CALIFORNIA PORTABLE CLASSROOMS STUDY
PHASE II: MAIN STUDY

FINAL REPORT, VOLUME II
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ABSTRACT

The purpose of the California Portable Classrooms study was to assess environmental conditions in California's portable classrooms. This report documents results from Phase II of the study. Phase II was an in-person monitoring study of a probability sample of all public California K-12 schools with at least one portable classroom. The Phase II field study was conducted in the fall and winter of 2001-02. Three classrooms were monitored in each of 67 schools, usually two portable classrooms and one traditional classroom. In addition to direct environmental monitoring, the study used several data collection forms, including a Facilities Questionnaire, a Teacher Questionnaire, and classroom and Heating, Ventilation, and Air Conditioning (HVAC) check lists, to assess environmental conditions in the sample classrooms. This report describes the sample design, the survey instruments, the monitoring methodology, the data collection process, the data analysis procedures, and the results that show and compare the major characteristics of the populations of eligible public schools as well as the population of portable and traditional classrooms in these schools.

The target population for this study is estimated to consist of 6,506 schools containing 69,447 portable classrooms and 126,322 traditional classrooms. Data were successfully collected in 67 of the 81 eligible sample schools, resulting in an overall weighted school-level response rate of 83%. Data for classrooms had overall study response rates of 57% to 82%, depending on the particular type of data.

Key results include:

(a) School characteristics: 75.8% of the schools were suburban, 17.1% urban, and 7.2% rural; 59.2% were elementary schools, 20.7% middle, and 20.1% high school; 40.1% of the schools have 30 or fewer classrooms, but 4.4% are estimated to have over 30 portable classrooms.

(b) Classroom Characteristics: Portable classrooms are newer than traditional classrooms, and they are more likely to have had a major addition or replacement in the past 3 years, to have carpet or rugs on the floor (and more often with water stains), to be constructed of tack board, fiber/particle board, or plywood (in contrast with traditional classrooms with sheetrock, plaster, or other wall material), to have pressed wood bookcases in the room, and to have a metal roof.

(c) Classroom Complaints or Problems: Higher percentages of facility managers reported problems with portable classrooms – such as water leaks, odors, mold, noise, and temperature – than traditional classrooms. Teachers in portable classrooms complained most frequently about noise (68%), followed by musty odors (67%), unacceptable classroom air (47%), insect occurrences (24%), lighting problems (22%), and past leak or flood in room (20%). Other concerns were reported by less than 10% of the teachers. The percentage of teachers in the traditional classrooms reporting on the same classroom problems was not statistically different from the percentage reported by the teachers in portable classrooms (at the 10% level of significance.)

(d) HVAC Characteristics: In addition to structural differences (physical location of unit, type of fuel, type of unit, and accessibility), indicators of potential

environmental quality were different between the two types of classrooms. Portable classrooms had a higher percentage of HVAC filters that showed the presence of mildew or mold, dirtier drain pans, more clogged drains, and more standing water. The air flow measurements were not significantly different between the two types of classrooms at the 0.05 level; however outdoor air flow (cfm/ft^2) was significantly higher for portable classrooms at the 0.10 level. The average ages of HVAC units were about the same. Indoor levels of CO_2 were significantly higher than outdoor levels, as expected; portable and traditional classrooms were about the same; significant predictors included classroom age, school type, and the teacher rating of indoor air quality.

(e) Light and Noise: The mean light intensity measured in the traditional classrooms was significantly higher than that measured in the portable classrooms (65.2 versus 55.7, respectively). Based on IESNA light guidelines of greater than 30 foot-candles needed to view materials of high contrast, 8.8% of the portable classrooms and 4.4% of the traditional classrooms failed to meet this level of lighting. Similarly 38.3% of the portable and 27.2% of the traditional classrooms failed to meet the requirement for more than 50 foot-candles of light to view materials of low contrast, or small print. Measured noise levels were not significantly different, although teachers in portable classrooms were more likely to turn off the HVAC system due to noise. Based on ANSI/ASA and WHO acoustic standards of less than 35 dBA for unoccupied classrooms, all classrooms failed to meet this level. In fact 50% of the measurements in portable and 37.5% of the traditional classrooms failed to meet the outdoor noise level adopted by a number of cities in California, less than 55 dBA.

(f) Comfort Measures: Temperature levels were more frequently cooler in the portable classrooms than in the traditional classrooms. Portable classrooms also had a higher frequency of relative humidity levels above 60%. Portable classrooms had temperatures below 17 ^{o}C (63 ^{o}F) significantly more of the time, 6.3% versus 3.2%. Portable classrooms had temperatures below 20 ^{o}C (68 ^{o}F) significantly more of the time, 27% versus 17.0%.

(g) Pollutant Levels (measured in occupied classrooms):

- Based on the Quality Control data, most of the environmental measurement and laboratory data quality was satisfactory.
- Particle Counts: Portable and traditional classrooms had about the same levels except for one $PM_{2.5}$ model where traditionals were estimated to have lower levels than portables. Significant predictors included outdoor levels and presence of carpets/rugs (for $PM_{2.5}$).
- Pollens and Spores: Outdoor levels were generally higher; portable and traditional classrooms had about the same levels; and significant predictors included window position (open or closed).
- Aldehydes –

  <u>Formaldehyde</u>: Indoor levels were higher than outdoor; portable classrooms were higher than traditional classrooms; significant predictors included classroom age, school type, general instruction classroom, and other materials in room. Indoor levels were lower than those measured in the mailed survey (Phase I), but there were many differences in methods, averaging time, and season of year.

Others: indoor levels were generally higher than outdoor levels; portable classroom levels were about the same as traditional classroom levels, except for o,p-tolualdehyde (portables higher).

- VOCs: Indoor levels were higher than outdoor levels; traditional classroom levels were about the same as portable classroom levels; significant predictors vary by specific analyte.
- Metals in floor dust: Portable classroom levels were about the same as traditional classroom levels.
- Pesticides: Portable classroom pesticide mean levels were about the same as traditional classroom levels. Six of the 20 pesticides were detected in over 80% of the classrooms – chlorpyrifos, cis- and trans-permethrin, o-phenylphenol, piperonyl butoxide, and esfenvalerate.
- Polynuclear Aromatic Hydrocarbons (PAHs): Six of 16 PAHs had significantly higher mean loadings (but not concentration levels) for the portables than for the traditional classrooms.
- Animal and arthropod allergens in dust: Portable classroom levels were about the same as those measured in traditional classrooms.

(h) Classrooms in specially-selected schools appeared to have indoor air formaldehyde levels comparable to those in the general target population, but moisture-related problems were more frequently reported than in the general population.

(i) The Phase II study was successful in generating a massive amount of information about California schools and classrooms.

Results from this survey suggest that there are important issues associated with environmental conditions in California K-12 schools that deserve appropriate attention. Furthermore, the environmental factors and complaints reported by the teachers and facility managers in the sampled schools are often different between the traditional and portable classrooms. Measured levels of several pollutants – most notably, formaldehyde – are significantly higher in the portable classrooms than in the traditional classrooms. This study resulted in an extensive, robust database that will generate even more findings with more extensive and varied data analyses.

EXECUTIVE SUMMARY

Background

There are many reasons to study the school indoor environment. School buildings are, by design, densely populated, making the task of maintaining an acceptable indoor environmental quality more difficult than in many other types of facilities. While in these buildings, the children and staff may be exposed to a number of chemicals and biological materials. Children are often more susceptible to health effects and, hence, more likely to be affected by indoor pollution.

Concerns over indoor environmental quality in California's schools have risen recently as the demand for classrooms has resulted in increased reliance on portable classrooms. Portable classrooms are usually constructed with materials and heating, ventilation, and air conditioning (HVAC) systems different from those used in traditional classrooms (Bayer et al., 1998). Manufactured buildings may emit hundreds of chemicals from the particleboard, plywood, fiberglass, carpets, glues, and other materials used in their construction. Adding to potential problems and environmental factors influencing the physical classroom are the specific activities which may be ongoing during the day that could add to already significant "background" concentrations. For example, volatile organic compounds (VOC) emissions of arts and crafts can add to levels of 1,1,1-trichloroethylene, toluene, and xylenes.

To address increasing concerns about portable classrooms, the California Air Resources Board (ARB) and Department of Health Services (DHS) requested funding in the 2000-2001 State budget to jointly conduct a comprehensive study of the environmental health conditions in portable classrooms. The Legislature approved the request, with milestones and requirements specified in AB 2872, Shelley, and California Health and Safety Code (HSC) Section 39619.6. The California Portable Classrooms Study (PCS) is being conducted in response to this legislative mandate. The findings from the PCS will form part of the basis for recommendations that ARB and DHS must make to the Legislature regarding ways to "…remedy and prevent unhealthful conditions found in portable classrooms…" (AB 2872).

The California Portable Classrooms Study was requested by Governor Gray Davis, mandated by the State Legislature, and endorsed by the Superintendent of Public Instruction, Ms. Delaine Eastin. Until this study, there has not been a systematic or comprehensive statewide survey or measurement of indoor environmental conditions in California public schools.

This study was conducted in two phases. Phase I was a mailed survey in which questionnaires and passive formaldehyde monitors were sent to a probability sample selected from all public schools with at least one portable classroom in the spring of 2001. Of 952 eligible schools in the Phase I sample, 426 provided some questionnaire data, and of 800 schools sent formaldehyde samplers, 320 completed formaldehyde monitoring for at least one classroom. Phase II was a monitoring study of environmental conditions in a smaller probability sample selected from all schools with at least one portable classroom both in the spring of 2001 and in the 2001-02 school year. Of 81 eligible schools in the Phase II sample, both questionnaire and environmental monitoring data were obtained for 67 schools.

Results from the PCS will be used by ARB, DHS and other stakeholders to assess the potential for adverse health impacts from environmental conditions and toxic pollutants that may be present in portable classrooms and, where necessary, to identify and implement effective actions that can be taken to remedy or prevent any unhealthful conditions.

This report documents Phase II of the study. It describes the sampling design, the survey instruments, the monitoring methods, the data collection process, the data analysis procedures and programs, and the results that show and compare the major characteristics of the populations of eligible schools, as well as portable and traditional classrooms. The specific objectives were:

- To characterize distributions of pollutants and environmental conditions, by type of classroom, for indoor air, chemical concentrations in dust, and other environmental measures, such as light and noise.
- To characterize indoor/outdoor air associations by type of classroom.
- To characterize performance of HVAC systems.
- To test for significant differences between portable and traditional classrooms regarding indoor air concentrations and concentrations of chemicals in dust.
- To assess the effects of HVAC performance and other factors on indoor air concentrations of pollutants for each type of classroom.

Methods

The Phase II study was an in-school monitoring study that was conducted from October 2001 through February 2002. It utilized a probability-based sample of California public schools having one or more portable classrooms. The sample of schools selected for the Phase II survey, which contained 81 eligible schools, is statistically representative of all California public schools that had portable classrooms in both the spring and fall of 2001 because the sample was randomly selected from all schools on the California Public Schools Directory 2000 (see http://www.cde.ca.gov/cdepress/) that had portable classrooms in the spring of 2001 (based on the Phase I preliminary survey).

Both school-level and classroom-level data were acquired during the study. Classroom data were collected for three classrooms, usually two portable classrooms and one traditional classroom per sample school. Sampling in occupied classrooms was conducted during one school day at each school, with samplers set up in the morning prior to arrival of students, and removed at the end of the day. HVAC testing, noise tests, and measurements of culturable airborne organisms were conducted during lunch breaks. Environmental samples were stored on ice and shipped weekly by overnight delivery.

Field QC checks were performed before and after sampling. Field blanks and controls were collected at a 5% rate. Field duplicates were collected for indoor air pollen and spores, aldehydes, and VOCs. Precision (measured as % RSD) averaged 10% or less across sample types.

Various types of data were collected at each participating school:

- School-level questionnaire data:
  - Facilities Questionnaire II
  - Consultation with Facilities and HVAC Managers (Part 2)
- Classroom-level questionnaire data:
  - Teacher Questionnaire II
  - Consultation with Facilities and HVAC Managers (Part 1)
  - HVAC Assessment Checklist and School Characteristics
- Environmental measurements (moisture, light, noise, and ventilation measurements)
- Laboratory data from environmental samples:
  - Pollen and spores in classroom and outdoor air (Allergenco slides)
  - Formaldehyde and other carbonyls in classroom and outdoor air
  - Volatile organic compounds (VOCs) in classroom and outdoor air
  - Culturable airborne microorganisms in classroom and outdoor air (Mattsen-Garvin samples) (only at specially-selected schools)
  - Culturable surface microorganisms on classroom surfaces (only at specially-selected schools)
  - Metals in classroom floor dust
  - Animal and arthropod allergens in classroom floor dust
  - Pesticides and polynuclear aromatic hydrocarbons (PAHs) in floor dust
- Continuous monitoring data regarding environmental conditions:
  - Carbon dioxide (CO_2), temperature, and relative humidity in classroom and outside air (Q-Trak)
  - Particle counts in classroom and outdoor air
  - HVAC operating status data (on or off) (HOBO)

Statistical estimates of population parameters such as means and proportions were computed using weighted data analysis techniques. SUDAAN software (RTI, 2001) was used to generate estimates of means, proportions and regression coefficients; this software properly accounts for features of the sampling design in the estimation of precision of such estimates (e.g., confidence intervals).

Results

The target population for Phase II of the study is estimated to consist of 6,506 schools containing 69,447 portable classrooms and 126,322 traditional classrooms (195,769 total classrooms). These totals are slightly less than the estimated size of the Phase I population because five schools selected for the Phase II sample were found to have no portable classrooms in the 2001-02 school year (thus those schools were ineligible). From Phase I, it was estimated that there were about 230,000 eligible classrooms in California, and that about 37% of these were portable classrooms. Moreover, the DHS preliminary survey estimated the total number of K-12 public classrooms in the 2000-01 school year was 268,000, of which about 80,000 were portable classrooms.

Data Completeness and Response Rates

Data were successfully collected (questionnaire data and environmental monitoring data) in 67 of 81 eligible sample schools, resulting in an overall weighted school-level response rate of 83.0%. Such a response rate for school-level participation in Phase II of this study is quite good and limits the possibility for nonresponse bias to seriously affect the results. This response rate was much better that the response rate obtained in Phase I of this study (44.7%) for several reasons. The most important reasons were that we used telephone recruitment (rather than mail), we began recruitment early in the school year, we obtained permission from superintendents before contacting principals, and we used three experienced staff members for making recruitment calls to superintendents and principals.

Characteristics of the Population of Eligible Schools

Weighted estimates of population proportions (and of means and percentiles, for continuous measurements) were generated for selected items from the data collection forms. Among the many estimates produced, the following *school* characteristics were most notable:

- The schools were about equally split between Northern and Southern California (45.5% in the north and 54.5% in the south).
- The schools were mostly suburban schools (75.8% suburban, 17.1% urban, and 7.2% rural).
- The schools were mostly elementary schools (59.2% elementary, 20.7% middle, and 20.1% high school, based on the highest grade offered).
- Many of the schools (40.1%) had 30 or fewer total classrooms, but 4.4% were estimated to have over 30 portable classrooms.
- Most of the schools (87.9%) performed regular HVAC inspection and maintenance.
- About half of the schools (58.7%) reported having HVAC maintenance logs, which are required by State regulations.
- Many of the schools (41.7%) were aware of EPA's Tools for Schools program, but few (18.7%) reported using this program.

These results are consistent with the Phase I findings, except that the awareness and use of the EPA's Tools for Schools program has increased slightly.

General Characteristics of the Population of Eligible Classrooms

Some general characteristics estimated for the eligible *classroom* population are the following:

- About 63.1% of the classrooms were located in Southern California.
- The classrooms were mostly in suburban schools (75.5% suburban, 17.8% urban, and 6.6% rural).
- The classrooms were mostly in elementary schools (59.0% elementary, 22.9% middle, and 18.1% high school, based on the highest grade offered).

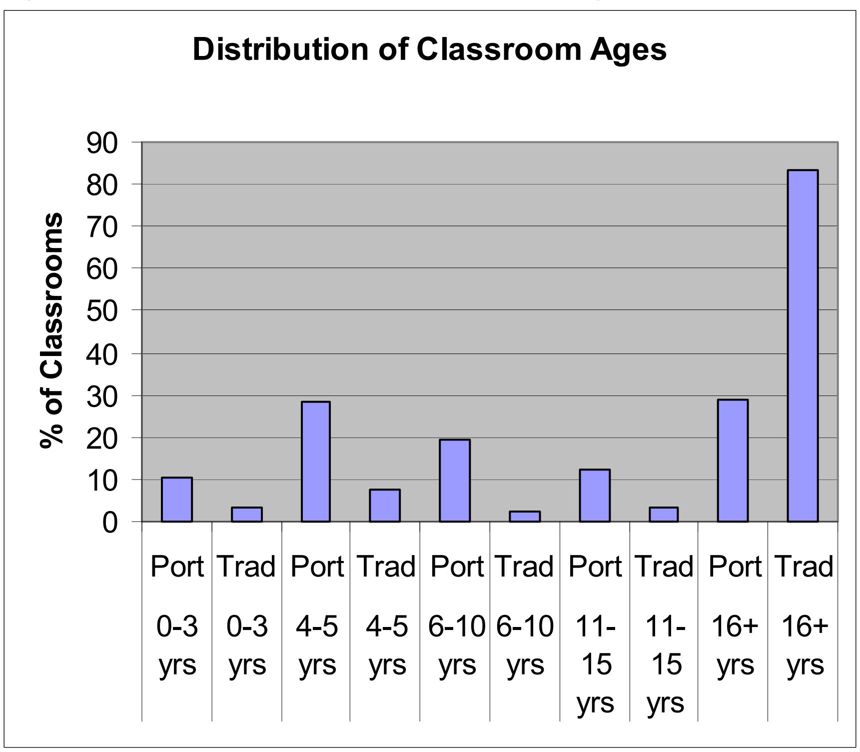
These results are comparable to those observed in Phase I of the study.

General classroom characteristics that were found to be significantly different (at the 5% significance level) between traditional and portable classrooms include the following:

- Portable classrooms (PORT) usually were newer than traditional classrooms (29.1% versus 83.4% over 15 years old). (See Figure ES-1.)
- Portable classrooms were much more likely to have had a major addition or replacement in the past 3 years (83.6% portable classrooms versus none observed for traditional classrooms).
- Portable classrooms were more likely to have carpet or rugs on the floor (82.0% versus 62.9%).
- Portable classrooms were more likely to have water stained floors (13.1% versus 2.0%).
- Portable classrooms were more likely to have tack board, fiber/particle board, or plywood walls, whereas traditional classrooms were more likely to have sheetrock, plaster, or other wall material.
- Portable classrooms were less likely to have chalk in the room (21.6% versus 40.8%).
- Portable classrooms were more likely to have pressed wood bookcases in the room (73.1% versus 49.8%).
- Portable classrooms were more likely to have a metal roof (28.5% versus 2.5%).
- Portable classrooms were used somewhat less frequently for general classroom instruction (87.9% versus 96.5%).

Moreover, the estimated distribution of the height of the foundation skirt for portable classrooms was as follows: 42.6% are less than 2”, 22.2% are from 2” to 12”, and 35.2% are over 12”.

Figure ES-1. Portable Classrooms Usually were Newer than Traditional Classrooms



Ventilation/HVAC Characteristics

Phase II provided more in-depth information about HVAC characteristics and comfort indicators than did Phase I. Several of the items from the data collection forms pertain to the condition and operation of the HVAC systems serving the classrooms. Several significant differences between portable and traditional classrooms were observed regarding HVAC characteristics:

- Teachers were more likely to turn off the HVAC system due to high noise levels in portable classrooms (68.3% versus 42.2%).
- The HVAC unit was more likely to be wall mounted in portable classrooms (79.8% versus 9.3%).
- The HVAC unit was more likely to be a heat pump in portable classrooms (94.6% versus 76.9%).
- The heating fuel was more likely to be electricity in portable classrooms (98.1% versus 79.3%).
- The air handling unit was more likely to have good access to its interior in portable classrooms (66.1% versus 35.3%).
- The air filter was more likely to have a lighter loading of dirt in portable classrooms (51.6% versus 42.9%).
- The size of the gap around the filter was more likely to be less than 1/2" in portable classrooms (71.6% versus 46.3%).
- The air handling unit was less likely to have clean condensate drain pans and lines in portable classrooms (30.0% versus 56.7%).
- In the drain test, the air handling unit was more likely to have standing water for portable classrooms (55.3% versus 11.1%).
- A blocked drain was more likely to be observed during the drain test in portable classrooms (36.6% versus 6.8%).
- In portable classrooms the air handling unit was more likely to fail the drain test (58.5% versus 12.4%).
- The air intake was blocked on the air handling units more often for portable classrooms than for traditional classrooms (10.8% versus 2.7%).

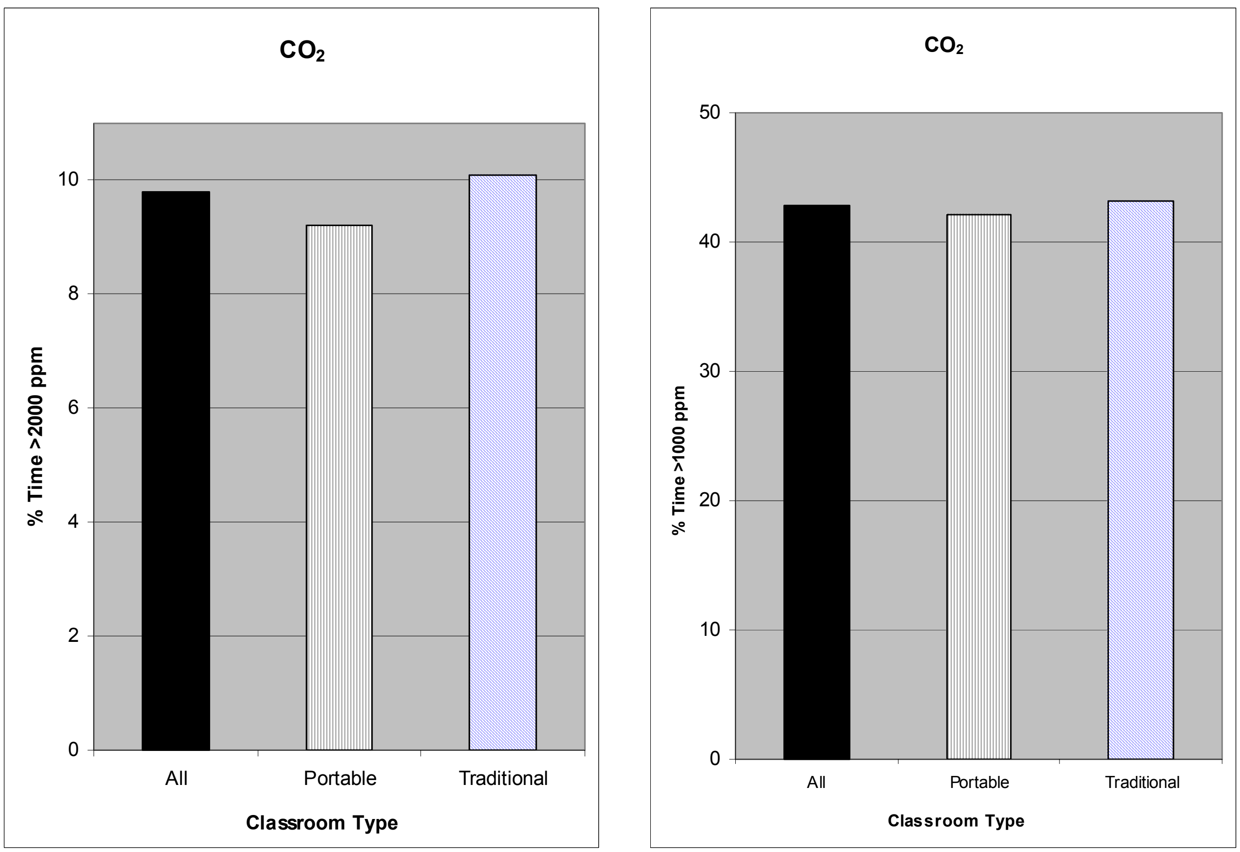
Mean differences in outdoor air flow, total supply air, and HVAC age were not significantly different (at the 5% level of significance) for portable versus traditional classrooms. (See discussion of CO_2 levels below.) However, outdoor airflow (cfm/ft^2) was significantly higher for portable classroom at the 0.10 level.

