeraldehyde ppm	Propionaldehyde ppm	Valeraldehyde ppm
1/15/05	1X	<0.011	<0.0085	<0.0066	<0.016	<0.0042	<0.0048	<0.0055	<0.0082	<0.0055
1/16/05	2G	<0.0077	<0.0060	<0.047	<0.011	<0.0030	<0.0034	<0.0039	<0.0058	<0.0039
2/19/05	219X	<0.0011	<0.0086	<0.0066	<0.016	<0.0042	<0.0048	<0.0056	<0.0083	<0.0056
2/20/05	220X	<0.010	<0.0081	<0.0063	<0.015	<0.0040	<0.0045	<0.0053	<0.0078	<0.0053

## II. Yellowstone Park Entrances

In addition to the West Entrance, the East, North, Northeast, and South Entrances were sampled for the following:

- Noise
- Aromatic Hydrocarbons
- Carbon Monoxide
- Respirable Particulate Matter

- Elemental and Organic Carbon

A complete report for each entrance can be found in Appendix A.

## Summary

All noise samples for the entrances showed employee exposure below OSHA's standards.

There were no petroleum hydrocarbons detected on any samples at these entrance stations

The carbon monoxide time weighted averages for the entrance stations ranged from 0 ppm to 1 ppm. Three samples showed CO peaks above the NIOSH ceiling limit of 200 ppm, with the south entrance having a the highest peak of 543 ppm.

**Table 19: Carbon Monoxide Levels – Northeast, South, North, and East Entrances**

Date	Location	TWA	STEL	PEAK
6/14/05	Northeast Entrance	0	0	69
6/14/05	Northeast Entrance	0	0	194
<b>6/21/05</b>	<b>South Entrance, Kiosk A</b>	<b>0</b>	<b>1</b>	<b>543</b>
6/21/05	South Entrance, Kiosk A	1	0	188
<b>6/21/05</b>	<b>South Entrance, Kiosk B</b>	<b>0</b>	<b>1</b>	<b>338</b>
7/25/05	North Entrance, Inside Window	0	0	112
<b>7/25/05</b>	<b>North Entrance, Outside Window</b>	<b>0</b>	<b>0</b>	<b>349</b>
7/27/05	East Entrance, Inside Window	0	0	53
7/27/05	East Entrance, Outside Window	0	0	53

The respirable particulate samples for the different entrance stations were reported below the limit of detection for the analytical method.

Elemental, organic, and total carbon samples for the entrance stations were below the previously proposed TLV's and MSHA's current total carbon standard.

## III. Materials and Methods

### Noise

Sound levels were monitored using two Quest® NoisePro™ noise dosimeters and a Quest® 2900 type 2 sound level meter. All noise equipment was setup to comply with OSHA guidelines. All noise equipment was calibrated before and after the sampling period following the manufacturer's recommendations. The noise dosimeters were worn by the entrance employee with the microphone within one foot of the workers ear. The sound level meter was used to record instantaneous peak readings while vehicles were idling at the entrance as well as when the vehicles accelerated from the entrance.

## **Carbon Monoxide**

The carbon monoxide samples were monitored using Lumidor MiniMAX Pro gas detectors equipped with carbon monoxide sensors. The MiniMAX Pro gas detectors passed the instruments self-tests and were calibrated according to the manufacturer's recommendations. The MiniMAX Pro shows the peak, time weighted average (TWA), and the short term exposure level (STEL). OSHA has set a permissible exposure limit of 50 ppm and the ACGIH threshold limit value is 25 ppm. Carbon monoxide was monitored over the course of a full day under normal conditions.

In addition to the MiniMAX Pro gas detector, an Industrial Scientific M40 multi-gas monitor was used to monitor carbon monoxide levels. The M40 is equipped with an electrochemical sensor that measures carbon monoxide levels ranging from 0 ppm to 999 ppm in 1 ppm increments. The M40 shows the peak, time weighted average (TWA), and the short term exposure level (STEL). The M40 was placed near the MiniMAX Pro at the entrance window for quality assurance.

## **Aromatic Hydrocarbons**

Aromatic hydrocarbons were sampled by following method 1501 in the NIOSH Manual of Analytical Methods. The sampler used was a solid sorbent tube, coconut shell charcoal 100mg/50mg, at a flow rate of approximately 0.20 liters/minute, given in table 3 of method 1501. The sampling pumps used were two SKC model 222 low flow pumps, calibrated using a DC-Lite Primary Flowmeter. Substances sampled in this method are benzene, p-tert-butyltoluene, cumene,  $\alpha$ -ethylbenzene,  $\beta$ -methylstyrene, toluene, xylene (o-m-p-), styrene, and total petroleum hydrocarbons.

## **Elemental and Organic Carbon**

Diesel particulate matter (as elemental, organic, and total carbon) was sampled following method 5040 of the NIOSH Manual of Analytical Methods. The sampler was a 37mm quartz-fiber filter with an SKC Aircheck sampling pump operating at approximately 2.0 liters per minute. Another sampler used in this study was a 37mm quartz-fiber filter with a submicron impactor. The impactor only allowed particles  $\geq 1.0 \mu\text{m}$  to impact the filter. The only regulatory agency with an exposure limit for diesel particulate is the Mine Safety and Health Administration (MSHA), and their limit is set at  $160 \mu\text{g}/\text{m}^3$ .

## **Respirable Dust**

Respirable particulates were monitored by following method 0600 in the NIOSH Manual of Analytical Methods. An aluminum cyclone with a cut-point of  $4\mu\text{m}$  was used to select the particulate size. An SKC Aircheck sampling pump pulled air through the sampling train at approximately 2.5 liters per minute. OSHA and ACGIH have established exposure limits of  $5 \text{mg}/\text{m}^3$  and  $3\text{mg}/\text{m}^3$  respectively.

## **Nitrogen Oxides**

Oxides of nitrogen samples were collected according to method 6014 in the NIOSH Manual of Analytical Methods. The three sampling tubes consisted of 2 triethanolamine-treated molecular sieves and an oxidizer. The three tubes were set up in a particular order, with the front tube collecting NO<sub>2</sub>, the middle tube was an oxidizer and discarded after sampling, and the last tube collected NO. The samples were collected at a flow rate of 0.025 L/min using SKC low flow sampling pumps. The sampling pumps were calibrated using a DC-Lite Primary Flowmeter before and after sampling. A lab used visible absorption spectrophotometry for NO and NO<sub>2</sub> with an estimated limit of detection of 1.0 µg.

## **Volatile Organic Compounds (VOCs)**

Volatile organic compound (VOC) samples were collected according to Environmental Protection Agency (EPA) analytical method TO-15. This method documents sampling and analytical procedures for the measurements of subsets of the 97 VOCs included in the 189 hazardous air pollutants listed in Title III of the Clean Air Act Amendment of 1990 (Winter Use Personal Exposure Monitoring, 05). The sampling media consisted of 400 ml stainless steel mini-canisters used with a sampling regulator to allow for an eight hour sampling time. The MRLs can be found in Table 15.

## **Aldehydes**

Aldehyde samples were collected according to method 2539 in the NIOSH Manual of Analytical Methods. The sampling media consisted of a solid sorbent tube (10% 2-hydroxymethyl piperidine on XAD-2, 120 mg/60 mg). The samples were collected at a flow rate of 0.01 to 0.05 L/min using SKC low flow sampling pumps. The sampling pumps were calibrated using a DC-Lite Primary Flowmeter. The samples were analyzed by gas chromatography/mass spectrometry (GC/MS) for the following compounds: acetaldehyde, acrolein, butyraldehyde, formaldehyde, heptanal, hexanal, iso-valeraldehyde, propionaldehyde, and valeraldehyde.

## **IV. Conclusion and Recommendations**

- The entrance stations that have a working ventilation system should keep the ventilation systems operating at all times.
- Where applicable, the opposite window should be kept closed.
- Fans should be placed behind kiosk attendant to reduce the contaminant entry, increasing the pressure inside the kiosk.
- Windows should be closed when possible
- Employees and volunteers at the entrances should ask visitors on motorcycles, and other vehicles emitting too much exhaust, to shut off the engine.

- Real time carbon monoxide monitors in the entrances would ensure the positive pressure inside the kiosks is maintained, therefore reducing the instantaneous carbon monoxide peaks and other contaminant exposures.
- The busy days in the summer had at least 4 times as many vehicles entering the park than were entering in the winter. With the exception of four carbon monoxide peaks and two formaldehyde samples, the summer sampling results were very similar to the winter sampling results. The Park Service should continue to monitor the entrances in the summer. Future summer monitoring can be used in comparison to the 2005 data. A comparison may show trends so the Park Service can anticipate future levels based on past data, and it will ensure the park employees are not being overexposed to contaminants.

## References

Spear, T, Stephenson, D, *Yellowstone Winter Use Personal Exposure Monitoring*, June 1, 2005.

Agency for Toxic Substances and Disease Registry, *Minimal Risk Levels*, December 2004.

2004 TLVs® and BEIs®, ACGIH Worldwide Signature Publications, 2004.

Table Z-1, Limits for Air Contaminants, ([http://www.osha.gov/SLTC/etools/respiratory/advisor\\_genius\\_nrdl/z\\_tables.html#TABLE%20Z-1](http://www.osha.gov/SLTC/etools/respiratory/advisor_genius_nrdl/z_tables.html#TABLE%20Z-1)).

NIOSH Pocket Guide to Chemical Hazards, February 2004.

## **APPENDIX A**



## Noise/Air Sampling Results – Northeast Entrance

**Sample Date:** June 14, 2005  
**Sample By:** Ryan Morris, Industrial Hygiene Intern

Sound levels, carbon monoxide, aromatic hydrocarbons, diesel particulate, and respirable dust were sampled at the Northeast Entrance. The sound levels and the aromatic hydrocarbons were personal samples while the rest of the samples were area samples. All area samples were located at the window where the employees interact with the visitors.

### Results

Results indicate that employee exposure did not exceed established exposure levels. Table 1 below shows the noise results.

**Table 1: Noise levels and PPE recommendation**

	Noise Level in Decibels	PPE Recommendation
Area – 50.5 dBA	< 70 dBA	No hearing protection required
Personal-57.4 dBA	70 – 85 dBA	Hearing protection recommended
	85 – 90 dBA	Hearing protection required when noise level is above the safe level
	> 90 dBA	Hearing protection required

All carbon monoxide levels were below the established exposure limits. The table below shows the recorded levels for the sampling period and the established exposure limits for carbon monoxide.

**Table 2: CO Levels**

Date	CO Monitor	Run Time	TWA*	STEL*	PEAK*	OSHA PEL
06/14/05	MiniMAX Pro	6hr 23min	0	0	69	50 ppm
06/14/05	Industrial Scientific M40 Gas monitor	6hr 22min	0	0	194	50 ppm

\* values in ppm

Both carbon monoxide monitors showed a time weighted average and a short term exposure limit of 0.0 ppm. One instrument showed a peak of 69 ppm and the other instrument showed a peak of 194 ppm. The peak values were recorded at the same time and they occurred when an older pickup passed through the gate. Blue exhaust

was easily seen from the pickup, and this was the only vehicle seen during the sample period to be burning fuel inefficiently. Both peak values from the exhaust are below the NIOSH ceiling of 200 ppm.

CO PPM*	Established Limits
25	ACGIH 8-hr time weighted average(TWA)
35	NIOSH 8-hr time weighted average(TWA)
50	OSHA 8-hr time weighted average(TWA)
200	NIOSH ceiling level

\*PPM – Parts Per Million

**Table 3: Carbon Monoxide (CO) Levels**

<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <p>All Time Weighted Averages were 0 ppm for the full shift.</p> </div>	CO Time Weighted Average level in PPM	Physiological and subjective symptoms
	0-50 ppm	50 ppm –OSHA 8-hr time weighted average No appreciable effect, except shortness of breath on vigorous exertion; possible tightness across the forehead; dilation of cutaneous blood vessel
	50-100 ppm	Shortness of breath on moderate exertion; occasional headache with throbbing in temples
100-200 ppm	Decided headache; irritable; easily fatigued; judgment disturbed; possible dizziness; dimness of vision	

The area aromatic hydrocarbon sample was below the exposure limit. The results for the sample are shown in Table 4: Aromatic Hydrocarbons.

**Table 4: Aromatic Hydrocarbons**

Date	Sample	Sample Type	Total Hydrocarbons mg/sample	Total Hydrocarbons ppm	Reporting Limit	Air Volume (L)
06/14/05	Area	Tube	ND	<0.036	0.01 mg/sample	78.80
06/14/05	Blank Sample	Tube	ND	<0.030	0.01 mg/sample	94.50

• ND – None Detected

The area diesel particulate sample, as organic carbon and elemental carbon, was below the established exposure limit of 160µg/m<sup>3</sup>. The results for the sample are shown in Table 5: Diesel Particulate.

**Table 5: Diesel Particulate**

Date	Sample	Sample Type	Organic Carbon $\mu\text{g}/\text{m}^3$	Elemental Carbon $\mu\text{g}/\text{m}^3$	Total Carbon $\mu\text{g}/\text{m}^3$	Volume (L)
06/14/05	Area	Filter	21.0	<1.7	21.0	743.98
06/14/05	Blank	Filter	26.0	2.1	28.0	750.00

The respirable dust sample was below the established exposure limit. Results for the samples are shown below in Table 6: Respirable Dust.

**Table 6: Respirable Dust**

Date	Sample	Sample Type	Respirable Dust mg/sample	Respirable Dust $\text{mg}/\text{m}^3$	Reporting Limit	Air Volume (L)
06/14/05	Area	Filter	ND	<0.02	0.02 mg/sample	960.00
06/14/05	Blank Sample	Filter	ND	<0.02	0.02 mg/sample	967.34

- ND – None Detected

## Materials, Methods, and Exposure Limits

Sound levels were monitored using two Quest NoisePro noise dosimeters. The noise dosimeters were calibrated before and after the sampling period in accordance with the manufacturer's recommendations and the instruments were setup following OSHA's guidelines. The noise dosimeters report the dose, the average sound level for the run time, the max level, and a projected 8 hour time weighted average. The noise dosimetry was done over the course of a full day under normal conditions. The OSHA 8 hour exposure level is 90 decibels.

The carbon monoxide samples were monitored using a Lumidor MiniMAX Pro gas detector equipped with a carbon monoxide sensor. The MiniMAX Pro gas detector passed the instruments self-tests and was calibrated according to the manufacturer's recommendations. The MiniMAX Pro shows the peak, time weighted average (TWA), and the short term exposure level (STEL). OSHA has set a permissible exposure limit of 50 ppm, and the ACGIH threshold limit value is 25 ppm. Carbon monoxide was monitored over the course of a full day under normal conditions.

In addition to the MiniMAX Pro gas detector, an Industrial Scientific M40 multi-gas monitor was used to monitor carbon monoxide levels. The M40 is equipped with an electrochemical sensor that measures carbon monoxide levels ranging from 0 ppm to 999 ppm in 1 ppm increments. The M40 shows the peak, time weighted average (TWA), and the short term exposure level (STEL). The M40 was placed near the MiniMAX Pro at the entrance window.

Aromatic hydrocarbons were sampled by following method 1501 in the NIOSH Manual of Analytical Methods. The sampler used was a solid sorbent tube, coconut shell charcoal 100mg/50mg, at a flow rate of 0.20 liters/minute, given in table 3 of method 1501. The pumps used to sample were three SKC model 222 low flow pumps, calibrated using a DC-Lite Primary Flowmeter. Substances sampled in this method are benzene, p-tert-butyltoluene, cumene,  $\alpha$ -ethylbenzene,  $\beta$ -methylstyrene, toluene, xylene (o-m-p-), and styrene. The results were shown as “none detected” for total petroleum hydrocarbons because all these individual compounds were below the limit of detection.

Diesel particulate matter (as elemental carbon) was sampled following method 5040 of the NIOSH Manual of Analytical Methods. The sampler was a 37mm quartz-fiber filter with an SKC Aircheck sampling pump operating at 1.943 liters per minute. The only regulatory agency with an exposure limit for diesel particulate is the Mine Safety and Health Administration (MSHA). The exposure limit is  $160\mu\text{g}/\text{m}^3$  for total carbon.

Respirable particulates were monitored by following method 0600 in the NIOSH Manual of Analytical Methods. An aluminum cyclone with a cut-point of  $4\mu\text{m}$  was used to select the particulate size. An SKC Aircheck sampling pump pulled air through the sampling train at approximately 2.5 liters per minute. OSHA and ACGIH have established exposure limits of  $5\text{ mg}/\text{m}^3$  and  $3\text{mg}/\text{m}^3$  respectively.

## Noise/Air Sampling Results – South Entrance

**Sample Date:** June 21, 2005  
**Sample By:** Ryan Morris, Industrial Hygiene Intern

Sound levels, carbon monoxide, aromatic hydrocarbons, diesel particulate, and respirable dust were sampled at the south entrance in both kiosk A and kiosk B. The sound levels and the aromatic hydrocarbons were personal samples while the rest of the samples taken were area samples. All area samples were taken at the kiosk window where the employees interact with the visitors.

It should be noted that due to the large number of mosquitoes in the morning, the employees burned Coghlan’s Mosquito Repellent. The repellent was burning for most of the morning and this may have added to the hydrocarbon results. At approximately 12:00 PM the blower in Kiosk B was turned on and at approximately 12:30 PM the blower in Kiosk A was turned on which helped to reduce exposure

### Results

The results showed the employees did not exceed any noise exposure limits. Table 1 below shows the noise results.

**Table 1: Noise levels**

	Noise Level in Decibels	PPE Recommendation
Kiosk B – 53.4 dBA	< 70 dBA	No hearing protection required
Kiosk A – 67.1 dBA	70 – 85 dBA	Hearing protection recommended
	85 – 90 dBA	Hearing protection required when noise level is above the safe level
	> 90 dBA	Hearing protection required

All carbon monoxide (CO) levels were below the established exposure limits. The table below shows the recorded levels for the sampling period and the established exposure limits for carbon monoxide.

**Table 3: CO Levels**

Date	CO Monitor	Run Time	TWA*	STEL*	PEAK*	OSHA PEL
06/21/05	MiniMAX Pro Kiosk A	5hr 14min	0	1	543	50 ppm
06/21/05	Industrial Scientific M40 Gas monitor-Kiosk A	5hr 21min	1	0	188	50 ppm
06/21/05	MiniMAX Pro Kiosk B	5hr 25min	0	1	338	50 ppm
* values in ppm						

CO PPM*	Established Limits
25	ACGIH 8-hr time weighted average
35	NIOSH 8-hr time weighted average
50	OSHA 8-hr time weighted average
200	NIOSH peak level

\*PPM – Parts Per Million

**Table 2: CO Levels and Possible Symptoms**

<p>All Time Weighted Averages were 0 ppm for the full shift.</p>	<p><b>CO Time Weighted Average level in PPM</b></p>	<p><b>Physiological and subjective symptoms</b></p>
	0-50 ppm	50 ppm –OSHA 8-hr time weighted average No appreciable effect, except shortness of breath on vigorous exertion; possible tightness across the forehead; dilation of cutaneous blood vessel
	50-100 ppm	Shortness of breath on moderate exertion; occasional headache with throbbing in temples
	100-200 ppm	Decided headache; irritable; easily fatigued; judgment disturbed; possible dizziness; dimness of vision

The area aromatic hydrocarbon samples were below the exposure limit. The results for the samples are shown in Table 4: Aromatic Hydrocarbons.

