CDM

Memorandum

To: *Catherine Wetherell, Asst. Director of Capital Programs, Environmental Management, Massport*

Keith Beasley, Environmental Project Manager, Massport

From: *Marc C. Wallace, QEP*
George Siple, QEP

Date: *March 10, 2008; Finalized September 9, 2008*

Subject: *Logan Air Quality Monitoring Study – Final First Quarter Monitoring Report*

This technical memorandum serves as the first of four quarterly monitoring data reports covering monitoring results for the baseline period at all monitoring locations as part of the Logan International Airport Air Quality Monitoring Study (Study). Camp Dresser & McKee Inc. (CDM) prepared this technical memorandum to provide:

- An overall status of the air quality monitoring program from start-up through November 30, 2007.
- A status of meeting the data quality objectives presented in the *Massport, Logan International Air Quality Monitoring Study, Active and Passive Monitoring Quality Assurance Project Plans, September 2007* (QAPPs), and
- The raw air quality monitoring and meteorological data for review by Massport, Massachusetts Departments of Environmental Protection (MassDEP), and Public Health (MassDPH).

The following sections of this technical memorandum include an overview discussion of issues affecting the data quality and quantity during this portion of the monitoring program, along with data collection and quality assurance activities based on the objectives established in the QAPPs. **Appendix A** presents the Quality Assurance Performance and Systems Audit Report prepared by an independent environmental

consultant (URS Corporation). A CD-ROM disk with the raw air quality monitoring and meteorological data is provided as **Appendix B**.

Overview

The monitoring network in this study is composed of 11 monitoring locations based upon the criteria established in the *Massport, Logan International Air Quality Monitoring Study, Final Air Quality Work Plan, September 2007*. Initial monitoring locations were recommended by the study project team and modified after consultation with the MassDEP and MassDPH. Of these 11 monitoring sites, three "primary" sites were established that use both "active" and "passive" air monitoring methods specifically selected for this study. In addition, seven "satellite" sites and one urban background site were added to expand the study area. These additional sites utilize a combination of passive sampling methods and active $PM_{2.5}$ samplers. The urban background site is located at the MassDEP Harrison Avenue monitoring site. An aerial map showing the 11 monitoring sites is shown in the study work plan referenced above. The Work Plan had identified 13 target pollutants that EPA and FAA classify as toxic air pollutants typically associated with airports. Fine PM (i.e., $PM_{2.5}$) and black carbon were added to this list to provide a more comprehensive record of pollutants that could originate from Logan. This technical memorandum focuses primarily on the data collection and quality assurance activities related to the monitoring for these target pollutants. However, samples were also analyzed for other potential pollutants. These secondary pollutant concentrations are reported in Appendix B.

The monitoring program was rolled out incrementally at the various sites beginning in the summer of 2007 with the first full quarter of monitoring between September and November. Passive sampling began in July 2007 at two of the primary sites (Annavoy Street and Bremen Street), the urban background site (Harrison Avenue), and at all but two of the satellite sites (Cottage Park Yacht Club and Coughlin Park). Passive sampling began at these two remaining satellite sites in August and at the remaining primary site (Court Road) in September. Active sampling and monitoring began in July at the Bremen Street site and at two of the satellite sites (Logan Satellite Fire Station and Constitution Beach). Active sampling and monitoring continued to be rolled out at the Annavoy Street site, the Harrison Avenue site, and the remaining satellite sites in August. Active sampling and monitoring began at the Court Road site in September.

As with any other large ambient air monitoring program, some start-up difficulties occurred which led to a partial loss or invalidation of some samples during the early part of monitoring. The study team worked together with Massport to resolve these

data collection problems including the acquisition of new equipment to improve the reliability of data collection. For these reasons, data recovery goals for some parameters in the study were not fully achieved during the initial months of the program.