The mean CO_2 concentrations were not statistically different for the portable and traditional classrooms. Average indoor levels (1070 ppm) were more than twice as high as outdoor levels (427 ppm). As can be seen in Table ES-1, both portable and traditional classrooms had school-day average concentrations of carbon dioxide (CO_2) greater than 1000 ppm. This table and Figure ES-2 show that both classroom types had one-hour average CO_2 levels above 1000 ppm for about 40% of the school day. Both classroom types had one-hour average CO_2 levels above 2000 ppm for about 10% of the school day. These results indicate insufficient ventilation in a substantial portion of California classrooms.

Table ES-1. CO_2 Levels as an Indicator of Ventilation Sufficiency

	Portable	Traditional	All
mean ppm across school day	1064	1074	1070
% with one-hour average above 1000 ppm (mean)	42.1	43.2	42.8
% with one-hour average above 2000 ppm (mean)	9.2	10.1	9.8

Figure ES-2. CO_2 Levels in Portable and Traditional Classrooms Were Similar



Lighting and Noise Characteristics

There was no significant difference between portable and traditional classrooms for the teachers' opinions regarding whether or not the classroom lighting was satisfactory. However, the mean light intensity in the center of the classroom was significantly higher for traditional classrooms than for portable classrooms (65.2 versus 56.7 foot-candles). Sampled portable classrooms failed to meet the IESNA light guidelines of 30 f-c for high contrast at double the rate of traditional classrooms, 8.8% versus 4.4%. They also failed to meet the IESNA light guidelines of 50 f-c for low contrast at a higher rate, 38.2% versus 27.2%.

All of the classrooms failed the 35 dBA ANSI acoustic standard for classrooms. In fact, 50% of the noise measurements taken indoors for the portable classrooms failed to meet the outdoor noise nuisance standard (< 55 dBA) adopted by a number of cities in California. (See Figure ES-2). None of the HVAC noise measurements were significantly different (at the 5% significance level) between portable and traditional classrooms. (See Figure ES-3.)

Temperature and Humidity Levels

A relatively large percentage of the classrooms in California do not achieve the ASHRAE standards for acceptable temperature and relative humidity. Portable classrooms had temperatures below 17 EC (63 EF) for more of the time (6.3% versus 3.2%); and they had temperatures below 20 EC (68 EF) for more of the time (27.0 % versus 17.0%). Both portables and traditionals exceeded 23 EC (73EF) about 27% of the time, but traditionals had a higher percent of time at very high temperatures (> 26 EC [79 EF] and > 29 EC [84 EF]) (see Figure ES-4).

None of the relative humidity (RH) summary measures exhibited statistically significant differences between the means of the two types of classrooms that were statistically significant at the 5% level. Average RH measurements were 46.8% and 45.9% for portable and traditional classrooms, respectively, within the acceptable range. However, as can be seen in Figure ES-5, California classrooms do not achieve the ASHRAE standards for acceptable relative humidity a substantial portion of the time.

Pollutant Levels

Particle Counts in Air. Real time counts of particles were measured in each classroom and outdoors. It should be noted that particle counts cannot be directly associated with mass concentration standards; however, the measurements do provide a relative indication of mass for comparison purposes. Mean counts of particles per minute for particles of 2.5 µm or less and for particles of 10 µm or less were not significantly different for portable and traditional classrooms. However, the 95th percentiles for particle counts for these two particle sizes were much higher in the portable classrooms, especially for the small size range. One possible explanation, as mentioned before under the characteristics of the classrooms, is that carpets and rugs were found more often in the portable classrooms, which could be a source of the particles.

Pollens and Spores in Air. In general there were few spore types that were observed frequently in either the outdoor or indoor environments. In the outdoor environment, only six were frequently seen (on 80% or more of the slides)—Amerospores, Ascospores, Cladosporium, Mycelial Fragments, Pollen Count, and Total Fungal Spores. Not too surprisingly, all of these except Ascospores were frequently found (80% or ore of the slides) indoors. No significant differences between portable and traditional classrooms were found for mean Total Pollen Counts or mean Total Fungal Spores.

Figure ES-3. Portable and Traditional Classrooms Mean Noise Levels Were Above the Outdoor Noise Nuisance Standard (< 55 dBA), but Not Significantly Different

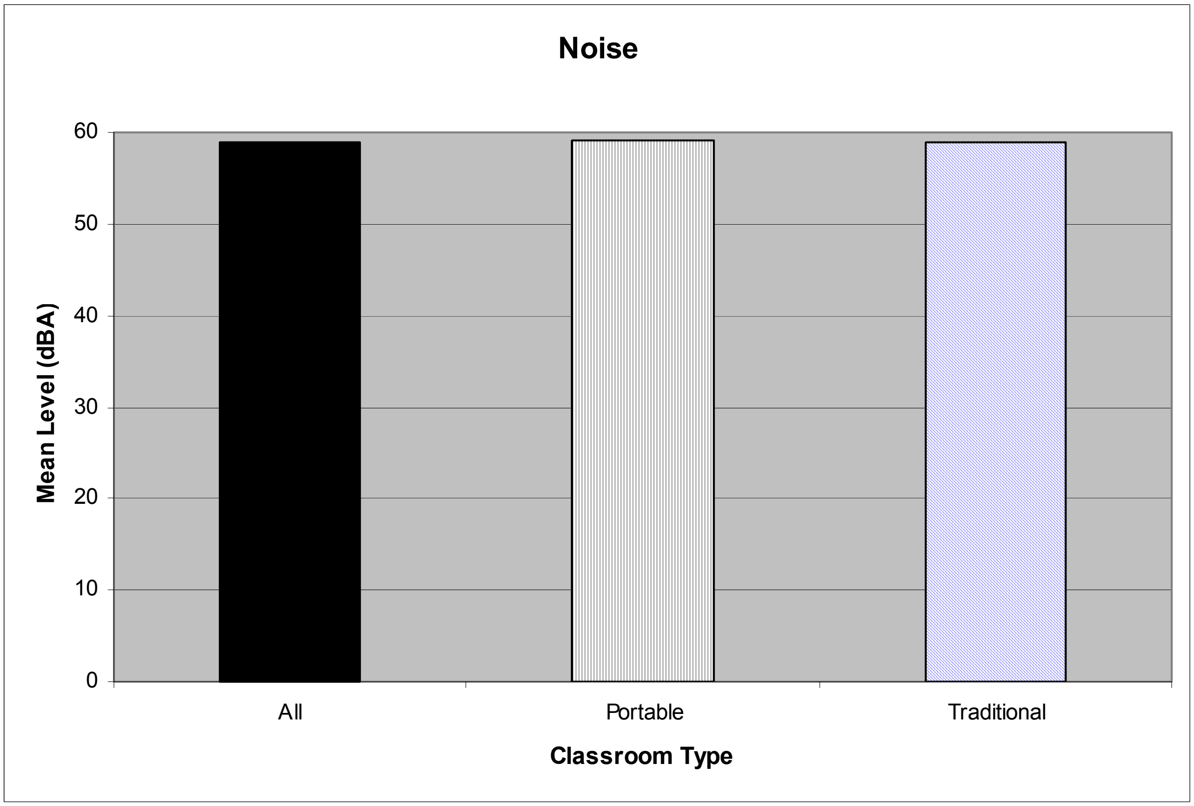


Figure ES-4. Portable Classrooms were More Frequently Cooler (< 20˚ C [68 EF]) and Less Frequently Warmer (> 26˚ C [79 EF]) than Traditional Classrooms

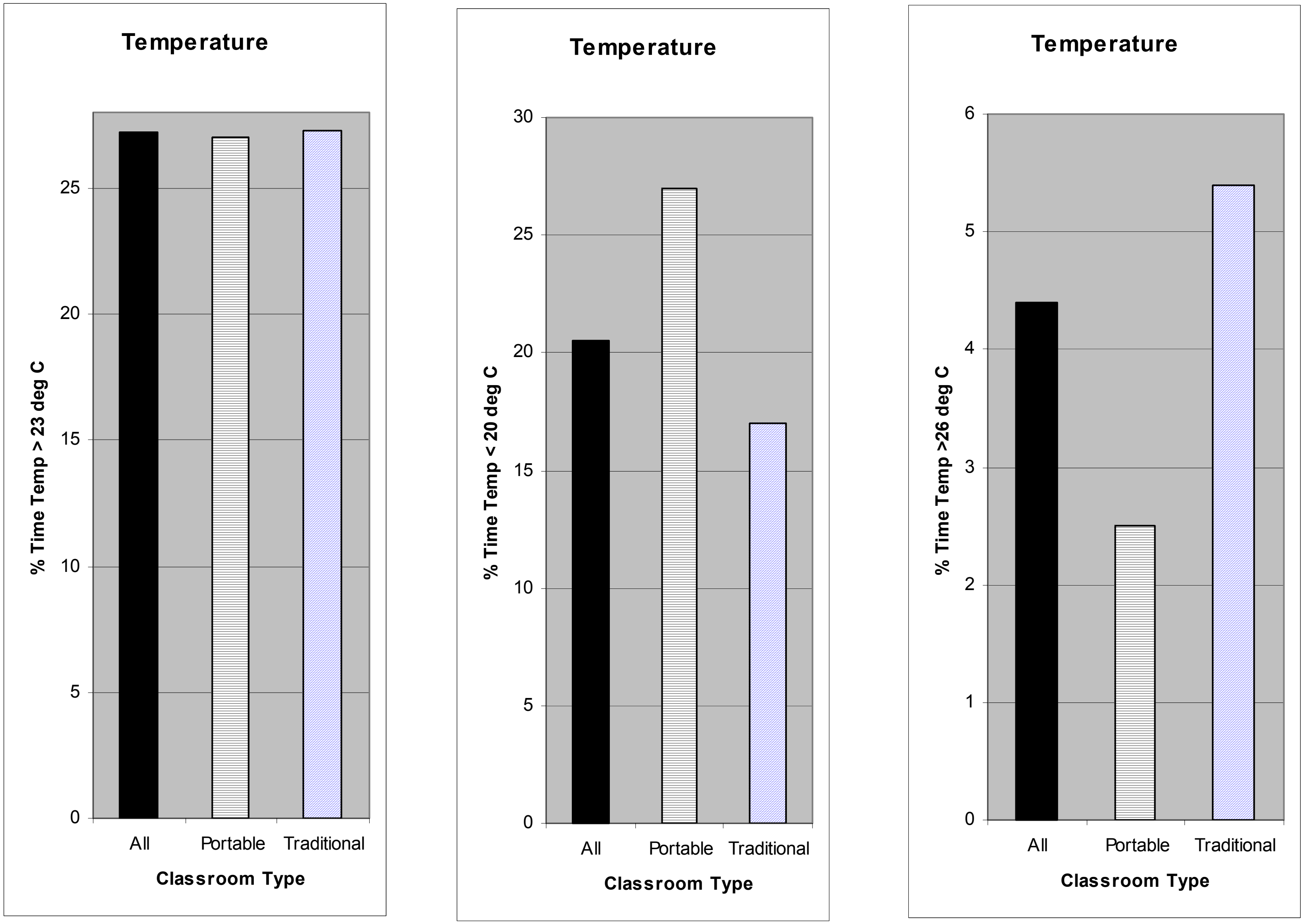
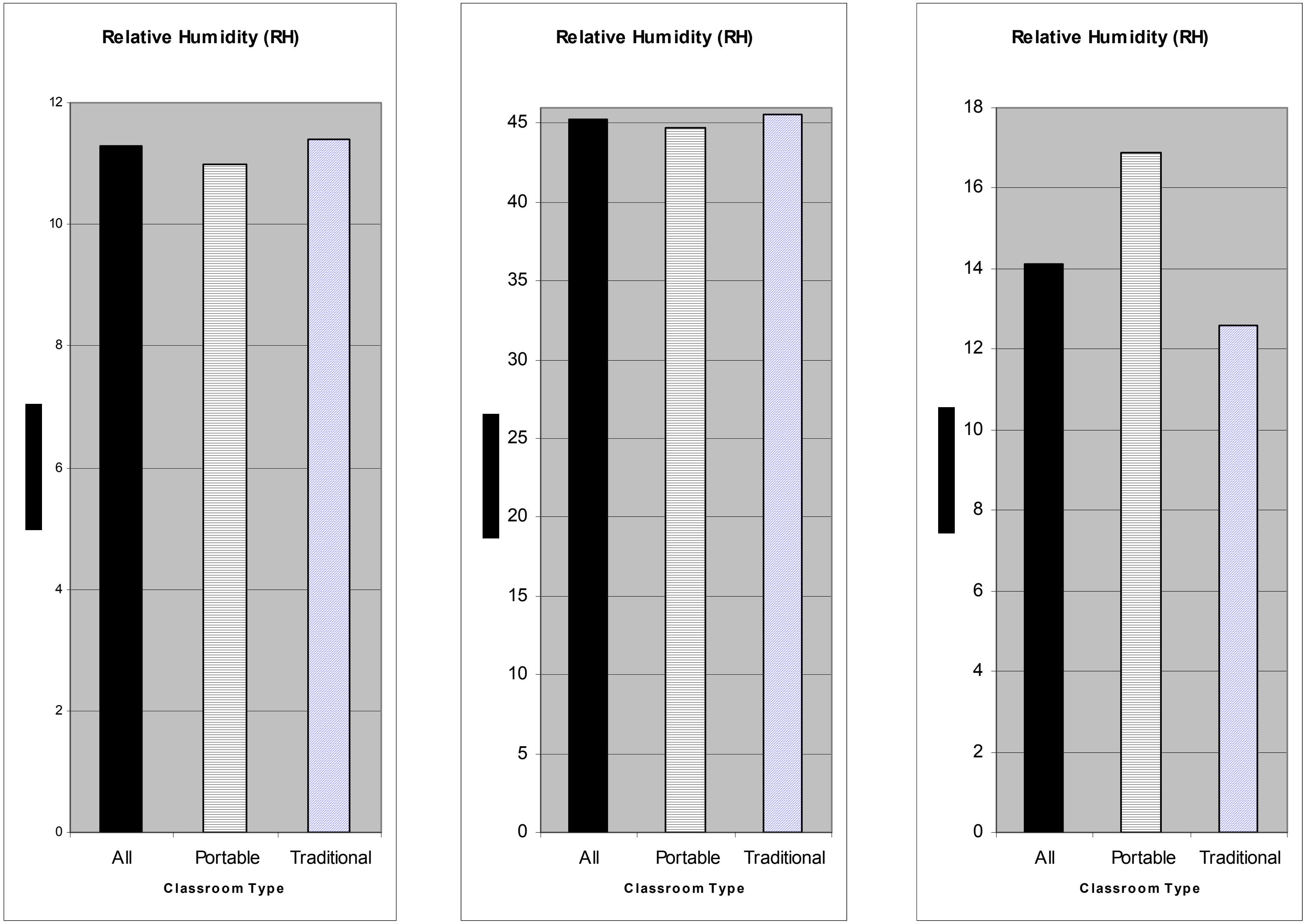
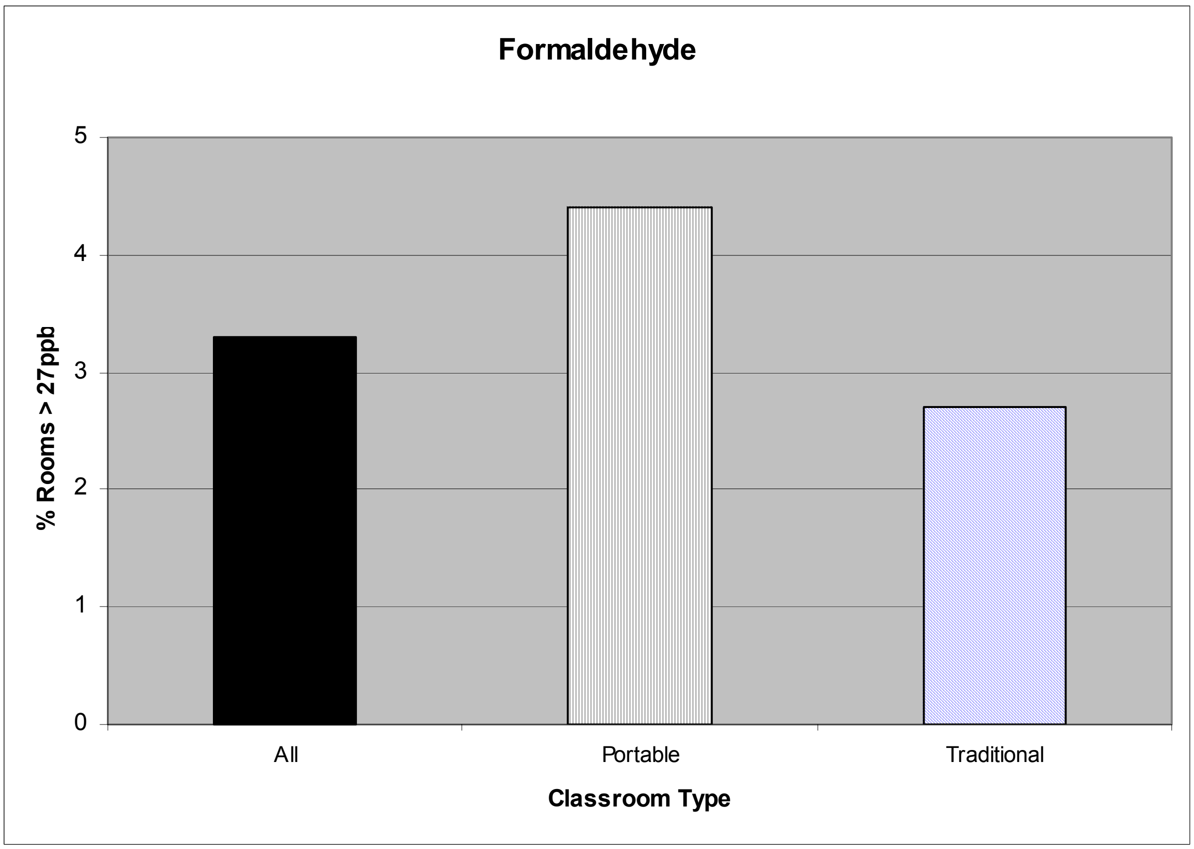


Figure ES-5. Average Percent of Time Classrooms were Outside ASHRAE Standards for Relative Humidity



Aldehydes in Air. Of the 13 specific aldehydes included in the analysis, only two were detected in more than 75% of the samples – formaldehyde and acetaldehyde. For virtually all of the aldehydes, the indoor levels were higher than the outdoor levels, indicating the presence of indoor sources. Formaldehyde, for example, had an overall mean level of 13.3 ppb indoors, but only 3.5 ppb outdoors, while the indoor-air 95th percentile was 3 times higher than outdoors. About 3.3% of the classrooms exceeded 27 ppb, the draft 8-hour Indoor Reference Exposure Level (see Figure ES-6). Statistically significant differences between mean levels in portable and traditional classrooms were found for two analytes at the 5% level of significance:

Figure ES-6. Percentage of Classrooms With Formaldehyde Levels Above the 8-hour Indoor Reference Exposure Level (27 ppb)



- Formaldehyde (mean of 15.1 for portables versus 12.3 ppb for traditionals)
- o,p-Tolualdehyde, although this analyte had a low percent of classrooms with measurable levels (~20%).

The distributions of formaldehyde measurements from Phase I and Phase II of this study were compared, even though there were many differences in the data collection methods and protocols. The Phase I measurements used PF-1 passive monitoring tubes sampling over 7 to 10 days, including nights and weekends when the schools were closed and HVAC systems may have been off, whereas the Phase II measurements used an active monitoring device during the 6 to 8 hours when classes were in session and HVAC systems were operating normally. Moreover, the Phase I measurements were obtained mostly in the spring and early summer, whereas the Phase II measurements were obtained in the fall and winter. Given these differences (colder weather and better air exchange during the monitoring period), it is not surprising that the Phase II formaldehyde concentrations were considerably lower than those observed in Phase I, as noted in Table ES-2.

Table ES-2. Summary of Formaldehyde Concentrations in Air (ppb)

	Sample size (n)		Mean (ppb)		Median (ppb)		95th Percentile (ppb)	
Location	Phase I	Phase II	Phase I	Phase II	Phase I	Phase II	Phase I	Phase II
Outdoor	NA	62	NA	3.48	NA	2.45	NA	8.05
All classrooms	911	199	27.0	13.29	22.0	12.01	61.7	23.93
Portable	644	135	32.4	15.07	27.1	14.49	71.5	25.78
Traditional	267	64	23.7	12.31	20.0	11.62	55.0	22.35

Volatile Organic Compounds in Air. Seven of the nine measured VOCs had at least 80% of their measured levels above the detection limit. There was a general tendency for the traditional classrooms to exhibit higher VOC concentrations than the portables, but none of the differences in mean concentrations were significant statistically, even at a significance level of 10%. As in most indoor air quality studies, the measured indoor VOC concentrations were higher than those observed outdoors. Average in-room concentrations ranged from a high of 6 µg/m^3 for toluene (slightly less for m,p-xylene, around 5 µg/m^3) to less than 0.5 µg/m^3 for chloroform. For all others, the averages were in the range of 1 to 2 µg/m^3.

Metals in Floor Dust. Samples of floor dust from the three sampled classrooms were collected using a hand-held vacuum dust collector (Data Vac II) and using a specialized protocol to attain as great a consistency as possible in sample collection. The samples were stored on ice for shipping and frozen until analysis. The samples were sieved at two cut points, less than 500 microns for the portion sent to California DHS for analysis of allergens, and the remainder of the dust was sieved again at less than 150 microns for consistency with reported chemicals in house dust. Equal aliquots of the sample collected from the portable classrooms were combined for further chemical analysis to reduce costs. Accordingly, there was one sample analyzed to represent the portable classrooms, and there was one sample analyzed to represent the traditional classrooms at each school. Results were reported in concentration units (µg/g) and loading (ng/cm^2).

Fifteen of the 18 elements were above the detection limit for all of the samples analyzed. The only three that were not always above the detection limit were selenium (54%), cobalt (64%), and palladium (34%). Of the 15 elements, the median concentration in composite samples from portable classrooms was greater than the median concentration in samples from traditional classrooms for 8 of the 15 elements (arsenic, chromium, copper, manganese, vanadium, cesium, iron and strontium). Conversely, the traditional median was higher than the portable for the other 7 elements, including lead. When the floor dust metals results are reported in terms of dust loading, all the elements show higher results in the portable classroom samples, except copper. However, none of these differences were statistically significant at the 0.10 level of significance.