**Table 4: Aromatic Hydrocarbons**

Date	Sample	Sample Type	Total Hydrocarbons mg/sample	Total Hydrocarbons ppm	Reporting Limit	Air Volume (L)
06/21/05	Kiosk A	Tube	0.021	0.090	0.01 mg/sample	64.51
06/21/05	Kiosk B	Tube	ND	<0.046	0.01 mg/sample	61.75

- ND – None Detected

The area diesel particulate samples, as organic carbon and elemental carbon, were below the established exposure limit. The results for the samples are shown in Table 5: Diesel Particulate.

**Table 5: Diesel Particulate –  $\mu\text{g}/\text{m}^3$** 

Date	Sample	Sample Type	Organic Carbon $\mu\text{g}/\text{m}^3$	Elemental Carbon $\mu\text{g}/\text{m}^3$	Total Carbon $\mu\text{g}/\text{m}^3$	Volume (L)
06/21/05	Kiosk A	Filter	46.0	6.7	53.0	659.46
06/21/05	Kiosk B	Filter	52.0	8.5	60.0	661.93

The respirable dust samples were below the established exposure limit. The results for the samples are shown below in Table 6: Respirable Dust.

**Table 6: Respirable Dust**

Date	Sample	Sample Type	Respirable Dust mg/sample	Respirable Dust $\text{mg}/\text{m}^3$	Reporting Limit	Air Volume (L)
06/14/05	Area	Filter	ND	<0.02	0.02 mg/sample	802.81
06/14/05	Blank Sample	Filter	ND	<0.03	0.02 mg/sample	792.23

- ND – None Detected

### Materials, Methods, and Exposure Limits

Sound levels were monitored using two Quest NoisePro noise dosimeters. The noise dosimeters were calibrated before and after the sampling period in accordance with the manufacturer's recommendations and the instruments were setup following OSHA's guidelines. The noise dosimeters report the dose, the average sound level for the run time, the max level, and a projected 8 hour time weighted average. The noise dosimetry was done over the course of a full day under normal conditions. The noise exposure level for an 8 hour workday is 90 decibels.

The carbon monoxide samples were monitored using Lumidor MiniMAX Pro gas detectors equipped with carbon monoxide sensors. The MiniMAX Pro gas detectors

passed the instruments self-tests and were calibrated according to the manufacturer's recommendations. The MiniMAX Pro shows the peak, time weighted average (TWA), and the short term exposure level (STEL). OSHA has set a permissible exposure limit of 50 ppm, and the ACGIH threshold limit value is 25 ppm. Carbon monoxide was monitored over the course of a full day under normal conditions.

In addition to the MiniMAX Pro gas detector, an Industrial Scientific M40 multi-gas monitor was used to monitor carbon monoxide levels. The M40 is equipped with an electrochemical sensor that measures carbon monoxide levels ranging from 0 ppm to 999 ppm in 1 ppm increments. The M40 shows the peak, time weighted average (TWA), and the short term exposure level (STEL). The M40 was placed near the MiniMAX Pro at the entrance window.

Aromatic hydrocarbons were sampled by following method 1501 in the NIOSH Manual of Analytical Methods. The sampler used was a solid sorbent tube, coconut shell charcoal 100mg/50mg, at a flow rate of approximately 0.20 liters/minute, given in table 3 of method 1501. The pumps used to sample were two SKC model 222 low flow pumps, calibrated using a DC-Lite Primary Flowmeter. Substances sampled in this method are benzene, p-tert-butyltoluene, cumene,  $\alpha$ -ethylbenzene,  $\beta$ -methylstyrene, toluene, xylene (o-m-p-), and styrene. None of these individual substances were detected. The results were reported as none detected for as total petroleum hydrocarbons.

Diesel particulate matter (as elemental carbon) was sampled following method 5040 of the NIOSH Manual of Analytical Methods. The sampler was a 37mm quartz-fiber filter with an SKC Aircheck sampling pump operating at approximately 2.0 liters per minute. The only regulatory agency with an exposure limit for diesel particulate is the Mine Safety and Health Administration (MSHA). The exposure limit for diesel particulate is  $160\mu\text{g}/\text{m}^3$ .

Respirable particulates were monitored by following method 0600 in the NIOSH Manual of Analytical Methods. An aluminum cyclone with a %50 cut-point of  $4\mu\text{m}$  was used to select the particulate size. An SKC Aircheck sampling pump pulled air through the sampling train at approximately 2.5 liters per minute. OSHA and ACGIH have established exposure limits of  $5\text{ mg}/\text{m}^3$  and  $3\text{mg}/\text{m}^3$  respectively.



## Noise/Air Sampling Results – North Entrance

**Sample Date:** July 25, 2005  
**Sample By:** Ryan Morris, Industrial Hygiene Intern

Sound levels, carbon monoxide, aromatic hydrocarbons, diesel particulate, and respirable dust were sampled at the north entrance on July 25, 2005. All samples were area samples. The sampling equipment was set up around the window where the employees interact with the visitors. The area samples are representative of the employee's exposure.

### Results

The employee's average noise exposure level was 66.8 decibels, well below the exposure limit of 85 decibels. Table 1, shows the noise level.

**Table 1: Noise levels and PPE recommendation**

	Noise Level in Decibels	PPE Recommendation
Area – 66.8 dBA	< 70 dBA	No hearing protection required
	70 – 85 dBA	Hearing protection recommended
	85 – 90 dBA	Hearing protection required when noise level is above the safe level
	> 90 dBA	Hearing protection required

All carbon monoxide levels, as a time weighted average, were below the established exposure limits.

One of the monitors was placed inside the window and the other monitor was placed on the outside edge of the window. The time weighted averages for the two carbon monoxide samples were 0 ppm, below the Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (PEL) of 50 ppm. The peak for the inside monitor was 112, below the NIOSH ceiling limit of 200 ppm. The peak on the monitor placed outside the window was 349 ppm, but this is not representative of the employee's exposure. The difference between the monitors shows a positive pressure in side the entrance station.

**Table 2: CO Levels**

Date	CO Monitor	Run Time	TWA*	STEL*	PEAK*	OSHA PEL
07/25/05	Inside Entrance Window	8hr 6min	0	0	112	50 ppm

07/25/05	Outside Entrance Window	8hr 5min	0	0	349	50 ppm
* values in ppm						

CO PPM*	Established Limits
25	ACGIH 8-hr time weighted average(TWA)
35	NIOSH 8-hr time weighted average(TWA)
50	OSHA 8-hr time weighted average(TWA)
200	NIOSH ceiling level

\*PPM – Parts Per Million

**Table 3: Carbon Monoxide (CO) Levels**

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: center;">All Time Weighted Averages were 0 ppm for the full shift.</p> </div>	CO Time Weighted Average level in PPM	Physiological and subjective symptoms
	0-50 ppm	50 ppm –OSHA 8-hr time weighted average No appreciable effect, except shortness of breath on vigorous exertion; possible tightness across the forehead; dilation of cutaneous blood vessel
	50-100 ppm	Shortness of breath on moderate exertion; occasional headache with throbbing in temples
100-200 ppm	Decided headache; irritable; easily fatigued; judgment disturbed; possible dizziness; dimness of vision	

The aromatic hydrocarbon sample was below the exposure limit. The sample was an area sample representative of the employee’s exposure. The results for the sample are shown in Table 4: Aromatic Hydrocarbons.

**Table 4: Aromatic Hydrocarbons**

Date	Sample	Sample Type	Total Hydrocarbons mg/sample	Total Hydrocarbons ppm	Reporting Limit	Air Volume (L)
07/25/05	Area	Tube	ND	<0.043	0.01 mg/sample	66.71
07/25/05	Blank Sample	Tube	ND	<0.054	0.01 mg/sample	53.02

• ND – None Detected

The area diesel particulate sample, as total carbon, was below the established exposure limit of 160µg/m<sup>3</sup>. The results for the sample are shown in Table 5: Diesel Particulate.

**Table 5: Diesel Particulate**

Date	Sample	Sample Type	Organic Carbon $\mu\text{g}/\text{m}^3$	Elemental Carbon $\mu\text{g}/\text{m}^3$	Total Carbon $\mu\text{g}/\text{m}^3$	Volume (L)
07/25/05	Area	Filter	14.0	1.7	15.0	1209.83
07/25/05	Blank	Filter	9.1	<1.3	9.1	967.78

The respirable dust sample was below the established exposure limit. The results for the sample are shown below in Table 6: Respirable Dust.

**Table 6: Respirable Dust**

Date	Sample	Sample Type	Respirable Dust mg/sample	Respirable Dust $\text{mg}/\text{m}^3$	Reporting Limit	Air Volume (L)
06/14/05	Area	Filter	ND	<0.02	0.02 mg/sample	960.00
06/14/05	Blank Sample	Filter	ND	<0.02	0.02 mg/sample	967.34

- ND – None Detected

## Materials, Methods, and Exposure Limits

Sound levels were monitored using two Quest NoisePro noise dosimeters. The noise dosimeters were calibrated before and after the sampling period in accordance with the manufacturer's recommendations and the instruments were setup following OSHA's guidelines. The noise dosimeters report the dose, the average sound level for the run time, the max level, and a projected 8 hour time weighted average. The noise dosimetry was done over the course of a full day under normal conditions. The OSHA 8 hour exposure level is 90 decibels.

The carbon monoxide samples were monitored using a Lumidor MiniMAX Pro gas detector equipped with a carbon monoxide sensor. The MiniMAX Pro gas detector passed the instruments self-tests and was calibrated according to the manufacturer's recommendations. The MiniMAX Pro shows the peak, time weighted average (TWA), and the short term exposure level (STEL). OSHA has set a permissible exposure limit of 50 ppm, and the ACGIH threshold limit value is 25 ppm. Carbon monoxide was monitored over the course of a full day under normal conditions.

Aromatic hydrocarbons were sampled by following method 1501 in the NIOSH Manual of Analytical Methods. The sampler used was a solid sorbent tube, coconut shell charcoal 100mg/50mg, at a flow rate of 0.20 liters/minute, given in table 3 of method 1501. The pumps used to sample were three SKC model 222 low flow pumps, calibrated using a DC-Lite Primary Flowmeter. Substances sampled in this method are benzene, p-tert-butyltoluene, cumene,  $\alpha$ -ethylbenzene,  $\beta$ -methylstyrene, toluene, xylene

(o-m-p-), and styrene. The results were reported as total petroleum hydrocarbons because none of the individual substances were detected.

Diesel particulate matter (as elemental carbon) was sampled following method 5040 of the NIOSH Manual of Analytical Methods. The sampler was a 37mm quartz-fiber filter with an SKC Aircheck sampling pump operating at 1.943 liters per minute. The only regulatory agency with an exposure limit for diesel particulate is the Mine Safety and Health Administration (MSHA). The exposure limit is  $160\mu\text{g}/\text{m}^3$  for total carbon.

Respirable particulates were monitored by following method 0600 in the NIOSH Manual of Analytical Methods. An aluminum cyclone with a cut-point of  $4\mu\text{m}$  was used to select the particulate size. An SKC Aircheck sampling pump pulled air through the sampling train at approximately 2.5 liters per minute. OSHA and ACGIH have established exposure limits of  $5\text{ mg}/\text{m}^3$  and  $3\text{mg}/\text{m}^3$  respectively.

## Noise/Air Sampling Results – East Entrance

**Sample Date:** July 27, 2005  
**Sample By:** Ryan Morris, Industrial Hygiene Intern

Sound levels, carbon monoxide, aromatic hydrocarbons, diesel particulates, and respirable dust were sampled at the east entrance on July 27, 2005. All samples were area samples that were set up around the kiosk window to represent the employee's exposure.

### Results

The average noise level was 60.2 decibels, well below the exposure limit of 85 decibels. Table 1, shows the noise level.

**Table 1: Noise levels and PPE recommendation**

Area – 60.2 dBA →	<b>Noise Level in Decibels</b>	<b>PPE Recommendation</b>
	< 70 dBA	No hearing protection required
	70 – 85 dBA	Hearing protection recommended
	85 – 90 dBA	Hearing protection required when noise level is above the safe level
	> 90 dBA	Hearing protection required

All carbon monoxide levels, as a TWA, STEL, and peak, were below all established exposure limits. One of the monitors was placed inside the window and the other monitor was placed on the outside edge of the window. The time weighted averages for the two carbon monoxide samples were 0 ppm, below the Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (PEL) of 50 ppm. The peak for both monitors occurred when the two CO monitors were being put in place. Two motorcycles pulled up to kiosk A and both monitors read 53 ppm. This peak was not exceeded throughout the rest of the day. Table 2 shows all carbon monoxide levels for the east entrance.

**Table 2: CO Levels**

Date	CO Monitor	Run Time	TWA*	STEL*	PEAK*	OSHA PEL
07/27/05	Inside Entrance Window	4hr 57min	0	0	53	50 ppm
07/27/05	Outside Entrance Window	4hr 53min	0	0	53	50 ppm

\* values in ppm

CO PPM*	Established Limits
25	ACGIH 8-hr time weighted average(TWA)
35	NIOSH 8-hr time weighted average(TWA)
50	OSHA 8-hr time weighted average(TWA)
200	NIOSH ceiling level

\*PPM – Parts Per Million

**Table 3: Carbon Monoxide (CO) Levels**

<p>All Time Weighted Averages were 0 ppm for the full shift.</p>	<p>CO Time Weighted Average level in PPM</p>	<p>Physiological and subjective symptoms</p>
	<p>0-50 ppm</p>	<p>50 ppm –OSHA 8-hr time weighted average No appreciable effect, except shortness of breath on vigorous exertion; possible tightness across the forehead; dilation of cutaneous blood vessel</p>
	<p>50-100 ppm</p>	<p>Shortness of breath on moderate exertion; occasional headache with throbbing in temples</p>
	<p>100-200 ppm</p>	<p>Decided headache; irritable; easily fatigued; judgment disturbed; possible dizziness; dimness of vision</p>

The aromatic hydrocarbon sample was below the exposure limit. The sample was an area sample representative of the employee's exposure. The results for the sample are shown in Table 4: Aromatic Hydrocarbons.

**Table 4: Aromatic Hydrocarbons**

Date	Sample	Sample Type	Total Hydrocarbons mg/sample	Total Hydrocarbons ppm	Reporting Limit	Air Volume (L)
07/27/05	Area	Tube	ND	<0.072	0.01 mg/sample	39.32

• ND – None Detected

The area diesel particulate sample, as total carbon, was below the established exposure limit of 160µg/m<sup>3</sup>. The results for the sample are shown in Table 5: Diesel Particulate.

**Table 5: Diesel Particulate**

Date	Sample	Sample Type	Organic Carbon $\mu\text{g}/\text{m}^3$	Elemental Carbon $\mu\text{g}/\text{m}^3$	Total Carbon $\mu\text{g}/\text{m}^3$	Volume (L)
07/27/05	Area	Filter	28.0	3.2	31.0	725.73

The respirable dust sample was below the established exposure limit. The results for the sample are shown below in Table 6: Respirable Dust.

**Table 6: Respirable Dust**

Date	Sample	Sample Type	Respirable Dust mg/sample	Respirable Dust $\text{mg}/\text{m}^3$	Reporting Limit	Air Volume (L)
06/14/05	Area	Filter	ND	<0.02	0.02 mg/sample	960.00
06/14/05	Blank Sample	Filter	ND	<0.02	0.02 mg/sample	967.34

- ND – None Detected

## Materials, Methods, and Exposure Limits

Sound levels were monitored using two Quest NoisePro noise dosimeters. The noise dosimeters were calibrated before and after the sampling period in accordance with the manufacturer's recommendations and the instruments were setup following OSHA's guidelines. The noise dosimeters report the dose, the average sound level for the run time, the max level, and a projected 8 hour time weighted average. The noise dosimetry was done over the course of a full day under normal conditions. The OSHA 8 hour exposure level is 90 decibels.

The carbon monoxide samples were monitored using a Lumidor MiniMAX Pro gas detector equipped with a carbon monoxide sensor. The MiniMAX Pro gas detector passed the instruments self-tests and was calibrated according to the manufacturer's recommendations. The MiniMAX Pro shows the peak, time weighted average (TWA), and the short term exposure level (STEL). OSHA has set a permissible exposure limit of 50 ppm, and the ACGIH threshold limit value is 25 ppm. Carbon monoxide was monitored over the course of a full day under normal conditions.

Aromatic hydrocarbons were sampled by following method 1501 in the NIOSH Manual of Analytical Methods. The sampler used was a solid sorbent tube, coconut shell charcoal 100mg/50mg, at a flow rate of 0.20 liters/minute, given in table 3 of method 1501. The pumps used to sample were three SKC model 222 low flow pumps, calibrated using a DC-Lite Primary Flowmeter. Substances sampled in this method are benzene, p-tert-butyltoluene, cumene,  $\alpha$ -ethylbenzene,  $\beta$ -methylstyrene, toluene, xylene (o-m-p-), and styrene. None of these samples were detected so the results was reported as none detected as a total petroleum hydrocarbon.

Diesel particulate matter (as elemental, organic, and total carbon) was sampled following method 5040 of the NIOSH Manual of Analytical Methods. The sampler was a 37mm quartz-fiber filter with an SKC Aircheck sampling pump operating at 1.943 liters per minute. The only regulatory agency with an exposure limit for diesel particulate is the Mine Safety and Health Administration (MSHA). The exposure limit is  $160\mu\text{g}/\text{m}^3$  for total carbon.

Respirable particulates were monitored by following method 0600 in the NIOSH Manual of Analytical Methods. An aluminum cyclone with a cut-point of  $4\mu\text{m}$  was used to select the particulate size. An SKC Aircheck sampling pump pulled air through the sampling train at approximately 2.5 liters per minute. OSHA and ACGIH have established exposure limits of  $5\text{ mg}/\text{m}^3$  and  $3\text{mg}/\text{m}^3$  respectively.