To improve the detection limits for the passive samplers, their sampling period was increased from seven consecutive days to 14 consecutive days beginning in November. Preliminary analysis of the passive sampling results for November suggest that pollutant detection and resolution for speciated VOCs, speciated carbonyl compounds, and speciated PAHs may not have changed significantly due to this extension of the sampling period. However, the project staff (Emory University) continues to work to improve the data detection and resolution of these samplers.

Data Collection Activities

The following sections present a summary of the percent data recovery and percent data reported below minimum detection limits (MDLs) for both continuous and real-time integrated monitoring data for the target pollutants.

Continuous Data

The pollutant concentrations were measured using continuous ambient air monitoring instruments and time-integrated ambient air sampling equipment. The continuous pollutant data include mass of black carbon (BC) measured using a seven-wavelength aethalometer (Magee Scientific Co.) and mass of particulate matter with an equivalent aerodynamic diameter of 2.5 micrometers ($PM_{2.5}$) measured using a beta attenuation monitor (BAM) (Met One Instruments, Inc.). In addition to the air pollution data, meteorological data was collected at the three primary sites. This included: wind speed, wind direction, ambient temperature, and relative humidity. Meteorological stations were operated at two of the primary sites and data was collected from a third party at the third primary site.

Percent Data Recovery for Continuous Data

CDM has developed a database spreadsheet to track the sampling program progress to achieve the percent data recovery goal established for the study. The data collection period of September through November 2007 included 2,184 hours in total. The goal for the study is to obtain at least 75 percent data recovery, i.e., at least 75 percent of scheduled data samples collected as valid samples. For continuous monitoring instruments, this value would represent 1,638 hours of valid data during the reporting period.

The percent data recovery for the continuous data collected during the reporting period is presented in **Table 1**. The results for BC reflect instrument problems encountered with the aethalometers during September and October. New aethalometers were installed in mid-October and data recovery increased afterwards. The data recovery for meteorological parameters measured at each of the two primary sites operated by Massport was greater than 75 percent.

Table 1
Data Recovery for Continuous Monitoring

Black Carbon	Sep	Oct	Nov	Q1*
Annavoy	46%	47%	99%	64%
Bremen	66%	41%	100%	69%
Court	0%	46%	97%	48%
$PM_{2.5}$ BAM	Sep	Oct	Nov	Q1
Annavoy	97%	95%	98%	97%
Bremen	97%	99%	94%	97%
Court	100%	88%	95%	94%
Meteorology	Sep	Oct	Nov	Q1
Annavoy	99%	98%	98%	98%
Bremen	100%	100%	100%	100%
Court	99%	96%	99%	98%
Logan	99%	99%	99%	99%

**Less than 75% valid data collected during the quarter due to aethalometer operating problems.*

Percent Data Reported Below Minimum Detection Limit for Continuous Data

One of the parameters reported in air monitoring data reports are minimum detection limits (MDLs) of monitoring equipment and/or laboratory analysis. Most air pollutant concentrations tend to be log normally distributed in the ambient air, resulting in a significant proportion of measured values being found at relatively low concentrations and a much lower proportion being found at higher concentrations. Due to analytical limitations, some of the lower concentrations cannot be quantified and must be considered to be below the minimum detection limit of the analytical method. The aethalometer MDL for BC reported by Magee Scientific is 50 nanograms per cubic meter (ng/m^3) for one-hour average measurements and the BAM MDL for $PM_{2.5}$ reported by Met One Instruments is 5 micrograms per cubic meter (ug/m^3) for one-hour average measurements. **Table 2** presents the percent of continuous data reported below MDL. For the continuous BC one-hour average measurements, less

than one percent of the time measurements were below the MDL at all three monitoring sites during this period. For the continuous $PM_{2.5}$ one-hour average measurements, about 25 percent of the time measurements were below the MDL at all three monitoring sites during this period.