Lead, Arsenic and Chromium concentration results (µg/g) and loading results (ng/cm^2) for the median and 95th percentile are shown below in Table ES-3. It illustrates that there are not clear cut patterns across the elements, and probably reflects the close proximity of sources. For example, since the portable classrooms are generally newer, the lower concentration of lead may reflect the number of years accumulation of the particles in the classroom. Arsenic, on the other hand, might indicate closer proximity to the school grounds where there may be treated wood.

Table ES-3. Concentration and Loading Results for Selected Elements

Element	Room Type	Concentrations (: g/g)		Loadings (ng/cm^2)	
		Median	95^{th} Percentile	Median	95^{th} Percentil
Lead	All	85.4	189.5	6.5	58.4
	Port	67.4	151.6	5.8	57.9
	Trad	95.5	200.6	7.1	57.5
Arsenic	All	11.6	17.3	1.3	5.5
	Port	12.7	18.6	1.6	5.5
	Trad	10.9	15.3	1.1	3.4
Chromium	All	36.6	72.8	3.4	17.8
	Port	35.8	54.1	3.9	23.9
	Trad	37.0	74.0	3.2	12.6

Pesticides in Floor Dust. Portable classroom pesticide mean levels were about the same as traditional classroom levels. Six of the twenty measured pesticides were detected in over 80% of the samples – chlorpyrifos, cis- and trans-permethrin, o-phenylphenol, piperonyl butoxide, and esfenvalerate. Esfenvalerate had the highest median concentration level (3.83 : g/g). It also had the highest median loading level (0.34 ng/cm^2), while many of the pesticides had median loading levels less than 0.01 ng/ cm^2).

PAHs in Floor Dust. Most of the 16 PAHs were detected in over 80% of the samples, but the loadings were generally very low. Only 5 of the PAHs had measured concentrations above 1.0 : g/g; these included chrysene, fluoranthene, pyrene, indo[1,2,3-cd]pyrene, and perylene/benzo[b]fluoranthene.

Comparing the portable classroom concentrations with the traditional classrooms, 9 of the PAHs were measured at higher median levels in the composite portable classroom samples, while two of the PAHs were measured at higher median levels in the traditional classrooms (fluorene and perylene/benzo[b]fluoranthene). Similar results can be seen using the 95^{th} percentile of the distribution as the statistic for comparison: 15 of the 16 PAHs were higher in the portable classroom samples. (Naphthalene was measured at equal levels in both types of classrooms.)

Animal and Arthropod Allergens in Floor Dust. Weighted distributional statistics characterizing the allergen levels from sieved dust samples (dust particles less than 500 Fm) that were collected in the sample classrooms revealed that Canis f1 and felis d1 were detected in 56% and 74% of the samples, respectively, while the other species were detected less than 10% of the time. The traditional classrooms had higher estimated concentrations for each species than the portables, but the differences were not statistically significant. The Canis f1 average concentration was about double the Felis d1 average concentration (0.43 versus 0.26).

School Reports of Environmental Problems or Complaints in the Past Year. Several differences are noted between the proportions of schools that reported environmental problems with, or complaints regarding, environmental conditions in their portable and traditional classrooms in the past year. Table ES-4 shows that higher percentages of schools reported environmental problems and complaints regarding environmental conditions for their portable classrooms. Higher percentages of schools reporting problems or complaints regarding their portable classrooms is consistent with the Phase I findings; however, the percentages of schools reporting problems or complaints is uniformly lower for both portable and traditional classrooms.

Table ES-4. Percentages of Schools Reporting Environmental Problems or Complaints in the Past Year

Problem/Complaint	Portable (%)	Traditional (%)
Roof leak	24.3	12.0
Plumbing leak	4.3	2.6
Air quality/odor complaint	20.2	7.0
Mold complaint	13.4	4.4
Temperature complaint	15.8	17.2
Noise complaint	4.3	0.1
Environmental conditions complaint	32.2	18.9

Factors Affecting Indoor Environmental Quality

Factors Affecting Indoor-Air Pollen/Spores. A number of different models were fit for log (Pollen Count) and log (Total Fungal Spores). Key findings were:

- There was a statistically significant[1] association between indoor and outdoor levels – with higher outdoor levels being associated with higher indoor levels.
- The portable and traditional classrooms were not significantly different when outdoor air levels were controlled in the model.
- The tests for significance for the candidate predictors revealed that only one predictor exhibited statistical significance – namely “windows open,” which indicated that classrooms with “windows open today” tended to have lower pollen counts.

Factors Affecting Indoor-Air Aldehyde Concentrations. Various models were fit for log (Formaldehyde Concentration), log (Acetaldehyde Concentration), and log (o,p-tolualdehyde Concentration). The preferred models for the three species were quite different. For formaldehyde, the type of classroom was generally statistically significant, with portables having higher levels. Acetaldehyde showed no significant differences for portable and traditional classrooms while the models for o,p-tolualdehyde included a significant room-type by outdoor-air interaction. They both showed significant associations with their outdoor levels, while the formaldehyde models generally did not show a relationship with the outdoor levels. Two variables showed the strongest positive relationships with indoor formaldehyde levels: indoor CO_2 and indoor relative humidity. These two models, with adjustments for outdoor air formaldehyde levels and/or classroom type, accounted for 22% and 32%, respectively, of the total variation in the indoor levels. The model including “pressed wood bookcases” as a predictor, which also included a significant classroom age variate (positive slope), accounted for

[1] Except where noted, a significance level of 0.05 was used to judge statistical significance of model terms.

only about 14% of the total variation in the indoor formaldehyde levels. However, this model implied about a 30% increase in formaldehyde levels when pressed wood bookcases were present, and about 30% higher concentrations for portable classrooms. The model for acetaldehyde that included “pressed wood bookcases” as a predictor accounted for about 24% of the total variation in the indoor levels of that analyte, and indicated a significant increase in the indoor levels when pressed wood bookcases were present. Unfortunately, the disparate classroom age distributions for portable and traditional classrooms and the small sample sizes for newer traditional classrooms made separation of the classroom type and classroom age effects infeasible.

Factors Affecting Indoor-Air VOC Concentrations. Models were fit for five VOCs (log-scale concentrations) using various candidate predictors. There were significant associations with outdoor levels in virtually all of the VOCs, except for benzene, and these associations appeared somewhat stronger than for the aldehydes. Toluene and m,p-xylene models indicated that the outdoor association varied by classroom type. The toluene and xylene models showed no relation with outdoor levels for portables, and a positive relation for traditional classrooms.

A number of the significant effects for the predictor variables were counter-intuitive. For example, for tetrachloroethylene, a significant negative association with presence of carpet/rugs was detected, perhaps suggesting that carpets/rugs were acting as a sink. For toluene, significantly lower levels were estimated when new construction/repair activities were on-going (which may reflect the fact that doors and windows might be more frequently closed when those activities were outside of the immediate classroom). The variables in this model accounted for 69% of the total variation in indoor toluene levels.

Factors Affecting Indoor-Air CO_2 Concentrations. Two summary CO_2 measures were modeled: log (CO_2 Concentration), and percent of time CO_2 concentrations exceed 1000 ppm. Among the candidate predictors that were considered, classroom age had a significant positive relationship with the log (CO_2) levels. Also, there was a significant positive relationship between indoor and outdoor concentrations. However, the inclusion of the teacher’s rating of IAQ in the log (CO_2) model resulted in a significant interaction effect between classroom type and outdoor CO_2 levels. A positive relation with the outdoor levels remained for the portables, but not for the traditionals. Based on this model, the indoor CO_2 levels were estimated to be approximately 30% lower when the teachers reported that the IAQ was acceptable. Models for both CO_2 measures also showed a significant effect of school type, with high schools having the highest indoor CO_2 levels.

Factors Affecting Indoor-Air Particle Counts. Models were fit for log (average number of particles/minute # 2.5 Fm) and log (average number of particles/minute # 10 Fm). Among several potential predictors considered, the only predictor showing significance (other than outdoor particle levels) was the “presence of carpets/rugs” which showed lower $PM_{2.5}$ particle counts for rooms with carpets/rugs. For that model, traditional classrooms showed significantly lower particle counts than the portable classrooms. Both particle measures exhibited significant interactions, at the 0.07 level of significance, between room type and the outdoor particle levels.

Factors Affecting Noise Associated with HVACs. The noise level (dBA) measured near the register when the HVAC unit was on was modeled. Of the candidate predictors, only classroom age was statistically significant. For that model, classroom age had a positive effect (older rooms had higher noise levels) and the portable classrooms had significantly higher noise levels than the traditional classrooms. This model only accounted for only about 11% of the total variation in the noise level, however.

Factors Affecting Indoor Temperatures. Two temperature measures were modeled: percent of time that the room was below 20EC (68EF, too cool) and percent of time that the room was above 23EC (73EF, too warm). For the latter outcome, only two predictors were significant (school type, and awareness of EPA IAQ Tools for Schools), and portable and traditional classrooms were not significantly different. However, portables and traditional classrooms were significantly different for the percent of time that the room was below 20EC (68EF). The percent of time that the portables had less than 20EC (68EF) temperatures was larger (by about 10%) than for the traditional classrooms.

Specially-Selected Schools

Fourteen schools were specially selected into the Phase II sample based on their Phase I results (high complaints of environmental problems or high formaldehyde levels). The Phase II formaldehyde levels for the classrooms at these schools appeared to match those estimated for the total population. CO_2 levels appeared to be somewhat lower, on average, for the classrooms in the specially-selected schools, as contrasted with those in the general population. On the other hand, moisture-related problems (musty odors, mold areas) were more frequently reported in these classrooms than in the general population of classrooms.

Conclusions

This is the largest, most comprehensive study of indoor environmental quality in California schools to date. The field effort began in October only weeks after the tragedy of September 11th. This event brought about changes to school procedures for clearing non-teacher, staff and students so that they could enter the building. This included some schools requiring finger printing of the technicians, and careful observance of what the technicians were doing as they brought in the equipment and set it up in the classrooms. Furthermore, it delayed gaining approval from the school authorities, in several cases.

Nevertheless, the resulting data from the 67 participating schools represent the IEQ conditions in portable classrooms (and traditional classrooms with less precision) across the state in the 2001-02 school year. Over 4 % of the schools in California were estimated to have more than 30 portable classrooms in school year 2001-2002. Also, an estimated 18.5% of the schools reported that they did not maintain HVAC maintenance records, as required, and another 22.8% were unsure if logs were kept.

There were a number of general classroom characteristics found to be significantly different between portable and traditional classrooms such as age (portables were newer) and construction material of the rooms. Also, similar to Phase I, there were a number of complaints from teachers from traditional classrooms as well as teachers from portable classrooms.

There were many study results indicating that there are Indoor Environmental Quality problems in both types of classrooms. For example, in all cases where there are standards or guidelines by which to judge the IEQ (such as noise, light, temperature, relative humidity, CO_2 and formaldehyde), there were some exceedances. Study data are available for further analysis, interpretation, and development of remedial actions.

Phase II provided measurement and observational information in greater detail than was obtained from Phase I. The data base provides a robust basis for statistical inferences regarding the population of schools with portable classrooms because response rates and data completeness were quite good for most analytes and questionnaire items. The exceptions were relatively poor data completeness for HOBO data regarding on/off cycles of HVAC units, CO data, and outdoor relative humidity data.

Most types of environmental complaints (roof leaks, air quality/odor, mold, temperature, noise) were reported more often for portable classrooms; an exception was plumbing leaks, which were more common in traditional classrooms. Pest related problems seemed to be about the same in portable and traditional classrooms.

Analysis of field blank samples, control samples, and duplicate samples revealed that analyte recovery and precision were reasonably good for most analytes. Hence, the quality control samples verified that the environmental measurement and laboratory data quality were satisfactory.

With respect to the HVAC characteristics, there were a number of significant differences between portable and traditional classrooms. Those related to structure include: physical location of unit (portables more wall units), type of fuel (electricity), type of unit (heat pump), and accessibility (better for portables). For those characteristics with potential impact on environmental quality, air filter dirt loading was lower in portables, and portables generally had more tightly fitting filters. HVAC filters in portable classrooms showed a higher percentage of mildew or mold, dirtier condensate drain pans, clogged drains, and standing water. Also, teachers were more likely to turn off the HVAC system due to high noise levels in portable classrooms. The air flow measurements in traditional and portable classrooms were not significantly different at the 5% level; however, outdoor air flow (cfm/ft^2) was significantly higher for portable classrooms at the 10% level.

The mean light intensity measured in the traditional classrooms was significantly higher than that measured in the portable classrooms. However, a small percentage of both portable and traditional classrooms did not meet IESNA light guidelines for high-contrast materials, and approximately one-third of both portables and traditionals did not meet the IESNA light guidelines for low-contrast materials, indicating inadequate lighting in both types of classrooms.

All classrooms exceeded the new ANSI acoustic standard for classroom noise levels (35 dBA), and a substantial percentage of both portable and traditional classrooms exceeded outdoor noise limits (45 and 55 dBA) set by some California communities. Noise levels measured in both types of classrooms were not statistically different. However, the teachers in portable classrooms were more likely to turn off the HVAC unit due to noise. This noise effect in portable classrooms was supported in the statistical modeling.

Temperature levels were significantly different, with some portable classrooms experiencing levels much cooler than ASHRAE comfort standards and some traditional classrooms experiencing levels notably warmer than ASHRAE comfort standards. Portables also had RH measurements above 60% more of the time than traditional classrooms; such levels are not only uncomfortable, but can lead to increased moisture and mold problems, increased dust mite populations (allergy and asthma triggers), and other problems.

Indoor formaldehyde air concentrations in Phase II were lower than those in Phase I; this was largely due to the many differences in procedures and timing of the two data collections. However, indoor levels are routinely higher than outdoor levels, and average formaldehyde levels are likely to fall between the Phase I and Phase II measurements. Thus, most classrooms exceed health guidelines for chronic effects, and a substantial percentage exceed guidelines designed to address acute effects. Other aldehydes and VOCs have not yet been examined relative to health-based guidelines, but indoor levels generally exceeded outdoor levels (similar to results in other studies), indicating the presence of indoor sources that may need to be addressed.

Airborne pollens and spores (primarily fungi) were found at higher levels outdoors than indoors, as expected. Typically indoor levels of fungi are elevated primarily in cases of extreme mold or biological contamination. However, classroom wall, floor, and ceiling moisture measurements indicated excess moisture in building materials in about 17% of the classrooms, indicating potential mold problems in those locations. Traditional classrooms had excess wall, floor, and ceiling moisture more often than portables, but portables were reported to experience roof leaks more often, and over two-thirds of the teachers in portables reported musty odors at times.

Pesticide residues were found in all floor dust samples, indicating the widespread use of a variety of different products in or near classrooms. Six pesticides were detected in over 80% of the rooms, with esfenvalerate (a common insecticide) showing the highest concentration and loading levels. Some of the pesticides are persistent chemicals, lasting for years, while other have an environmental lifetime lasting just weeks; thus, some of the pesticides were likely applied just a week or two prior to the sampling period at some schools in 2001-2002.

Similarly, 15 of the 18 metals analyzed for were detected in the floor dust samples. Some, such as arsenic, were detected at higher levels in portables, while others, like lead, were higher in traditional classrooms. Some of the metals are known to have neurological or carcinogenic effects. Most of the 16 PAHs studied (some of which are also known or suspected carcinogens) also were found in over 80% of the classrooms, but the loading levels were low. Most were found at higher levels in the portable classrooms.

Some contaminants in dust, such as pesticides, can be ingested or absorbed through the skin, as well as inhaled, making them undesirable in the floor dust of classrooms, especially those used for younger children who spend more time on the floor.

Dog and cat allergens were found commonly in floor dust. Dust mite allergens and cockroach allergens were found much less often.

1. INTRODUCTION

The California Air Resources Board (ARB) and the California Department of Health Services (DHS) provided funding as well as in-kind services and equipment to address indoor environmental concerns regarding the use of portable classrooms by public schools in California. These concerns have included problems associated with indoor concentrations of formaldehyde and other volatile organic compounds (VOCs), carbon monoxide (CO) and other combustion products, microbial growth, odors, and excessive temperature and noise. Problems have been attributed to inadequate or deferred maintenance, poorly designed and noisy heating, ventilating and air conditioning (HVAC) systems, and the use of pollutant-emitting materials, products, or equipment in or near buildings (Bayer et al., 1998). Health symptoms reported in schools are similar to those that are reported in "sick buildings." Of noted concern are asthma-like symptoms, since asthma is one of the upward trending respiratory diseases in the U.S.

The purpose of this study was to assess environmental conditions in California's portable classrooms. The results will be used by ARB, DHS, and other stakeholders to assess the potential for adverse health impacts from environmental conditions and toxic pollutants that may be present in portable classrooms, and identify effective actions that can be taken to remedy or prevent any unhealthful conditions found.

To generate the required data, RTI International has conducted a two-phase study. Phase I was a mailed survey, and Phase II was an environmental assessment field study of a sample of portable and traditional classrooms. Results from the two phases of this study are presented in separate project reports. This is the second of these reports. It focuses on discussing the methods used for collecting the Phase II data, and presents the results from Phase II of the California Portable Classrooms Study.

1.1 Background

There are many reasons to study the school indoor environment. Children in California spend, on average, about 5.5 hours per day at school. A large percentage of that time is spent indoors (Robinson and Thomas, 1991; Jenkins et al., 1992; Phillips et al., 1991). Teachers and other school staff typically spend even more time in school buildings. While in these buildings, the children and staff may be exposed to a number of chemicals and biological materials. However, children are often more susceptible to health effects and, hence, more likely to be affected by indoor pollution. School buildings are, by design, densely populated, making the task of maintaining an acceptable indoor environmental quality more difficult than in many other types of buildings. Yet there have been few studies of the effects of classroom environmental conditions on the learning process.

Concerns regarding indoor environmental quality in California's schools have risen recently as the demand for classrooms has resulted in increased use of portable classrooms. Portable classrooms are usually constructed with materials and HVAC systems different from those used in traditional classrooms (Bayer et al., 1998). Manufactured buildings may emit hundreds of chemicals from the particle board, plywood, fiberglass, carpets, glues and other materials used in their construction. Adding to potential problems and environmental factors influencing the physical classroom are the specific activities which may be ongoing during the day that could add to already significant "background" concentrations. For example, VOC emissions of arts and crafts materials can add to levels of 1,1,1-trichloroethylene, toluene, xylenes, and formaldehyde.

Limited information indicates that some indoor environmental conditions in portable classrooms potentially put children at risk of serious health impacts. It has been reported that 63% of a total of 144 school districts responding to a California survey have experienced health complaints that may be associated with the classroom environment. These problems were attributed to moisture, fungal contamination, poor ventilation, and maintenance issues (CASH, 1999). There has not been a systematic or comprehensive statewide survey or measurement of indoor environmental conditions in California schools.

1.2 Objectives of Phase II Report

The overarching research objective of the California Portable Classrooms study is to assess environmental conditions in California's portable classrooms. To accomplish this ultimate objective, the following specific research objectives are addressed:

1. To characterize distributions of pollutants and environmental conditions by type of classroom, for indoor air, chemical concentrations in dust, and other environmental measures, such as light and noise.
2. To characterize indoor/outdoor air associations by type of classroom.
3. To characterize performance of HVAC systems.
4. To test for significant differences between portable and traditional classrooms regarding indoor air concentrations and concentrations of chemicals in dust.
5. To assess the effects of HVAC performance and other factors on indoor air concentrations of pollutants for each type of classroom.

This report presents the results from the environmental assessment of the schools selected for the study. The report includes discussion of methods of school and classroom selection, sample collection and analysis, field procedures and protocols, and questionnaires and other data collection forms that were used in the Phase II study. The remainder of this report is organized into the following sections: (2) materials and methods; (3) results and discussion; (4) summary and conclusions; and (5) recommendations.

2. MATERIALS AND METHODS

2.1 Development of Questionnaires and Other Data Collection Forms

Six questionnaires or data collection forms were developed by copying items from the Facilities and Teacher Questionnaires used in Phase I, and adapting pre-existing HVAC checklists. Additional input was received from environmental consultants, the California ARB, and the California DHS. Several revisions were made to the questionnaires and data collection forms until the content and flow were satisfactory to the sponsoring agencies. Copies of all the questionnaires and data collection forms are provided in Appendix A.

Questionnaires were developed with the intention of minimizing the number of questionnaires completed during each school visit while segregating items that required input from different respondents or visiting different sites (e.g., indoors and outdoors) to different questionnaires. The HVAC Assessment Checklist and School Characteristics and Consultation with Facilities and HVAC Managers (Part 2) Questionnaire contained columns for all three classrooms rather than just one, so that only one questionnaire of each type was needed for each school.

Facilities Questionnaire

The Facilities Questionnaire II was derived from the first four pages of the questionnaire used in Phase I of the study. The questionnaire's purpose was to obtain background information about the school, information about HVAC inspections and maintenance, and identify environmental conditions that may have caused complaints. It was completed by the school's facility manager.

Teacher Questionnaire

The Teacher Questionnaire II was compiled from several items of Teacher Questionnaire I, used during Phase I of the study. Like the previous questionnaire, Teacher Questionnaire II obtained general information about temperature, odors, cleanliness, and environmental conditions in the classroom.

Classroom Form

Each Classroom Form's purpose was to collect observational information about one of the three selected classrooms at each school. The questionnaire was developed upon the review of other indoor air quality questionnaires and after suggestions from environmental health consultants. It was completed by the field technicians.

HVAC Assessment Checklist and School Characteristics

The purpose of this checklist was to capture all the measurements obtained by the field technicians. Measurements for all three classrooms were captured on one questionnaire to eliminate the need for two additional questionnaires per school. The second half of the questionnaire contains observation-type questions that capture the characteristics of HVAC systems. The HVAC questions were obtained from other HVAC questionnaires and Facilities Questionnaire I, used during Phase I of the study.

Consultation with Facilities and HVAC Managers (Part 1)

This brief questionnaire was developed to capture background and historical information about the classrooms. Characteristics of all three classrooms were captured on each form; hence, there was need for only one questionnaire for each school. It was completed by the field technicians in consultation with the school's facility manager and/or HVAC technician.

Consultation with Facilities and HVAC Managers (Part 2)

This brief questionnaire was developed to capture general information about the school and its grounds. A table was also added to capture information on pesticide usage; including type and frequency for pesticides applied as well as who applied the pesticide. It was completed by the school's facility manager.

2.2 Development of Introductory Letters and Other Survey Materials

As discussed in Section 2.5, recruitment of districts and schools for participation in Phase II of the study began with mailing a letter to the Superintendents. This letter was developed from the letter to superintendents that was used in Phase I of the study. The letter provided information regarding the mandate for the study, described what schools participating in the study would be asked to do, and asked that the superintendent fax a letter of support to RTI. A copy of the letter to superintendents is provided in Appendix A.

Enclosed with the letter to the superintendents was a sample letter that the district could use as a template and fax to RTI to indicate their support for the study. A copy of this sample letter is provided in Appendix A.

The letter to the principal, requesting the school's participation, was based on the letter used in Phase I of the study. Like the letter to the superintendent, it provided information regarding the mandate for the study and described what schools participating in the study would be asked to do. In addition, the letter of endorsement from the superintendent was enclosed, if it was available, and, if it was not available, the letter noted that the superintendent had given verbal approval for the school to participate in the study. Both versions of the letter to the principal are provided in Appendix A.