## **APPENDIX B**

**Aldehydes  
Table 1B**

Sample ID: X7503      Date: 7/5/05  
Sample Location: Area Sample, Kiosk A  
Sample Length: 400 minutes

Sample Volume: 20.12 Liters

Aldehyde	Lab Result ppm	8-hour TWA ppm	PEL-TWA ppm	TLV ppm	REL-TWA ppm
Acetaldehyde	<0.0083	<0.0083	200	25 (STEL)	None
Acrolien	<0.0065	<0.0065	0.1	0.1 (STEL)	0.1
Butyraldehyde	<0.0051	<0.0051	None	None	None
Formaldehyde	<0.012	<0.012	0.75	0.3 (STEL)	0.016
Heptanal	<0.0032	<0.0032	None	None	None
Hexanal	<0.0036	<0.0036	None	None	None
Iso-Valeraldehyde	<0.0042	<0.0042	None	None	None
Propionaldehyde	<0.0063	<0.0063	None	None	None
Valeraldehyde	<0.0042	<0.0042	None	None	None

Sample ID: X7507      Date: 7/5/05  
Sample Location: Area Sample, Kiosk B  
Sample Length: 393 minutes

Sample Volume: 20.89 Liters

Aldehyde	Lab Result ppm	8-hour TWA ppm	PEL-TWA ppm	TLV ppm	REL-TWA ppm
Acetaldehyde	<0.0080	<0.0080	200	25 (STEL)	None
Acrolien	<0.0063	<0.0063	0.1	0.1 (STEL)	0.1
Butyraldehyde	<0.0049	<0.0049	None	None	None
Formaldehyde	<0.012	<0.012	0.75	0.3 (STEL)	0.016
Heptanal	<0.0031	<0.0031	None	None	None
Hexanal	<0.0035	<0.0035	None	None	None
Iso-Valeraldehyde	<0.0041	<0.0041	None	None	None
Propionaldehyde	<0.0060	<0.0060	None	None	None
Valeraldehyde	<0.0041	<0.0041	None	None	None

Sample ID: X7603      Date: 7/6/05  
Sample Location: Area Sample, Kiosk A  
Sample Length: 337 minutes

Sample Volume: 17.64 Liters

Aldehyde	Lab Result ppm	8-hour TWA ppm	PEL-TWA ppm	TLV ppm	REL-TWA ppm
Acetaldehyde	<0.0094	<0.0094	200	25 (STEL)	None
Acrolien	<0.0074	<0.0074	0.1	0.1 (STEL)	0.1
Butyraldehyde	<0.0058	<0.0058	None	None	None
Formaldehyde	<0.014	<0.014	0.75	0.3 (STEL)	0.016
Heptanal	<0.0036	<0.0036	None	None	None
Hexanal	<0.0042	<0.0042	None	None	None
Iso-Valeraldehyde	<0.0048	<0.0048	None	None	None
Propionaldehyde	<0.0072	<0.0072	None	None	None
Valeraldehyde	<0.0048	<0.0048	None	None	None

Sample ID: X7607      Date: 7/6/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 337 minutes

Sample Volume: 17.88 Liters

Aldehyde	Lab Result ppm	8-hour TWA ppm	PEL-TWA ppm	TLV ppm	REL-TWA ppm
Acetaldehyde	<0.0093	<0.0093	200	25 (STEL)	None
Acrolien	<0.0073	<0.0073	0.1	0.1 (STEL)	0.1
Butyraldehyde	<0.0057	<0.0057	None	None	None
Formaldehyde	<0.014	<0.014	0.75	0.3 (STEL)	0.016
Heptanal	<0.0036	<0.0036	None	None	None
Hexanal	<0.0041	<0.0041	None	None	None
Iso-Valeraldehyde	<0.0048	<0.0048	None	None	None
Propionaldehyde	<0.0071	<0.0071	None	None	None
Valeraldehyde	<0.0048	<0.0048	None	None	None

Sample ID: X71103      Date: 7/11/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 357 minutes

Sample Volume: 18.92 Liters

Aldehyde	Lab Result ppm	8-hour TWA ppm	PEL-TWA ppm	TLV ppm	REL-TWA ppm
Acetaldehyde	<0.0088	<0.0088	200	25 (STEL)	None
Acrolien	<0.0069	<0.0069	0.1	0.1 (STEL)	0.1
Butyraldehyde	<0.0054	<0.0054	None	None	None
Formaldehyde	0.015	0.015	0.75	0.3 (STEL)	0.016
Heptanal	<0.0034	<0.0034	None	None	None
Hexanal	<0.0039	<0.0039	None	None	None
Iso-Valeraldehyde	<0.0045	<0.0045	None	None	None
Propionaldehyde	<0.0067	<0.0067	None	None	None
Valeraldehyde	<0.0045	<0.0045	None	None	None

Sample ID: X71203      Date: 7/12/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 375 minutes

Sample Volume: 19.89 Liters

Aldehyde	Lab Result ppm	8-hour TWA ppm	PEL-TWA ppm	TLV ppm	REL-TWA ppm
Acetaldehyde	<0.0084	<0.0084	200	25 (STEL)	None
Acrolien	<0.0066	<0.0066	0.1	0.1 (STEL)	0.1
Butyraldehyde	<0.0051	<0.0051	None	None	None
Formaldehyde	0.024	0.024	0.75	0.3 (STEL)	0.016
Heptanal	<0.0032	<0.0032	None	None	None
Hexanal	<0.0037	<0.0037	None	None	None
Iso-Valeraldehyde	<0.0043	<0.0043	None	None	None
Propionaldehyde	<0.0063	<0.0063	None	None	None
Valeraldehyde	<0.0043	<0.0043	None	None	None

**Elemental, Organic, and Total Carbon  
Table 2B**

Sample ID: DC75223      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 398 minutes      Sample Volume: 985.1 Liters

<b>Analyte</b>	<b>Lab Result ug/m<sup>3</sup></b>	<b>8-hour TWA ug/m<sup>3</sup></b>	<b>PEL- TWA ug/m<sup>3</sup></b>	<b>REL- TWA ug/m<sup>3</sup></b>	<b>TLV-TWA 1996 Proposed ug/m<sup>3</sup></b>	<b>TLV-TWA 2001 Proposed ug/m<sup>3</sup></b>	<b>MSHA- TWA ug/m<sup>3</sup></b>
Organic Carbon	31.0	31.0	None	None			
Elemental Carbon	2.4	2.4	None	None		20	
Total Carbon	33.0	33.0	None	None	150		160

Sample ID: DC75165      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 389 minutes      Sample Volume: 968.2 Liters

<b>Analyte</b>	<b>Lab Result ug/m<sup>3</sup></b>	<b>8-hour TWA ug/m<sup>3</sup></b>	<b>PEL- TWA ug/m<sup>3</sup></b>	<b>REL- TWA ug/m<sup>3</sup></b>	<b>TLV-TWA 1996 Proposed ug/m<sup>3</sup></b>	<b>TLV-TWA 2001 Proposed ug/m<sup>3</sup></b>	<b>MSHA- TWA ug/m<sup>3</sup></b>
Organic Carbon	30.0	30.0	None	None			
Elemental Carbon	6.3	6.3	None	None		20	
Total Carbon	36.0	36.0	None	None	150		160

Sample ID: DQ75237      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 399 minutes      Sample Volume: 903.7 Liters

<b>Analyte</b>	<b>Lab Result ug/m<sup>3</sup></b>	<b>8-hour TWA ug/m<sup>3</sup></b>	<b>PEL- TWA ug/m<sup>3</sup></b>	<b>REL- TWA ug/m<sup>3</sup></b>	<b>TLV-TWA 1996 Proposed ug/m<sup>3</sup></b>	<b>TLV-TWA 2001 Proposed ug/m<sup>3</sup></b>	<b>MSHA- TWA ug/m<sup>3</sup></b>
Organic Carbon	45.0	45.0	None	None			
Elemental Carbon	2.4	2.4	None	None		20	
Total Carbon	47.0	47.0	None	None	150		160

Sample ID: DQ75229 Date: 7/5/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 391 minutes Sample Volume: 999.6 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	59.0	59.0	None	None			
Elemental Carbon	7.2	7.2	None	None		20	
Total Carbon	66.0	66.0	None	None	150		160

Sample ID: DC76223 Date: 7/6/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 337 minutes Sample Volume: 838.96 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	27.0	27.0	None	None			
Elemental Carbon	4.6	4.6	None	None		20	
Total Carbon	32.0	32.0	None	None	150		160

Sample ID: DC76165 Date: 7/6/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 335 minutes Sample Volume: 841.01 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	29.0	29.0	None	None			
Elemental Carbon	3.8	3.8	None	None		20	
Total Carbon	33.0	33.0	None	None	150		160

Sample ID: DQ76237 Date: 7/6/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 330 minutes Sample Volume: 831.6 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	32.0	32.0	None	None			
Elemental Carbon	3.5	3.5	None	None		20	
Total Carbon	35.0	35.0	None	None	150		160

Sample ID: DC711165 Date: 7/11/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 355 minutes Sample Volume: 898.51 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	25.0	25.0	None	None			
Elemental Carbon	3.0	3.0	None	None		20	
Total Carbon	28.0	28.0	None	None	150		160

Sample ID: DC711223 Date: 7/11/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 348 minutes Sample Volume: 873.13 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	20.0	20.0	None	None			
Elemental Carbon	4.6	4.6	None	None		20	
Total Carbon	24.0	24.0	None	None	150		160

Sample ID: DQ711229 Date: 7/11/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 355 minutes Sample Volume: 896.02 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	30.0	30.0	None	None			
Elemental Carbon	2.9	2.9	None	None		20	
Total Carbon	33.0	33.0	None	None	150		160

Sample ID: DQ711237 Date: 7/11/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 348 minutes Sample Volume: 882.7 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	25.0	25.0	None	None			
Elemental Carbon	3.7	3.7	None	None		20	
Total Carbon	29.0	29.0	None	None	150		160

Sample ID: DC712165 Date: 7/12/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 366 minutes Sample Volume: 924.33 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	25.0	25.0	None	None			
Elemental Carbon	5.2	5.2	None	None		20	
Total Carbon	31.0	31.0	None	None	150		160

Sample ID: DC712223 Date: 7/12/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 357 minutes Sample Volume: 898.39 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	22.0	22.0	None	None			
Elemental Carbon	5.6	5.6	None	None		20	
Total Carbon	28.0	28.0	None	None	150		160

Sample ID: DQ712229 Date: 7/12/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 357 minutes Sample Volume: 924.81 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	22.0	22.0	None	None			
Elemental Carbon	5.1	5.1	None	None		20	
Total Carbon	27.0	27.0	None	None	150		160

Sample ID: DQ712237 Date: 7/12/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 366 minutes Sample Volume: 931.65 Liters

Analyte	Lab Result ug/m <sup>3</sup>	8-hour TWA ug/m <sup>3</sup>	PEL-TWA ug/m <sup>3</sup>	REL-TWA ug/m <sup>3</sup>	TLV-TWA 1996 Proposed ug/m <sup>3</sup>	TLV-TWA 2001 Proposed ug/m <sup>3</sup>	MSHA-TWA ug/m <sup>3</sup>
Organic Carbon	23.0	23.0	None	None			
Elemental Carbon	3.9	3.9	None	None		20	
Total Carbon	27.0	27.0	None	None	150		160



**Oxides of Nitrogen  
Table 3B**

Sample ID: NO7501      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 381 minutes      Sample Volume: 12.01 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide	0.13	0.13	5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide			25 TWA	25	25 TWA

Sample ID: NO27501      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 381 minutes      Sample Volume: 12.01 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide			5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide	0.031	0.031	25 TWA	25	25 TWA

Sample ID: NO7504      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 395 minutes      Sample Volume: 11.32 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide	0.12	0.12	5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide			25 TWA	25	25 TWA

Sample ID: NO27504      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 395 minutes      Sample Volume: 11.32 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide			5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide	0.032	0.032	25 TWA	25	25 TWA

Sample ID: NO7601      Date: 7/6/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 337 minutes      Sample Volume: 10.99 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide	0.19	0.19	5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide			25 TWA	25	25 TWA

Sample ID: NO27601      Date: 7/6/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 337 minutes      Sample Volume: 10.99 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide			5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide	0.033	0.033	25 TWA	25	25 TWA

Sample ID: NO7604      Date: 7/6/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 337 minutes      Sample Volume: 9.87 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide	0.19	0.19	5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide			25 TWA	25	25 TWA

Sample ID: NO27604      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 337 minutes      Sample Volume: 9.87 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide			5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide	0.037	0.037	25 TWA	25	25 TWA

Sample ID: NO71101      Date: 7/11/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 346 minutes      Sample Volume: 11.56 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide	0.11	0.11	5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide			25 TWA	25	25 TWA

Sample ID: NO271101      Date: 7/11/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 346 minutes      Sample Volume: 11.56 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide			5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide	<0.037	<0.037	25 TWA	25	25 TWA

Sample ID: NO71104 Date: 7/11/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 357 minutes Sample Volume: 10.17 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide	0.13	0.13	5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide			25 TWA	25	25 TWA

Sample ID: NO271104 Date: 7/11/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 357 minutes Sample Volume: 10.17 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide			5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide	<0.042	<0.042	25 TWA	25	25 TWA

Sample ID: NO71201 Date: 7/12/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 375 minutes Sample Volume: 12.90 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide	0.11	0.11	5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide			25 TWA	25	25 TWA

Sample ID: NO271201 Date: 7/12/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 375 minutes Sample Volume: 12.90 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide			5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide	<0.033	<0.033	25 TWA	25	25 TWA

Sample ID: NO71204 Date: 7/12/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 361 minutes Sample Volume: 10.34 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide	0.17	0.17	5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide			25 TWA	25	25 TWA

Sample ID: NO271204    Date: 7/12/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 361 minutes    Sample Volume: 10.34 Liters

<b>NO<sub>x</sub> Analyte</b>	<b>Lab Result ppm</b>	<b>8-hour TWA ppm</b>	<b>PEL ppm</b>	<b>TLV-TWA ppm</b>	<b>REL ppm</b>
Nitric Oxide			5.0 Ceiling	3.0	1.0 STEL
Nitrogen Dioxide	<0.041	<0.041	25 TWA	25	25 TWA

**Respirable Particulates  
Table 4B**

Sample ID: R75206      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 401 minutes      Sample Volume: 982.50 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>PEL-TWA mg/m<sup>3</sup></b>	<b>TLV-TWA mg/m<sup>3</sup></b>	<b>REL-TWA mg/m<sup>3</sup></b>
Respirable Particulate	<0.02	<0.02	1	0.5	0.1

Sample ID: R76206      Date: 7/6/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 337 minutes      Sample Volume: 785.50 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>PEL-TWA mg/m<sup>3</sup></b>	<b>TLV-TWA mg/m<sup>3</sup></b>	<b>REL-TWA mg/m<sup>3</sup></b>
Respirable Particulate	<0.03	<0.03	1	0.5	0.1

Sample ID: G76229      Date: 7/6/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 336 minutes      Sample Volume: 837.60 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>PEL-TWA mg/m<sup>3</sup></b>	<b>TLV-TWA mg/m<sup>3</sup></b>	<b>REL-TWA mg/m<sup>3</sup></b>
Respirable Particulate	<0.02	<0.02	1	0.5	0.1

Sample ID: G711206      Date: 7/11/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 356 minutes      Sample Volume: 839.80 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>PEL-TWA mg/m<sup>3</sup></b>	<b>TLV-TWA mg/m<sup>3</sup></b>	<b>REL-TWA mg/m<sup>3</sup></b>
Respirable Particulate	<0.02	<0.02	1	0.5	0.1

Sample ID: G712206      Date: 7/12/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 366 minutes      Sample Volume: 904.02 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>PEL-TWA mg/m<sup>3</sup></b>	<b>TLV-TWA mg/m<sup>3</sup></b>	<b>REL-TWA mg/m<sup>3</sup></b>
Respirable Particulate	<0.02	<0.02	1	0.5	0.1

**Total Petroleum Hydrocarbons (TPH)  
Table 5B**

Sample ID: B7502      Date: 7/5/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 390 minutes      Sample Volume: 24.16 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>Total Petroleum Hydrocarbons mg/sample</b>	<b>PEL- TWA mg/m<sup>3</sup></b>	<b>TLV- TWA mg/m<sup>3</sup></b>	<b>REL- TWA mg/m<sup>3</sup></b>
Total Petroleum Hydrocarbons (TPH)	<0.12	<0.12	None Detected	None	None	None

Sample ID: B7602      Date: 7/6/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 337 minutes      Sample Volume: 20.64 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>Total Petroleum Hydrocarbons mg/sample</b>	<b>PEL- TWA mg/m<sup>3</sup></b>	<b>TLV- TWA mg/m<sup>3</sup></b>	<b>REL- TWA mg/m<sup>3</sup></b>
Total Petroleum Hydrocarbons (TPH)	<0.14	<0.14	None Detected	None	None	None

Sample ID: B71102      Date: 7/11/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 346 minutes      Sample Volume: 21.56 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>Total Petroleum Hydrocarbons mg/sample</b>	<b>PEL- TWA mg/m<sup>3</sup></b>	<b>TLV- TWA mg/m<sup>3</sup></b>	<b>REL- TWA mg/m<sup>3</sup></b>
Total Petroleum Hydrocarbons (TPH)	<0.13	<0.13	None Detected	None	None	None

Sample ID: B71107      Date: 7/11/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 357 minutes      Sample Volume: 19.10 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>Total Petroleum Hydrocarbons mg/sample</b>	<b>PEL- TWA mg/m<sup>3</sup></b>	<b>TLV- TWA mg/m<sup>3</sup></b>	<b>REL- TWA mg/m<sup>3</sup></b>
Total Petroleum Hydrocarbons (TPH)	<0.15	<0.15	None Detected	None	None	None

Sample ID: B71202      Date: 7/12/05  
 Sample Location: Area Sample, Kiosk A  
 Sample Length: 361 minutes      Sample Volume: 22.22 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>Total Petroleum Hydrocarbons mg/sample</b>	<b>PEL- TWA mg/m<sup>3</sup></b>	<b>TLV- TWA mg/m<sup>3</sup></b>	<b>REL- TWA mg/m<sup>3</sup></b>
Total Petroleum Hydrocarbons (TPH)	<0.13	<0.13	None Detected	None	None	None

Sample ID: B71207      Date: 7/12/05  
 Sample Location: Area Sample, Kiosk B  
 Sample Length: 375 minutes      Sample Volume: 19.95 Liters

<b>Analyte</b>	<b>Lab Result mg/m<sup>3</sup></b>	<b>8-hour TWA mg/m<sup>3</sup></b>	<b>Total Petroleum Hydrocarbons mg/sample</b>	<b>PEL- TWA mg/m<sup>3</sup></b>	<b>TLV- TWA mg/m<sup>3</sup></b>	<b>REL- TWA mg/m<sup>3</sup></b>
Total Petroleum Hydrocarbons (TPH)	<0.14	<0.14	None Detected	None	None	None

## **APPENDIX C**





**ANALYTICAL REPORT**

Form ARF-AL  
 Page 1 of 2  
 Part 1 of 1  
 07180510000721RX

**JUL 18 2005**

Date \_\_\_\_\_  
 Laboratory Group Name 05I-2790-01  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

**Sampling Collection and Shipment**

Sampling Site West Entrance Date of Collection July 05, 2005  
 Date Samples Received at Laboratory July 11, 2005

**Analysis**

Method of Analysis NMAM 6014  
 Date(s) of Analysis July 15, 2005

**Analytical Results**

Field Sample Number	Laboratory Number	Sample Type	Nitric Oxide ug/sample	Nitrogen Dioxide ug/sample	Nitric Oxide Ppm	Nitrogen Dioxide Ppm	Air Volume L			
NO7501	05I26095	TUBE	1.9	NR	0.13	NR	12.01			
NO7504	05I26096	TUBE	1.7	NR	0.12	NR	11.32			
NO7601	05I26097	TUBE	2.6	NR	0.19	NR	10.99			
NO7604	05I26098	TUBE	2.3	NR	0.19	NR	9.87			
NO7610	05I26099	TUBE	ND	NR	<0.031	NR	10.43			
NO27501	05I26100	TUBE	NR	0.69	NR	0.031	12.01			
NO27504	05I26101	TUBE	NR	0.69	NR	0.032	11.32			
NO27601	05I26102	TUBE	NR	0.69	NR	0.033	10.99			
NO27604	05I26103	TUBE	NR	0.69	NR	0.037	9.87			
NO27610	05I26104	TUBE	NR	ND	NR	<0.031	10.43			
Reporting Limit			0.4	0.6						

† See comment on last page.  
 ND Parameter not detected above LOD.  
 NR Parameter not requested.  
 NA Parameter not applicable.