Table 2
Percent of Continuous Data Reported Below MDL

	Annavoy	Bremen	Court
Black Carbon	0.07%	0.00%	0.19%
$PM_{2.5}$ (BAM)	25%	25%	24%

Aethalometer MDL = 50 ng/m³ based on 1-hour average
BAM MDL = 5 µg/m³ based on 1-hour average

Time-Integrated Data

The time-integrated pollutant data include samples collected using both active and passive sampling techniques and include speciated volatile organic compounds (VOC), speciated carbonyl compounds, speciated polynuclear aromatic hydrocarbons (PAH), and $PM_{2.5}$ mass (active only). The active time-integrated samples were collected over designated periods of 24 consecutive hours from midnight to midnight, whereas the passive time-integrated samples were collected over designated periods of seven consecutive days (September and October) or 14 consecutive days (November). When possible, sample collection occurred at the same time as federal reference sampling being done by MassDEP.

Active samples of $PM_{2.5}$ were collected at the Annavoy Street site once every six days using a federal reference method Anderson RAAS $PM_{2.5}$ sampler. Active samples of $PM_{2.5}$ were also collected at each of the three primary sites, the seven satellite sites, and one urban background site once every twelve days using an Airmetrics MiniVol™ sampler. Active whole air samples were collected over a 24-hour period once every twelve days in passivated Summa canisters for analysis of speciated VOCs at each of the three primary sites. Active samples were also collected once every twelfth day on dinitrophenylhydrazine medium for analysis of speciated carbonyl compounds. In addition, active samples were collected one day per month on XAD resin with pre-filters for analysis of speciated PAHs.

All passive samples were collected one time per month over a consecutive seven-day period (or 14-day period in November). Passive samples were collected using activated charcoal medium for analysis of speciated VOCs. Passive samples were also collected on dansylhydrazine medium for analysis of speciated carbonyl

compounds. In addition, passive samples were collected using gas chromatography column medium for analysis of speciated PAHs.

Percent Data Recovery for Time-Integrated Data

During the data collection period from September through November 2007, 15 total samples of $PM_{2.5}$ were collected using the federal reference method at one of the primary sites, eight active samples for $PM_{2.5}$ analysis at each of the 11 sites, eight active samples for VOC and carbonyl analyses at each of the primary sites, three active samples for PAH analysis at two of the primary sites and the urban background site, and three passive samples each for VOC, carbonyl, and PAH analyses at each of the 11 sites. To meet the 75 percent data recovery goal for time-integrated samples, it was necessary to capture 12 of the 15 scheduled $PM_{2.5}$ samples via the federal reference method, 6 of the samples scheduled for 8 total samples, and all of the samples scheduled for 3 total samples.

The percent data recovery for the time-integrated data collected during the reporting period is presented in **Table 3**. Active samples that did not meet the quarterly goal (VOC, PAH, $PM_{2.5}$ FRM, and some $PM_{2.5}$ Minivol) were due to operator error when setting up the timers, incomplete documentation by the field operator, or equipment failure. The passive samples at Constitution Beach were missing at the completion of the sampling period in September and therefore did not meet the quarterly goal.

Percent Data Reported Below Minimum Detection Limit for Time Integrated Data

Tables 4 and **5** present the percent of time-integrated data reported below MDL for both the active and passive sampling program. For the active monitoring program, VOCs and PAHs measurements were above the MDLs for 100 percent of the time for all target compounds at all three monitoring sites. Similarly, the carbonyl measurements were above the MDLs for formaldehyde, acetaldehyde and propionaldehyde at Annavoy and Bremen Street monitoring sites. Carbonyl sampling results at the Court Road site below the MDLs ranged from 43 to 86 percent of the time. Acrolein measurements at all three sites were also 86 percent or greater of the time below the MDL.