2.3 Environmental Sampling and Analysis

2.3.1 Pre-testing of Methods

Testing the field data collection methods was a three step process: preparation and review of protocols, pre-pilot testing in one NC school, and pilot testing in two schools in CA. Development of methods, procedures and protocols was necessary so that the field team would have a clear and complete understanding of what would be required and the order for implementing the methods in the field. This step served to highlight what training was required before the methods could be used in the field. As RTI prepared for the study, field procedures for calibrating all instruments, the quality control procedures required to ensure that the instrumentation was working properly, and the field protocols required to maintain the integrity of the sample while handling, storing, and shipping samples to the laboratory for analysis were reviewed. Also during this process, the system for handling the samplers, samples, and field data sheets was developed. This system formed the basis for the data information shell, a computerized field operation system. This system provided information to the field technicians about what monitoring were required at each school, as discussed in Section 2.5.3. It also provided a check list and order of performance for each of the required activities at each school, together with the chain of custody and sample tracking sheets.

The monitors, procedures, and protocols (with the exception of the HVAC assessment) were tested in a pre-pilot study at an elementary school in traditional classrooms in Durham, NC. Because this phase of testing was a dress-rehearsal of the field logistics and methodology, the samples were not saved. The checklists used for this exercise had been adapted from forms used in the Texas Elementary School Indoor Air Study (Torres et al., 2002) and from the EPA's Tools for Schools Building Air Quality Questionnaire (www.epa.gov.iaq/schools). Subsequent to the actual pilot test in California, these checklists were discarded and replaced with completely redesigned forms, as described above in Section 2.1.

Following the pre-pilot, the pilot field study was conducted in the Sacramento area of California. The Air Resources Board provided RTI with several district names and contact persons to call about participating in the pilot study. RTI called five different school districts and received approval to conduct the pilot study at two schools, one elementary school and one high school.

A description of the sampling and analysis methods that were used in the field study are summarized in the following sections.

2.3.2 Sample Collection and Analysis Methods

Human Comfort. Human comfort is often strongly associated with temperature. Thermal comfort levels result from the interaction of temperature, relative humidity, air movement, clothing, activity level, and individual differences. From a measurement perspective, the first two, temperature and relative humidity, are the primary indicators of thermal comfort measured in the classrooms for this study. However, air movement data also were collected and are presented within the framework of ventilation. Maintaining appropriate levels of these factors can provide a relatively simple and inexpensive way to reduce environmental stressors in the classroom. Acceptable ranges of temperature and relative humidity during the summer and winter are available for comparison (ASHRAE Standard 55-1981).

Temperature and relative humidity were measured continuously with the Q-Trak instrument. (See www.tsi.com.)

Light. Classroom lighting was measured at 3 locations, one at a desk near a window, one at the center of the room, and one on the far side away from the windows, in each classroom. The quantity of light was measured in units of foot-candles (English) per lux-meter (metric). (See www.extech.com.) The unit displays light measurements with accuracy within 5%. This information was collected by a technician and recorded in the HVAC Assessment Checklist and School Characteristics CA PCS Phase II form described in Section 2.1.

Noise. Classroom noise was measured in the center of the room, 10 feet from the return register, and outside on the noisiest side of the room for each classroom and recorded by the technician onto the HVAC Assessment Checklist and School form. Noise readings were taken in an empty classroom with the HVAC on and off at break time or at the end of the day. Measurements were taken in the center of the classroom and one 10 feet away from the return register or in the noisy area of the room in each classroom. One reading was also taken outside of the classroom. Each measurement was taken both with the HVAC on and with it off. A simple sound level meter manufactured by Cirrus Research was used for this purpose which provided measurements in decibels (dB).

Moisture. Moisture measurements were made with a Delmhorst BD-8 Meter to determine the relative moisture content of materials. These moisture measurements are based on the principle of electric conductivity. Raw data were entered directly into the HVAC Assessment Checklist and Item B-5 of the School Characteristics Checklist. Readings were taken at six locations, all four walls plus the floor and ceiling. Moisture readings were taken in a location with mold or water stains, if present. Otherwise they were taken in the center of the wall or under windows.

Ventilation. The HVAC system includes all the heating, cooling, and ventilation equipment serving the classroom. The HVAC function and performance for each classroom were assessed through input from the facility manager and with measurements of air flow taken in the classrooms. The questionnaire and measurement aspects are discussed in Section 2.1.

Formaldehyde and Other Aldehydes. Formaldehyde samples were collected in each of the classrooms and outdoors. Aldehydes were collected by passing air through commercially available 2,4-dinitrophenylhydrazine (DNPH) coated silica gel cartridges. A battery powered low flow, constant flow air pump pulled air through the sampling cartridge. Potential air interferents were removed from the sampled air using a potassium iodide scrubber at the DNPH cartridge inlet. Samples were collected from approximately 8:00 a.m. until around 4:00 p.m. in each of the schools. The cartridges were stored on ice and shipped to RTI for analysis. After extraction with acetonitrile, the sample extract was analyzed by high pressure liquid chromatography (HPLC) with UV detection. The detection limit of this method is 1.4 Fg/m^3. The list of target aldehydes and other carbonyls is shown in Table 2-1.

Formaldehyde is the only compound that was measured in classrooms in both Phase I and Phase II of this study. Differences in the data collection methods and protocols must be considered when comparing the results. In Phase I, formaldehyde samples were collected over a 7- to 10-day period using a passive PF-1 sampling tube manufactured by Air Quality Research (AQR). Integrated average formaldehyde concentrations were determined by AQR using NIOSH standard laboratory reference method 3500. As described above, an active integrated sampling method, DNPH, was used in Phase II to monitor classrooms for the 6- to 8-hour period of time when classes were in session. Therefore, comparison of formaldehyde concentrations between Phase I and Phase II of this study must account for the following differences in methodology:

Phase I concentrations were integrated over 7 to 10 days, whereas Phase II concentrations were integrated over 6 to 8 hours when classes were in session.
Phase I concentrations included nighttime and weekend hours when classrooms may have been closed and the schools' HVAC systems may have been off, whereas Phase II samples were collected entirely during the day when classes were in session.

Phase I samples were collected mostly in the spring, whereas Phase II samples were collected in the fall and winter. (Formaldehyde emissions are temperature- and humidity-dependent.) Because the Phase II sample size is much smaller (199 classrooms with formaldehyde data versus 911 classrooms in Phase I), extreme values are less likely to be observed in Phase II. The passive sampler method used in Phase I is a screening method. It is not intended to be highly accurate and sensitive; passive formaldehyde monitor concentrations typically are within 20 to 30% of active monitor concentrations.

Table 2-1. List of Target Aldehydes and Other Carbonyls

formaldehyde	Isovaleraldehyde	propionaldehyde
acetaldehyde	n-butraldehyde	o-tolualdehyde
acetone*	crotonaldehyde	m-tolualdehyde
acrolein**	hexaldehyde	p-tolualdehyde
benzaldehyde	2,5-dimethylbenzaldehyde	valeraldehyde

*unable to quantify due to variable background levels
**unable to quantify due to interferences in signal

VOCs. Volatile organic compounds (VOCs) were collected on Carbotrap 400 multisorbent tubes with Dupont P-125 constant flow samplers. Four to 6 L of air was pulled through each tube. This air flow provided a detection limit of approximately 2 Fg/m^3. The tubes were stored on ice and returned to RTI for analysis by thermal desorption/GC/MS. Analysis was by full scan GC/MS with processing for the specific target list shown in the Table 2-2.

Table 2-2. List of Target VOCs

benzene	1,1,1-trichloroethane	chloroform
toluene	tetrachloroethylene	butadiene*
m,p-xylenes and o-xylene	carbon tetrachloride	ethylbenzene

* unable to quantify

2.3.3 Methods for Continuous Measurements

Carbon Monoxide, Carbon Dioxide, Temperature, and Relative Humidity. For the pilot study, carbon monoxide (CO), temperature (T) and relative humidity (RH) were measured continuously with two instruments. These instruments were set up in each classroom and at an outside location to provide measurements for an assessment of both indoor and outdoor sources, as well as ventilation within a classroom. CO was measured using Draeger Model 190 CO monitors. Results were stored and reported as one hour average and peak CO concentrations. Temperature and relative humidity were collected using a HOBO data logging system. To improve field operations, RTI replaced these two instruments with a single Q-Trak instrument after the pilot study. This eliminated one piece of equipment at each monitoring location at each school, making it easier for the field technicians. In addition to CO, temperature, and relative humidity, the Q-Trak also provided continuous measurements of carbon dioxide (CO_2). The Q-Trak used a non-dispersive infrared (NDIR) sensor for the CO_2 measurement and an electro-chemical sensor for CO.

Real-Time Particle Counts. RTI used a battery-operated Met One Portable Airborne Particle Counter to measure real-time particle counts. This system provides counts of particles at various sizes, including: > 0.5 Fm, >2.5 Fm, and >10 Fm. By subtraction of the counts, particle counts are available for the fine and course fractions that are usually referred to in EPA standards. These instruments were placed in each classroom and outdoors at one location at each school.

Special Functions. A HOBO data logger with an electric field sensor (open/closed) was installed on each HVAC unit to record when the unit was running.

2.3.4 Floor Dust Collection and Analysis

Floor Dust for Biological and Chemical Analysis. Floor dust samples were collected in each classroom for animal and arthropod allergen analysis by California Department of Health Services (DHS). This dust was also analyzed for pesticides, metals, and PAHs. The dust was collected using the Data Vac 2 vacuum cleaner that had been previously used for the EPA's National Human Exposure Assessment Survey (Pellizzari et al., 1999).

Before RTI made the final decision to use the Data Vac 2, a side-by-side comparison with the High Volume Small Surface Sampler (HVS3), developed by Envirometrics, Inc., was performed at the pre-pilot phase in NC. In the pre-pilot study, the major operational characteristics were compared. The following information was obtain from this comparison: (1) the HVS3 is much more difficult to operate — it is much heavier and subject to changes in settings to obtain the proper suction and readings; (2) cleaning the HVS3 between classrooms took about 1 hour, compared to less than 5 minutes for the Data Vac 2; and (3) the Data Vac 2 collected more dust than the HVS3 over the same area. Because collecting a sample with enough dust for numerous analyses was an important goal, RTI verified this last observation in other locations to strengthen the case for using the Data Vac 2. Table 2-3 presents these results which indicated that using the Data Vac 2 would be expected to provide more sampled mass than the HVS3. Accordingly, RTI and ARB decided to use only the Data Vac 2 in the pilot study and subsequently in the main field study.

Table 2-3. Comparison of Dust Mass (g) Collected by the HVS3 and the Data Vac Samplers from a Side By Side Area of 1.49 m^2

Location	HVS3		Data-Vac	
	mass(g)	g dust/m^2	mass(g)	g dust/m^2
Location 1	1.9965	1.34	3.9729	2.67
Location 2	0.9702	0.65	2.8288	1.90
Location 3	0.0536	0.04	0.223	0.15
Location 4	0.1046	0.07	1.6205	1.09

The collected dust samples were shipped to RTI where they were sieved to remove unwanted debris and large (>500 micron) particles. To reduce analytical costs, equal portions of the dust collected from the two portable classrooms were combined for each school to provide the total mass required for the specific analysis. For metals, 50 mg of dust was used. For pesticides and PAHs, a total of 200 mg was used. Approximately 500 mg of the sieved dust was sent to the California Department of Health Services (DHS) for analysis for arthropod and animal allergens. The remainder of the sample, if any, was stored in freezers at -20EC at RTI.

The chemical species, elements, and allergens to be analyzed were reviewed and recommended by an advisory panel of State scientists with expertise in this area of measurement science. The analytes were chosen based on their health effects, their prevalence in California, their detectability, and the cost of analyses.

Analysis of Dust for the Determination of the House Dust Mite Allergens. The 500 mg sieved dust sample was sent to the DHS laboratory. A saline buffer was added to the sample, and any dust mite allergens present (>99% recovery) were extracted from the dust into the buffer solution. Analysis of the solution was by the ELISA method for mite allergens Der p 1 and Der f 1 in the sample liquid extracts, with quantification by UV spectrophotometer.

Analysis of Classroom Floor Dust for Trace Metals. The analysis method used by RTI for the dust samples was Inductively-Coupled Plasma Mass Spectrometry (ICP-MS). This method provides a multi-elemental determination. Samples were received and prepared in a metal-free Class 100 sample preparation laboratory. Sample material in solution was introduced into the ICP-MS by pneumatic nebulization into a radio frequency argon plasma. The ions are extracted from the plasma and separated on the basis of their mass-to-charge ratio by a quadrupole mass spectrometer. Table 2-4 provides the list of analytes looked for in the dust samples.

Table 2-4. List of Target Metals

Aluminum	Arsenic	Cadmium	Cesium
Chromium	Cobalt	Copper	Iron
Lead	Magnesium	Manganese	Nickel
Paladium	Selenium	Strontium	Titanium
Vanadium	Zinc		

Analysis of Dust for Pesticides and PAHs. The analysis method used for the dust samples was GC/MS in the selected ion monitoring mode (SIM). The sample extract was injected into the GC/MS system where analytes were separated on a fused silica capillary column. The compounds were identified based on chromatographic retention time of at least two representative mass fragment ions by comparison to standard solutions analyzed under identical conditions. One ion (a primary ion) was used for quantitation of a given compound. Quantitation was carried out by the method of internal standards by utilizing the areas of the analytes and internal standards to determine relative response factors for each specific analyte of interest. Table 2-5 provides the target list of pesticides and PAHs for this study.

Table 2-5. Target List of Pesticides and PAHs

PESTICIDES			PAHs
Chlorpyrifos	Lindane	Simazine*	Acenaphthalene
Diazinon	Imidacloprid*	DDVP*	Acenaphthylene
cis-Permethrin	Propetamphos	Naled*	Anthracene
trans-Permethrin	Bifenthrin	Oxadiazon*	Benzo(a)anthracene
Cypermethrin	Deltamethrin	Oryzalin*	Benzo(a)pyrene
Malathion	Pyrethrins	Prodiamine*	Benzo(b)fluoranthene
Cyfluthrin	Pendimethalin	PCNB*	Benzo(g,h,i)perylene
lamda-Cyhalothrin	Chlorothalonil*	Fenoxycarb*	Benzo(k)fluoranthene
Diuron*	Esfenvalerate	Bendiocarb*	Chrysene
ortho-Phenylphenol	Carbaryl*	Dacthal*	Dibenz[a,h]anthracene
Propoxur	Piperonyl butoxide	Dicofol*	Fluoranthene
Tralomethrin	Resmethrin	Dichlorvos*	Fluorene
DDE	Captan*		Indeno[1,2,3-cd]pyrene
Dieldrin			Naphthalene
			Perylene
			Phenanthrene
			Pyrene

* unable to quantify

Culturable Airborne Microorganisms. RTI also collected surface samples using cotton swabs and Mattsen-Garvin (M-G) bioaerosol samples to be analyzed for fungi and other microbial growth. However, to reduce costs, these samples were only collected in “specially-selected schools” (see Section 2.4.1). M-G samples were collected for 15 minutes, both indoors in the three classrooms and outdoors at the one site. Cotton swab samples were only collected in areas where microbiological growth could be visually determined.

The M-G slit-to-agar volumetric bioaerosol sampler selectively measures culturable airborne bacteria and fungi. The slit-to-agar sampler allows particles in a measured volume of air to impact upon microbiological growth medium in rotating petri dishes that are then incubated at appropriate temperatures. Culturable bacteria and mold particles grow into visible colonies that are counted and identified. Final results obtained with the sampler provide a measure or concentration of viable, culturable airborne bacteria or fungi expressed in colony forming units per cubic meter of air (CFU/m^3).

The procedure used for collection of environmental swabs for microbiological analysis required a sample of dust or debris collected from an environmental surface using a pre-sterilized, dry cotton swab. The person collecting the samples broke off the swab and discarded the portion that came into contact with bare hands while collecting the sample. The portion of the swab with the sample was then placed into a sterile container and returned to RTI for analysis.

Direct Examination for Pollens and Spores and Identification. An Allergenco sampler was used to collect airborne biological agents impacted onto a glass slide. The slide was then read by Aerotech Laboratories, Inc., using a 400-1500 X brightfield microscope. Using this method, all fungal spores were enumerated, including non-viable spores. The targeted fungal species are listed in Table 2-6. Slides were collected in each of the sampled classrooms, plus at one outdoor location.

Table 2-6. List of Target Pollens and Spores Species

Alternaria Amerospores Arthrinium Ascospores Aspergillus/ Penicillium-like Aureobasidium	Basidiospores Bipolaris/ Dreschlera Botrytis Chaetomium Cladosporium Curvularia	Epicoccum Fusarium Memnoniella Nigrospora Oidium/Peronospora Pithomyces/Ulocladium	Rusts Smuts/Myxomycetes Stachybotrys Stemphylium Torula Unidentified Conidia
Mycelial Fragments	Pollen Count	Total Fungal Spores	

Videotaping Methodology for Documentation of Monitoring Site Environments. Videotaping was used to record environmental settings and monitoring equipment in the classrooms, main school facility, and outdoor environments. For each classroom undergoing monitoring, the field technician(s) attempted to record the layout of the room, the locations of samples collected and HVAC systems, and any other observations deemed important by the field staff for assessing the environmental conditions of the classroom. The field technician began recording after all monitors had been set up. The technician verbally described the setting and monitoring locations while taping with the video recorder, being careful not to include teachers, children, or any other confidential information in the video, such as the name of the school.

2.4 Statistical Sampling Design

2.4.1 Selection of Sample Schools

The sampling frame for Phase I of the PCS was the California Public School Directory 2000, which was published by the California Department of Education Press. CA DHS staff sorted this frame by the county/district/school (CDS) code and selected a 1-in-7 systematic sample from the sorted frame, which resulted in an initial sample of 1,216 schools. Hence, the Phase I sample was implicitly stratified by county and district, ensuring representation of these geographic areas proportionate to the number of public schools in each area.

DHS then conducted a preliminary survey of the school districts with at least one school in this sample and identified 177 schools that did not have any portable classrooms. These schools were deleted from further consideration for the PCS, leaving 1,039 schools that appeared to be eligible for Phase I of the PCS. From these 1,039 eligible schools, 1,000 were randomly selected for Phase I of the PCS.

All of the ineligible schools in the sample (those with no portable classrooms) were identified during Phase I data collection, including telephone follow-up of non-responding schools. This process determined that 48 of the 1,000 schools in the Phase I sample had no portable classrooms. Hence, the CA PCS Phase I sample of 1,000 schools included 952 eligible sample schools (with portable classrooms).

The sample of schools selected for Phase II of the CA PCS was a stratified random sample of 86 of the 952 eligible schools in the Phase I sample. As shown in Table 2-7, 938 eligible sample schools were stratified by:

- *School level:* Schools for which the highest level of offering (based on the CA Public School Directory 2000) was less than seventh grade were defined to be elementary schools.
- *Location:* Counties were partitioned into Northern and Southern California based on temperature and rainfall differences and the results of an earlier formaldehyde study in mobile homes (Liu et al., 1986). As shown in Figure 2-1, the southern boundary of Northern California was defined to be the southern boundaries of Monterey, Fresno, and Mono Counties.
- *Urbanicity:* Schools for which POP_STATUS from the CA Public School Directory was 5-7 (large town, small town, or rural) were classified as rural.
- *Potential IEQ Problem:* Schools that satisfied at least one of the following conditions based on their Phase I data were defined to have a potential IEQ problem (Problem=Yes):

    - Had at least one portable classroom in the upper 25% of the distribution of Phase I formaldehyde concentrations in portable classrooms
    - Had at least one portable classroom with poor or very poor overall environmental quality reported by a teacher (TQ37)
    - Had 2 or more portable classrooms or 5 or more traditional classrooms with a roof leak, plumbing leak or flood, or mold problem in the past year reported by the Facility Manager (FQ25).

  Other schools that participated in Phase I were classified as not having a potential IEQ problem (Problem=No), and schools that did not participate in Phase I were classified as not knowing whether or not they had a potential IEQ problem (Problem=Don't Know).

The 14 schools in the Phase I sample that appeared to have the greatest potential for indoor environmental quality (IEQ) problems were all included in the Phase II sample and are referred to as the "specially-selected schools." The 14 specially-selected schools comprise Stratum 1 of the Phase II sample and were those schools whose Phase I data satisfied two or more of the following conditions:

- Had at least one portable classroom with one of the 20 highest formaldehyde concentrations among the portable classrooms with Phase I data (over 89 ppb)
- Had at least one portable classroom with visible mold reported by a teacher (TQ32)
- Had at least one portable classroom with very poor overall environmental quality reported by a teacher (TQ37)
- Had 5 or more classrooms (portable or traditional) with a mold problem in the past year reported by the Facility Manager (FQ25).

Figure 2-1. Definition of Northern and Southern California for the Portable Classrooms Study

Of the 14 specially-selected schools, 13 had visible mold reported by a teacher, 12 had very poor overall environmental quality reported by a teacher, four had 5 or more classrooms with a mold problem reported by the Facility Manager, and one had classrooms with formaldehyde concentrations over 89 ppb. However, the formaldehyde concentrations were over 70 ppb for all three sample classrooms in the latter school, and they were over 35 ppb for all three sample classrooms in another school.

Although the Phase II sample schools were selected using stratified random sampling, all strata were sampled at approximately the same rate, except for the 14 specially-selected schools that were selected with certainty. The purpose of the stratification was to ensure the representativeness of the sample, rather than to over-represent any particular segment of the population. The schools in each stratum were randomly ordered. We first contacted the district superintendent (including local districts in the Los Angeles Unified School District) and then the school principal (as discussed in Section 2.5) for each sample school. For each stratum, we contacted only enough superintendents and principals to achieve the target number of participating schools shown in Table 2-7.

2.4.2 Selection of Schools for the VOC Subsample

Half the schools in each stratum were randomly selected to have indoor and outdoor VOC samples collected. For each of the 15 strata, the first school that agreed to participate was randomly assigned to either have, or not have, VOC samples collected. The remainder of the participating schools in each stratum were then assigned to the VOC sample in the order in which they agreed to participate so that the sample alternated between schools that were and were not included in the VOC subsample.

2.4.3 Selection of Sample Classrooms

From each of the sample schools that agreed to participate, we obtained a site map that identified the school's portable and traditional classrooms. We randomly selected two portable classrooms and one traditional classroom as the primary sample, except for schools that had only one portable classroom. For them, we randomly selected the one portable classroom and two traditional classrooms. For each school, we also randomly selected the same number of portable and traditional classrooms as a backup sample to be used whenever the classroom teacher refused or the classroom was not in use on the day scheduled for monitoring.

The procedures used to select sample classrooms for the 14 specially-selected schools retained from the Phase I sample were different from those used for the other Phase II sample schools. For the 14 specially-selected schools, we attempted to monitor the same classrooms that were monitored in Phase I. Thirteen of these schools agreed to participate in Phase II, and exceptions were necessary for one classroom in each of three schools: one in which the portable classroom was no longer located at the school (another portable classroom was randomly selected), one in which the traditional classroom was no longer being used as a classroom (another traditional classroom was randomly selected), and one in which three portable classrooms were selected in Phase I (one traditional classroom was randomly selected as a substitute for one of the portable classrooms for Phase II). The other 36 classrooms monitored in the 13 participating specially-selected schools were the same classrooms monitored during Phase I.