\*\* See comment on last page.  
 ( ) Parameter between LOD and LOQ.

*Sarah C. Campbell*  
 Analyst: Sarah C. Campbell  
*Lisa M. Reid*  
 Reviewer: Lisa M. Reid

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547  
 Phone (801) 266-7700 Web Page: [www.datachem.com](http://www.datachem.com)  
 FAX (801) 268-9992 E-mail: [lab@datachem.com](mailto:lab@datachem.com)



# ANALYTICAL REQUEST FORM

1.  REGULAR Status OSI 2790-01  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/7/05 Purchase Order No.        4. Quote No.         
 3. Company Name Yellowstone National Park DCL Project Manager         
 Address Mammoth Supply Center 5. Sample Collection         
Yellowstone Park WY, 82190 Sampling Site West Entrance  
 Person to Contact Brandon Gauthier Industrial Process Visitor Entry  
 Telephone (307) 344-2030 Date of Collection 7-5, 7-6  
 Fax Telephone (307) 344-2027 Time Collected 8:30, 300  
 E-mail Address brandon.gauthier@nps.gov Date of Shipment 7/7/05  
 Billing Address (if different from above) Chain of Custody No.       

### 6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
<u>OSI 279015</u>	<u>N07501</u>	<u>serbent tubes</u>	<u>12.01 L</u>	<u>NAAM 6014</u> <u>Nitric Oxide</u> <u>Nitrogen Dioxide</u>	
<u>96</u>	<u>N07504</u>		<u>11.32 L</u>		
<u>97</u>	<u>N07601</u>		<u>10.99 L</u>		
<u>98</u>	<u>N07604</u>		<u>9.87 L</u>		
<u>99</u>	<u>N07610</u>		<u>10.43 L</u>		
<u>100</u>	<u>N027501</u>		<u>12.01 L</u>		
<u>101</u>	<u>N027504</u>		<u>11.32 L</u>		
<u>102</u>	<u>N027601</u>		<u>10.99 L</u>		
<u>103</u>	<u>N027604</u>		<u>9.87 L</u>		
<u>104</u>	<u>N027610</u>		<u>10.43 L</u>		

\* Specify: Solid sorbent tube. e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1. ug/sample 2 mg/m<sup>3</sup> 3 ppm 4 % 5. \_\_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*

Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

### 7. Chain of Custody (Optional)

Relinquished by _____	Date/Time _____
Received by <u>[Signature]</u>	Date/Time <u>7/11/05</u>
Relinquished by <u>[Signature]</u>	Date/Time _____
Received by _____	Date/Time _____
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____



ANALYTICAL REPORT

Form ARF-AL  
 Page 1 of 2  
 Part 1 of 1  
 07180508550691RX

Date JUL 18 2005  
 Laboratory Group Name 05I-2790-02  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 05, 2005  
 Date Samples Received at Laboratory July 11, 2005

Analysis

Method of Analysis NMAM 5040  
 Date(s) of Analysis July 14, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Organic Carbon µg/sample	Elemental Carbon µg/sample	Total Carbon µg/sample	Organic Carbon mg/m <sup>3</sup>	Elemental Carbon mg/m <sup>3</sup>	Total Carbon mg/m <sup>3</sup>	Air Volume L	
DC75223	05I26105	FILTER	30.	2.3	33.	0.031	0.0024	0.033	985.1	†
DC75165	05I26106	FILTER	29.	6.1	35.	0.030	0.0063	0.036	968.2	†
DC76223	05I26107	FILTER	23.	3.9	26.	0.027	0.0046	0.032	838.96	†
DC76165	05I26108	FILTER	25.	3.2	28.	0.029	0.0038	0.033	841.01	†
DC76116	05I26109	FILTER	14.	ND	14.	0.016	<0.0015	0.016	839.99	†
DQ75237	05I26110	FILTER	41.	2.1	43.	0.045	0.0024	0.047	903.7	†
DQ75229	05I26111	FILTER	59.	7.2	66.	0.059	0.0072	0.066	999.6	†
DQ76237	05I26112	FILTER	26.	2.9	29.	0.032	0.0035	0.035	831.6	†
DQ76117	05I26113	FILTER	12.	ND	12.	0.015	<0.0016	0.015	835.8	†
Reporting Limit			**	**						

† See comment on last page.  
 ND Parameter not detected above LOD.  
 NR Parameter not requested.  
 NA Parameter not applicable.

\*\* See comment on last page.  
 ( ) Parameter between LOD and LoQ.

*Mei Qi Huang*  
 Analyst: Mei Qi Huang  
*Penny A. Foote*  
 Reviewer: Penny A. Foote

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547  
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 FAX (801) 268-9992 E-mail: lab@datachem.com



18895  
Page



**DATA  
CHEM**  
LABORATORIES, INC.

**ANALYTICAL REQUEST FORM**

1.  REGULAR Status OSI-2790-02  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/7/05 Purchase Order No. - 4. Quote No. -  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Mammoth Supply Center 5. Sample Collection \_\_\_\_\_  
Yellowstone Park WY, 82190 Sampling Site West Entrance  
 Person to Contact Brandon Gauthier Industrial Process Visitor Entry  
 Telephone (307) 344-2030 Date of Collection 7-5, 7-6  
 Fax Telephone (307) 344-2027 Time Collected 8:30 - 3:00  
 E-mail Address brandon.gauthier@nps.gov Date of Shipment 7/7/05  
 Billing Address (if different from above) Chain of Custody No. -

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
<u>OSI 26105</u>	<u>DC75223</u>	<u>quartz filter</u>	<u>985.1 L</u>		
<u>06</u>	<u>DC75165</u>	<u>quartz filter</u>	<u>969.2 L</u>		
<u>07</u>	<u>DC76223</u>	<u>quartz filter</u>	<u>838.96 L</u>		
<u>08</u>	<u>DC76165</u>	<u>quartz filter</u>	<u>841.01 L</u>		
<u>09</u>	<u>DC76116</u>	<u>quartz filter</u>	<u>839.99 L</u>		
<u>10</u>	<u>DQ75227</u>	<u>quartz filter</u>	<u>902.7 L</u>		
<u>11</u>	<u>DQ75229</u>	<u>quartz filter</u>	<u>999.6 L</u>		
<u>12</u>	<u>DQ76227</u>	<u>quartz filter</u>	<u>831.6 L</u>		
<u>13</u>	<u>DQ76117</u>	<u>quartz filter</u>	<u>835.8 L</u>		
<u>14</u>	<u>R75206</u>	<u>filter-cyclone</u>	<u>982.5 L</u>		
<u>15</u>	<u>G76206</u>	<u>filter-cyclone</u>	<u>785.5 L</u>		

*Handwritten notes in table:*  
 - A large bracket on the right side of rows 06-13 is labeled "MAMM 5040 DPM".  
 - Next to row 14: "g roachme HZ" and "mkt 07/14/05".  
 - Next to row 15: "g roachme HZ" and "mkt 07/14/05".

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1. ug/sample 2 mg/m<sup>3</sup> 3 ppm 4 % 5 \_\_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*  
 Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_  
 7. Chain of Custody (Optional)

Relinquished by _____	Date/Time _____
Received by <u>[Signature]</u>	Date/Time <u>7/11/05</u>
Relinquished by <u>[Signature]</u>	Date/Time _____
Received by <u>[Signature]</u>	Date/Time <u>07/14/05 11:00</u>
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____

960 West LeVoy Drive / Salt Lake City, UT 84123 800-356-9135 or 801-266-7700 / FAX: 801-268-9992  
 DATACHEM LABORATORIES, INC.



ANALYTICAL REPORT

Form ARF-AL  
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 Part 1 of 1  
 07180503214502RX

Date JUL 18 2005  
 Laboratory Group Name 05I-2790-04  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 05, 2005  
 Date Samples Received at Laboratory July 11, 2005

Analysis

Method of Analysis NMAM 1501  
 Date(s) of Analysis July 17, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Total Hydrocarbons mg/sample GC/FID	Total Hydrocarbons mg/m <sup>3</sup> RUC/FID	Air Volume liters						
B7502	05I26118	TUBE	ND	<0.12	24.16						
B7602	05I26119	TUBE	ND	<0.14	20.64						
B7609	05I26120	TUBE	ND	<0.13	22.40						
Reporting Limit			0.01								

† See comment on last page.      \*\* See comment on last page.  
 ND Parameter not detected above LOD.      ( ) Parameter between LOD and LOQ.  
 NR Parameter not requested.  
 NA Parameter not applicable.

Analyst: Fred M. Rejali  
 Reviewer: [Signature]



**DATA  
CHEM**  
LABORATORIES, INC.

**ANALYTICAL REQUEST FORM**

1.  REGULAR Status OST-2790-04  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/7/05 Purchase Order No. \_\_\_\_\_ 4. Quote No. —  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Mammoth Supply Center  
Yellowstone Park WY, 82190 5. Sample Collection  
 Person to Contact Brandon Gauthier Sampling Site West Entrance  
 Telephone (307) 344-2030 Industrial Process Visitor Entry  
 Fax Telephone (307) 344-2627 Date of Collection 7-6  
 E-mail Address brandon.gauthier@nps.gov Time Collected 8:30 - 9:00  
 Billing Address (if different from above) Date of Shipment 7/7/05  
 Chain of Custody No. \_\_\_\_\_

**6. REQUEST FOR ANALYSES**

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
OSTZ6116	B76229	Filter-cyclone	837.6 L	gravimetric respirable	
↓ 17	G76118	Filter-cyclone	868.5 L		
OSTZ6118	B7502	solid sorbent tube	24.16 L	NMAAM 1501 Oromanz my concentrations	
↓ 19	B7602	solid sorbent tube	30.64 L		
↓ 20	B7609	solid sorbent tube	32.40 L		
OSTZ6121	X7503	solid sorbent	20.12 L	NMAAM 2539 # additional screening	
↓ 22	X7507	solid sorbent	20.99 L		
↓ 23	X7603	solid sorbent	17.64 L		
↓ 24	X7607	solid sorbent	17.58 L		
↓ 25	X7608	solid sorbent	17.76 L		

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1. ug/sample 2 mg/m<sup>3</sup> 3 ppm 4 % 5 \_\_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*  
 Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

**7. Chain of Custody (Optional)**

Relinquished by _____	Date/Time _____
Received by <u>TRP</u>	Date/Time <u>7/11/05</u>
Relinquished by <u>TWELZ JW FWH JW</u>	Date/Time _____
Received by _____	Date/Time _____
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____

960 West LeVoy Drive / Salt Lake City, UT 84123 800-356-9135 or 801-266-7700 / FAX: 801-268-9992  
 DATACHEM LABORATORIES, INC.



ANALYTICAL REPORT

Form ARF-AL  
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 Part 1 of 3  
 07180503470300RX

JUL 18 2005

Date \_\_\_\_\_  
 Laboratory Group Name 05I-2790-05  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 05, 2005  
 Date Samples Received at Laboratory July 11, 2005

Analysis

Method of Analysis NMAM 2539  
 Date(s) of Analysis July 17, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Acetaldehyde µg/sample GC/FID	Acrolein µg/sample GC/FID	Butyraldehyde µg/sample GC/FID	Formaldehyde µg/sample GC/FID	Heptanal µg/sample GC/FID	Hexanal µg/sample GC/FID	Iso-Valeraldehyde µg/sample GC/FID	Propionaldehyde µg/sample GC/FID
X7503	05I26121	TUBE	ND	ND	ND	ND	ND	ND	ND	ND
X7507	05I26122	TUBE	ND	ND	ND	ND	ND	ND	ND	ND
X7603	05I26123	TUBE	ND	ND	ND	ND	ND	ND	ND	ND
X7607	05I26124	TUBE	ND	ND	ND	ND	ND	ND	ND	ND
X7608	05I26125	TUBE	ND	ND	ND	ND	ND	ND	ND	ND
Reporting Limit			0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

† See comment on last page.      \*\* See comment on last page.  
 ND Parameter not detected above LOD.      ( ) Parameter between LOD and LOQ.  
 NR Parameter not requested.  
 NA Parameter not applicable.

Analyst: Fred M. Rejali  
 Reviewer: \_\_\_\_\_

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547  
 Phone (801) 266-7700      Web Page: www.datachem.com  
 FAX (801) 268-9992      E-mail: lab@datachem.com





ANALYTICAL REPORT

Form ARF-AL  
 Page 2 of 4  
 Part 2 of 3  
 07180503470300RX

Date JUL 18 2005  
 Laboratory Group Name 05I-2790-05  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 05, 2005  
 Date Samples Received at Laboratory July 11, 2005

Analysis

Method of Analysis NMAM 2539  
 Date(s) of Analysis July 17, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Valeraldehyde µg/sample GC/FID	Acetaldehyde ppm GC/FID	Acrolein ppm GC/FID	Butyraldehyde ppm GC/FID	Formaldehyde ppm GC/FID	Heptanal ppm GC/FID	Hexanal ppm GC/FID	Iso-Valeraldehyde ppm GC/FID
X7503	05I26121	TUBE	ND	<0.0083	<0.0065	<0.0051	<0.012	<0.0032	<0.0036	<0.0042
X7507	05I26122	TUBE	ND	<0.0080	<0.0063	<0.0049	<0.012	<0.0031	<0.0035	<0.0041
X7603	05I26123	TUBE	ND	<0.0094	<0.0074	<0.0058	<0.014	<0.0036	<0.0042	<0.0048
X7607	05I26124	TUBE	ND	<0.0093	<0.0073	<0.0057	<0.014	<0.0036	<0.0041	<0.0048
X7608	05I26125	TUBE	ND	<0.0094	<0.0074	<0.0057	<0.014	<0.0036	<0.0041	<0.0048
Reporting Limit			0.3							

† See comment on last page.      \*\* See comment on last page.  
 ND Parameter not detected above LOD.      ( ) Parameter between LOD and LOQ.  
 NR Parameter not requested.  
 NA Parameter not applicable.



**ANALYTICAL REPORT**

Form ARF-AL  
Page 3 of 4  
Part 3 of 3  
07180503470300RX

Date JUL 18 2005  
Laboratory Group Name 05I-2790-05  
Account No. 07003

Yellowstone National Park  
Attention: Brandon Gauthier  
Safety Services  
P.O. Box 168  
Mammoth, WY 82190

FAX (307) 344-2027  
Telephone (307) 344-2030  
E-mail brandon-gauthier@nps.gov

**Sampling Collection and Shipment**

Sampling Site West Entrance Date of Collection July 05, 2005  
Date Samples Received at Laboratory July 11, 2005

**Analysis**

Method of Analysis NMAM 2539  
Date(s) of Analysis July 17, 2005

**Analytical Results**

Field Sample Number	Laboratory Number	Sample Type	Propionaldehyde ppm GC/FID	Valeraldehyde ppm GC/FID	Air Volume liters					
X7503	05I26121	TUBE	<0.0063	<0.0042	20.12					
X7507	05I26122	TUBE	<0.0060	<0.0041	20.89					
X7603	05I26123	TUBE	<0.0072	<0.0048	17.64					
X7607	05I26124	TUBE	<0.0071	<0.0048	17.88					
X7608	05I26125	TUBE	<0.0071	<0.0048	17.76					
Reporting Limit										

† See comment on last page.  
ND Parameter not detected above LOD.  
NR Parameter not requested.  
NA Parameter not applicable.

\*\* See comment on last page.  
( ) Parameter between LOD and LOQ.

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Phone (801) 266-7700 Web Page: www.datachem.com  
FAX (801) 268-9992 E-mail: lab@datachem.com



# ANALYTICAL REQUEST FORM

1.  REGULAR Status OST-2790-05  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/7/05 Purchase Order No. \_\_\_\_\_ 4. Quote No. -  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Moore Supply Center  
Yellowstone Park WY, 82190 5. Sample Collection  
 Person to Contact Brendan Gauthier Sampling Site West Entrance  
 Telephone (307) 344-2030 Industrial Process Visitor Entry  
 Fax Telephone (307) 344-2627 Date of Collection 7-5, 7-6  
 E-mail Address brendan.gauthier@nps.gov Time Collected 8:30 - 3:00  
 Billing Address (if different from above) Date of Shipment 7/7/05  
 Chain of Custody No. -

## 6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
OSTZ6116	G76229	Filter-cyclone	837.6 L	gravimetric respirable	
↓ 17	G76118	Filter-cyclone	868.5 L		
OSTZ6118	B7502	solid sorbent tube	24.16 L	NMAM-1501 aromatic hydrocarbons	
↓ 19	B7602	solid sorbent tube	30.64 L		
↓ 20	B7609	solid sorbent tube	22.40 L		
OSTZ6121	X7503	solid sorbent	20.12 L	NMAM 2539 aldehydes screening	
↓ 22	X7507	solid sorbent	20.99 L		
↓ 23	X7603	solid sorbent	17.64 L		
↓ 24	X7607	solid sorbent	17.58 L		
↓ 25	X7608	solid sorbent	17.76 L		

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1. ug/sample 2. mg/m<sup>3</sup> 3. ppm 4. % 5. \_\_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*

Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

## 7. Chain of Custody (Optional)

Relinquished by _____	Date/Time _____
Received by <u>PLR</u>	Date/Time <u>7/11/05</u>
Relinquished by <u>TWSL3 JW FWH JW</u>	Date/Time _____
Received by _____	Date/Time _____
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____

960 West LeVoy Drive / Salt Lake City, UT 84123

800-356-9135 or 801-266-7700 / FAX: 801-268-9992

DATACHEM LABORATORIES, INC.