Table 3
Data Recovery for Time Integrated Monitoring

Active Samples

VOC	Sep	Oct	Nov	Q1*
Annavoy	33%	50%	100%	63%
Bremen	0%	50%	100%	50%
Court	33%	50%	67%	50%
Carbonyl	Sep	Oct	Nov	Q1*
Annavoy	100%	100%	100%	100%
Bremen	67%	100%	100%	88%
Court	67%	100%	100%	88%
PAH	Sep	Oct	Nov	Q1*
Annavoy	0%	100%	100%	67%
Court	0%	100%	100%	67%
Harrison	0%	0%	100%	33%
$PM_{2.5}$ FRM	Sep	Oct	Nov	Q1*
Annavoy	40%	60%	100%	67%
$PM_{2.5}$ Minivol	Sep	Oct	Nov	Q1*
Annavoy	67%	50%	100%	75%
Bremen	67%	50%	67%	63%
Court	0%	50%	67%	38%
Harrison	100%	50%	100%	88%
Cottage	100%	50%	100%	88%
Constitution	100%	50%	67%	75%
Jeffries	100%	50%	100%	88%
S.Bos	100%	50%	100%	88%
Logan	0%	50%	100%	50%
Coughlin	0%	50%	67%	38%
Bayswater	100%	50%	67%	75%

Passive Samples

VOC	Sep	Oct	Nov	Q1
Annavoy	100%	100%	100%	100%
Bremen	100%	100%	100%	100%
Court	100%	100%	100%	100%
Harrison	100%	100%	100%	100%
Cottage	100%	100%	100%	100%
Constitution	0%	100%	100%	67%
Jeffries	100%	100%	100%	100%
S.Bos	100%	100%	100%	100%
Logan	100%	100%	100%	100%
Coughlin	100%	100%	100%	100%
Bayswater	100%	100%	100%	100%
Carbonyl	Sep	Oct	Nov	Q1
Annavoy	100%	100%	100%	100%
Bremen	100%	100%	100%	100%
Court	100%	100%	100%	100%
Harrison	100%	100%	100%	100%
Cottage	100%	100%	100%	100%
Constitution	0%	100%	100%	67%
Jeffries	100%	100%	100%	100%
S.Bos	100%	100%	100%	100%
Logan	100%	100%	100%	100%
Coughlin	100%	100%	100%	100%
Bayswater	100%	100%	100%	100%
PAH	Sep	Oct	Nov	Q1*
Annavoy	100%	100%	100%	100%
Bremen	100%	100%	100%	100%
Court	100%	100%	100%	100%
Harrison	100%	100%	100%	100%
Cottage	100%	100%	100%	100%
Constitution	0%	100%	100%	67%
Jeffries	100%	100%	100%	100%
S.Bos	100%	100%	100%	100%
Logan	100%	100%	100%	100%
Coughlin	100%	100%	100%	100%
Bayswater	100%	100%	100%	100%

*****_Less than 75% valid active sampling data collected during the quarter due to equipment failure and incomplete documentation of sampling data by the field operators. Passive samplers were found to be missing at the Constitution site at the completion of the sampling period in September 2007._

Table 4
Active Sample Target Pollutants
Percent of Time Integrated Data Reported Below MDL*

VOC	**Annavoy**	**Bremen**	**Court**	**MDLs**
1,3-Butadiene	0%	0%	0%	0.010 - 0.036
Benzene	0%	0%	0%	0.015 – 0.127
Toluene	0%	0%	0%	0.025 – 0.582
Ethylbenzene	0%	0%	0%	0.010 – 0.065
m&p-Xylene	0%	0%	0%	0.014 – 0.247
o-Xylene	0%	0%	0%	0.011 – 0.166
Styrene	0%	0%	0%	0.010 – 0.028
Carbonyl	**Annavoy**	**Bremen**	**Court**	
Formaldehyde	0%	0%	57%	0.010 – 0.776
Acetaldehyde	0%	0%	43%	0.010 – 0.059
Acrolein	100%	71%	86%	0.009 – 0.010
Propionaldehyde	25%	0%	57%	0.010 – 0.015
PAH	**Annavoy**	**Court**	**Harrison**	
Naphthalene	0%	0%	0%	0.935 – 3.930
1-Methylnaphthalene	0%	0%	0%	0.378 – 2.373
2-Methylnaphthalene	0%	0%	0%	0.206 – 1.014