Table 2-7. Phase II Stratum Sample Sizes and Numbers of Target Schools

Stratum	School Level	School Location	Urbanicity	IEQ Problem	Frame Count	Sample Size	Target Respondents
1	Specially-selected Schools				14	14	14
2	Elementary	North	Rural	NA	31	2	2
3	Elementary	North	Not Rural	DK	123	8	7
4	Elementary	North	Not Rural	No	40	3	3
5	Elementary	North	Not Rural	Yes	37	2	2
6	Elementary	South	Rural	NA	22	2	2
7	Elementary	South	Not Rural	DK	175	14	10
8	Elementary	South	Not Rural	No	65	6	4
9	Elementary	South	Not Rural	Yes	62	4	4
10	Not Elementary	North	Rural	NA	63	4	4
11	Not Elementary	North	Not Rural	NA	128	11	7
12	Not Elementary	South	Rural	NA	21	2	1
13	Not Elementary	South	Not Rural	DK	103	10	7
14	Not Elementary	South	Not Rural	No	36	2	2
15	Not Elementary	South	Not Rural	Yes	32	2	2
Total					952	86	71

Note: DK = don't know and NA = not applicable.

2.5 Data Collection

2.5.1 Human Subjects Approval

Research Triangle Institute's Institutional Review Board (IRB) reviewed and approved the data collection forms and procedures for both Phase I and Phase II of the CA Portable Classrooms Study. The Phase I procedures were approved in March 19, 2001 and the Phase II procedures were approved on September 14, 2001. Toll-free phone numbers were provided on the study materials if the respondents had any questions about their rights as survey respondents. A handful of teachers called the IRB contact and inquired about the study results. Other project staff followed-up with these inquiries in a timely and appropriate manner. RTI's IRB followed the study closely, hence, we can be sure that the study conformed to strict government guidelines for obtaining informed consent, and protecting human rights of all the study participants.

2.5.2 Recruiting Districts

In August 2001, RTI sent advance packages about the study via Federal Express to superintendents in Priority 1 and 2 districts (those definitely needed and those likely to be needed as replacements for nonrespondents) requesting permission to contact school principals of selected schools. The advance package included a letter of endorsement from the California Superintendent of Public Instruction, a letter from the RTI Project Director, a study brochure, a list of sampled schools for the district, and an example of a district letter of support. Within several days of the Federal Express mailing, RTI recruiters made follow-up calls to all Priority 1 district superintendents. This call was placed to obtain permission to contact selected schools' principals about the study and to identify a district contact person for the study.

2.5.3 Recruiting and Scheduling Schools

Similar to the advance package sent to districts, an advance package about the study was sent via Federal Express to school principals requesting permission to conduct the study at the school. These advance packages to principals included a letter from the California Superintendent of Public Instruction, a letter from the RTI Project Director, a study brochure, and a letter of support from the district (when provided). Once again, within several days RTI recruiters made follow-up calls to school principals to obtain permission from the school principal or designated contact person to conduct the site visit for the study. As needed, RTI replaced refusing or ineligible schools by contacting the next available school on the randomly ordered sample stratum list. If the district had not already been contacted (was not a Priority 1 or 2 district), the district was contacted first.

The RTI recruiter completed the following tasks with the school contact person: received a copy of the school site map via facsimile; identified portable and traditional classrooms on the map; identified the facilities manager; and received a facsimile of the school calendar. The RTI recruiter then selected the classrooms to be monitored at the school and sent this information and other pertinent site information via email to the RTI scheduler who then contacted the school to secure the date of the site visit and answer any final concerns or questions. One week prior to the site visit, RTI sent a confirmation letter to the school and the Facilities Questionnaire to the designated facilities manager.

Once site visits were completed, RTI sent thank you letters and participation checks of $100 to participating schools.

2.5.4 Field Data Collection Procedures

The field team visited each school on the date established during recruitment. The field team consisted of a trained HVAC technician and two environmental field technicians. They usually arrived at the school 30 minutes before the classes started, sometimes earlier, which meant that they sometimes arrived before 7:00 a.m. After arriving at the school and checking in with the principal's office, they began setting up the equipment in the three pre-selected classrooms, usually two portable classrooms and one traditional classroom.

They brought a single box to each sample classroom. It contained one each of the following instruments: Met One Particle Counter, Q-Trak, aldehyde sampler and pump, and, if the school was selected to have VOC sampling, a VOC sampler and pump. A similar box was taken to one location outside to set up for the outdoor measurements. These instruments operated continuously during the school day and until the instruments were shut down at the end of the school day, usually around 4:00 p.m. Also, a HOBO data logger was placed on the HVAC unit to record when the unit was on and off.

Throughout the day, the other measurements were taken, including the lighting, noise, air flow, microbiological samples (Allergenco), and wall moisture. If the school was a "specially – selected" school (see Section 2.4.1), then a 15-minute Mattsen-Garvin sample and microbial swab samples were taken during the lunch period when the room was vacant. Also during the day, the data collection forms were filled out. At the end of the day, after the children had left, the dust samples were collected and the videos were taken. Table 2-8 summarizes the types of measurements taken at each school.

2.6 Monitoring Receipt of Questionnaires and Data Collection Forms

Several procedures were implemented to monitor questionnaires coming from the field and follow-up on outstanding questionnaires. All questionnaires and study materials for a school were collected and returned in an accordion folder labeled with the school name and ID. Upon receipt, the questionnaires and study materials were distributed to the appropriate staff. A Chain of Custody Checklist and a Survey Control System were used to track incoming questionnaires and identify outstanding or missing questionnaires. After missing questionnaires were identified, telephone follow-up and re-mailings were conducted to increase the response rate.

2.6.1 Chain of Custody

The field technician was asked to complete a Chain of Custody (COC) Checklist as questionnaires were completed in the field. The checklist provided columns for each questionnaire a school was asked to complete, and check boxes for the questionnaires. A “comments”column provided additional information, such as if the teacher refused, if the teacher or facility manager said they would mail the questionnaire to RTI, etc. The checklist was used to update the control system when questionnaires were received.

2.6.2 Control System

A Microsoft Access survey control system was designed to monitor incoming and outstanding questionnaires. Once a questionnaire was received, project staff used the COC checklist to update the corresponding questionnaire boxes in the control system. The “comments” field of the database was used for describing phone conversations and results. The control system easily identified missing questionnaires.

2.6.3 Telephone Follow-up

An experienced telephone interviewer conducted telephone follow-up of questionnaires that were identified as missing by the control system. A contact sheet was used to summarize all the contact information necessary to conduct telephone follow-up. The contact sheet also contained the classrooms selected for sampling and any backups that could be used as alternatives. The classroom sampling information on the contact sheet was effective in the event a questionnaire had to be mailed to the attention of a teacher in a particular classroom. After reviewing the “missing” questionnaires and contact information for those schools with outstanding questionnaires, the telephone interviewer prompted schools about missing questionnaires. As telephone prompts were made, a telephone script was followed and adjusted, as necessary. Notes from each call were added to the “comments” field of the control system.

Two common telephone follow-up situations and their resolutions are described below.

Table 2-8. Types of Data Collected

What was collected?	Where was it collected?	When was it collected?
Temperature and relative humidity	Each classroom and outside	Throughout the day
Light	Each classroom	5 minutes/classroom when no students present, usually mid-day.
Noise	Each classroom	When no students were present, usually mid-day.
Moisture	Each classroom; inside walls	5 min/classroom when no students present, usually mid-day.
Ventilation	Each classroom and outside	5 min/classroom at each vent when no students present.
Instrument panel $ VOCs, Aldehydes $ Particle Counts $ CO, CO_2, T, RH	Each classroom and outside	Throughout the day
HVAC status	Outside HVAC unit	Throughout the day
Microbiologicals (Allergenco)	Each classroom and outside	5 min/classroom during the day.
Culturable biologicals	Each classroom and outside for "specially-selected" schools	15 min during the lunch break
Classroom floor dust	Each classroom	At the end of the day
Video	Each classroom and outside	At the end of the day
Data collection forms	School and classroom	During the day and some mailed to RTI later by the FM

Difficulty Contacting Principal or Facility Manager - If the appropriate person was not reached, up to four attempts were subsequently made at different times of the day and/or days of the week. If all telephone prompts were unsuccessful, the school or district's fax number was obtained, and the appropriate school or district staff person was prompted by a fax.

Lost Questionnaire – The principal or facility manager was asked if he or she would complete another questionnaire. If agreeable, another questionnaire(s) was mailed to the principal or facility manager.

As a result of telephone follow-up and re-mailing questionnaires to non-respondents, a 94% response rate was achieved. RTI received 627 out of a possible 670 questionnaires from field data collection. Most of the outstanding questionnaires (41 of 43) were a result of non-response, although two were the result of refusal by one teacher.

2.7 Data Processing

Once questionnaires were accounted for in the control system, editing, keying, and scanning activities began. Every questionnaire (scannable and pencil and paper instruments) went through a preliminary edit to ensure that IDs and ID-Classroom Number linkage was accurate. Upon completion of this preliminary edit, questionnaires were separated into scannable and pencil and paper instruments and passed along to the appropriate data processing staff.

2.7.1 Processing Scannable Instruments

Programmers tested the Teacher and Facilities Questionnaires to ensure that the Teleform program captured marks on the data collection instruments. Once the programmer was assured that all marks were captured on the "test" questionnaires, the remainder of the questionnaires were scanned. During the scanning process, the Teleform reader identified problems, such as missing entries in key fields, and flagged them for resolution. Images from the scanned questionnaires were copied to an electronic file for error resolution.

2.7.2 Processing Instruments for Data Entry

The pencil and paper questionnaires first were subjected to manual editing based on written specifications. A data entry program was then used to capture all items in the instrument.

Data Editing

Edit specifications were developed for the four pencil and paper questionnaires. Codes and ranges in the specifications were consistent with the questionnaires. Editors were trained by reading the edit specifications as they reviewed completed questionnaires.

Edit problems were minimal and consisted of key items that were left blank or others that were out of range. Minimal contact with school and facilities staff about edit problems was necessary.

One hundred percent quality control was performed on the first 5 questionnaires of each type before any data were keyed. Quality control on first five questionnaires yielded two errors in 20 questionnaires. This was considered "very good" given the number of items on two of the questionnaires (Classroom and HVAC). After data collection was complete, additional QC was performed on 10% of the questionnaires. This yielded two potential errors that occurred on five of the 29 forms reviewed. Edit errors identified during QC have been corrected in the dataset.

Data Entry

A codebook was developed prior to creation of the data entry program. The codebook was compared to questionnaire and edit specifications for accuracy. A user-friendly data entry program, based on the codebook, was then developed. The data entry program was tested prior to usage for valid ranges, text entries, and consistency codes. All data were double-keyed to ensure accuracy of data entry.

2.7.3 Preparation of School-level Analysis Files

The school-level Phase II questionnaire data consisted of responses to questionnaire items from two questionnaires (see Appendix A):

Facilities Questionnaire
Consultation with Facility and HVAC Managers (Part 2)

These data were stored in separate files and each file was processed separately. As a first step in preparing the data for analysis, a revised version of each file was created. This entailed the following basic steps:

1. Recoding of negative missing value codes to SAS[2] special missing value codes.
2. Recoding of "circle all that apply" responses to have response codes of 1 (yes) and 2 (no).
3. Review of variables designed as single-response items for which multiple responses were recorded to see if any should be recoded as multiple-response items.
4. Recoding and consistency checking of variables involved in skip patterns to create new combined variables that have appropriate response categories for all respondents (e.g., by adding a "not applicable" category).
5. Recoding (e.g., collapsing of categories) of variables to create new variables suitable for analysis (see Section 2.9).

To ensure accuracy of the recoded variables, cross tabulations of the original and recoded variates were generated and examined. In addition, steps 1 and 2 above were accomplished with specially written SAS macros.

The final school files were created by augmenting the appropriate adjusted school-level sampling weight to each record of the file (see Section 2.8). Initially, we had planned to merge the files to form a single school-level file. However, since nonresponse patterns differed for the two files, separate weights were needed for each file; consequently, to ensure that users would utilize the appropriate sampling weight in their analyses, we decided to maintain two separate analysis files:

[2] SAS is the registered trademark of SAS Institute, Inc., Cary, NC.

- The Facilities Questionnaire File was called FACILITIES_REV3; it contains 56 records.
- The Consultation with Facility and HVAC Managers (Part 2) File was called CONSULT2_REV3: it contains 61 records.

2.7.4 Preparation of Classroom-level Analysis Files

The classroom-level Phase II questionnaire data consisted of responses to questionnaire items from the following forms (see Appendix A):

- Teachers Questionnaire
- Classroom Form
- Consultation with Facility and HVAC Managers (Part 1)
- HVAC Assessment Checklist and School Characteristics

These data were stored in separate files and each file was processed separately. As a first step in preparing the data for analysis, a revised version of each file was created. This involved the same basic steps as those indicated above for the school-level files. In addition, the portable/traditional classroom designations from the various files and from the field staff indications (associated with the physical measurements) were reviewed and compared; in the majority of cases the data agreed; where they did not, a consensus portable/traditional indicator (called PT_IND) was created for use in adjusting sample weights and checking consistency of some variables (e.g., items that were only to be answered for portable classrooms).

The final classroom level files included new variables suitable for analysis (see Section 2.9) plus the appropriately adjusted sampling weights (see Section 2.8). Again, cross tabulations of the original and recoded variates were generated and examined. As with the school-level files, we had originally planned to merge the files to form a single classroom-level file. However, since nonresponse patterns differed for the various files, separate sampling weights were needed for each file and thus four separate classroom-level files were retained (1 record per responding classroom):

Source of Data	SAS File Name	No. of Records
Teachers Questionnaire	TEACH_REV3	186
Classroom Form	CLR_REV3	199
Consultation with Facility and HVAC Managers (Part 1)	CONSULT1_REV3	174
HVAC Assessment Checklist and School Characteristics	HVAC_REV3	194

2.7.5 Preparation of Laboratory Data Analysis Files

The following types of laboratory data were received:

- Pollen and spores in air (indoor and outdoor)
- Aldehydes in air (indoor and outdoor)
- Volatile organic compounds (VOCs) in air (indoor and outdoor)
- Bioaerosols (indoor and outdoor) and surface biologicals

– Metals in floor dust
– Pesticides and PAHs in floor dust
– Allergens in dust

Although each type had its own format and its own particular nuances, the basic steps used to process these files were as follows:

1. Conversion of raw data (in various formats) into a SAS file and comparison of acquired samples with anticipated samples.
2. Conversion of raw measurements, coupled with information from the field staff, into appropriate concentration and loading data.
3. Assignment of codes identifying the type of sample/analysis (e.g., a duplicate analysis, a blank sample), the quality of the particular measurement, and the measurability status (detected/ not detected).
4. Extraction of "valid" records from each data file and creation of the following composite files
   - LABDAT – consists of all valid field records
   - DUPSAMP – contains pairs of records for duplicate samples
   - DUPANAL – contains pairs of records for duplicate analyses or duplicate injections
   - FBLKS – contains results of blank sample analyses, by type of blank (e.g., lab blank, field blank)
   - CNTL – contains results (e.g., percent recovery) for various types of control samples.
5. Assignment of appropriate sampling weights and weighting status indicators to LABDAT data records (see Section 2.8).

Steps 1 through 3 were performed for each data type. In cases where data were supplied directly, the processing was minimal. In other cases, extensive processing was required. Step 4 included the following processes:

- Creation of consistently-named variables for the primary measures of interest (e.g., concentrations), for the data quality and measurability status indicators, and for the detection limits
- Averaging over duplicate analyses or duplicate samples (for field data)
- Assignment of media codes to distinguish the media and types of measurements (e.g., indoor air aldehydes, outdoor air aldehydes, dust metals)

The types of available data and the number of data records in the QC files are indicated in Table 2-9.

The types of available data and the number of data records in the final field-data file (called LABDATW) are given in Table 2-10. The LABDATW file maintains a separate data record for each school, location (e.g., classroom or outdoors), medium (e.g., air), analyte class

Table 2-9. Number of Available QC Observations, By Type

Medium Code and Type	Blank Samples*				Control Samples				Duplicate Samples/Analyses**			
	Type	No. Records	No. Analytes	No. Records /Analyte	Type	No. Records	No. Analytes	No. Records /Analyte	Type	No. Records	No. Analytes	No. Records /Analyte
100 Indoor air pollen/spores	FB	270	27	10					DS	972	27	36
101 Outdoor air pollen/spores									DS	54	27	2
200 Indoor air aldehydes	FB	432	12	36	LC	132	12	11	DS	816	12	68
	LB	60	12	5								
201 Outdoor air aldehydes									DS	216	12	18
300 Indoor air VOCs	FB	64	9	7-8					DS	128	9	12-18
400 Indoor air biologicals	FB	9	9	1					DS	10	5	2
401 Outdoor air biologicals									DS	10	5	2
500 Dust pesticide	LRB	138	20	6-7	LFM	116	20	5-6	DA	264	20	6-16
concentration	LMB	137	20	6-7	LFB	177	20	8-9	DI	434	20	10-24
501 Dust pesticide loading									DA	232	20	6-14
									DI	368	20	10-20
600 Dust PAH concentration	LRB	106	16	1-7	LFM	111	16	6-7	DA	242	16	10-16
	LMB	105	16	1-7	LFB	109	16	5-7	DI	338	16	10-24
601 Dust PAH loading									DA	212	16	10-14
									DI	112	16	4-8
700 Dust allergens – 500µm												
800 Dust metals	LB	72	18	4	LFB	71	18	3-4	DA	288	18	16
concentration					SRM	61	16	2-4	DI	396	18	15-24
801 Dust metals loading									DA	252	18	14
									DI	276	18	13-16
Total		1393				777				5620		

* Indoor and outdoor air not distinguished. ** There are two records per duplicate.

Type codes: FB=field blank, LB=lab blank, LRB=lab reagent blank, LMB=lab matrix blank, LC=laboratory control, LFB=lab fortified blank, LFM=lab fortified matrix, SRM=standard reference material, DS=duplicate sample, DA=duplicate analysis, DI=duplicate injection

Table 2-10. Number of Available Field Data Observations from Laboratory Analyses, By Type

Medium Code and Type	Unit of Record (C=classroom S=school)	No. Records	No. Analytes	No. Records / Analyte	No. Classrooms (Port/Trad/Total)	No. Schools	Weighted Analysis	Non-Detect Reporting Strategy ‡‡
100 Indoor air pollen/spores	C	4995	27	185	126/59/185		Yes	A
200 Indoor air aldehydes	C	2388	12	199	135/64/199		Yes	B
300 Indoor air VOCs**	C	719	9	73-93	65/28/93		Yes	B
400 Indoor air biologicals†	C	181	5	36-37	27/10/37		No	A
402 Surface biologicals*†	C*	164	4	41	26/10/36		No	A
500 Dust pesticide conc††	C	1363	20	30-78	39/38/77		No‡	B
501 Dust pesticide loading††	C	1002	20	26-57	29/28/57		No‡	B
600 Dust PAH conc††	C	1152	16	54-77	39/37/76		No‡	B
601 Dust PAH loading††	C	842	16	40-56	29/27/56		No‡	B
700 Dust allergens – 500µm	C	935	5	187	129/58/187		Yes	C
701 Dust allergens – 150µm***	C	30	5	6	4/2/6		No	C
800 Dust metals concentration††	C	1404	18	78	40/38/78		No‡	B
801 Dust metals loading††	C	1044	18	58	30/28/58		No‡	B
101 Outdoor air pollen/spores	S	1674	27	62		62	Yes	A
201 Outdoor air aldehydes	S	744	12	62		62	Yes	B
301 Outdoor air VOCs**	S	258	9	26-34		34	Yes	B
401 Outdoor air biologicals†	S	50	5	10		10	No	A
TOTAL		18945						

* Multiple sites at some classrooms.
** VOC subsample.
*** Note: Only as a special study prior to analysis of all floor dust samples.
† Specially selected schools only.
†† Subset of portables selected. Samples from portables composited prior to analysis. Corresponding traditionals selected.
‡ Weighted to reflect classrooms in the sample for which data are available.
‡‡ Reporting strategies are defined as follows:
A Non-detects are reported as zeros. Detection limits (DLs) are not generally available.
B Negative values are converted to zeros; otherwise data are not censored. DLs vary by sample.
C Non-detects are set equal to the DL, which is constant across samples.
Note: Numbers of observations for dust loadings differ from those for concentrations because of missing or unreliable data on the areas sampled.

(e.g., aldehydes), and species (e.g., formaldehyde). Other pertinent identifying information (e.g., date of sampling, type of classroom) are also maintained. Thus this file involves multiple records per classroom (or school) that correspond to the various types of measurements. Three digit codes are used to identify chemical classes/media (henceforth called the media code) and the particular species (henceforth called chemical code). The final file is sorted by media code, chemical code, analysis stratum (see Section 2.8), and classroom or school ID in order to facilitate generation of summary statistics.

2.7.6 Processing of Data from Continuous Monitors

Three types of continuous monitors were employed in the Phase II data collection:

- Q-Trak data: CO, CO_2, temperature, and relative humidity
- Particle count data
- HOBO data: HVAC on/off status.

The processing of each is described briefly below.

Q-Trak Data. These data consisted of CO, CO_2, temperature, and relative humidity measurements for air in classrooms and outside of schools. Time resolution for these data were, in general, one minute intervals, although there were some schools/classrooms with 30-minute intervals, and some with 1-second intervals. Those with 1-second resolution were first converted to 1-minute resolution, while those with 30-minute resolution were flagged as unusable. A number of problems with these data were discovered. For instance, all CO data were judged to be suspect and were flagged accordingly. Also, some consecutive CO_2 values were found to be consistently reported as 6000 ppm, which appeared to be an upper threshold of the instrument; data for these schools/classrooms were flagged as unusable. There were also a number of problems with the dates and times of the loggers; although the dates could generally be determined independently, the accuracy of the times was suspect. Hence the accuracy of some summary measures, especially hour-specific summary measures, (see below) may be poor. Since only a few classrooms had reported data before 7:00 am or after 4:00 pm, data used to construct the summary measures were restricted to be within the 7:00 am-4:00 pm range. Subsequently, we carried out the following steps (for the “valid” 1-minute resolution data):

1. Computed the length of monitoring period.
2. Constructed aggregated measures (restricted to cases with monitoring periods of 240 or more minutes):
   - Computed 5-minute averages; retained any average with 3 or more minutes; computed the maximum 5-minute value and (for temperature and humidity) the minimum 5-minute value; saved the maximum and minimum 5-minute values.
   - Computed 1-hour averages; retained any average with 45 or more minutes; computed the maximum 1-hour value and (for temperature and humidity) the minimum 1-hour value; saved the maximum and minimum values, as well as the hourly averages.
   - Computed and saved overall averages.
   - Computed exceedance indicators for various threshold levels, as shown below:

Parameter	Averaging times	Threshold levels for Indoor Data
CO_2 (ppm)	Overall, hourly, max 5-minute	>1000, >2000
Temperature, EC (EF)	Overall, hourly, max 5-minute	<17 (63), <20(68), >23(73), >26(79), >29(84)
Relative Humidity (%)	Overall, hourly, max 5-minute	<30, >50, >60

3. Assigned appropriate identifiers to indicate the level of aggregation and the data quality.
4. Assigned appropriate sampling weights and weighting status indicators (see Section 2.8).

All of the above summary measures were maintained in two final files: ALLHRSI for indoor (classroom) data and ALLHRSO for outdoor data. Each file contained a separate data record for each classroom or each school. Table 2-11 shows the numbers of valid observations.

HOBO Data. The raw HOBO data records for a given classroom HVAC unit consisted of variables identifying the classroom, the instrument, the date, the HVAC status (on or off), and the start time of that status. Typically, sequential records would show an on-off-on-off pattern. From these data, we attempted the following:

1. Computed the length of monitoring period in minutes and determined the number of time intervals (i.e., status changes) overall and within (wholly or partially) the 7am-to-4pm time window.
2. Corrected dates, where necessary, based on field sampling dates.
3. Computed the overall percentage of time that the HVAC was "on" (restricted to cases with monitoring periods of 240 or more minutes, and restricted to the 7am to 4pm time window if the monitoring period extended beyond that window).
4. Computed the percentage of time the HVAC unit was on within a given hour of day (from 7am to 4pm); retained any percentage that was based on 45 minutes or more.