ANALYTICAL REPORT

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 Part 1 of 1  
 07290512394143RX

Date JUL 29 2005  
 Laboratory Group Name Q5I-2994-02  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 11, 2005  
 Date Samples Received at Laboratory July 19, 2005

Analysis

Method of Analysis NMAM 5040  
 Date(s) of Analysis July 28, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Organic Carbon ug/sample	Elemental Carbon ug/sample	Total Carbon ug/sample	Organic Carbon ug/m <sup>3</sup>	Elemental Carbon ug/m <sup>3</sup>	Total Carbon ug/m <sup>3</sup>	Air Volume L	
DQ711229	05I28355	FILTER	27.	2.6	29.	0.030	0.0029	0.033	896.02	†
DQ711237	05I28356	FILTER	22.	3.2	25.	0.025	0.0037	0.029	882.70	†
DQ712116	05I28357	FILTER	8.1	ND	8.1	0.0088	<0.0014	0.0088	928.23	†
DQ712229	05I28358	FILTER	21.	4.7	25.	0.022	0.0051	0.027	924.81	†
DQ712237	05I28359	FILTER	21.	3.7	25.	0.023	0.0039	0.027	931.65	†
DC711165	05I28360	FILTER	23.	2.7	25.	0.025	0.0030	0.028	898.51	†
DC711223	05I28361	FILTER	17.	4.0	21.	0.020	0.0046	0.024	873.13	†
DC712117	05I28362	FILTER	36.	6.6	43.	0.041	0.0074	0.048	885.82	†
DC712165	05I28363	FILTER	24.	4.8	28.	0.025	0.0052	0.031	924.33	†
DC712223	05I28364	FILTER	20.	5.1	25.	0.022	0.0056	0.028	898.39	†
Reporting Limit			**	**						

† See comment on last page.  
 ND Parameter not detected above LOD.  
 NR Parameter not requested.  
 NA Parameter not applicable.

\*\* See comment on last page.  
 ( ) Parameter between LOD and LOQ.

Analyst: Mei Qi Huang  
 Reviewer: Penny A. Foote

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547  
 Phone (801) 266-7700 Web Page: www.datachem.com  
 FAX (801) 268-9992 E-mail: lab@datachem.com



**DATA  
CHEM**  
LABORATORIES, INC.

**ANALYTICAL REQUEST FORM**

1.  REGULAR Status OST: 2994-02  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/13/05 Purchase Order No. \_\_\_\_\_ 4. Quote No. \_\_\_\_\_  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Mammoth Supply Center  
Yellowstone Park WY, 82190  
 Person to Contact Brandon Gauthier 5. Sample Collection  
 Telephone (307) 344-2030 Sampling Site West Entrance  
 Fax Telephone (307) 344-2027 Industrial Process Visitor Entry  
 E-mail Address brandon.gauthier@nps.gov Date of Collection 7-11, 7-12  
 Billing Address (if different from above) Time Collected 8:30-3:00  
 Date of Shipment 7/13/05  
 Chain of Custody No. \_\_\_\_\_

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
<u>OST 28355</u>	<u>DQ711229</u>	<u>quartz filter</u>	<u>896.02 L</u>	<u>NMAM 5040</u> <u>DPM</u>	
<u>56</u>	<u>DQ711237</u>	<u>↓</u>	<u>882.70 L</u>		
<u>57</u>	<u>DQ712116</u>	<u>↓</u>	<u>928.23 L</u>		
<u>58</u>	<u>DQ712229</u>	<u>↓</u>	<u>924.81 L</u>		
<u>59</u>	<u>DQ712237</u>	<u>↓</u>	<u>931.65 L</u>		
<u>60</u>	<u>DC711165</u>	<u>quartz filter</u>	<u>898.51 L</u>		
<u>61</u>	<u>DC711223</u>	<u>↓</u>	<u>873.13 L</u>		
<u>62</u>	<u>DC712117</u>	<u>↓</u>	<u>885.82 L</u>		
<u>63</u>	<u>DC712165</u>	<u>↓</u>	<u>924.33 L</u>		
<u>64</u>	<u>DC712223</u>	<u>↓</u>	<u>898.39 L</u>		

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type: Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1 ug/sample 2 mg/m<sup>3</sup> 3 ppm 4 % 5 \_\_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*

Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

7. Chain of Custody (Optional)

Relinquished by _____	Date/Time _____
Received by <u>RAV</u>	Date/Time <u>7/19/05 10:50</u>
Relinquished by <u>OG I RW</u>	Date/Time _____
Received by <u>Mike H</u>	Date/Time <u>6/27/05 16:50</u>
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____

960 West LeVoy Drive / Salt Lake City, UT 84123 800-356-9135 or 801-266-7700 / FAX: 801-268-9992  
 DATACHEM LABORATORIES, INC.



ANALYTICAL REPORT

Form ARF-AL  
 Page 1 of 2  
 Part 1 of 1  
 08010516515157RX

Date AUG 02 2005  
 Laboratory Group Name 05I-2994-03  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 11, 2005  
 Date Samples Received at Laboratory July 19, 2005

Analysis

Method of Analysis NMAM 6014  
 Date(s) of Analysis August 01, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Nitric Oxide µg/sample	Nitrogen Dioxide µg/sample	Nitric Oxide ppm	Nitrogen Dioxide ppm	Air Volume L
NO71101	05I28365	TUBE	1.6	NR	0.11	NR	11.56
NO71104	05I28366	TUBE	1.6	NR	0.13	NR	10.17
NO71201	05I28367	TUBE	1.8	NR	0.11	NR	12.9
NO71204	05I28368	TUBE	2.2	NR	0.17	NR	10.34
NO271101	05I28369	TUBE	NR	ND	NR	<0.037	11.56
NO271104	05I28370	TUBE	NR	ND	NR	<0.042	10.17
NO271201	05I28371	TUBE	NR	ND	NR	<0.033	12.9
NO271204	05I28372	TUBE	NR	ND	NR	<0.041	10.34
Reporting Limit			0.5	0.8			

† See comment on last page.  
 ND Parameter not detected above LOD.  
 NR Parameter not requested.  
 NA Parameter not applicable.

\*\* See comment on last page.  
 ( ) Parameter between LOD and LOQ.

*Tanya Cheklin*  
 Analyst Tanya Cheklin  
*Rosemary H. Hanks*  
 Reviewer: Rosemary H. Hanks

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547  
 Phone (801) 266-7700 Web Page: www.datachem.com  
 FAX (801) 268-9992 E-mail: lab@datachem.com





# ANALYTICAL REQUEST FORM

1.  REGULAR Status OSI-2994-03  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/13/05 Purchase Order No. \_\_\_\_\_ 4. Quote No. \_\_\_\_\_  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Mammoth Supply Center  
Yellowstone Park WY, 82190 5. Sample Collection  
 Person to Contact Brandon Gauthier Sampling Site West Entrance  
 Telephone (307) 344-2030 Industrial Process Visitor Entry  
 Fax Telephone (307) 344-2027 Date of Collection 7-11, 7-12  
 E-mail Address brandon\_gauthier@nps.gov Time Collected 8:30-3:00  
 Billing Address (if different from above) Date of Shipment 7/13/05  
 Chain of Custody No. \_\_\_\_\_

## 6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
<u>OSI 28365</u>	<u>11071101</u>	<u>solvent tubes</u>	<u>11.56 L</u>	<u>MAM 6014</u> <u>Nitrate Oxide N</u> <u>Nitrogen Dioxide</u>	
<u>366</u>	<u>11071104</u>		<u>10.17 L</u>		
<u>367</u>	<u>11071201</u>		<u>12.9 L</u>		
<u>368</u>	<u>11071204</u>		<u>10.34 L</u>		
<u>369</u>	<u>110271101</u>		<u>11.56 L</u>		
<u>370</u>	<u>110271104</u>		<u>10.17 L</u>		
<u>371</u>	<u>110271201</u>		<u>12.9 L</u>		
<u>372</u>	<u>110271204</u>	<u>↓</u>	<u>10.34 L</u>		

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1 ug/sample 2 mg/m<sup>3</sup> 3 ppm 4 % 5 \_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*

Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

## 7. Chain of Custody (Optional)

Relinquished by _____	Date/Time _____
Received by <u>[Signature]</u>	Date/Time <u>7/13/05 18:50</u>
Relinquished by <u>[Signature]</u>	Date/Time _____
Received by _____	Date/Time _____
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____

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 DATACHEM LABORATORIES, INC.





ANALYTICAL REPORT

Form ARF-AL  
 Page 1 of 2  
 Part 1 of 1  
 07290514334761RX

JUL 29 2005

Date \_\_\_\_\_  
 Laboratory Group Name 05I-2994-04  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 11, 2005  
 Date Samples Received at Laboratory July 19, 2005

Analysis

Method of Analysis NMAM 0600  
 Date(s) of Analysis July 29, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Respirable Dust mg/sample	Respirable Dust mg/m <sup>3</sup>	Air Volume L					
G711206	05I28373	FILTER	ND	<0.02	839.8					
G712118	05I28374	FILTER	ND	<0.02	871.91					
G712206	05I28375	FILTER	ND	<0.02	904.02					
Reporting Limit			0.02							

† See comment on last page.  
 ND Parameter not detected above LOD.  
 NR Parameter not requested.  
 NA Parameter not applicable.

\*\* See comment on last page.  
 ( ) Parameter between LOD and LOQ.  
*Janah A. Campbell RKA*  
 Analyst, Robert K. Aullman  
*P.P. Steen*  
 Reviewer: Peter P. Steen

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 FAX (801) 268-9992 E-mail: lab@datachem.com



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LABORATORIES, INC.

**ANALYTICAL REQUEST FORM**

1.  REGULAR Status OSI-2994-04  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/13/05 Purchase Order No. \_\_\_\_\_ 4. Quote No. \_\_\_\_\_  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Mammoth Supply Center  
Yellowstone Park WY, 82190 5. Sample Collection  
 Person to Contact Brandon Gauthier Sampling Site West Entrance  
 Telephone (307) 344-2030 Industrial Process Visitor Entry  
 Fax Telephone (307) 344-2027 Date of Collection 7/1, 7-12  
 E-mail Address brandon.gauthier@nps.gov Time Collected 8:30-3:00  
 Billing Address (if different from above) Date of Shipment 7/13/05  
 Chain of Custody No. \_\_\_\_\_

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
<u>OSI 2994-04</u>	<u>G711206</u>	<u>Filter cyclone</u>	<u>839.80 L</u>	<u>gravimetric respirable</u>	
<u>↓ 374</u>	<u>G712118</u>	<u>↓</u>	<u>871.91 L</u>		
<u>↓ 375</u>	<u>G712206</u>	<u>↓</u>	<u>904.02 L</u>		
	<u>X71103</u>	<u>solid sorbat tube</u>	<u>18.98 L</u>	<u>NMAM 2539 aldehyde screening</u>	
	<u>X71203</u>	<u>↓</u>	<u>19.89 L</u>		
	<u>X71209</u>	<u>↓</u>	<u>19.41 L</u>		
	<u>B71102</u>	<u>solid sorbat tube</u>	<u>21.56 L</u>	<u>NMAM 1501 aromatic hydrocarbons</u>	
	<u>B71107</u>	<u>↓</u>	<u>19.16 L</u>		
	<u>B71202</u>	<u>↓</u>	<u>22.22 L</u>		
	<u>B71207</u>	<u>↓</u>	<u>19.95 L</u>		
	<u>B71208</u>	<u>↓</u>	<u>20.71 L</u>		

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1. ug/sample 2. mg/m<sup>3</sup> 3. ppm 4. % 5. \_\_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*  
 Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

7. Chain of Custody (Optional)

Relinquished by _____	Date/Time _____
Received by <u>[Signature]</u>	Date/Time <u>7/19/05 10:50</u>
Relinquished by <u>TW-SIL 3 JW</u>	Date/Time _____
Received by _____	Date/Time _____
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____



ANALYTICAL REPORT

Form ARF-AL  
 Page 1 of 4  
 Part 1 of 3  
 07290503041136RX

Date JUL 29 2005  
 Laboratory Group Name 05I-2994-05  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 11, 2005  
 Date Samples Received at Laboratory July 19, 2005

Analysis

Method of Analysis NMAM 2539  
 Date(s) of Analysis July 28, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Acetaldehyde µg/sample GC/FID	Acrolein µg/sample GC/FID	Butyraldehyde µg/sample GC/FID	Formaldehyde µg/sample GC/FID	Heptanal µg/sample GC/FID	Hexanal µg/sample GC/FID	Iso-valeraldehyde µg/sample GC/FID	Propionaldehyde µg/sample GC/FID
X71103	05I28376	TUBE	ND	ND	ND	0.34	ND	ND	ND	ND
X71203	05I28377	TUBE	ND	ND	ND	0.58	ND	ND	ND	ND
X71209	05I28378	TUBE	ND	ND	ND	ND	ND	ND	ND	ND
Reporting Limit			0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

† See comment on last page.  
 ND Parameter not detected above LOD.  
 NR Parameter not requested.  
 NA Parameter not applicable.

\*\* See comment on last page.  
 ( ) Parameter between LOD and LOQ

Analyst: F. Rejali  
 Fred H. Rejali  
 Reviewer: [Signature]



ANALYTICAL REPORT

Form ARF-AL  
Page 2 of 4  
Part 2 of 3  
07290503041136RX

JUL 29 2005

Date \_\_\_\_\_  
Laboratory Group Name 05I-2994-05  
Account No. 07003

Yellowstone National Park  
Attention: Brandon Gauthier  
Safety Services  
P.O. Box 168  
Mammoth, WY 82190

FAX (307) 344-2027  
Telephone (307) 344-2030  
E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 11, 2005  
Date Samples Received at Laboratory July 19, 2005

Analysis

Method of Analysis NMAM 2539  
Date(s) of Analysis July 28, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Valeraldehyde µg/sample GC/FID	Acetaldehyde ppm GC/FID	Acrolein ppm GC/FID	Butyraldehyde ppm GC/FID	Formaldehyde ppm GC/FID	Heptanal ppm GC/FID	Hexanal ppm GC/FID	Iso-Valeraldehyde ppm GC/FID
X71103	05I28376	TUBE	ND	<0.0088	<0.0069	<0.0054	0.015	<0.0034	<0.0039	<0.0045
X71203	05I28377	TUBE	ND	<0.0084	<0.0066	<0.0051	0.024	<0.0032	<0.0037	<0.0043
X71209	05I28378	TUBE	ND	<0.0086	<0.0067	<0.0052	<0.013	<0.0033	<0.0038	<0.0044
Reporting Limit			0.3							

† See comment on last page.      \*\* See comment on last page.  
ND Parameter not detected above LOD.      ( ) Parameter between LOD and LOQ.  
NR Parameter not requested.  
NA Parameter not applicable.

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ANALYTICAL REPORT

Form ARF-AL  
 Page 3 of 4  
 Part 3 of 3  
 07290503041136RX

Date JUL 29 2005  
 Laboratory Group Name 05I-2994-05  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 11, 2005

Date Samples Received at Laboratory July 19, 2005

Analysis

Method of Analysis NMAM 2539

Date(s) of Analysis July 28, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Propionaldehyde ppm GC/FID	Valeraldehyde ppm GC/FID	Air Volume liters						
X71103	05I28376	TUBE	<0.0067	<0.0045	18.92						
X71203	05I28377	TUBE	<0.0063	<0.0043	19.89						
X71209	05I28378	TUBE	<0.0065	<0.0044	19.41						
Reporting Limit											

† See comment on last page.      \*\* See comment on last page.  
 ND Parameter not detected above LOD.      ( ) Parameter between LOD and LOQ.  
 NR Parameter not requested.  
 NA Parameter not applicable.

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**ANALYTICAL REQUEST FORM**

1.  REGULAR Status OSI-2994-05

RUSH Status Requested - ADDITIONAL CHARGE

RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_

CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/13/05 Purchase Order No. \_\_\_\_\_ 4. Quote No. \_\_\_\_\_  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Mammoth Supply Center 5. Sample Collection \_\_\_\_\_  
Yellowstone Park WY, 82190 Sampling Site West Entrance  
 Person to Contact Brandon Gunther Industrial Process Visitor Entry  
 Telephone (307) 344-2830 Date of Collection 7-1, 7-12  
 Fax Telephone (307) 344-2027 Time Collected 8:30-3:00  
 E-mail Address brandon.gunther@nps.gov Date of Shipment 7/13/05  
 Billing Address (if different from above) Chain of Custody No \_\_\_\_\_

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	6711206	Filter cyclone	839.80 L	} gravimetric respirable	
	6712118	↓	871.91 L		
	6712206	↓	904.02 L		
<u>OSI 28576</u>	X 71103	solid sorbent tube	18.92 L	} NAM 2559 alkene screening	
<u>377</u>	X 71203	↓	19.89 L		
<u>378</u>	X 71209	↓	19.41 L		
	B 71102	solid sorbent tube	21.56 L	} NAM 1501 aromatic hydrocarbons	
	B 71107	↓	19.10 L		
	B 71202	↓	22.22 L		
	B 71207	↓	19.95 L		
	B 71208	↓	20.71 L		

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1 ug/sample 2. mg/m<sup>3</sup> 3 ppm 4. % 5. \_\_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*

Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

7. Chain of Custody (Optional)

Relinquished by _____	Date/Time _____
Received by <u>[Signature]</u>	Date/Time <u>7/19/05 10:50</u>
Relinquished by <u>[Signature]</u>	Date/Time _____
Received by _____	Date/Time _____
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____

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DATACHEM LABORATORIES, INC.



ANALYTICAL REPORT

Form ARF-AL  
 Page 1 of 2  
 Part 1 of 1  
 07280511545990RX

Date JUL 28 2005  
 Laboratory Group Name 05I-2994-06  
 Account No. 07003

Yellowstone National Park  
 Attention: Brandon Gauthier  
 Safety Services  
 P.O. Box 168  
 Mammoth, WY 82190

FAX (307) 344-2027  
 Telephone (307) 344-2030  
 E-mail brandon-gauthier@nps.gov

Sampling Collection and Shipment

Sampling Site West Entrance Date of Collection July 11, 2005  
 Date Samples Received at Laboratory July 19, 2005

Analysis

Method of Analysis NMAM 1501  
 Date(s) of Analysis July 26, 2005 - July 28, 2005

Analytical Results

Field Sample Number	Laboratory Number	Sample Type	Total Hydrocarbons mg/sample	Total Hydrocarbons ppm	Air Volume L					
B71102	05I28379	TUBE	ND	<0.13	21.56					
B71107	05I28380	TUBE	ND	<0.15	19.10					
B71202	05I28381	TUBE	ND	<0.13	22.22					
B71207	05I28382	TUBE	ND	<0.14	19.95					
B71208	05I28383	TUBE	ND	<0.14	20.71					
Reporting Limit			0.01							

† See comment on last page.  
 ND Parameter not detected above LOD.  
 NR Parameter not requested.  
 NA Parameter not applicable.