** The results presented in this table represent a small number of the total compounds collected on the sample media. The concentration results for these additional compounds are presented in Appendix B. The MDLs presented in the table represent a range of values over all samples analyzed for the reporting period; values are in units of parts per billion by volume (ppbv).*

Table 5
Passive Sample Target Pollutants
Percent of Time Integrated Data Reported Below MDL*

VOC	Benzene	Toluene	Ethyl Benzene	m,p-Xylene	o-Xylene	Styrene
All sites	0%	0%	0%	0%	0%	0%
Detection Limit	**0.200 – 0.467**	**0.067 – 0.157**	**0.016 – 0.037**	**0.017 – 0.039**	**0.016 – 0.038**	**0.014 - 0.032**

Carbonyl	Formaldehyde	Acrolein	Acetaldehyde	Propionaldehyde
Annavoy	33%	33%	67%	67%
Bremen	33%	0%	33%	33%
Court	33%	0%	67%	67%
Harrison	67%	0%	67%	67%
Cottage	33%	0%	67%	67%
Constitution	0%	33%	100%	100%
Jeffries	33%	33%	33%	67%
S Boston	33%	0%	67%	67%
Logan	100%	0%	0%	67%
Coughlin	33%	0%	0%	0%
Bayswater	67%	0%	33%	67%
Detection Limit	**0.002 – 0.004**	**0.015 – 0.036**	**0.002 – 0.004**	**0.002 – 0.004**

PAH	Naphthalene	1-methylnaphthalene	2-methylnaphthalene
Annavoy	67%	100%	100%
Bremen	67%	100%	100%
Court	0%	100%	100%
Harrison	0%	100%	100%
Cottage	67%	100%	100%
Constitution	50%	100%	100%
Jeffries	33%	67%	100%
S Boston	33%	100%	100%
Logan	33%	100%	100%
Coughlin	67%	100%	100%
Bayswater	67%	100%	100%
Detection Limit	**0.024 – 0.056**	**0.016 – 0.038**	**0.004 – 0.009**

** The results presented in this table represent a small number of the total compounds collected on the sample media. The concentration results for these additional compounds are presented in Appendix B. The DLs presented in the table represent an average over all samples analyzed for the reporting period; values are in units of parts per billion by volume (ppbv) for VOCs, carbonyl compounds, and PAH compounds.*

For the passive monitoring program, all target VOC compounds were above the MDLs during this monitoring period. Many of the carbonyl and PAH samples were below the MDLs. The personnel at Emory University, who are responsible for this portion of the Study, are working on alternative means to improve the below MDL percentage during future sampling. Also, it should be noted that the current MDLs reported in Table 5, except for benzene, are 1 to 2 orders of magnitude lower than originally anticipated (see Work Plan and QAPP) due to improvements made in laboratory analyses by Emory University personnel. The benzene sampling issue is discussed further in the Field Blanks section below.

The results presented in these tables represent a subset of the total number of compounds that were collected and analyzed from the sampling media. The concentration results for the additional compounds are presented in Appendix B.

Quality Assurance Activities

Quality assurance activities include those routine and non-routine activities that are intended to improve or assure the quality of measured data. The following discussion briefly addresses those activities conducted during this monitoring period. The passive and active QAPPs provide more in-depth discussion of the active and passive monitoring QA/QC procedures. Table 6 summarizes the field and lab blank and duplicate samples that were analyzed during this monitoring period.