Data with more than 2000 intervals or less than 3 intervals in the time frame of interest were excluded and those with more than 1000 intervals or a suspect date were flagged as suspect data. These data as a whole are not considered very reliable.

Particle Count Data. The raw particle count data (for a given classroom or outdoors) consisted of the following one-minute counts every five minutes:

- number of particles with diameter over 0.5 Fm
- number of particles with diameter over 2.5 Fm
- number of particles with diameter over 5 Fm
- number of particles with diameter over 10 Fm

The counts for intervals of particle sizes were calculated by subtracting the counts of a subset with narrower size range from those of a large size range. The counts for the size intervals then averaged over time to produce the following:

- the average number of particles/minute with diameter 0.5 to 2.5 Fm
- the average number of particles/minute with diameter 2.5 to 5 Fm
- the average number of particles/minute with diameter 5 to 10 Fm
- the average number of particles/minute with diameter over 10 Fm
- the average number of particles/minute with diameter 0.5 to 10 Fm

Table 2-11. Number of Available Observations for Summary Measures from Continuous Monitors, By Type

Medium and Type	Unit of Record	No. Classroom Observations (Port/Trad/Total)	No. School Observations	Weighted Analysis
Indoor air CO_2	C	92/44/136		Yes*
Indoor air temperature	C	102/46/148		Yes*
Indoor air relative humidity	C	102/46/148		Yes*
Indoor particle counts	C	113/56/169		Yes*
HVAC status	C	48/16/64		No‡
Outdoor air CO_2	S		49	Yes*
Outdoor air temperature	S		52	Yes*
Outdoor air relative humidity	S		28	No
Outdoor particle counts	S		50	Yes*

* Only measures associated with the overall monitoring period are to be weighted; measures for individual hours of the day are not to be weighted.
‡ Weighted to reflect classrooms in the sample for which data are available.

These averages were computed over the entire monitoring period (restricted to the 7am-to-4pm time window), as well as for each hour of the day. Records were retained for cases with a relevant monitoring period of 240 or more minutes. Hourly averages were retained for a given hour of the day if there were 7 or more original records within the hour. Adjusted sampling weights were then augmented onto the file containing these summary measures. Cases for which the logger date and the field sampling date were inconsistent were flagged as suspect records. Numbers of observations appear in Table 2-11.

2.8 Statistical Analysis Weights

2.8.1 Initial School-level Weight

Whenever units are selected from a population with known probabilities, unbiased estimates of population totals (e.g., total number of CA public schools with portable classrooms in the 2001-02 school year) are achieved by weighting the survey responses by the reciprocals of their probabilities of selection, including appropriate adjustments for survey nonresponse. Hence, the initial sampling weight for each of the 1,000 CA public schools randomly selected for Phase I of the PCS was the product of 7 and 1.039 (i.e., initial weight = 7.273) to account for selection of a 1-in-7 systematic sample and a random subsample of 1,000 of the 1,039 eligible schools initially selected.

All of the ineligible schools in the Phase I sample (those schools without any portable classrooms in the Spring of 2002) were identified either during data collection or during telephone follow-up of non-responding schools. Hence, the initial weight for each school found to be ineligible for the study because it had no portable classrooms was set to zero. This process resulted in setting the initial weight to zero for 48 of the 1,000 schools in the Phase I sample.

Hence, the PCS sample of 1,000 schools included 952 schools eligible for Phase I of the PCS. Their sampling weight, P1WT4, was the initial weight for schools selected into the Phase II sample.

The Phase II sampling weight for each school in the Phase II sample is the product of this initial weight for all eligible schools in Phase I sample, P1WT4, and the reciprocal of the probability of selection into the Phase II subsample. Because the Phase II sampling design was stratified simple random sampling, the Phase II weighting factor for each school in stratum "h" was

$$P2WT1 = N_h / n_h ,$$

where N_h is the number of the 952 eligible schools on the sampling frame in stratum "h," and n_h is the number of sample schools in stratum "h," per Table 2-7. The product of P1WT4 and P2WT1 was the initial sampling weight for each school in the Phase II sample.

However, five of the 86 schools selected for Phase II were found to be ineligible because they had no portable classrooms in use during the 2001-02 school year. The initial weight for these five schools was set to zero, leaving 81 schools with positive initial sampling weights.

2.8.2 Adjustment for School-level Nonresponse

The first stage of nonresponse occurred when 14 eligible sample schools refused to participate in Phase II of the CA PCS, leaving 67 participants. Weighting class methods were used to adjust the statistical analysis weights and reduce the potential for nonresponse bias. Because weighting classes must be based on information known for both responding and nonresponding schools (Oh and Scheuren, 1983), the weighting classes were based on the following information that was known from the sampling frame (the California Public School Directory 2000) for all 81 eligible sample schools:

1. School level (elementary versus not elementary)
2. School location (rural versus not rural)
3. Northern vs. southern California
4. Percent of children receiving AFDC
5. Percent of children receiving Federal meals assistance
6. Expenditure per student.

The 14 Stratum 1 schools that comprised the "Specially Selected Schools" stratum were used as a weighting class for Phase II nonresponse adjustments so that the weight total for this stratum would be preserved. This was possible because of the high response rate that was achieved for this stratum when only one of these 14 schools refused to participate. For the remaining 67 eligible sample schools, we performed a Chi-squared automatic interaction detection (CHAID) analysis (a "tree-growing" algorithm developed by Kass, 1980) to determine the most significant predictors of whether or not the school participated in Phase II. This classification tree algorithm partitioned the eligible sample schools into three clusters that were most predictive of the schools' response status. Those clusters were used as weighting classes. The four weighting classes used for school-level Phase II nonresponse adjustments are defined in Table 2-12.

Table 2-12. Weighting Classes

Weighting Class	Description	Number of Eligible Schools	Percent Responding Schools
1	"Specially Selected Schools" stratum	14	92.86
2	School level = Elementary	38	89.47
3	School level = Not Elementary; 0 ≤ Percent on AFDC ≤ 9.84556	17	52.94
4	School level = Not Elementary; Percent on AFDC > 9.84556 or missing	12	91.67

For each school in weighting class "c" the adjustment for Phase II nonresponse was calculated as follows:

$$Adj(c) = \frac{\sum_{i \in c} w_1(i)\ I_e(i)}{\sum_{i \in c} w_1(i)\ I_r(i)}$$

where the summation is over all schools in weighting class "c," $w_1(i)$ is the initial Phase II sampling weight for the *i*-th school, $I_e(i)$ is a (0,1)-indicator of whether or not the *i*-th school was eligible for Phase II of the CA PCS, and $I_r(i)$ is a (0,1)-indicator of whether or not the *i*-th school participated in Phase II of the CA PCS. When the initial weights are multiplied by these adjustment factors, the sum of the adjusted weights (P2WT5) for the responding schools in each weighting class is identical to the sum of the initial sampling weights (P2WT3) for all eligible schools.

Because the VOC subsample was selected from the Phase II participants, the initial weights for the 35 schools in the VOC subsample (P2WT5S) were constructed from the school-level, nonresponse-adjusted weights, P2WT5. The weights were multiplied by two (2) for each school selected for the VOC subsample and by zero (0) for each school not selected because participating schools were randomly selected for VOC sampling using a 50% sampling rate within each stratum.

Since the nonresponse-adjusted weights, P2WT5, are not identical within each stratum, and because of random sampling at a fixed rate (50%) for the VOC subsample, the weight sums of these VOC subsample weights and the full sample weights were not identical, even though they both estimate the number of schools in the population of eligible schools. Therefore, the VOC subsample weights were calibrated to produce adjusted VOC sample weights (P2WT5V) that reproduce the same estimated population totals as the full Phase II sample. Calibration was performed within the Phase II school-level weighting classes, rather than within sampling strata, to limit the loss of precision due to unequal weighting. The VOC calibration adjustment for all schools in weighting class "c" was

$$VOCADJ(c) = \frac{\sum_{i \in c} P2WT5}{\sum_{i \in c} P2WT5S} \quad .$$

The adjusted weight for all eligible schools in the VOC subsample in weighting class "c" was then

$$P2WT5V = P2WT5S * VOCADJ(c).$$

Some classroom-level data were obtained for all 67 participating schools. Two VOCs were successfully measured in all but one of the 35 schools in the VOC subsample. All other types of school-level data were missing for at least two schools. Hence, weighting class adjustments for nonresponse were implemented for all the other types of school-level data to produce the final school-level analysis weights summarized in Table 2-13.

Table 2-13. Summary of School-level Analysis Weights

Type of Data	Analysis Weight	Number of Participants
Facilities Questionnaire II	P2WT5FAC	56
Consultation with Facilities and HVAC Managers (Part 1)	P2WT5CNSL1	58
Consultation with Facilities and HVAC Managers (Part 2)	P2WT5CNSL2	61
HVAC Assessment Checklist (HVC)	P2WT5HVAC	65
Outdoor air pollen/spores	P2WT5_101	62
Outdoor air aldehydes	P2WT5_201	62
Outdoor air VOCs		
• All other VOCs	P2WT5_301A	28
• Carbon tetrachloride and tetrachloroethylene	P2WT5_301B	34
• Chloroform	P2WT5_301C	28
Outdoor air CO_2	P2WT5SCO2	49
Outdoor air temperature	P2WT5STEMP	52
Outdoor soil metals	P2WT5_901	67
Outdoor particle counts	P2WT5PRTO	50

2.8.3 Initial Classroom-level Weight

In order to compute classroom-level sampling weights, we first constructed a file with one record for each sample classroom, including the backup sample classrooms used in the field. The response status of each sample classroom was then classified as respondent, nonrespondent, or ineligible (i.e., not a classroom or not in use on the day of monitoring). We verified that each participating school had at least three eligible sample classrooms and no more than three participating classrooms, except for one school where only two classrooms were monitored.

Each sample classroom then was classified either as portable or traditional. The classification was based primarily on four data items:

- Classroom Form Item A-5
- HVAC Assessment Checklist Item A-2

- Consultation with Facilities and HVAC Manager (Part 1) Item A-4
- Classification recorded in the chemistry data shell.

When the majority of these sources were in agreement, they were used to classify the room. When there was not a clear majority among these sources, we determined how the classroom was classified when the sample was selected and used that classification.

The classroom-level sampling weight component was then computed by treating the sample of classrooms selected for each of the 67 participating schools as a simple random sample stratified by portable or traditional classroom type. Hence, the classroom-level weight component for every sample classroom was calculated as

$$\begin{aligned} P2WT6 &= N_p / n_p \text{ for portable classrooms} \\ &= N_t / n_t \text{ for traditional classrooms} \end{aligned}$$

where N_p and N_t and the total numbers of portable and traditional classrooms at the school, respectively, and n_p and n_t and the numbers of portable and traditional *sample* classrooms at the school, respectively. The total numbers of portable and traditional classrooms at each school were determined as recorded when the sample classrooms were selected. The numbers in the sample were based on the final sample classroom file, including ineligible sample classrooms (because they were on the sampling frame when the classroom sample was selected).

The initial sampling weight for all eligible sample classrooms was then computed as the product of the school-level weight, the classroom-level weight component, and a (0,1)-indicator of classroom-level eligibility. This resulted in two classroom-level sampling weights, P2WT7 and P2WT7V, for the full sample and the VOC subsample, respectively.

Two of the questionnaires completed at the school level had one column for each of the three sample classrooms: (a) Consultation with Facilities and HVAC Managers (Part 1) and (b) HVAC Assessment Checklist and School Characteristics. An initial classroom-level weight also was computed for each of these questionnaires by using the school-level nonresponse-adjusted weight for each of these questionnaires, which resulted in the initial classroom-level weights, P2WT7CNSL1 and P2WT7HVAC, for these forms, respectively.

2.8.4 Adjustment for Classroom-level Nonresponse

Weighting class weight adjustment procedures were used to adjust for classroom-level nonresponse. The adjustments were calculated using the same weighting classes described in Table 2-12 for school-level nonresponse, except that the adjustments were calculated separately for portable and traditional classrooms, which effectively doubled the number of weighting classes from four to eight.

The Classroom Form and indoor air aldehyde data were obtained for 199 of 201 eligible sample classrooms. Additional nonresponse occurred for all other types of classroom-level data. The final classroom-level analysis weights are summarized in Table 2-14.

Table 2-14. Summary of Classroom-level Analysis Weights

Type of Data	Analysis Weight	Number of Participants
Consultation with Facilities and HVAC Managers (Part 1)	P2WT9CNSL1	174
HVAC Assessment Checklist	P2WT9HVAC	194
Teacher Questionnaire	P2WT9TQ	186
Classroom Form	P2WT9CLR	199
Indoor air pollen/spores	P2WT9_100	185
Indoor air aldehydes	P2WT9_200	199
Indoor air VOCs		
• All other VOCs	P2WT9_300A	79
• Carbon tetrachloride and tetrachloroethylene	P2WT9_300B	93
• Chloroform	P2WT9_300C	78
Indoor air CO_2	P2WT9CCO2	136
Indoor air temperature and relative humidity	P2WT9CRH	148
Indoor particle counts	P2WT9CPRTI	169
Dust allergens (# 500µm)	P2WT9_700	187

2.9 Statistical Analysis Methods

2.9.1 Overview of Research Objectives and Data Analysis Strategy

The major part of the data analysis effort involved conducting data analyses and interpreting the results for those analyses directed at the specific research objectives. These research objectives are shown in the first column of Table 2-15. The second column identifies the primary types of analysis variables that were involved – that is, a variable to be subjected to statistical summarization or to be used as a dependent variable in an analysis of variance (ANOVA) or analysis of covariance (ANOCOVA) model. The last column gives the basic statistical approach that was employed.

Objective 1. The first objective (in the first column of Table 2-15) relates to characterizing the quality of the data collection process and the resultant data. Depending on the results of these analyses, some of the subsequent analyses may be judged to be inappropriate. The methods are described in Section 2.9.2. *Results are presented in Section 3.1 and Appendix B.*

Objective 2. The second objective is aimed at characterizing the completeness of the data. Response rates were calculated for the various data types in the manner described in Sections 2.8 and 2.9.3. These response rates were determined overall and for several key subgroups. *Results are presented in Section 3.2.*

Table 2-15. Summary Of Statistical Analyses For Addressing Research Objectives

Research Objective	Data Types	Statistical Analysis Approach
1. To assess data completeness	All	Generate response rates and completion rates.
2. To assess data quality	lab data	Generate summary statistics characterizing concentrations of blank samples, recoveries for control samples, and summary measures of precision for duplicate samples and/or duplicate analyses.
3. To characterize the populations of schools and classrooms (by classroom type (CT)) with respect to selected questionnaire variables	Selected questionnaire items (Tables 2-16 and 2-17)	Generate weighted estimates (and confidence intervals (CIs)) of proportion of schools having given characteristics (see Table 2-16 for list of variables). Generate weighted estimates (and CIs) of proportion of classrooms, overall and by CT, having given characteristic (see Table 2-17 for list of variables).
4. To characterize distributions of pollutants and environmental conditions for C concentrations in outdoor air (over schools) C concentrations in indoor air (over classrooms, by CT) C dust chemical concentrations (over classrooms, by CT) C environmental measures (e.g., light) (over classrooms, by CT)	lab data, summary measures from continuous monitors, continuous measures reported in questionnaires as indicated in Table 2-17	For each CT, use weighted data analyses to produce estimates (and CIs) of distribution parameters such as percent measurable, means, and selected percentiles (10^{th}, 25^{th}, median, 75^{th}, 90^{th} , 95^{th}) for each species. For continuous monitor data, provide estimated means (and CIs) for the various averaging times and estimates (and CIs) of the average proportion of time that threshold levels are exceeded.
5. To characterize performance of HVAC systems.	Continuous and discrete measures of HVAC performance, from HVAC checklist	For continuous performance measures, use weighted data analyses as above to produce estimates of performance distribution parameters., by CT. For discrete measures, estimate proportion of systems with the given characteristic, by CT. Provide confidence interval estimates for all of these estimated parameters.
6. To compare portable and traditional classrooms with respect to pollutants' indoor-air concentrations	Indoor air concentrations for selected species (dependent variable), Outdoor air concentrations for selected species (covariate)	Use analysis of variance (ANOVA) models that test for effects of CT on concentration levels, and analysis of covariance (ANOCOVA) models that test for effects of CT on concentration levels after adjustment for outdoor levels
7. To assess other effects (e.g., classroom age) on pollutants' indoor-air concentrations in each CT	as above, plus selected items from questionnaires	Augment ANOVA and ANOCOVA models to include primary effects such as classroom age (and possible interactions of these with CT, outdoor air levels).
8. To assess effects of HVAC performance and other factors on pollutants' indoor-air concentrations in each CT	as above, plus selected HVAC performance measures	Augment above models to include HVAC performance measures and other factors as covariates (one at a time). Also, for each CT, generate correlations (and/or scatterplots and cross-tabulations) of indoor concentrations with other measures (e.g., age of classroom, HVAC performance)
9. To characterize classrooms in specially selected schools	Biological swab data, formaldehyde and CO_2 data, selected questionnaire items.	Generate unweighted means and medians, by classroom type.

Objective 3. The third objective is concerned with characterizing the populations of schools and classrooms in terms of means or proportions associated with selected questionnaire variables. These variables are listed in Tables 2-16 and 2-17 for school-level and classroom-level variates, respectively. Hundreds of potential variables of interest in the database were screened in order to develop a manageable set for statistical analysis. Selection of variables was based on (one or more of) the following criteria:

Adequacy of sample sizes within categories (typically more than 25 in each category)
Known or suspected effect on IEQ (e.g., an indicator of a pollutant source or ventilation rate)
Anticipated portable-versus-traditional classroom differences.

The particular methods for producing the estimates are described in Section 2.9.4. Special purpose software (SUDAAN (PROC DESCRIPT)) was used to generate estimates of population proportions for the population of schools or classrooms (by classroom type). This software was also used to produce estimates of standard errors or confidence intervals for these estimated proportions (or means) that appropriately reflect the sampling design (e.g., stratification of schools by area, clustering of classrooms within schools. *Results are presented in Sections 3.3, 3.4, and 3.6 and in Appendices C and D.*

Objective 4. Analyses associated with research objective 4, which is one of the primary research objectives, involved use of data from the laboratory file and summary data from the continuous monitors. These analyses were aimed at characterizing distributions for each species of each medium by generating weighted estimates via the SUDAAN (PROC DESCRIPT) software. These estimates include the percent measurable, the mean, and selected percentiles -- for the population of classrooms (overall and by type [portable, traditional]) and for the population of schools (for outdoor measurements). The software also produces estimates of standard errors or confidence intervals for such parameters that appropriately reflect the sampling design. Specific estimation formulae are given in Section 2.9.4. *Results are presented in Sections 3.7 through 3.16 and in Appendices E and F.*

Objective 5. HVAC performance characteristics were summarized using the methods described above for objectives 3 and 4. The variables, in this case, however, involved variables in Table 2-17 related to HVAC performance. *Results are given in Section 3.5 and Appendix D.*

Objectives 6, 7, and 8. The SUDAAN REGRESS procedure (see Section 2.9.4) was employed for the ANOVA and ANOCOVA modeling associated with research objectives 6, 7 and 8. These objectives are concerned with understanding how indoor air quality measures (e.g., pollutant levels, particle counts) are affected by, or associated with, other measures such as those reflecting classroom HVAC performance and outdoor air levels. Analyses associated with these research objectives are meaningful for only those species having a relatively high percent measurable; hence the analyses were restricted to a subset of the species. Models for these variables were built in a sequential fashion, starting with objective 6 and ending with objective 8. Objective 6 models include only classroom type and outdoor concentration level (of the same species as the indoor variable). Models for objective 7 augment this model with another key

Table 2-16. School-Level Analysis Variables

Variable	Description	Level 1	Level 2	Level 3	Level 4	Source*
REGION	Geographic region	North	South			Sample frame
POPSTAT	School location	Urban	Suburb	Rural		Sample frame
SCHTYP	School type	Elem	Middle	High		Sample frame
FACILITIES QUESTIONNAIRE						
NUMPORT	Number of portable classrooms	1-10	11-20	21-30	>30	FQ7a
NUMTRAD	Number of traditional classrooms	1-20	21-40	41-60	>60	FQ7b
NUMTOT	Total number classrooms	1-30	31-60	61-100	>100	FQ7a,b
HVACLOG	HVAC maintenance logs kept	Yes	No	DK		FQ11a-g
FQ15A	Regular HVAC inspection/maintenance	Yes	No	NA		FQ15a
RFQ16B	Freq of vacuuming/sweeping/dusting	5/wk	3-4/wk	Other		FQ16b
USETOL	Awareness/use of EPA IAQ Tools	Aware/yes	Aware/no	Aware/DK	Unaware	FQ19a,b
FQ25	Any major complaints of envir cond. last yr	Yes	No	DK		FQ25
RFQ25AA	Roof leak complaint last yr: Port	None	Some			FQ25,FQ25aa
RFQ25AB	Plumbing leak complaint last yr: Port	None	Some			FQ25,FQ25ab
RFQ25AC	Air/odor complaint last yr: Port	None	Some			FQ25,FQ25ac
RFQ25AD	Mold complaint last yr: Port	None	Some			FQ25,FQ25ad
RFQ25AE	Temperature complaint last yr: Port	None	Some			FQ25,FQ25ae
RFQ25AF	Noise complaint last yr: Port	None	Some			FQ25,FQ25af
RFQ25BA	Roof leak complaint last yr: Trad	None	Some			FQ25,FQ25ba
RFQ25BB	Plumbing leak complaint last yr: Trad	None	Some			FQ25,FQ25bb
RFQ25BC	Air/odor complaint last yr: Trad	None	Some			FQ25,FQ25bc
RFQ25BD	Mold complaint last yr: Trad	None	Some			FQ25,FQ25bd
RFQ25BE	Temperature complaint last yr: Trad	None	Some			FQ25,FQ25be
RFQ25BF	Noise complaint last yr: Trad	None	Some			FQ25,FQ25bf
PORTCP	Port classroom envir complaints	Yes	No	DK		FQ25,aa-af
TRADCP	Trad classroom envir complaints	Yes	No	DK		FQ25,ba-bf
CONSULTANT FORM (PART 2)						
SCHTYPE	School type (Consultant Form, part 2)	Elem	Middle	High	Other/Mix	DC3
DC8_3	Major water leaks past 5 yrs	Yes	No			DC8_3
RDC9	Ballasts/transformer problems	Yes	No	DK		DC9
RDC10	Standing water	Never	Occasly	Frequent	DK	DC10

* "Source" identifies the questionnaire item(s) from which the variable was derived.