\*\* See comment on last page.  
 ( ) Parameter between LOD and LOQ.

Analyst: Robert B. Copenhagen

Reviewer: Steven J. Sagers

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547  
 Phone (801) 266-7700 Web Page: www.datachem.com  
 FAX (801) 268-9992 E-mail: lab@datachem.com







# ANALYTICAL REQUEST FORM

1.  REGULAR Status 05I-2994-06  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/13/05 Purchase Order No. \_\_\_\_\_ 4. Quote No. \_\_\_\_\_  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Mammoth Supply Center  
Yellowstone Park WY, 82190 5. Sample Collection  
 Person to Contact Brandon Gauthier Sampling Site West Entrance  
 Telephone (307) 344-2030 Industrial Process Visitor Entry  
 Fax Telephone (307) 344-2027 Date of Collection 7/1, 7-12  
 E-mail Address brandon.gauthier@nps.gov Time Collected 8:30-3:00  
 Billing Address (if different from above) Date of Shipment 7/13/05  
 Chain of Custody No. \_\_\_\_\_

### 6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	G711206	Filter cyclone	839.80 L	GRAVIMETRIC residue	
	G712118	↓	871.91 L		
	G712206	↓	904.02 L		
	X71103	solid sorbent tube	18.92 L	MAM 2599 alkaline scrubbing	
	X71203	↓	19.89 L		
	X71209	↓	19.41 L		
05I28879	B71102	solid sorbent tube	21.56 L	MAM 1501 atomic hydrocarbons	
↓ 380	B71107	↓	19.10 L		
↓ 381	B71202	↓	22.22 L		
↓ 382	B71207	↓	19.95 L		
↓ 383	B71208	↓	20.71 L		

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1 ug/sample 2 mg/m<sup>3</sup> 3 ppm 4 % 5 \_\_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*

Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

### 7. Chain of Custody (Optional)

Relinquished by _____	Date/Time _____
Received by <u>[Signature]</u>	Date/Time <u>7/19/05 10:50</u>
Relinquished by <u>[Signature]</u>	Date/Time _____
Received by <u>[Signature]</u>	Date/Time _____
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____

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 DATACHEM LABORATORIES, INC.



FORM H (TYPE I)  
SINGLE METHOD ANALYSES

Form RLIMS63H-V1.4  
07290508554129  
Page 2

SAMPLE GROUP COMMENTS



DCL Report Group : 05I-2994-01  
Date Printed : 29-JUL-05 08:55  
Release Number : West Entrance

Client Name : Yellowstone National Park

Sample Group Comments

Analyzed by GC/MS according to method T015

PQL - Practical Quantitation Limit - Lowest standard that is detectable  
MDL - Method Detection Limit - Statistically derived value using 40 CFR methods

General Information

The DCL QC Database maintains all numerical figures which are input from the pertinent data source. These data have not been rounded to significant figures nor have they been moisture corrected. Reports generated from the system, however, list data which have been rounded to the number of significant figures requested by the client or deemed appropriate for the method. This may create minor discrepancies between data which appear on the QC Summary Forms (Forms B-G) and those that would be calculated from rounded analytical results. Additionally, if a moisture correction is performed, differences will be observed between the QC data and the surrogate data reported on Form A (or other report forms) and corresponding data reported on QC Summary Forms. In these cases, the Form A will indicate the "Report Basis" as well as the moisture value used for making the correction.  
Report generation options: BX

Result Symbol Definitions

ND - Not Detected above the MDL (LLD or MDC for radiochemistry).  
\*\* - No result could be reported, see sample comments for details

Qualifier Symbol Definitions

U - Not Detected above the MDL (LLD or MDC for radiochemistry).  
B - For organic analyses the qualifier indicates that this analyte was found in the method blank. For inorganic analyses the qualifier signifies the value is between the MDL and PQL.  
J - For organic analyses the qualifier indicates that the value is between the MDL and the PQL. It is also used for indicating an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.

QC Flag Symbol Definitions

\* - Parameter outside of specified QC limits

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Phone (801) 266-7700 Web Page: www.datachem.com  
FAX (801) 268-9992 E-mail: lab@datachem.com



FORM A (TYPE I)  
SINGLE METHOD ANALYSES

Form RLIMS63A-V1.4  
07290508554129

Page 3

SAMPLE ANALYSIS DATA SHEET



Date Printed : 29-JUL-05 08:55  
Client Name : Yellowstone National Park  
Client Ref Number : West Entrance  
Sampling Site : West Entrance  
Release Number : West Entrance  
Date Received : 19-JUL-05 00:00

Client Sample Name: MC75KA  
DCL Sample Name : 05I28351  
DCL Report Group : 05I-2994-01  
Matrix : AIR  
Date Sampled : 11-JUL-05 00:00  
Reporting Units : PPB V/V  
Report Basis :  As Received  Dried

DCL Preparation Group: Not Applicable  
Date Prepared : Not Applicable  
Preparation Method : Not Applicable  
Aliquot Weight/Volume: 200 mL  
Net Weight/Volume : Not Required

DCL Analysis Group: G056X004  
Analysis Method : TO-15  
Instrument Type : GC/MS VO  
Instrument ID : 5972-0  
Column Type : DB-1  
 Primary  
 Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Propene	28-JUL-05 18:24	0.0964	0.62			1	0.5
Dichlorodifluoromethane	28-JUL-05 18:24	0.150	0.51			1	0.5
Chloromethane	28-JUL-05 18:24	0.187	0.87			1	0.5
Freon 114	28-JUL-05 18:24	0.155	ND			1	0.5
Vinyl Chloride	28-JUL-05 18:24	0.180	ND			1	0.5
1,3-Butadiene	28-JUL-05 18:24	0.215	ND			1	0.5
Bromomethane	28-JUL-05 18:24	0.176	ND			1	0.5
Chloroethane	28-JUL-05 18:24	0.249	ND			1	0.5
Freon 11	28-JUL-05 18:24	0.132	0.29		J	1	0.5
cis-1,2-Dichloroethene	28-JUL-05 18:24	0.0938	ND			1	0.5
Carbon Disulfide	28-JUL-05 18:24	0.130	ND			1	0.5
Freon 113	28-JUL-05 18:24	0.124	ND			1	0.5
Acetone	28-JUL-05 18:24	0.179	20.		B	10	0.5
Methylene Chloride	28-JUL-05 18:24	0.117	1.1			1	0.5
trans-1,2-Dichloroethene	28-JUL-05 18:24	0.100	ND			1	0.5
1,1-Dichloroethane	28-JUL-05 18:24	0.143	ND			1	0.5
Methyl t-Butyl Ether	28-JUL-05 18:24	0.111	ND			1	0.5
Vinyl Acetate	28-JUL-05 18:24	0.0642	ND			1	0.5
1,1-Dichloroethene	28-JUL-05 18:24	0.105	ND			1	0.5
2-Butanone	28-JUL-05 18:24	0.237	3.5			1	0.5
Ethyl Acetate	28-JUL-05 18:24	0.129	0.14		J	1	0.5
Hexane	28-JUL-05 18:24	0.140	1.8			1	0.5
Chloroform	28-JUL-05 18:24	0.127	ND			1	0.5
1,1,1-Trichloroethane	28-JUL-05 18:24	0.122	ND			1	0.5
Carbon Tetrachloride	28-JUL-05 18:24	0.161	ND			1	0.5
Benzene	28-JUL-05 18:24	0.0939	2.1			1	0.5
Tetrahydrofuran	28-JUL-05 18:24	0.0747	0.25		J	1	0.5
1,2-Dichloroethane	28-JUL-05 18:24	0.101	ND			1	0.5
Cyclohexane	28-JUL-05 18:24	0.0901	0.55			1	0.5
Trichloroethene	28-JUL-05 18:24	0.109	ND			1	0.5
1,2-Dichloropropane	28-JUL-05 18:24	0.0669	ND			1	0.5
Bromodichloromethane	28-JUL-05 18:24	0.138	ND			1	0.5
Heptane	28-JUL-05 18:24	0.133	0.45		J	1	0.5
cis-1,3-Dichloropropene	28-JUL-05 18:24	0.0979	ND			1	0.5
4-Methyl-2-Pentanone	28-JUL-05 18:24	0.0747	1.4			1	0.5
Toluene	28-JUL-05 18:24	0.120	21.			1	0.5
trans-1,3-Dichloropropene	28-JUL-05 18:24	0.0788	ND			1	0.5
1,1,2-Trichloroethane	28-JUL-05 18:24	0.174	ND			1	0.5
Tetrachloroethene	28-JUL-05 18:24	0.117	0.12		J	1	0.5
2-Hexanone	28-JUL-05 18:24	0.0887	0.16		J	1	0.5
Dibromochloromethane	28-JUL-05 18:24	0.125	ND			1	0.5

960 West LeVoy Drive / Salt Lake City, Utah 84123-2547  
Phone (801) 266-7700 Web Page: www.datachem.com  
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FORM A (TYPE I)  
SINGLE METHOD ANALYSES

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SAMPLE ANALYSIS DATA SHEET



Date Printed : 29-JUL-05 08:55  
Client Name : Yellowstone National Park

DCL Sample Name : 05I28351  
DCL Report Group : 05I-2994-01

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
1,2-Dibromoethane	28-JUL-05 18:24	0.117	ND			1	0.5
Chlorobenzene	28-JUL-05 18:24	0.118	ND			1	0.5
Ethylbenzene	28-JUL-05 18:24	0.0872	0.67			1	0.5
m,p-Xylene	28-JUL-05 18:24	0.215	2.5			1	1.0
o-Xylene	28-JUL-05 18:24	0.103	0.87			1	0.5
Styrene	28-JUL-05 18:24	0.0625	0.50			1	0.5
Bromoform	28-JUL-05 18:24	0.118	ND			1	0.5
1,1,2,2-Tetrachloroethane	28-JUL-05 18:24	0.140	ND			1	0.5
Benzyl Chloride	28-JUL-05 18:24	0.0856	ND			1	0.5
4-Ethyl toluene	28-JUL-05 18:24	0.0888	0.14	J		1	0.5
1,3,5-Trimethylbenzene	28-JUL-05 18:24	0.0592	ND			1	0.5
1,2,4-Trimethylbenzene	28-JUL-05 18:24	0.0756	0.42	J		1	0.5
1,3-Dichlorobenzene	28-JUL-05 18:24	0.133	ND			1	0.5
1,4-Dichlorobenzene	28-JUL-05 18:24	0.133	ND			1	0.5
1,2-Dichlorobenzene	28-JUL-05 18:24	0.107	ND			1	0.5
1,2,4-Trichlorobenzene	28-JUL-05 18:24	0.149	ND			1	0.5
Hexachlorobutadiene	28-JUL-05 18:24	0.232	ND			1	0.5

Tentatively Identified Compound Results

Analyte (Retention Time)	Date Analyzed	Result	Comment	Qual.	Dilution
Isobutane (4.61)	28-JUL-05 18:24	4.6		J	1
Ethanol (5.33)	28-JUL-05 18:24	120		J	1
Isopropyl Alcohol (5.95)	28-JUL-05 18:24	10.		J	1

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SINGLE METHOD ANALYSES

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SAMPLE ANALYSIS DATA SHEET



Date Printed : 29-JUL-05 08:55

Client Sample Name: MC76KB

Client Name : Yellowstone National Park  
Client Ref Number : West Entrance  
Sampling Site : West Entrance  
Release Number : West Entrance

DCL Sample Name : 05I28352  
DCL Report Group : 05I-2994-01

Date Received : 19-JUL-05 00:00

Matrix : AIR  
Date Sampled : 11-JUL-05 00:00  
Reporting Units : PPB V/V  
Report Basis :  As Received  Dried

DCL Preparation Group: Not Applicable  
Date Prepared : Not Applicable  
Preparation Method : Not Applicable  
Aliquot Weight/Volume: 200 mL  
Net Weight/Volume : Not Required

DCL Analysis Group: G056X004  
Analysis Method : TO-15  
Instrument Type : GC/MS VO  
Instrument ID : 5972-0  
Column Type : DB-1

Primary  
 Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Propene	28-JUL-05 19:48	0.0964	2.4			1	0.5
Dichlorodifluoromethane	28-JUL-05 19:48	0.150	0.51			1	0.5
Chloromethane	28-JUL-05 19:48	0.187	0.76			1	0.5
Freon 114	28-JUL-05 19:48	0.155	ND			1	0.5
Vinyl Chloride	28-JUL-05 19:48	0.180	ND			1	0.5
1,3-Butadiene	28-JUL-05 19:48	0.215	0.22		J	1	0.5
Bromomethane	28-JUL-05 19:48	0.176	ND			1	0.5
Chloroethane	28-JUL-05 19:48	0.249	ND			1	0.5
Freon 11	28-JUL-05 19:48	0.132	0.32		J	1	0.5
cis-1,2-Dichloroethene	28-JUL-05 19:48	0.0938	0.17		J	1	0.5
Carbon Disulfide	28-JUL-05 19:48	0.130	ND			1	0.5
Freon 113	28-JUL-05 19:48	0.124	0.13		J	1	0.5
Acetone	28-JUL-05 19:48	0.179	51.		B	10	0.5
Methylene Chloride	28-JUL-05 19:48	0.117	0.53			1	0.5
trans-1,2-Dichloroethene	28-JUL-05 19:48	0.100	ND			1	0.5
1,1-Dichloroethane	28-JUL-05 19:48	0.143	ND			1	0.5
Methyl t-Butyl Ether	28-JUL-05 19:48	0.111	ND			1	0.5
Vinyl Acetate	28-JUL-05 19:48	0.0642	ND			1	0.5
1,1-Dichloroethene	28-JUL-05 19:48	0.105	ND			1	0.5
2-Butanone	28-JUL-05 19:48	0.237	9.5			1	0.5
Ethyl Acetate	28-JUL-05 19:48	0.129	0.40		J	1	0.5
Hexane	28-JUL-05 19:48	0.140	1.0			1	0.5
Chloroform	28-JUL-05 19:48	0.127	ND			1	0.5
1,1,1-Trichloroethane	28-JUL-05 19:48	0.122	ND			1	0.5
Carbon Tetrachloride	28-JUL-05 19:48	0.161	ND			1	0.5
Benzene	28-JUL-05 19:48	0.0939	1.7			1	0.5
Tetrahydrofuran	28-JUL-05 19:48	0.0747	ND			1	0.5
1,2-Dichloroethane	28-JUL-05 19:48	0.101	ND			1	0.5
Cyclohexane	28-JUL-05 19:48	0.0901	ND			1	0.5
Trichloroethene	28-JUL-05 19:48	0.109	0.51			1	0.5
1,2-Dichloropropane	28-JUL-05 19:48	0.0669	ND			1	0.5
Bromodichloromethane	28-JUL-05 19:48	0.138	ND			1	0.5
Heptane	28-JUL-05 19:48	0.133	0.39		J	1	0.5
cis-1,3-Dichloropropene	28-JUL-05 19:48	0.0979	ND			1	0.5
4-Methyl-2-Pentanone	28-JUL-05 19:48	0.0747	0.46		J	1	0.5
Toluene	28-JUL-05 19:48	0.120	5.0			1	0.5
trans-1,3-Dichloropropene	28-JUL-05 19:48	0.0788	ND			1	0.5
1,1,2-Trichloroethane	28-JUL-05 19:48	0.174	ND			1	0.5
Tetrachloroethene	28-JUL-05 19:48	0.117	0.97			1	0.5
2-Hexanone	28-JUL-05 19:48	0.0887	0.19		J	1	0.5
Dibromochloromethane	28-JUL-05 19:48	0.125	ND			1	0.5

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SINGLE METHOD ANALYSES

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SAMPLE ANALYSIS DATA SHEET



Date Printed : 29-JUL-05 08:55  
Client Name : Yellowstone National Park

DCL Sample Name : 05I28352  
DCL Report Group : 05I-2994-01

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
1,2-Dibromoethane	28-JUL-05 19:48	0.117	ND			1	0.5
Chlorobenzene	28-JUL-05 19:48	0.118	ND			1	0.5
Ethylbenzene	28-JUL-05 19:48	0.0872	0.68			1	0.5
m,p-Xylene	28-JUL-05 19:48	0.215	2.3			1	1.0
o-Xylene	28-JUL-05 19:48	0.103	0.86			1	0.5
Styrene	28-JUL-05 19:48	0.0625	0.32		J	1	0.5
Bromoform	28-JUL-05 19:48	0.118	ND			1	0.5
1,1,2,2-Tetrachloroethane	28-JUL-05 19:48	0.140	ND			1	0.5
Benzyl Chloride	28-JUL-05 19:48	0.0856	0.11		J	1	0.5
4-Ethyl toluene	28-JUL-05 19:48	0.0888	0.29		J	1	0.5
1,3,5-Trimethylbenzene	28-JUL-05 19:48	0.0592	0.19		J	1	0.5
1,2,4-Trimethylbenzene	28-JUL-05 19:48	0.0756	0.74			1	0.5
1,3-Dichlorobenzene	28-JUL-05 19:48	0.133	ND			1	0.5
1,4-Dichlorobenzene	28-JUL-05 19:48	0.133	0.18		J	1	0.5
1,4-Dichlorobenzene	28-JUL-05 19:48	0.107	0.14		J	1	0.5
1,2-Dichlorobenzene	28-JUL-05 19:48	0.149	ND			1	0.5
1,2,4-Trichlorobenzene	28-JUL-05 19:48	0.149	ND			1	0.5
Hexachlorobutadiene	28-JUL-05 19:48	0.232	ND			1	0.5

Tentatively Identified Compound Results

Analyte (Retention Time)	Date Analyzed	Result	Comment	Qual.	Dilution
Acetaldehyde (4.63)	28-JUL-05 19:48	2.4		J	1
Ethanol (5.33)	28-JUL-05 19:48	110		J	1
Isopropyl Alcohol (5.96)	28-JUL-05 19:48	4.5		J	1
Pentane, 2-methyl- (7.57)	28-JUL-05 19:48	2.2		J	1
Pentane, 2,3-dimethyl- (10.03)	28-JUL-05 19:48	2.1		J	1

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FORM A (TYPE I)  
SINGLE METHOD ANALYSES

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SAMPLE ANALYSIS DATA SHEET



Date Printed: 29-JUL-05 08:55

Client Sample Name: MC711KA  
DCL Sample Name: 05I28353  
DCL Report Group: 05I-2994-01

Client Name: Yellowstone National Park  
Client Ref Number: West Entrance  
Sampling Site: West Entrance  
Release Number: West Entrance

Matrix: AIR  
Date Sampled: 11-JUL-05 00:00  
Reporting Units: PPB V/V  
Report Basis:  As Received  Dried

Date Received: 19-JUL-05 00:00

DCL Preparation Group: Not Applicable  
Date Prepared: Not Applicable  
Preparation Method: Not Applicable  
Aliquot Weight/Volume: 200 mL  
Net Weight/Volume: Not Required