Table 6
Summary of Samples Collected During the 1nd Quarter with Blanks and Duplicates

Samples/Blanks/ Duplicates	Active					Passive		
	VOC	Carbonyl	PAH	PM (FRM)	PM (MV)	VOC	Carbonyl	PAH
Field Samples	13	22	5	10	61	32	32	32
Field Blanks	N/A	1	1	1	0	0	0	N/A
Field Duplicates	0	0	N/A	N/A	0	13	31	9
Lab Blanks	0	0	0	0	2	9	33	9
Lab Duplicates	2	0	N/A	N/A	N/A	N/A	N/A	N/A

N/A = not applicable to method

Field Blanks

The practice of conducting and analyzing field blanks is to provide information about contamination that may be introduced during sample collection, storage, and transport. Field blanks are to be collected on or near the scheduled federal reference method sample day and shipped back to the laboratory for analysis.

For the active sampling portion of the Study during the reporting period, there was one field blank analyzed for speciated carbonyls and one field blank analyzed for speciated PAHs; there were no field blanks analyzed for speciated VOCs. For carbonyls, only acetone (not identified as a target compound for the Study) presented a quantifiable concentration (i.e., concentration above the MDL) in the field blank; the other 13 species of carbonyls were less than their respective MDLs in the field blank. The concentration of acetone in the field blank was relatively high compared to those concentrations of acetone quantified in the various samples collected during the reporting period. Based on the results for this one field blank, it cannot be stated with confidence that those concentrations of acetone quantified in the various samples were indeed due to acetone being present in the ambient air at the time of sampling or were the result of contamination from other sources. Although acetone is excluded from the definition of a VOC by EPA and it is not listed by EPA as a hazardous air pollutant (HAP), MassDEP does include it as a compound in its Allowable Ambient Limits (AALs) guidelines. Further evaluation of the sampling results will be conducted based upon review of future carbonyl sampling and field blanks results.

For PAHs, eight compounds (1-methyl naphthalene, 2-methyl naphthalene, anthracene, benz (a) anthracene, benzo (b+j+k) fluoranthene, chrysene, naphthalene, and phenanthrene) presented quantifiable concentrations in the field blank; all other species of PAHs were less than their respective MDLs in the field blank. The concentrations of the eight compounds listed above found in the field blank were relatively low compared to those concentrations of the same compounds quantified in the various samples collected during the reporting period. Based on the results for this one field blank, it can be stated with some confidence that those concentrations of the eight listed compounds quantified in the various samples were indeed due to their being present in the ambient air at the time of sampling.

It should be noted that the active sample results were corrected for media blanks prior to reporting, but were not corrected for results of the field blanks. Details of the field blank results can be found in the data tables in Appendix B.

For the passive portion of the Study during the reporting period, laboratory blanks were analyzed for VOCs, carbonyl compounds, and PAHs. For carbonyl and PAH compounds, all species were found to be less than their respective MDLs in the field blanks. For VOCs, only benzene presented a quantifiable concentration (i.e., concentration above the MDL) in the field blanks; all other species of VOCs were less than their respective MDLs in the field blanks. The concentration of benzene in the field blanks (and other VOC sampling media) resulted in a higher than expected

MDL. The personnel at Emory University, who are responsible for this portion of the Study, are working on alternative means to resolve this problem for future sampling.

Data Precision (Replicate and Duplicate Sampling)

Data precision is of one of the measures used to assess the quality of the monitoring data. Data precision is the degree of mutual agreement among individual measurements under identical or substantially similar conditions measured as either the range or as the standard deviation. This can be done by either using the same analytical instrument to make repeated analyses of the same (replicate) sample, or it can be done by collecting, processing and analyzing collocated (duplicate) samples.

For integrated samples with subsequent laboratory analysis, precision was determined by periodic laboratory replicate analyses. Laboratory replication involves splitting a single sample in the laboratory and performing replicate tests. For continuous measurements, it is determined by periodic presentation of transfer standards to the measurement system.