Table 2-17. Classroom-Level Analysis Variables

Variable	Description	Level 1	Level 2	Level 3	Level 4	Level 5	Source
ROOMTYPE	Classroom type	Portable	Traditional				PT_IND
OVERALL	All classrooms	All					
POPSTAT	School location	Urban	Suburb	Rural			Sample Frame
REGION	Geographic region	North	South				Sample Frame
SCHTYP	School type	Elem	Middle	High			Sample Frame
TEACHER QUESTIONNAIRE							
PESTUSE	Pesticide use past yr (teacher)	Current	Previous	Never			TQ8
CAIROK	Classroom air okay	Yes	No				TQ2c
LIGHTOK	Classroom light okay	Yes	No				TQ2d
TURNOFF	Turn off heat/AC due to noise	Yes	No				TQ4
BUGPROB	Bug problems in room	Current	Previous	Never			TQ7a
RODPROB	Rodent problems in room	Current	Previous	Never			TQ7b
MUSTODOR	Musty odor at times	Yes	No				TQ5a
WATRLEK	Leak or flood in room	Current	Previous	Never	Unknown		TQ6a
CONSULTANT FORM (PART 1)							
CLAGEX	Classroom age (yrs)	0-3yr	4-5yr	6-10yr	11-15yr	16+yr	CA3,CA1
PORTREPL	Major addition or replacement (3 yrs)	Some	None	NA			CA8
CLASSROOM FORM							
ROOMAREA	Square feet of floor area [&]	Continuous (actual measured values)					AA6L,AA6W
ROOMAREC	Square feet of floor area [&]	≤ 1,000 sf	>1,000 sf				AA6L,AA6W
AA11	Total number of chairs in room	Continuous					AA11
AB3	Ceiling holes or missing panels	Yes	No				AB3
CWATSTAN	Water stains on ceiling	Yes	No				AB5
CEILMOLD	Mold areas on ceiling	Some	None				AB6
CARPET	Carpet/rugs on floor	Yes	No				AC2_02, AC2_07
AC3	Indoor walk-off mat	Yes	No				AC3
FWATSTAN	Water stains on floor	Yes	No				AC7
TAKWALL	Tackboard walls	Yes	No				AD1_01
BORDWALL	Fiberboard, plywood, particle board walls	Yes	No				AD1_02, AD1_07
SHETWALL	Sheetrock or plaster walls	Yes	No				AD1_03
OTHRWALL	Other wall material	Yes	No				AD1_04, AD1_05, AD1_06 AD1_08SP

Variable	Description	Level 1	Level 2	Level 3	Level 4	Level 5	Source
PNTPEN	Paints/pens in room	Yes	No				AE4_01, AE4_02,
AE4_03	Whiteboard markers in room	Yes	No				AE4_03
AE4_04	Chalk in room	Yes	No				AE4_04
FRESHNER	Air freshener	Some	None				AE6_05
PETSPLNT	Animals and plants	Some	None				AE9_07
AE11_03	Bookcase – pressed wood	Yes	No				AE11_03
AE12_03	Cabinet – pressed wood	Yes	No				AE12_03
CABNEW	New bookcases/cabinets	Yes	No				AE14, AE15_02, AE15_03
DESKNEW	New desks/tables/chairs	Yes	No				AE14, AE15_01, AE15_04
PST_CIDE	Pests or pesticides	Some	None				AE16_07
CHEMPROD	Chemical products	Some	None				AE17_11
MOLDAREA	Mold areas	Some	None				AF11
ACTVOUT	New const. &/or repairs affecting IAQ	Yes	No				AG1_01, AG1_02
OTHRACTV	Other campus activities affecting IAQ	Yes	No				AG1_03, AG1_04, AG1_08
AG6	Outdoor walk off mats	Yes	No	DK			AG6
AG8_01	Parking lot/roadway within 50 ft	Yes	No				AG8_01
SKIRTHT	Foundation skirt height (portables only)	≤ 2 in.	2-12 in.	>12 in.	NA		AH6,PT_IND
ROOFTYPE	Type of roof	Tar & gravel	Metal	Other/DK			AH7
ROOFPTCH	Pitch of room	Flat or Both	Sloped				AH8
WALLCOND	Exterior wall condition	Good	Fair or poor				AH11
WALLMOLD	Mold areas on exterior walls	Some	None				AH14
AH16_02	Chipped paint on exterior wall	Yes	No				AH16_02
AI2	Windows open today	Yes	No				AI2
AI6	Door(s) left open today	Yes	No				AI6
VACMTYPE	Vacuum type	Beat brush/ power head	Canister	Other/DK			AI8
RAA9_01	Musty odor at times	Yes	No				AA8,AA9_01
RAA9_02	Air freshener odor at times	Yes	No				AA8,AA9_02
RAA9_05	New carpet/furniture odor at times	Yes	No				AA8,AA9_05
GENINST	General instruction classroom	Yes	No				AA13
HVAC FORM							
HVACMODE	HVAC mode	Heating	Cooling	Fan only	NA		BB2

Variable	Description	Level 1	Level 2	Level 3	Level 4	Level 5	Source
BB4_C	Outdoor air flow (cfm)	Continuous – form averages by HVACMODE categories					BB4_C
OAPERS	Outdoor air flow per person &&	Continuous – form averages by HVACMODE categories					BB4_C, AA11
OASF	Outdoor air flow per square feet &&&	Continuous – form averages by HVACMODE categories					BB4_C, AA6
TOTSAIR	Total supply air flow (cfm)	Continuous – BB4D+BB4E-- form averages by HVACMODE categories					BB4_D, BB4_E
MOISTA	Max wall, ceiling, floor moisture (%)	Max=0	Max>0				BB5a-f,
BB6_C	Mid-room light	Continuous – form averages					BB6_C
RBB7ICY	Noise –indoor center-HVAC on	Continuous – form averages					BB7ARIC, B7B_RIC
RBB7IRY	Noise –near register-HVAC on	Continuous – form averages					BB7ARIR, B7B_RIR
RBB7OY	Noise –outdoor -HVAC on	Continuous – form averages					BB7AROU, B7B_ROU
RBB7ICN	Noise –indoor center-HVAC off	Continuous – form averages					B7C_RIC, B7D_RIC
RBB7IRN	Noise –near register-HVAC off	Continuous – form averages					B7C_RIR, B7D_RIR
RBB7ON	Noise –outdoor -HVAC off	Continuous – form averages					B7C_ROU, B7D_ROU
RBC4	AHU location	Wall	Window	Rooftop	Other/NA		BC4
RBC5	Type heating system	Forced air	Radiant	Heat pump	Other/NA		BC5
RBC6	Heating fuel	Electricity	Nat gas	Other/NA			BC6
HVACAGE	HVAC age	Continuous – form averages (2002-year built)					BC11
AHUAXS	Ease of access to AHU interior	Good	Fair	Poor/None			BG1
FLTRLDG	Dirt loading on filter	Heavy	Medium	Light	DK/NA		BG5
FLTRGAP	Size of gap around filter	≥ ½”	< ½”	None	DK/NA)		BG6
FLTRMOLD	Mold or mildew on filter	Yes	No	DK/NA			BG7
BG11_1	Clean condensate drain pans & lines	Yes	No				BG11_1
STANWATR	Standing water in drain test	Yes	No	NA			BG13_1, BG13_10
BLKDRAIN	Blocked drain in drain test	Yes	No	NA			BG13_2, BG13_10
DRNFAIL	Drain test failure	Yes	No	NA			STANWATR, BLKDRAIN
OABLOCK	Air intake blocked	Yes	No	DK/NA			BG15B

* “Source” identifies the questionnaire item(s) from which the variable was derived.
& Square feet of floor area = Width x Length of room dimensions (from AA6 values).
&& Outdoor air flow per person = outdoor air cfm / number of seats in room (from BB4C and AA11, respectively).
&&& Outdoor air flow per square foot = outdoor air cfm / floor area of room (from BB4C and ROOMAREA [actual measured value, continuous] , respectively).

explanatory variable (e.g., classroom age) to form a base model that serves as the starting point for the objective 8 modeling, which investigates effects of other variates, one at a time. *Results are presented in Section 3.17.* Various candidate independent variables were considered for objectives 7 and 8.

The models were fit using SUDAAN to properly account for sample design features (e.g., clustering of classrooms within schools) in the estimation of variances of the model parameter estimates. Results of these ANOVA and ANOCOVA tests were summarized by providing the p-values associated with the adjusted Wald F tests (see *SUDAAN User's Manual, Release 8.0* (2001)). These tests are analogous to the usual F tests used in classical ANOVAs. Details on the models and the methods are given in Section 2.9.4.

Objective 9. For the biologicals-in-dust data, observations were available from a small, purposefully selected group of classrooms. Various sampling sites were used in the various classrooms, and in some cases, multiple sites occurred in the same classroom. As a result, the original objective – summarizing these data in terms of (unweighted) means – did not appear reasonable. These data were simply listed. Formaldehyde and bioaerosol data were summarized in terms of unweighted means. CO_2 data and selected questionnaire items were also summarized. *Results are given in Section 3.18.*

Tables 2-18, 2-19, and 2-20 indicate the programs used for data processing and analysis and provide an overview of the various steps involved in the effort.

2.9.2 Quality Control Analyses

The Quality Control (QC) data were of four fundamental types:

Blank Samples. These data were summarized by computing the mean (mass or concentration) level and the standard deviation of the levels, by analyte, medium, and type of blank sample.

Control Samples. These data were summarized by computing the mean percent recovery and the standard deviation of the recoveries, by analyte, medium, and type of blank sample.

Duplicate Samples. These data were summarized by computing the standard deviation (SD) and relative standard deviation (RSD) of each duplicate pair and then summarizing the distribution of these SDs and RSDs, by analyte and medium. Statistics reported included the mean, the median, and the maximum of the RSDs.

Duplicate Analyses. These data were summarized by computing the SD and RSD of each duplicate pair and then summarizing the distribution of these SDs and RSDs, by analyte, medium, and type of duplicate (analysis or injection). Statistics reported included the mean, the median, and the maximum of the RSDs.

Results summarizing the QC data are presented in Section 3.1 and Appendix B. Appendix B also summarizes detection limit information.

Table 2-18. Summary of Programs Used to Process and Analyze Questionnaire Data

Program	Input Files	Description	Output Files	Print Files
1. RECODSCH_AG	FACILITIES CONSULT2	Recode selected variables and create school-level analysis variables	FACILITIES_REV2 CONSULT2_REV2	
2. CONSULT1_REV2	CONSULT1	Recode selected variables and create classroom-level analysis variables	CONSULT1_REV2	
3. CLR_REV2	CLASROOM	Recode selected variables and create classroom-level analysis variables	CLR_REV2	
4. HVAC_Rev2	HVAC	Recode selected variables and create classroom-level analysis variables	HVAC_REV2	
5. TEACH_REV2	TEACH	Recode selected variables and create classroom-level analysis variables	TEACH_REV2	
6. CRSLABVR	(user-supplied labels/formats)	Create file of labels and formats for school-level analysis variables	SLABVAR	SCHLABL
7. CRLABVAR	(user-supplied labels/formats)	Create file of labels and formats for classroom-level analysis variables	LABVAR	VARDEFS
8. AUGWTS (Should be run after SCHWGTS and CLRWGTS programs.)	STRATIDS SCHWGTS CLRWGTS FACILITIES_REV2 CONSULT2_REV2 CONSULT1_REV2 HVAC_REV2 CLR_REV2 TEACH_REV2	Generate counts of eligible and responding schools and classrooms, generate response rates, augment sampling weights and analysis strata codes onto questionnaire files	FACILITIES_REV3 CONSULT2_REV3 CONSULT1_REV3 HVAC_REV3 CLR_REV3 TEACH_REV3	RESP_RATQ
9. POPCHAR2	FACILITIES_REV3 CONSULT2_REV3 SLABVAR	Generate population percentages for selected school level variables using SUDAAN PROC DESCRIPT	SCHPCT	POPCHAR2 (Appendix C)
10. POPCHAR1	CONSULT1_REV3 HVAC_REV3 CLR_REV3 TEACH_REV3 LABVAR	Generate population percentages for selected classroom level variables, overall and by classroom type, using SUDAAN PROC CROSSTAB; perform Wald chi-square tests to test for association of room type with selected variables	CLASPCT	POPCHAR1 (Appendix D)
11. WTDQSTAT	HVAC_REV3 CLR_REV3	Generate population estimates, via SUDAAN PROC DESCRIPT, for characterizing continuous measurements, by classroom type, and (for some variables) by HVAC mode Compare portable vs. traditional means.		POPESTQ (Appendix D)

Table 2-19. Summary of Programs Used to Develop and Adjust Sampling Weights

Program	Input Files	Description	Output Files
1. SCHWGTS	Sample Frame Data	Generate adjusted school-level sampling weights for data analysis	SCHWGTS
2. CLRWGTS	Sample Frame Data	Generate adjusted classroom-level sampling weights for data analysis	CLRWGTS
3. GETSTRAT	SCHWGTS	Collapse strata to form analysis strata	STRATIDS

Table 2-20. Summary of Programs Used to Process and Analyze Laboratory and Continuous Monitor Data

Program	Input Files	Description	Output Files*	Print Files
1. CONTINVAR2	CONTINU	Create summary variables from 1-minute Q-Trak data characterizing CO_2, temperature, and relative humidity	ALLHRSI ALLHRSO	
2. HOBODAT	HOBO	Create summary variables from times and HVAC on/off indicators	HOBOSUMRY	
3. PARTICLES	PARTICLES	Create summary variables from 1-minute particle count data (every 5 minutes)	PARTCNTI PARTCNTO	
4. CRLABDAT	AIRVOC ALLSLIDE BIOPART DUSTMETLS MAINAHYDE ALLERGEN SOILDUST DUSTPEST	Create combined file of field data; extract QC data and separate into appropriate QC files. (Note: ALLHRSI, ALLHRSO, HOBOSUMRY, PARTCNTI and PARTCNTO files are also used as input files, but only for the purpose of identifying which schools and classrooms have data of those types.)	LABDAT FBLKS CNTL DUPSAMP DUPANAL MSLIST CLRCHEMIDS SCHCHEMIDS	
5. AUGWTSCHEM (Should be run after SCHWGTS and CLRWGTS programs.)	LABDAT CLRCHEMIDS SCHCHEMIDS SCHWGTS CLRWGTS	Augment sampling weights onto LABDAT file; generate response rate information for LABDAT, ALLHRSI, ALLHRSO, PARTCNTI and PARTCNTO data.	LABDATW	RESP_RAT
6. QCANAL1	FBLKS CNTL DUPSAMP DUPANAL MSLIST	Generate summary statistics characterizing the QC data (blanks, controls, duplicate samples, and duplicate analyses)		QCANAL2 (Appendix B)
7. LABSUMRY	LABDATW MSLIST	Generate school and classroom distributional estimates, via SUDAAN PROC DESCRIPT, for characterizing concentrations, loadings, etc. For classroom data, generate distributional estimates overall and by classroom type and compare population means (portable vs. traditional).	OUTPCTL OUTPCTLC OUTMEAND	LABSTATS (Appendix E)
8. AUGWTS (Should be run after SCHWGTS and CLRWGTS programs.)	ALLHRSI ALLHRSO PARTCNTI PARTCNTO HOBOSUMRY SCHWGTS CLRWGTS	Augment sampling weights onto ALLHRSI, ALLHRSO, PARTCNTI, PARTCNTO, and HOBOSUMRY files (Note: Hourly data in these files and all data in the HOBOSUMRY file are not population-weighted; rather they are weighted only to reflect the numbers of classrooms in those schools for which usable data were actually acquired.)	CONTINIW CONTINOW PARTCNTIW PARTCNTOW HOBOSUMRY	
9. WTTSISTAT	CONTINIW CONTINOW PARTCNTIW PARTCNTOW HOBOSUMRY	Generate school and classroom distributional estimates, via SUDAAN PROC DESCRIPT, for characterizing summary measures. For classroom data, generate distributional estimates overall and by classroom type. Compare portable vs. traditional means.		WTD_TSI (Appendix F)
10. WTEDREGC (WTEDREGS1)	LABDATW CONTINIW PARTCNTIW PARTCNTOW All _REV3 questionnaire files MSLIST SLABVAR LABVAR	Use SUDAAN PROC REGRESS to fit weighted ANOVA and ANOCOVA models for comparing portable vs. traditional classrooms, after adjustment for outdoor levels .(where applicable) and for other selected independent variables (e.g., classroom age)	AMODLRESL BAMODLRESL CMODLRESL CHECKA CHECKB CHECKC (WTEDREGS1) (Appendix H)	REGC1 (Appendix G)

* MSLIST is file providing an index of media and analyte codes and descriptions. CLRCHEMIDS and SCHCHEMIDS are files containing indices that indicate, at the classroom and school level, respectively, whether a particular type of data is available.

2.9.3 Determination of Response Rates

Nonresponse occurs in the CA PCS Phase II study at two levels: schools and classrooms. Therefore, response rates were calculated at both levels. Several different types of data collection forms and environmental samples were collected at each school and for each classroom. Weighted response rates were calculated for each type of data collected. The weighted response rate is an estimate of the response rate that would have been obtained if we had conducted a census instead of a sample survey.

Each weighted response rate is the sum of the initial sampling weights of the respondents divided by the sum of the same initial sampling weights over all eligible schools or classrooms. Table 2-21 describes how each weighted school-level and classroom-level response rate was calculated. The classroom-level response rates calculated as described in Table 2-21 are conditional response rates because they estimate the percentage of responding classrooms within the population of responding schools (i.e., they are conditional on the set of responding schools). The overall unconditional classroom-level response rates also were computed. They are the products of the school-level and conditional classroom-level response rates. The Phase I response rates are not a factor in this calculation because the Phase II sample was selected from all eligible schools in the Phase I sample, rather than the Phase I respondents. *The resulting estimated response rates are presented in Section 3.2.*

2.9.4 Estimation and Hypothesis Testing Methods

Proper analysis of data collected for members of a probability sample requires that all observations be weighted inversely to their probabilities of selection. These sampling weights enable design-unbiased estimation of linear population parameters, such as population totals. As described above, initial sampling weights were developed as a part of the sample design activities, and, after data collection, these sampling weights were adjusted to compensate (at least partially) for the potential bias resulting from survey nonresponse. Weighting class adjustment procedures, for instance, were used in this study to make the adjustments. The remainder of this section indicates how the adjusted sampling weights were employed in making estimates of various population parameters.

Estimates of Summary Statistics. A common example requiring weighted data analysis is estimation of a population proportion. For instance, for estimating a proportion P_x, the general form of the estimate is

$$\hat{P}_x = \sum w_i X_i / \sum w_i$$

where the summations are over all sample participants, where w_i denotes the sampling weight associated with classroom (or school) i, and where X_i is an indicator variable with a value of 1 if classroom (or school) i has the characteristic of interest and with a value of 0 otherwise. Note that the numerator is an estimate of the total number of classrooms (or schools) in the population having the characteristic, and the denominator is an estimate of the total number of classrooms (or schools) in the population. This type of estimate is used to characterize the population of eligible schools or classrooms (e.g., as in objective 3). For instance, if X is set to 1 for all

Table 2-21. Response Rate Calculations

Response Rate	Numerator	Denominator	Weight
Percent of eligible schools with any data	All 67 sample schools with any data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with Facilities Questionnaire data	All sample schools with Facilities Questionnaire data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with Consultant Part 1 Questionnaire data	All sample schools with Consultant Part 1 Questionnaire data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with Consultant Part 2 Questionnaire data	All sample schools with Consultant Part 2 Questionnaire data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with HVAC Checklist data	All sample schools with HVAC Checklist data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with outdoor air pollen/spores data	All sample schools with outdoor air pollen/spores data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with outdoor air aldehyde data	All sample schools with outdoor air aldehyde data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with outdoor soil metals data	All sample schools with outdoor soil metals data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with outdoor VOC data (product of two factors)	1. All 67 sample schools with any data 2. All schools in the VOC subsample with outdoor VOC data	1. All 81 eligible sample schools 2. All 35 schools in the VOC subsample	1. P2WT3 2. P2WT5V
Percent of eligible schools with outdoor air CO_2 data	All sample schools with outdoor air CO_2 data	All 81 eligible sample schools	P2WT3
Percent of eligible schools with outdoor air temperature data	All sample schools with outdoor air temperature data	All 81 eligible sample schools	P2WT3
Percent of eligible classrooms with Teacher Questionnaire data	All sample classrooms with Teacher Questionnaire data	All 201 eligible sample classrooms	P2WT7
Percent of eligible classrooms with Classroom Form data	All sample classrooms with Classroom Form data	All 201 eligible sample classrooms	P2WT7
Percent of eligible classrooms with indoor air pollen/spores data	All sample classrooms with indoor air pollen/spores data	All 201 eligible sample classrooms	P2WT7
Percent of eligible classrooms with air aldehyde data	All sample classrooms with air aldehyde data	All 201 eligible sample classrooms	P2WT7
Percent of eligible classrooms with dust allergen data	All sample classrooms with dust allergen data	All 201 eligible sample classrooms	P2WT7
Percent of eligible classrooms with indoor air VOC data	All classrooms in the VOC subsample with indoor air VOC data	All eligible classrooms in the VOC subsample	P2WT7V
Percent of eligible classrooms with CO_2 data	All sample classrooms with CO_2 data	All 201 eligible sample classrooms	P2WT7
Percent of eligible classrooms with indoor temperature and relative humidity data	All sample classrooms with indoor temperature and relative humidity data	All 201 eligible sample classrooms	P2WT7
Percent of eligible classrooms with indoor air particles data	All sample classrooms with indoor air particles data	All 201 eligible sample classrooms	P2WT7

classrooms less than 3 years old, and to 0 otherwise, then the result is the proportion of the population estimated to be in that subgroup. Such estimates can also be used to characterize the population distribution of concentration levels over classrooms (e.g., by defining x to be 1 when a classroom has a concentration exceeding a detection limit or some other given threshold level).

If Y_i denotes a measured quantity for classroom i (or school i) (e.g., the concentration of a given chemical), then a similar expression is used to estimate the target population's mean:

$$\bar{Y} = \sum w_i Y_i / \sum w_i$$

The numerator estimates the total of the Y variable that would have been obtained if all members of the target population had been observed, and, as before, the denominator estimates the total size of the target population.

Other research objectives involve estimating classroom concentrations for various domains (subpopulations) of the target population. Such domains are defined in terms of characteristics of the classrooms (or schools)—for example, classrooms in suburban areas. If proportions are to be estimated, then the form of an estimated proportion for a domain d is

$$\hat{P}_x(d) = \sum w_i d_i X_i / \sum w_i d_i$$

where $d_i = 1$ if classroom i is in the domain d and $d_i = 0$ otherwise. Analogously, if means are to be estimated for such domains, then the form of the estimate is

$$\bar{Y}(d) = \sum w_i d_i Y_i / \sum w_i d_i$$

(Note that if the d_i are identically 1, then the domain of interest is the entire target population.)

A large portion of the data analysis for this study is based upon the above four estimation formulae. Estimates for all of the following, for example, can be obtained either directly from one of the formulae or through application of some simple function to the estimates derived from the formulae:

All tabulations and cross-tabulations of questionnaire items (from the same or different forms)
Characteristics of overall distributions of various chemical, biological, or environmental measures

- percent of population with levels > limit of detection (LOD)
- proportion or percent of population with levels > specified guideline levels
- overall arithmetic means
- selected percentiles (10^{th}, 25^{th}, 50^{th} [median], 75^{th}, 90^{th}, 95^{th})

The same types of distributional characteristics for specific domains.

In addition to estimating such population and domain parameters (e.g., proportions, means), it is important to estimate the precision of the estimate, which is usually expressed in terms of its variance or standard error. The estimation of sampling variances and standard errors for statistics calculated from probability sampling data should be based on the randomization distribution induced by the sampling design (i.e., they should account for all features of the sampling design, such as stratification and multistage sampling). Such an approach is robust because it makes no assumptions regarding the distribution of occurrence (e.g., normality) of the survey items. Hence, analyses based on the design-induced distribution provide the most defensible basis for making inferences from the sample to the target population.