DCL Analysis Group: G056X004  
Analysis Method: TO-15  
Instrument Type: GC/MS VO  
Instrument ID: 5972-0  
Column Type: DB-1  
 Primary  
 Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Propene	28-JUL-05 21:14	0.0964	ND			1	0.5
Dichlorodifluoromethane	28-JUL-05 21:14	0.150	ND			1	0.5
Chloromethane	28-JUL-05 21:14	0.187	1.8			1	0.5
Freon 114	28-JUL-05 21:14	0.155	ND			1	0.5
Vinyl Chloride	28-JUL-05 21:14	0.180	ND			1	0.5
1,3-Butadiene	28-JUL-05 21:14	0.215	ND			1	0.5
Bromomethane	28-JUL-05 21:14	0.176	ND			1	0.5
Chloroethane	28-JUL-05 21:14	0.249	ND			1	0.5
Freon 11	28-JUL-05 21:14	0.132	0.25		J	1	0.5
cis-1,2-Dichloroethene	28-JUL-05 21:14	0.0938	ND			1	0.5
Carbon Disulfide	28-JUL-05 21:14	0.130	ND			1	0.5
Freon 113	28-JUL-05 21:14	0.124	ND			1	0.5
Acetone	28-JUL-05 21:14	0.179	83.		B	10	0.5
Methylene Chloride	28-JUL-05 21:14	0.117	0.46		J	1	0.5
trans-1,2-Dichloroethene	28-JUL-05 21:14	0.100	ND			1	0.5
1,1-Dichloroethane	28-JUL-05 21:14	0.143	ND			1	0.5
Methyl t-Butyl Ether	28-JUL-05 21:14	0.111	ND			1	0.5
Vinyl Acetate	28-JUL-05 21:14	0.0642	ND			1	0.5
1,1-Dichloroethene	28-JUL-05 21:14	0.105	ND			1	0.5
2-Butanone	28-JUL-05 21:14	0.237	6.1			1	0.5
Ethyl Acetate	28-JUL-05 21:14	0.129	0.47		J	1	0.5
Hexane	28-JUL-05 21:14	0.140	0.96			1	0.5
Chloroform	28-JUL-05 21:14	0.127	ND			1	0.5
1,1,1-Trichloroethane	28-JUL-05 21:14	0.122	ND			1	0.5
Carbon Tetrachloride	28-JUL-05 21:14	0.161	ND			1	0.5
Benzene	28-JUL-05 21:14	0.0939	4.0			1	0.5
Tetrahydrofuran	28-JUL-05 21:14	0.0747	ND			1	0.5
1,2-Dichloroethane	28-JUL-05 21:14	0.101	ND			1	0.5
Cyclohexane	28-JUL-05 21:14	0.0901	ND			1	0.5
Trichloroethene	28-JUL-05 21:14	0.109	ND			1	0.5
1,2-Dichloropropane	28-JUL-05 21:14	0.0669	ND			1	0.5
Bromodichloromethane	28-JUL-05 21:14	0.138	ND			1	0.5
Heptane	28-JUL-05 21:14	0.133	0.39		J	1	0.5
cis-1,3-Dichloropropene	28-JUL-05 21:14	0.0979	ND			1	0.5
4-Methyl-2-Pentanone	28-JUL-05 21:14	0.0747	0.26		J	1	0.5
Toluene	28-JUL-05 21:14	0.120	17.			1	0.5
trans-1,3-Dichloropropene	28-JUL-05 21:14	0.0788	ND			1	0.5
1,1,2-Trichloroethane	28-JUL-05 21:14	0.174	ND			1	0.5
Tetrachloroethene	28-JUL-05 21:14	0.117	0.13		J	1	0.5
2-Hexanone	28-JUL-05 21:14	0.0887	ND			1	0.5
Dibromochloromethane	28-JUL-05 21:14	0.125	ND			1	0.5

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FORM A (TYPE I)  
SINGLE METHOD ANALYSES

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SAMPLE ANALYSIS DATA SHEET



Date Printed : 29-JUL-05 08:55  
Client Name : Yellowstone National Park

DCL Sample Name : 05I28353  
DCL Report Group : 05I-2994-01

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
1,2-Dibromoethane	28-JUL-05 21:14	0.117	ND			1	0.5
Chlorobenzene	28-JUL-05 21:14	0.118	ND			1	0.5
Ethylbenzene	28-JUL-05 21:14	0.0872	0.89			1	0.5
m,p-Xylene	28-JUL-05 21:14	0.215	3.8			1	1.0
o-Xylene	28-JUL-05 21:14	0.103	1.2			1	0.5
Styrene	28-JUL-05 21:14	0.0625	0.24		J	1	0.5
Bromoform	28-JUL-05 21:14	0.118	ND			1	0.5
1,1,2,2-Tetrachloroethane	28-JUL-05 21:14	0.140	ND			1	0.5
Benzyl Chloride	28-JUL-05 21:14	0.0856	ND			1	0.5
4-Ethyl toluene	28-JUL-05 21:14	0.0888	0.21		J	1	0.5
1,3,5-Trimethylbenzene	28-JUL-05 21:14	0.0592	0.16		J	1	0.5
1,2,4-Trimethylbenzene	28-JUL-05 21:14	0.0756	0.73			1	0.5
1,3-Dichlorobenzene	28-JUL-05 21:14	0.133	ND			1	0.5
1,4-Dichlorobenzene	28-JUL-05 21:14	0.133	ND			1	0.5
1,2-Dichlorobenzene	28-JUL-05 21:14	0.107	ND			1	0.5
1,2,4-Trichlorobenzene	28-JUL-05 21:14	0.149	ND			1	0.5
Hexachlorobutadiene	28-JUL-05 21:14	0.232	ND			1	0.5

Tentatively Identified Compound Results

Analyte(Retention Time)	Date Analyzed	Result	Comment	Qual.	Dilution
Ethanol(5.47)	28-JUL-05 21:14	30.		J	1
Isopropyl Alcohol(6.07)	28-JUL-05 21:14	29.		J	1
Limonene(17.63)	28-JUL-05 21:14	3.8		J	1

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SINGLE METHOD ANALYSES

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SAMPLE ANALYSIS DATA SHEET



Date Printed : 29-JUL-05 08:55  
Client Name : Yellowstone National Park  
Client Ref Number : West Entrance  
Sampling Site : West Entrance  
Release Number : West Entrance  
Date Received : 19-JUL-05 00:00

Client Sample Name: MC712KB  
DCL Sample Name : 05I28354  
DCL Report Group : 05I-2994-01  
Matrix : AIR  
Date Sampled : 11-JUL-05 00:00  
Reporting Units : PPB V/V  
Report Basis :  As Received  Dried

DCL Preparation Group: Not Applicable  
Date Prepared : Not Applicable  
Preparation Method : Not Applicable  
Aliquot Weight/Volume: 200 mL  
Net Weight/Volume : Not Required

DCL Analysis Group: G056X004  
Analysis Method : TO-15  
Instrument Type : GC/MS VO  
Instrument ID : 5972-0  
Column Type : DB-1  
 Primary  
 Confirmation

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
Propene	28-JUL-05 22:44	0.0964	0.31		J	1	0.5
Dichlorodifluoromethane	28-JUL-05 22:44	0.150	0.33		J	1	0.5
Chloromethane	28-JUL-05 22:44	0.187	1.2			1	0.5
Freon 114	28-JUL-05 22:44	0.155	ND			1	0.5
Vinyl Chloride	28-JUL-05 22:44	0.180	ND			1	0.5
1,3-Butadiene	28-JUL-05 22:44	0.215	0.31		J	1	0.5
Bromomethane	28-JUL-05 22:44	0.176	ND			1	0.5
Chloroethane	28-JUL-05 22:44	0.249	ND			1	0.5
Freon 11	28-JUL-05 22:44	0.132	0.22		J	1	0.5
cis-1,2-Dichloroethene	28-JUL-05 22:44	0.0938	ND			1	0.5
Carbon Disulfide	28-JUL-05 22:44	0.130	ND			1	0.5
Freon 113	28-JUL-05 22:44	0.124	ND			1	0.5
Acetone	28-JUL-05 22:44	0.179	25.		B	10	0.5
Methylene Chloride	28-JUL-05 22:44	0.117	0.21		J	1	0.5
trans-1,2-Dichloroethene	28-JUL-05 22:44	0.100	ND			1	0.5
1,1-Dichloroethane	28-JUL-05 22:44	0.143	ND			1	0.5
Methyl t-Butyl Ether	28-JUL-05 22:44	0.111	ND			1	0.5
Vinyl Acetate	28-JUL-05 22:44	0.0642	ND			1	0.5
1,1-Dichloroethene	28-JUL-05 22:44	0.105	ND			1	0.5
2-Butanone	28-JUL-05 22:44	0.237	ND			1	0.5
Ethyl Acetate	28-JUL-05 22:44	0.129	ND			1	0.5
Hexane	28-JUL-05 22:44	0.140	1.4			1	0.5
Chloroform	28-JUL-05 22:44	0.127	ND			1	0.5
1,1,1-Trichloroethane	28-JUL-05 22:44	0.122	ND			1	0.5
Carbon Tetrachloride	28-JUL-05 22:44	0.161	ND			1	0.5
Benzene	28-JUL-05 22:44	0.0939	3.0			1	0.5
Tetrahydrofuran	28-JUL-05 22:44	0.0747	ND			1	0.5
1,2-Dichloroethane	28-JUL-05 22:44	0.101	ND			1	0.5
Cyclohexane	28-JUL-05 22:44	0.0901	ND			1	0.5
Trichloroethene	28-JUL-05 22:44	0.109	ND			1	0.5
1,2-Dichloropropane	28-JUL-05 22:44	0.0669	ND			1	0.5
Bromodichloromethane	28-JUL-05 22:44	0.138	ND			1	0.5
Heptane	28-JUL-05 22:44	0.133	0.40		J	1	0.5
cis-1,3-Dichloropropene	28-JUL-05 22:44	0.0979	ND			1	0.5
4-Methyl-2-Pentanone	28-JUL-05 22:44	0.0747	8.9			1	0.5
Toluene	28-JUL-05 22:44	0.120	7.9			1	0.5
trans-1,3-Dichloropropene	28-JUL-05 22:44	0.0788	ND			1	0.5
1,1,2-Trichloroethane	28-JUL-05 22:44	0.174	ND			1	0.5
Tetrachloroethene	28-JUL-05 22:44	0.117	ND			1	0.5
2-Hexanone	28-JUL-05 22:44	0.0887	ND			1	0.5
Dibromochloromethane	28-JUL-05 22:44	0.125	ND			1	0.5

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FORM A (TYPE I)  
SINGLE METHOD ANALYSES

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SAMPLE ANALYSIS DATA SHEET



Date Printed : 29-JUL-05 08:55  
Client Name : Yellowstone National Park

DCL Sample Name : 05I28354  
DCL Report Group : 05I-2994-01

Analytical Results

Analyte	Date Analyzed	MDL	Result	Comment	Qual.	Dilution	PQL
1,2-Dibromoethane	28-JUL-05 22:44	0.117	ND			1	0.5
Chlorobenzene	28-JUL-05 22:44	0.118	ND			1	0.5
Ethylbenzene	28-JUL-05 22:44	0.0872	0.93			1	0.5
m,p-Xylene	28-JUL-05 22:44	0.215	4.3			1	1.0
o-Xylene	28-JUL-05 22:44	0.103	1.3			1	0.5
Styrene	28-JUL-05 22:44	0.0625	0.23		J	1	0.5
Bromoform	28-JUL-05 22:44	0.118	ND			1	0.5
1,1,2,2-Tetrachloroethane	28-JUL-05 22:44	0.140	ND			1	0.5
Benzyl Chloride	28-JUL-05 22:44	0.0856	ND			1	0.5
4-Ethyl toluene	28-JUL-05 22:44	0.0888	0.34		J	1	0.5
1,3,5-Trimethylbenzene	28-JUL-05 22:44	0.0592	0.28		J	1	0.5
1,2,4-Trimethylbenzene	28-JUL-05 22:44	0.0756	1.1			1	0.5
1,3-Dichlorobenzene	28-JUL-05 22:44	0.133	ND			1	0.5
1,4-Dichlorobenzene	28-JUL-05 22:44	0.133	ND			1	0.5
1,2-Dichlorobenzene	28-JUL-05 22:44	0.107	ND			1	0.5
1,2,4-Trichlorobenzene	28-JUL-05 22:44	0.149	ND			1	0.5
Hexachlorobutadiene	28-JUL-05 22:44	0.232	ND			1	0.5

Tentatively Identified Compound Results

Analyte(Retention Time)	Date Analyzed	Result	Comment	Qual.	Dilution
Acetaldehyde(4.61)	28-JUL-05 22:44	3.2		J	1
Ethanol(5.46)	28-JUL-05 22:44	25.		J	1
Isopropyl Alcohol(6.06)	28-JUL-05 22:44	9.5		J	1
Butane, 2,2,3,3-tetramethyl-(10.53)	28-JUL-05 22:44	2.2		J	1

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FORM J (TYPE I)  
 SINGLE METHOD ANALYSES  
 QUALITY CONTROL DATA SHEET  
 LABORATORY CONTROL SAMPLE (LCS)  
 LABORATORY CONTROL DUPL (LCD)

Form RLIMS63J-V1.4  
 07290508554129  
 Page 11



S056W0CN

Client Name : Yellowstone National Park  
 Release Number : West Entrance  
 Matrix : AIR  
 Reporting Units : ppb v/v

DCL Sample Name : QC-234139-1  
 Date Printed : 29-JUL-05 08:55

DCL Analysis Group: G056X004  
 Analysis Method : TO15  
 Instrument Type : GC/MS VO  
 Instrument ID : 5972-0  
 Column Type : DB-1

DCL Preparation Group: Not Applicable  
 Date Prepared : Not Applicable  
 Preparation Method : Not Applicable

Primary  
 Confirmation

QC Limit Type : Method

Analytical Results

Analyte	Date Analyzed	Target	Result	Percent Recovery	QC Limits	QC Flag
Propene	28-JUL-05 12:14	10.0	10.9	109.	70.0/130.	
Dichlorodifluoromethane	28-JUL-05 12:14	10.0	10.3	103.	70.0/130.	
Chloromethane	28-JUL-05 12:14	10.0	13.4	134.	70.0/130.	*
Freon 114	28-JUL-05 12:14	10.0	9.92	99.2	70.0/130.	
Vinyl Chloride	28-JUL-05 12:14	10.0	10.3	103.	70.0/130.	
1,3-Butadiene	28-JUL-05 12:14	10.0	10.7	107.	70.0/130.	
Bromomethane	28-JUL-05 12:14	10.0	10.7	107.	70.0/130.	
Chloroethane	28-JUL-05 12:14	10.0	11.3	113.	70.0/130.	
Freon 11	28-JUL-05 12:14	10.0	11.0	110.	70.0/130.	
cis-1,2-Dichloroethene	28-JUL-05 12:14	10.0	10.1	101.	70.0/130.	
Carbon Disulfide	28-JUL-05 12:14	10.0	10.0	100.	70.0/130.	
Freon 113	28-JUL-05 12:14	10.0	9.76	97.6	70.0/130.	
Acetone	28-JUL-05 12:14	10.0	14.2	142.	70.0/130.	*
Methylene Chloride	28-JUL-05 12:14	10.0	9.78	97.8	70.0/130.	
trans-1,2-Dichloroethene	28-JUL-05 12:14	10.0	10.1	101.	70.0/130.	
1,1-Dichloroethane	28-JUL-05 12:14	10.0	10.0	100.	70.0/130.	
Methyl t-Butyl Ether	28-JUL-05 12:14	10.0	10.2	102.	70.0/130.	
Vinyl Acetate	28-JUL-05 12:14	10.0	10.4	104.	70.0/130.	
1,1-Dichloroethene	28-JUL-05 12:14	10.0	9.76	97.6	70.0/130.	
2-Butanone	28-JUL-05 12:14	10.0	10.3	103.	70.0/130.	
Ethyl Acetate	28-JUL-05 12:14	10.0	11.1	111.	70.0/130.	
Hexane	28-JUL-05 12:14	10.0	10.2	102.	70.0/130.	
Chloroform	28-JUL-05 12:14	10.0	10.1	101.	70.0/130.	
1,1,1-Trichloroethane	28-JUL-05 12:14	10.0	10.3	103.	70.0/130.	
Carbon Tetrachloride	28-JUL-05 12:14	10.0	10.6	106.	70.0/130.	
Benzene	28-JUL-05 12:14	10.0	10.6	106.	70.0/130.	
Tetrahydrofuran	28-JUL-05 12:14	10.0	11.3	113.	70.0/130.	
1,2-Dichloroethane	28-JUL-05 12:14	10.0	10.4	104.	70.0/130.	
Cyclohexane	28-JUL-05 12:14	10.0	9.91	99.1	70.0/130.	
Trichloroethene	28-JUL-05 12:14	10.0	10.5	105.	70.0/130.	
1,2-Dichloropropane	28-JUL-05 12:14	10.0	10.8	108.	70.0/130.	
Bromodichloromethane	28-JUL-05 12:14	10.0	10.9	109.	70.0/130.	
Heptane	28-JUL-05 12:14	10.0	10.9	109.	70.0/130.	
cis-1,3-Dichloropropene	28-JUL-05 12:14	10.0	11.6	116.	70.0/130.	
4-Methyl-2-Pentanone	28-JUL-05 12:14	10.0	11.4	114.	70.0/130.	
Toluene	28-JUL-05 12:14	10.0	10.8	108.	70.0/130.	
trans-1,3-Dichloropropene	28-JUL-05 12:14	10.0	11.8	118.	70.0/130.	
1,1,2-Trichloroethane	28-JUL-05 12:14	10.0	11.3	113.	70.0/130.	
Tetrachloroethene	28-JUL-05 12:14	10.0	10.5	105.	70.0/135.	
2-Hexanone	28-JUL-05 12:14	10.0	11.4	114.	70.0/130.	
1,2-Dibromoethane	28-JUL-05 12:14	10.0	11.0	110.	70.0/130.	
Chlorobenzene	28-JUL-05 12:14	10.0	10.6	106.	70.0/130.	
Ethylbenzene	28-JUL-05 12:14	10.0	11.3	113.	70.0/130.	
m,p-Xylene	28-JUL-05 12:14	20.0	22.6	113.	70.0/130.	
o-Xylene	28-JUL-05 12:14	10.0	12.0	120.	70.0/130.	
Styrene	28-JUL-05 12:14	10.0	12.3	123.	70.0/130.	
Bromoform	28-JUL-05 12:14	10.0	11.6	116.	70.0/130.	