For the active portion of the Study during the reporting period, there were no collocated (duplicate) samples collected in the field. However, there were two valid replicate analyses for speciated VOCs performed in the laboratory which provide a measure of the precision, or reproducibility, of the sample data. The results of the replicate analyses for the six target VOCs were less than 15 percent, with one exception. One of the replicate analyses for 1, 3-butadiene was found to be 21 percent below the reported sample concentration; due to the low concentration of the reported sample (0.129 parts per billion by volume for the sample collected at the Annavoy Street site on November 14, 2007), the level of precision is considered acceptable.

It should be noted that there are collocated active measurements of $PM_{2.5}$ being made at the three primary sites. The Annavoy Street site includes sample collection for $PM_{2.5}$ via a federal reference method as well as via a minivol, and continuous measurement of $PM_{2.5}$ via the BAM. Both the Bremen Street site and the Court Road site include both a minivol and a BAM. However, since the collocated methods at each of these sites represent different methodologies, a direct comparison of the collocated results is not a true measure of precision for $PM_{2.5}$.

For the passive portion of the Study during the reporting period, collocated (duplicate) samples were collected at varying rates, depending on the sampling method, the month, and the site. In September, duplicate VOC samples were collected at four sites, duplicate carbonyl samples were collected at nine sites, but no duplicate PAH samples were collected. In October, duplicate VOC samples were

collected at four sites, duplicate carbonyl samples were collected at 11 sites, and duplicate PAH samples were collected at four sites. In November, duplicate VOC samples were collected at five sites, duplicate carbonyl samples were collected at 11 sites, and duplicate PAH samples were collected at five sites. Where duplicates were collected at fewer than all the sites in succeeding months, the locations tended to be rotated so as to avoid collecting duplicates at the same site each month. Because the measured concentrations for all pollutants collected using the passive methods have been found to be low—often near or less than the MDL—precision results on a percentage basis were greater than 10 percent.

Data Accuracy

Performance audits are typically part of a comprehensive air monitoring quality assurance program. They validate and document the measurement system data accuracy. To ensure against conflicts of interest, all audits should be conducted by individuals who are independent of the organizations responsible for the monitoring and/or using the data. This is especially important as the audit is essential in confirming validity of the data.

As a measure of the accuracy of the data results, an independent consultant (URS Corporation) was hired to conduct a performance audit of the monitoring instruments and sampling equipment. The audit was performed on October 22 through 25, 2007, and it consisted primarily of comparing the sampling flow rates of the monitoring instruments and sampling equipment to appropriate transfer standards of known accuracy. The audit findings were documented in the URS audit report dated December 7, 2007 (see Appendix A).

The performance audit found the sampling flow rates to be within acceptable limits for all active pollutant monitoring instruments and sampling equipment, including the aethalometers (within $^{+/-}$ 5%), BAMs, $PM_{2.5}$ federal reference method sampler, minivol samplers, , PAH samplers (within $^{+/-}$2%) and carbonyl compound samplers (within $^{+/-}$0.1 liters per minute). The audit also checked the meteorological monitoring instruments at Annavoy Street site and the Court Road site. The meteorological instrumentation was found to be within acceptable limits at the Court Road site. The meteorological instrumentation at the Annavoy Street site was found to be within acceptable limits except that the wind direction was found to be 12 degrees west of the correct orientation and the wind speed was found to be 1.2 miles per hour greater than the audit value at the mid point. The auditor recommended that the wind direction measured at the Annavoy Street site prior to October 24, 2007 (date of the audit at that site), be corrected for the 12 degree deviation. The data reported in Appendix B have been corrected.

Next Report

The next reporting period will be for December 2007 through February 2008. The monitoring report will present the monitoring results and will include a discussion of any changes made to improve the monitoring program.

If you have any questions, or would like to discuss further these results, please do not hesitate to contact George Siple at (919) 787-5620 or myself at (617) 452-6363.

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Appendix A

Quality Assurance Performance and Systems Audit Report

Appendix B

CD-ROM Disk
Air Quality Monitoring and Meteorological Data