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FORM J (TYPE I)  
SINGLE METHOD ANALYSES  
QUALITY CONTROL DATA SHEET  
LABORATORY CONTROL SAMPLE (LCS)  
LABORATORY CONTROL DUPL (LCD)

Form RLIMS63J-V1.4  
07290508554129  
Page 12



Client Name : Yellowstone National Park

DCL Sample Name : QC-234139-1  
Date Printed : 29-JUL-05 08:55

Analytical Results

Analyte	Date Analyzed	Target	Result	Percent Recovery	QC Limits	QC Flag
1,1,2,2-Tetrachloroethane	28-JUL-05 12:14	10.0	11.6	116.	70.0/130.	
Benzyl Chloride	28-JUL-05 12:14	10.0	13.0	130.	70.0/130.	*
4-Ethyl toluene	28-JUL-05 12:14	10.0	12.1	121.	70.0/130.	
1,3,5-Trimethylbenzene	28-JUL-05 12:14	10.0	11.7	117.	70.0/130.	
1,2,4-Trimethylbenzene	28-JUL-05 12:14	10.0	12.5	125.	70.0/130.	
1,3-Dichlorobenzene	28-JUL-05 12:14	10.0	11.7	117.	70.0/130.	
1,4-Dichlorobenzene	28-JUL-05 12:14	10.0	12.3	123.	70.0/130.	
1,2-Dichlorobenzene	28-JUL-05 12:14	10.0	12.3	123.	70.0/130.	
1,2,4-Trichlorobenzene	28-JUL-05 12:14	10.0	16.7	167.	70.0/130.	*
Hexachlorobutadiene	28-JUL-05 12:14	10.0	14.2	142.	70.0/130.	*
Ethanol	28-JUL-05 12:14	10.0	12.0	120.	70.0/130.	
Isopropyl Alcohol	28-JUL-05 12:14	10.0	10.9	109.	70.0/130.	



DCL Sample Name : QD-234139-1

Analytical Results

Analyte	Date Analyzed	Duplicate Result	Percent Recovery	Mean	Range	RPD	QC Limits	QC Flag
Propene	28-JUL-05 12:58	10.5	105.	10.7	0.432	4.0	0.00/25.0	
Dichlorodifluoromethane	28-JUL-05 12:58	10.0	100.	10.2	0.275	2.7	0.00/25.0	
Chloromethane	28-JUL-05 12:58	12.2	122.	12.8	1.14	8.9	0.00/25.0	
Freon 114	28-JUL-05 12:58	9.47	94.7	9.69	0.452	4.7	0.00/25.0	
Vinyl Chloride	28-JUL-05 12:58	9.22	92.2	9.78	1.13	12.	0.00/25.0	
1,3-Butadiene	28-JUL-05 12:58	9.35	93.5	10.0	1.31	13.	0.00/25.0	
Bromomethane	28-JUL-05 12:58	9.68	96.8	10.2	1.06	10.	0.00/25.0	
Chloroethane	28-JUL-05 12:58	8.90	89.0	10.1	2.42	24.	0.00/25.0	
Freon 11	28-JUL-05 12:58	9.27	92.7	10.1	1.74	17.	0.00/25.0	
cis-1,2-Dichloroethene	28-JUL-05 12:58	9.97	99.7	10.0	0.0840	0.84	0.00/25.0	
Carbon Disulfide	28-JUL-05 12:58	9.83	98.3	9.93	0.190	1.9	0.00/25.0	
Freon 113	28-JUL-05 12:58	9.68	96.8	9.72	0.0810	0.81	0.00/25.0	
Acetone	28-JUL-05 12:58	11.3	113.	12.8	2.86	22.	0.00/25.0	
Methylene Chloride	28-JUL-05 12:58	9.56	95.6	9.67	0.211	2.2	0.00/25.0	
trans-1,2-Dichloroethene	28-JUL-05 12:58	9.89	98.9	10.0	0.225	2.3	0.00/25.0	
1,1-Dichloroethane	28-JUL-05 12:58	9.73	97.3	9.89	0.317	3.2	0.00/25.0	
Methyl t-Butyl Ether	28-JUL-05 12:58	9.99	99.9	10.1	0.226	2.2	0.00/25.0	
Vinyl Acetate	28-JUL-05 12:58	10.3	103.	10.3	0.151	1.5	0.00/25.0	
1,1-Dichloroethene	28-JUL-05 12:58	9.62	96.2	9.69	0.138	1.4	0.00/25.0	
2-Butanone	28-JUL-05 12:58	10.2	102.	10.2	0.153	1.5	0.00/25.0	
Ethyl Acetate	28-JUL-05 12:58	10.5	105.	10.8	0.584	5.4	0.00/25.0	
Hexane	28-JUL-05 12:58	9.87	98.7	10.0	0.317	3.2	0.00/25.0	
Chloroform	28-JUL-05 12:58	9.74	97.4	9.93	0.379	3.8	0.00/25.0	
1,1,1-Trichloroethane	28-JUL-05 12:58	9.59	95.9	9.96	0.746	7.5	0.00/25.0	
Carbon Tetrachloride	28-JUL-05 12:58	9.74	97.4	10.1	0.812	8.0	0.00/25.0	
Benzene	28-JUL-05 12:58	9.94	99.4	10.3	0.650	6.3	0.00/25.0	
Tetrahydrofuran	28-JUL-05 12:58	10.7	107.	11.0	0.521	4.7	0.00/25.0	
1,2-Dichloroethane	28-JUL-05 12:58	10.1	101.	10.3	0.313	3.0	0.00/25.0	
Cyclohexane	28-JUL-05 12:58	9.38	93.8	9.64	0.537	5.6	0.00/25.0	
Trichloroethene	28-JUL-05 12:58	9.87	98.7	10.2	0.663	6.5	0.00/25.0	
1,2-Dichloropropane	28-JUL-05 12:58	10.2	102.	10.5	0.542	5.2	0.00/25.0	
Bromodichloromethane	28-JUL-05 12:58	10.1	101.	10.5	0.792	7.5	0.00/25.0	
Heptane	28-JUL-05 12:58	10.0	100.	10.5	0.921	8.8	0.00/25.0	
cis-1,3-Dichloropropene	28-JUL-05 12:58	10.8	108.	11.2	0.883	7.9	0.00/25.0	

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FORM J (TYPE I)  
SINGLE METHOD ANALYSES

Form RLIMS63J-V1.4  
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QUALITY CONTROL DATA SHEET  
LABORATORY CONTROL SAMPLE (LCS)  
LABORATORY CONTROL DUPL (LCD)



Client Name : Yellowstone National Park

DCL Sample Name : QD-234139-1  
Date Printed : 29-JUL-05 08:55

Analytical Results

Analyte	Date Analyzed	Duplicate Result	Percent Recovery	Mean	Range	RPD	QC Limits	QC Flag
4-Methyl-2-Pentanone	28-JUL-05 12:58	10.4	104.	10.9	1.05	9.6	0.00/25.0	
Toluene	28-JUL-05 12:58	10.7	107.	10.7	0.109	1.0	0.00/25.0	
trans-1,3-Dichloropropene	28-JUL-05 12:58	11.0	110.	11.4	0.820	7.2	0.00/25.0	
1,1,2-Trichloroethane	28-JUL-05 12:58	10.5	105.	10.9	0.854	7.8	0.00/25.0	
Tetrachloroethene	28-JUL-05 12:58	10.2	102.	10.3	0.272	2.6	0.00/25.0	
2-Hexanone	28-JUL-05 12:58	10.9	109.	11.2	0.486	4.3	0.00/25.0	
1,2-Dibromoethane	28-JUL-05 12:58	10.8	108.	10.9	0.198	1.8	0.00/25.0	
Chlorobenzene	28-JUL-05 12:58	10.4	104.	10.5	0.190	1.8	0.00/25.0	
Ethylbenzene	28-JUL-05 12:58	11.2	112.	11.3	0.100	0.89	0.00/25.0	
m,p-Xylene	28-JUL-05 12:58	21.3	107.	21.9	1.23	5.6	0.00/25.0	
o-Xylene	28-JUL-05 12:58	11.5	115.	11.7	0.502	4.3	0.00/25.0	
Styrene	28-JUL-05 12:58	11.8	118.	12.0	0.473	3.9	0.00/25.0	
Bromoform	28-JUL-05 12:58	11.4	114.	11.5	0.229	2.0	0.00/25.0	
1,1,2,2-Tetrachloroethane	28-JUL-05 12:58	11.3	113.	11.5	0.284	2.5	0.00/25.0	
Benzyl Chloride	28-JUL-05 12:58	12.6	126.	12.8	0.374	2.9	0.00/25.0	
4-Ethyl toluene	28-JUL-05 12:58	11.5	115.	11.8	0.611	5.2	0.00/25.0	
1,3,5-Trimethylbenzene	28-JUL-05 12:58	11.4	114.	11.6	0.311	2.7	0.00/25.0	
1,2,4-Trimethylbenzene	28-JUL-05 12:58	12.2	122.	12.4	0.313	2.5	0.00/25.0	
1,3-Dichlorobenzene	28-JUL-05 12:58	11.6	116.	11.7	0.0650	0.56	0.00/25.0	
1,4-Dichlorobenzene	28-JUL-05 12:58	11.9	119.	12.1	0.414	3.4	0.00/25.0	
1,2-Dichlorobenzene	28-JUL-05 12:58	11.9	119.	12.1	0.353	2.9	0.00/25.0	
1,2,4-Trichlorobenzene	28-JUL-05 12:58	15.3	153.	16.0	1.36	8.5	0.00/25.0	
Hexachlorobutadiene	28-JUL-05 12:58	13.1	131.	13.7	1.15	8.4	0.00/25.0	
Ethanol	28-JUL-05 12:58	10.8	108.	11.4	1.25	11.	0.00/25.0	
Isopropyl Alcohol	28-JUL-05 12:58	9.09	90.9	9.97	1.76	18.	0.00/25.0	

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FORM C (TYPE I)  
SINGLE METHOD ANALYSES

QUALITY CONTROL DATA SHEET  
BLANK SAMPLE

Form RLIMS63C-V1.4  
07290508554129  
Page 14



Client Name : Yellowstone National Park  
Release Number : West Entrance  
  
Matrix : AIR  
Reporting Units : PPB V/V

DCL Sample Name : BL-234139-1  
Date Printed : 29-JUL-05 08:55

DCL Analysis Group: G056X004  
Analysis Method : TO-15  
Instrument Type : GC/MS VO  
Instrument ID : 5972-0  
Column Type : DB-1

DCL Preparation Group: Not Applicable  
Date Prepared : Not Applicable  
Preparation Method : Not Applicable

Primary  
 Confirmation

QC Limit Type : Method

Analytical Results

Analyte	Date Analyzed	Result	MDL	CRDL
Propene	28-JUL-05 13:41	ND	0.0964	0.5
Dichlorodifluoromethane	28-JUL-05 13:41	ND	0.150	0.5
Chloromethane	28-JUL-05 13:41	ND	0.187	0.5
Freon 114	28-JUL-05 13:41	ND	0.155	0.5
Vinyl Chloride	28-JUL-05 13:41	ND	0.180	0.5
1,3-Butadiene	28-JUL-05 13:41	ND	0.215	0.5
Bromomethane	28-JUL-05 13:41	ND	0.176	0.5
Chloroethane	28-JUL-05 13:41	ND	0.249	0.5
Freon 11	28-JUL-05 13:41	ND	0.132	0.5
cis-1,2-Dichloroethene	28-JUL-05 13:41	ND	0.0938	0.5
Carbon Disulfide	28-JUL-05 13:41	ND	0.130	0.5
Freon 113	28-JUL-05 13:41	ND	0.124	0.5
Acetone	28-JUL-05 13:41	0.22	0.179	0.5
Methylene Chloride	28-JUL-05 13:41	ND	0.117	0.5
trans-1,2-Dichloroethene	28-JUL-05 13:41	ND	0.100	0.5
1,1-Dichloroethane	28-JUL-05 13:41	ND	0.143	0.5
Methyl t-Butyl Ether	28-JUL-05 13:41	ND	0.111	0.5
Vinyl Acetate	28-JUL-05 13:41	ND	0.0642	0.5
1,1-Dichloroethene	28-JUL-05 13:41	ND	0.105	0.5
2-Butanone	28-JUL-05 13:41	ND	0.237	0.5
Ethyl Acetate	28-JUL-05 13:41	ND	0.129	0.5
Hexane	28-JUL-05 13:41	ND	0.140	0.5
Chloroform	28-JUL-05 13:41	ND	0.127	0.5
1,1,1-Trichloroethane	28-JUL-05 13:41	ND	0.122	0.5
Carbon Tetrachloride	28-JUL-05 13:41	ND	0.161	0.5
Benzene	28-JUL-05 13:41	ND	0.0939	0.5
Tetrahydrofuran	28-JUL-05 13:41	ND	0.0747	0.5
1,2-Dichloroethane	28-JUL-05 13:41	ND	0.101	0.5
Cyclohexane	28-JUL-05 13:41	ND	0.0901	0.5
Trichloroethene	28-JUL-05 13:41	ND	0.109	0.5
1,2-Dichloropropane	28-JUL-05 13:41	ND	0.0669	0.5
Bromodichloromethane	28-JUL-05 13:41	ND	0.138	0.5
Heptane	28-JUL-05 13:41	ND	0.133	0.5
cis-1,3-Dichloropropene	28-JUL-05 13:41	ND	0.0979	0.5
4-Methyl-2-Pentanone	28-JUL-05 13:41	ND	0.0747	0.5
Toluene	28-JUL-05 13:41	ND	0.120	0.5
trans-1,3-Dichloropropene	28-JUL-05 13:41	ND	0.0788	0.5
1,1,2-Trichloroethane	28-JUL-05 13:41	ND	0.174	0.5
Tetrachloroethene	28-JUL-05 13:41	ND	0.117	0.5
2-Hexanone	28-JUL-05 13:41	ND	0.0887	0.5
Dibromochloromethane	28-JUL-05 13:41	ND	0.125	0.5
1,2-Dibromoethane	28-JUL-05 13:41	ND	0.117	0.5
Chlorobenzene	28-JUL-05 13:41	ND	0.118	0.5
Ethylbenzene	28-JUL-05 13:41	ND	0.0872	0.5
m,p-Xylene	28-JUL-05 13:41	ND	0.215	1.0
o-Xylene	28-JUL-05 13:41	ND	0.103	0.5
Styrene	28-JUL-05 13:41	ND	0.0625	0.5

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FORM C (TYPE I)  
SINGLE METHOD ANALYSES

QUALITY CONTROL DATA SHEET  
BLANK SAMPLE

Form RLIMS63C-V1.4  
07290508554129

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Client Name : Yellowstone National Park

DCL Sample Name : BL-234139-1  
Date Printed : 29-JUL-05 08:55

Analytical Results

Analyte	Date Analyzed	Result	MDL	CRDL
Bromoform	28-JUL-05 13:41	ND	0.118	0.5
1,1,2,2-Tetrachloroethane	28-JUL-05 13:41	ND	0.140	0.5
Benzyl Chloride	28-JUL-05 13:41	ND	0.0856	0.5
4-Ethyl toluene	28-JUL-05 13:41	ND	0.0888	0.5
1,3,5-Trimethylbenzene	28-JUL-05 13:41	ND	0.0592	0.5
1,2,4-Trimethylbenzene	28-JUL-05 13:41	ND	0.0756	0.5
1,3-Dichlorobenzene	28-JUL-05 13:41	ND	0.133	0.5
1,4-Dichlorobenzene	28-JUL-05 13:41	ND	0.133	0.5
1,2-Dichlorobenzene	28-JUL-05 13:41	ND	0.107	0.5
1,2,4-Trichlorobenzene	28-JUL-05 13:41	ND	0.149	0.5
Hexachlorobutadiene	28-JUL-05 13:41	ND	0.232	0.5

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FORM G (TYPE I)  
SINGLE METHOD ANALYSES

Form RLIMS63G-V1.4  
07290508554129  
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QUALITY CONTROL DATA SHEET  
SURROGATE SUMMARY



Client Name : Yellowstone National Park  
Release Number : West Entrance  
Matrix : AIR  
Reporting Units : ppb v/v

Date Printed : 29-JUL-05 08:55

DCL Analysis Group: G056X004  
Analysis Method : TO15

DCL Prep Group : Not Applicable  
Preparation Method: Not Applicable

QC Limit Type : Method

Surrogate Recoveries

Surr. ID	4-Bromofluorobenzene								
QC Limits	65.0/135.								
DCL Sample Number	Analyte Result	Spiked Amount	% Rec. Q	Analyte Result	Spiked Amount	% Rec. Q	Analyte Result	Spiked Amount	% Rec. Q
05I28351	19.4	20.0	97.1						
05I28352	19.4	20.0	97.2						
05I28353	19.5	20.0	97.3						
05I28354	19.0	20.0	95.2						
BL-234139-1	19.4	20.0	97.0						
QC-234139-1	20.6	20.0	103.						
QD-234139-1	20.2	20.0	101.						

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**DATA  
CHEM**  
LABORATORIES, INC.

**ANALYTICAL REQUEST FORM**

1.  REGULAR Status OSR 2994-01  
 RUSH Status Requested - ADDITIONAL CHARGE  
 RESULTS REQUIRED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES

2. Date 7/13/05 Purchase Order No. \_\_\_\_\_ 4. Quote No. -  
 3. Company Name Yellowstone National Park DCL Project Manager \_\_\_\_\_  
 Address Mammoth Supply Center  
Yellowstone Park WY, 82190 5. Sample Collection  
 Person to Contact Brandon Gauthier Sampling Site West Entrance  
 Telephone (307) 344-2636 Industrial Process Visitor Entry  
 Fax Telephone (307) 344-2027 Date of Collection 7-11, 7-12  
 E-mail Address brandon.gauthier@nps.gov Time Collected 8:30 - 3:00  
 Billing Address (if different from above) Date of Shipment 7/13/05  
 Chain of Custody No. \_\_\_\_\_

**6. REQUEST FOR ANALYSES**

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
<u>OSR 28351</u>	<u>MC75 KA</u>	<u>Mini-cans</u>		} EPA TC-15	
<u>↓ 52</u>	<u>MC76 KB</u>	<u>↓</u>			
<u>↓ 53</u>	<u>MC711 KA</u>	<u>↓</u>			
<u>↓ 54</u>	<u>MC712 KB</u>	<u>↓</u>			

\* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other  
 \*\* 1. ug/sample 2 mg/m<sup>3</sup> 3 ppm 4 % 5 \_\_\_\_ (other) Please indicate one or more units in the column entitled Units\*\*

Comments \_\_\_\_\_

Possible Contamination and/or Chemical Hazards \_\_\_\_\_

**7. Chain of Custody (Optional)**

Relinquished by _____	Date/Time _____
Received by <u>PAK</u>	Date/Time <u>7/19/05 10:50</u>
Relinquished by <u>OSG. Z JW</u>	Date/Time _____
Received by _____	Date/Time _____
Relinquished by _____	Date/Time _____
Received by _____	Date/Time _____

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 DATACHEM LABORATORIES, INC.