The classic approach to estimating standard errors for nonlinear statistics, such as means and proportions, from complex probability sampling designs is a first-order Taylor Series linearization method. Alternative variance estimation techniques for such designs include jackknifing and balanced repeated replication. Standard statistical software packages (e.g., SAS, SPSS, BMDP, IMSL, etc.) do not typically include any of these algorithms for variance estimation. Therefore, special-purpose Survey Data Analysis (SUDAAN) software was used to analyze the survey data (RTI, 2001). SUDAAN estimates standard errors using the classical Taylor Series method because such estimates are both computationally and statistically efficient. The software includes procedures for survey-based estimation of standard errors of population totals, means, proportions, and ratios as well as linear and logistic regression relationships. RTI software for analysis of complex sample survey data has been reviewed by several non-RTI researchers and generally found to be the most efficient such software currently available. For means, proportions, differences in means, or differences in proportions, the precision is generally reported as an approximate 95% confidence interval calculated as the estimate plus or minus two times the standard error of the estimate.

To develop a manageable list of statistical analyses, hundreds of potential variables of interest were screened from the database. Selection of a variable was based on the following criteria:

Sufficient sample size (typically a minimum of 25-50) in two or more categories
A known or suspected effect on indoor environmental quality, such as an indicator of a pollutant source or ventilation rate
In some cases, significant portable/traditional classroom differences.

The method for calculating measures of precision for percentiles is somewhat different. First, the percentile estimate (say, for the p^{th} percentile) is determined by forming a weighted cumulative empirical distribution and determining the point (say, X_p) at which the sum of the weights is 100p% of the total sum of the weights. A domain consisting of all observations with observed values less than X_p is then formed and the proportion of the population falling into this domain (approximately equal to p) is estimated as $\hat{p}$. The standard error of $\hat{p}$ is formed via the Taylor's Series method and a confidence interval for p is formed as $[\hat{p}-t_\alpha s.e.(\hat{p}),\ \hat{p}+t_\alpha s.e.(\hat{p})]$, where t_α is an appropriate tabulated t value. An inverse interpolation of the empirical cumulative distribution is then used to translate this interval into one for the percentile. That is, the lower confidence limit is that point L_p at which $100(\hat{p}-t_\alpha s.e.(\hat{p}))\%$ of the total sum of the weights occurs, and the upper confidence limit is that point U_p at which $100(\hat{p}+t_\alpha s.e.(\hat{p}))\%$ of the total sum of the weights occurs. This interval, $[L_p, U_p]$, forms an interval estimate for the p^{th} percentile; it is typically asymmetric about X_p. The interval can be translated into a standard error by dividing the interval length (U_p-L_p) by $2t_\alpha$. Although such a standard error statistic cannot be used along with the estimated percentile to directly construct a confidence interval, it can be used to indicate the precision of one estimated percentile relative to another.

All of the above described estimates, standard errors, and confidence intervals can be generated utilizing the SUDAAN procedures DESCRIPT and CROSSTAB.

Analysis of Variance and Covariance Modeling. As noted above, SUDAAN also includes a regression procedure that can be employed to estimate the ANOVA and ANOCOVA models associated with research objectives 6, 7, and 8. As with the means and proportions, the estimated regression coefficients are weighted estimates and their standard errors (and hence tests of hypotheses for the regression coefficients) reflect the survey design features.

For objective 6, the basic models are of the form (error terms are omitted for simplicity):

$$Y = a + b_0 R \text{, or} \tag{A1}$$

$$Y = a + b_0 R + c_0 Z \text{, or} \tag{A2}$$

$$Y = a + b_0 R + c_0 Z + c_1 RZ \text{,} \tag{A3}$$

where the *a*s *b*s and *c*s are parameters to be estimated and where

Y = log(indoor concentration) for a given analyte[3],
R = classroom type indicator = 1 if portable, 0 if traditional,
Z = log(outdoor concentration) for the analyte.

Model (A1) is an ANOVA model, Model (A2) is an ANOCOVA model, and Model (A3) is an extension of the ANOCOVA model that allows different slopes on the Z variable for portable and traditional classrooms (by inclusion of an R by Z interaction term).

For objective 7, the above models (or the one deemed most appropriate) were augmented with another explanatory variable (either a continuous or categorical variable). The models are denoted as (B1), (B2), or (B3), depending on whether they employ (A1), (A2), or (A3) as their base set of terms. For instance, if model (A3) is used as the base model from objective 6, the augmented model would be model (B3) and would have the form:

$$Y = a + b_0 R + c_0 Z + c_1 RZ + b_1 X_1 \text{,} \tag{B3}$$

where X_1 is a given independent variable. (This formulation, for purposes of illustration, treats X_1 as continuous or as a discrete variable with only 2 levels [represented as a single dummy variate taking on values of 0 and 1], but if more than two categories are involved, then additional Xs would be included.) Model (B1) would exclude the Z and RZ terms, while Model (B2) would exclude the RZ term.

[3] The log scale is generally preferred for the modeling since variances of measurement errors tend to increase with increasing levels. The log-transform in this situation will tend to produce data with more homogeneous error variances.

For objective 8, a series of additional models for each Y variable were attempted by augmenting the (B1), (B2), or (B3) model with an additional set of dummy variates corresponding to items from selected questionnaire-based categorical variables. These models are denoted as models (C1), (C2), or (C3), depending on the particular B model upon which they are based. The additional variables were treated one at a time, as opposed to attempting to build a overall model that utilizes many variables, for two reasons: (1) sample sizes were not large enough to support the simultaneous inclusion of many such variates, and (2) time and resources for the study were not adequate to allow that type of model development activity to be performed, given that several analytes (i.e., several Y variates) and many candidate predictor variates are of interest. The C type models thus have the following form:

$$Y = a + b_0 R + c_0 Z + c_1 RZ + b_1 X_1 + b_2 X_2 + b_3 X_3 \,, \qquad \text{(C3)}$$

where (for illustration) X_1 is a continuous variate or dummy variate from model (B3) (equal to 1 if the response is level 1 and to 0 if response is level 2), and where X_2 and X_3 are dummy variates associated with a three-level item (for illustration) – i.e., $X_2 = 1$ if the response is level 1 and 0 otherwise, and $X_3 = 1$ if the response is level 2 and is 0 otherwise. The particular predictors used in the B- and C- models are indicated in the results section (Section 3.16). Additional information on the modeling strategy is given in Section 3.16.1.

Handling of Non-Detects and Low-Level Values. As noted in Table 2-10, three basic strategies were employed in the processing of the laboratory data to deal with non-detectable and negative values. For estimation (summary statistics) and testing, no additional censoring of the measured data was performed. For the ANOVA and ANOCOVA modeling, which was generally performed using log-transformed data (for the Y and Z variables), it was necessary to convert any zero values to a positive value prior to taking logarithms. The positive value used to replace any zero value was set equal to 1/2 of the smallest positive value that was observed among all samples for the particular analyte and medium of interest. Further information on detection limit definitions and values is in Appendix B.

It should be noted that the pesticide and PAH analyses of the dust samples involved use of second-order calibration curves. The lowest point on a calibration curve was adopted as a quantitation limit. All observed values falling below that limit were considered non-detects and were also flagged as “suspect” cases (since they were outside the calibration range). Since cases with zero peak areas are in this category, a number of samples may yield the same “measured” value, which could be either positive or negative (without further censoring). Since blank samples were not (and should not be) subjected to further censorings and since zero peak areas were generally observed, all of the blank samples for these chemicals tend to have the same (possibly negative) value.

3. RESULTS AND DISCUSSION

3.1 Quality Control Results

3.1.1 Field and Laboratory Blanks

Blank samples originate in the field and/or in the laboratory and are processed identically to actual samples. A summary of blank sample results is given in Appendix B. This table gives the following summary statistics of the observed levels (usually in mass units), by medium and analyte and type of blank (e.g., FB = field blank, LB = laboratory blank): the number of blank samples (n), their mean and standard deviation, and the minimum and maximum values.

Appendix B also provides a summary of the values of the detection limits. In general, the blank results were employed in the calculation of the method detection limits. If the analyte(s) of interest were not detected in the blanks, the method detection limit was calculated from the lowest calibration point at which the analyte was detected. Methods of determination of the detection limits for the specific classes of analytes are indicated in Appendix B.

In general, the levels in the blanks were minimal and relatively uniform. Notable exceptions were acetone and acrolein in the air-aldehyde samples and zinc in the dust-metals. Acetone and acrolein results have been excluded from this report. Zinc results were reported without adjustment.

3.1.2 Control Samples

Appendix B also gives the following summary statistics for percent recoveries, by medium, analyte and type of control sample (LFB = lab fortified blank, LC = laboratory control, SRM = standard reference material): the number of control samples; their mean, median, standard deviation, and coefficient of variation (CV); the minimum and maximum recoveries, and the percent of the control samples that were detected. Recoveries of analytes were calculated from control samples (field and/or laboratory) by dividing the amount, or concentration, found by the amount, or concentration, spiked. In most cases, the median recoveries show satisfactory analytical method performance. Zero, and exceedingly small, recoveries are very likely the result of unspiked control samples. Depressed recoveries (e.g., palladium and selenium in dust) are relatively rare and may indicate marginal analytical performance for these species. Exceedingly large recoveries (e.g., acetaldehyde in air; aluminum in dust) are generally the result of the presence of the analyte in the blanks.

Control recoveries, by medium, analyte group and control type are summarized below (n=number of samples):

Medium	Analyte Group	Control Type	n	Median Range (% Recovery)
Air	Aldehydes	Lab Control	11	81.1 - 140.1
Dust	Metals	Laboratory Fortified Blank	3-4	7.3 - 493.3
Dust	Metals	SRM	2-4	19.0 - 101.1
Dust	Pesticides	Laboratory Fortified Blank	8-9	20.3 – 110.7
Dust	Pesticides	Laboratory Fortified Matrix	5-6	9.7 – 112.3
Dust	PAHs	Laboratory Fortified Blank	5-7	71.3 –105.6
Dust	PAHs	Laboratory Fortified Matrix	6-7	37.1 – 99.7

3.1.3 Duplicate Samples

By definition, duplicate samples are "co-located" samples at the point of collection and represent two independent samples of the same environment. Appendix B provides results that characterize the precision of duplicate samples that were obtained at a subset of the schools and classrooms for certain media. For each analyte and each such pair, a standard deviation was first calculated. A pooled standard deviation was then determined. In addition to this statistic, the appendix table reports the number of pairs and the median and maximum standard deviation. It also gives the mean, median, and maximum of the relative standard deviations (RSDs). The median RSD is regarded as the most appropriate measure of precision. Note that whenever one member of a pair has a zero value, then the RSD will be 141.4% (the square root of 2 times 100%). The appendix also presents a summary of duplicate samples for cases where both samples have detectable values. The same statistics as previously are presented, but cases with non-detects are excluded. This reduces the number of pairs in many situations, but there is less distortion of the RSDs.

Median RSDs for results where both values were measurable are summarized below (n=number of pairs):

Medium	Analyte Group	n	Median Range (% RSD)
Indoor Air	Pollen/Spores	1-18	5.6 – 30
Outdoor Air	Pollen/Spores	1	0.2 - 45.4
Indoor Air	Aldehydes	2-33	2.2 - 11.8
Outdoor Air	Aldehydes	2-8	5.0 - 24.2
Indoor Air	VOCs	1-9	7.0 - 22.7

3.1.4 Duplicate Analyses and Duplicate Injections

Duplicate analyses represent separate aliquots of the same sample carried through the entire analytical procedure. Duplicate injections were repeat instrumental analyses of the same sample extract. For certain media and types of analytes, duplicate analyses (DA) or duplicate injections (DI) were used to assess these components of analytical precision. Appendix B characterizes the precision of these types of duplicates, which were obtained for a subset of the field samples. For each analyte and each such pair, a standard deviation was first calculated. A pooled standard deviation was then determined. In addition to this statistic, the table reports the number of pairs and the median and maximum standard deviation. It also gives the mean, median, and maximum of the relative standard deviations (RSDs). The median RSD is regarded as the most appropriate measure of precision. Note that whenever one member of pair has a zero value, then the RSD will be 141.4% (the square root of 2 times 100%). The appendix shows similar results for cases where both analyses produced detectable values. The same statistics as before are presented, but cases with non-detects are excluded. This reduces the number of pairs in many situations, but there is less distortion of the RSDs.

Median RSDs for duplicate analysis and injections where both values were measurable are indicated below:

Duplicate-Analysis RSDs for Floor Dust Samples

Analyte Group	Duplicate Type	Range of Median %RSDs for Concentrations	Range of Median %RSDs for Loadings
Metals	DA	5.9 - 18.6	3.7 - 11.9
	DI	1.8 - 9.7	1.8 - 8.9
Pesticides	DA	1.0 - 22.0	1.0 - 13.4
	DI	0.3 - 8.2	0.2 - 8.2
PAHs	DA	1.5 - 17.5	1.9 - 25.2
	DI	2.0 - 10.5	0.8 - 11.8

The number of pairs upon which the above statistics were based is often quite small (see Appendix B).

3.2 Response Rates

Weighted school-level, classroom-level, and overall study response rates were calculated as described in Section 2.9.3. School-level response rates are reported by type of school (elementary, middle, or high school), school location (urban, suburban, or rural), and geographic region (Northern or Southern California).

Table 3-1 shows that school-level data were successfully collected (both questionnaire data and environmental monitoring data) in 67 of 81 eligible sample schools. Table 3-2 shows that this results in a weighted response rate of 83.0%. However, we also see in this table that the school-level questionnaire response rates ranged from 70.3% for the Facilities Questionnaire to 79.5% for the HVAC checklist. This table also shows that response rates are highest for elementary schools and lowest for high schools. The estimated response rates for rural schools are erratic because there were only five rural schools in the sample. There appears to be little difference in response rates between Northern and Southern California.

Table 3-1. Number of Eligible and Responding Schools for Questionnaire Data

Classification	Category	No. Eligible Schools	Any Data	Facilities Questionnaire	Consultant Part 1 Questionnaire	Consultant Part 2 Questionnaire	HVAC Checklist
Overall		81	67	56	58	61	65
School Type	Elem	47	42	35	37	38	41
	Middle	16	12	11	10	11	12
	High	18	13	10	11	12	12
School Location	Urban	13	12	10	8	10	12
	Suburb	63	50	41	45	46	49
	Rural	5	5	5	5	5	4
Geographic Region	North	36	30	26	26	28	28
	South	45	37	30	32	33	37

Table 3-2. Weighted School-Level Response Rates for Questionnaire Data

Classification	Category	Any Data	Facilities Questionnaire	Consultant Part 1 Questionnaire*	Consultant Part 2 Questionnaire	HVAC Checklist*
Overall		83.0	70.3	71.0	76.0	79.5
School Type	Elem	89.8	76.4	79.3	82.2	86.9
	Middle	76.3	70.8	61.1	70.8	76.3
	High	69.7	51.7	56.7	63.2	60.9
School Location	Urban	92.4	76.6	55.2	74.6	92.4
	Suburb	79.3	66.1	71.8	74.0	77.0
	Rural	100.0	100.0	100.0	100.0	75.4
Geographic Region	North	84.5	70.8	71.7	78.4	76.8
	South	81.7	69.8	70.3	74.0	81.7

* The Consultant Part 1 Questionnaire and the HVAC Checklist were completed for *every* sample classroom (i.e., data were reported for every sample classroom in the responding schools).

Table 3-3 shows the number of schools for which we successfully obtained school-level environmental samples that resulted in usable data. For outdoor air VOCs, the number of schools with usable data varied by analyte. Therefore, Tables 3-3 and 3-4 show results for three sets of VOCs:

a) all other VOCs;
b) carbon tetrachloride and tetrachloroethylene; and
c) chloroform.

We see in Table 3-4 that the response rate for obtaining usable environmental monitoring data ranges from 61.5% for outdoor air CO_2 to 79.8% for some outdoor VOCs.

The 83.0% response rate for school-level participation in Phase II of this study is quite good. This relatively high response rate limits the possibility for nonresponse bias to affect the results. This response rate is much better that the response rate obtained in Phase I of this study (44.7%) for several reasons. The most important reasons are: (1) the field study was based on telephone recruitment, in contrast to the mail survey; (2) we began recruitment early in the school year; (3) we obtained permission from superintendents before contacting principals, and (4) only three staff who had extensive experience recruiting schools were used to make recruitment calls to superintendents and principals (see Section 2.5).

In Table 3-5, we see that conditional classroom-level response rates for the Teacher Questionnaire and the Classroom Form were 93.0% and 98.5%, respectively. When multiplied by the 83.0% school-level response rate, we see that this results in respectable response rate of 77.2% and 81.7% for the Teacher Questionnaire and the Classroom From, respectively.

Table 3-6 shows the numbers of classrooms for which we successfully obtained environmental samples that resulted in usable data. For indoor air VOCs, the number of classrooms with usable data varied by analyte in the same manner as described above regarding outdoor air VOCs. In Table 3-7, we see that conditional classroom-level response rates varied from 70.6% for some indoor-air VOCs to 98.5% for indoor air aldehydes. When multiplied by the 83.0% school-level response rate, we see in Table 3-8 that the resulting overall study-level response rates for classroom monitoring data varied from 58.6% to 81.7%.

3.3 School Characteristics Based on Responses to Questionnaires and Checklists

As discussed in Section 2.4.1, the target population for Phase II of this study consists of all California's K-12 public schools that had at least one portable classroom in both the spring of 2001 and in the 2001-02 school year, including special districts operated by the counties. Hence, traditional classrooms at schools with no portable classrooms are excluded as well as all classrooms at schools in the 2001-02 school year that did not have portable classrooms in the spring of 2001.

The target population for Phase II of the study is estimated to consist of 6,506 schools containing 69,447 portable classrooms and 126,322 traditional classrooms (195,769 total classrooms). These totals are slightly less than the estimated size of the Phase I population because five schools selected for the Phase II sample were found to have no portable classrooms in the 2001-02 school year.

Appendix C characterizes the schools in the target population for selected items from the Facilities Questionnaire and the Consultation Form Part 2. The schools are classified by several school-level variables (e.g., region), and the estimated percentages of the schools falling into each category (e.g., north, south) are shown. The table also gives, for each estimated percentage, the sample size (number of schools) upon which the estimate is based and the approximate 95% confidence intervals for the percentages. Intervals ending in 0 and 100 have been truncated and indicate (a) cases where the coverage probability is actually less than 0.95 and (b) cases where the relative precision is likely to be poor. The estimates are based on weighted data and thus reflect the target population of schools.

Table 3-3. Number of Eligible and Responding Schools for Laboratory and Monitoring Data

Classification	Category	No. Eligible Schools	Any School Data	Outdoor Air Pollen/ Spores	Outdoor Air Aldehydes	Outdoor Air VOCs (a)*	Outdoor Air VOCs (b)*	Outdoor Air VOCs (c)*	Outdoor Air CO2	Outdoor Air Temp	Outdoor Air Particles
Overall		81	67	62	62	28	34	28	49	52	50
School Type	Elem	47	42	38	38	15	20	14	34	34	33
	Middle	16	12	12	11	6	7	7	8	11	9
	High	18	13	12	13	7	7	7	7	7	8
School Location	Urban	13	12	12	11	2	4	2	9	9	9
	Suburb	63	50	46	46	25	28	24	35	38	38
	Rural	5	5	4	5	1	2	2	5	5	3
Geographic Region	North	36	30	25	28	12	15	11	22	23	22
	South	45	37	37	34	16	19	17	27	29	28

* (a) other VOCs, (b) carbon tetrachloride and tetrachloroethylene, (c) chloroform

Table 3-4. Weighted School-Level Response Rates for Laboratory and Monitoring Data

Classification	Category	Any School Data	Outdoor Air Pollen/ Spores	Outdoor Air Aldehydes	Outdoor Air VOCs (a)*	Outdoor Air VOCs (b)*	Outdoor Air VOCs (c)*	Outdoor Air CO2	Outdoor Air Temp	Outdoor Air Particles
Overall		83.0	74.0	77.1	64.6	79.8	63.6	61.5	63.9	62.3
School Type	Elem	89.8	77.6	81.9	62.4	84.0	54.3	68.5	68.5	69.5
	Middle	76.3	76.3	70.8	62.3	76.3	76.3	59.0	70.7	52.9
	High	69.7	60.9	69.7	69.7	69.7	69.7	43.4	43.4	50.6
School Location	Urban	92.4	92.4	84.2	45.0	92.4	45.0	67.0	67.0	67.5
	Suburb	79.3	69.7	73.4	68.0	75.4	62.6	56.6	59.8	60.0
	Rural	100.0	75.4	100.0	50.0	100.0	100.0	100.0	100.0	73.8
Geographic Region	North	84.5	64.7	77.5	62.5	77.5	54.7	63.3	63.6	65.9
	South	81.7	81.7	76.8	66.3	81.7	71.0	59.9	64.2	59.2

* (a) other VOCs, (b) carbon tetrachloride and tetrachloroethylene, (c) chloroform

Table 3-5. Number of Eligible and Responding Classrooms and Weighted Response Rates for Teacher Questionnaire and Classroom Form

Classification	Category	No. Eligible Schools	No. Responding Classrooms Teacher Questionnaire	No. Responding Classrooms Classroom Form	Conditional Response Rate Teacher Questionnaire	Conditional Response Rate Classroom Form	Overall Response Rate Teacher Questionnaire	Overall Response Rate Classroom Form
Overall		81	186	199	93.0	98.5	77.2	81.7
School Type	Elem	47	121	126	95.3	98.3	85.6	88.3
	Middle	16	31	36	88.5	98.9	67.5	75.5
	High	18	34	37	91.2	98.7	63.6	68.8
School Location	Urban	13	33	35	92.8	99.4	85.7	91.8
	Suburb	63	139	149	93.0	98.2	73.7	77.8
	Rural	5	14	15	93.7	100.0	93.7	100.0
Geographic Region	North	36	83	88	93.9	98.3	79.3	83.1
	South	45	103	111	92.5	98.6	75.6	80.6
Classroom Type	Port	N	126	135	89.9	98.1	74.6	81.4
	Trad	N	60	64	94.7	98.7	78.6	81.9

Table 3-6. Number of Eligible and Responding Classrooms for Laboratory and Monitoring Data

Classification	Category	No. Eligible Schools	Indoor Air Pollen/ Spores	Indoor Air Aldehydes	Indoor Dust Allergens	Indoor Air VOCs (a)[*]	Indoor Air VOCs (b)[*]	Indoor Air VOCs (c)[*]	Indoor Air CO2	Indoor Air Temp &RH	Indoor Air Particles
Overall		81	185	199	187	79	93	78	136	148	169
School Type	Elem	47	115	126	122	44	56	44	90	95	110
	Middle	16	36	36	33	19	21	19	25	28	27
	High	18	34	37	32	16	16	15	21	25	32
School Location	Urban	13	35	35	35	7	11	7	25	26	27
	Suburb	63	138	149	138	68	76	67	107	113	129
	Rural	5	12	15	14	4	6	4	4	9	13
Geographic Region	North	36	74	88	84	33	39	30	49	61	76
	South	45	111	111	103	46	54	48	87	87	93
Classroom Type	Port	N	126	135	129	56	65	54	92	102	113
	Trad	N	59	64	58	23	28	24	44	46	56

[*] (a) other VOCs, (b) carbon tetrachloride and tetrachloroethylene, (c) chloroform

Table 3-7. Weighted Conditional Classroom-Level Response Rates for Laboratory and Monitoring Data

Classification	Category	Indoor Air Pollen/ Spores	Indoor Air Aldehydes	Indoor Dust Allergens	Indoor Air VOCs (a)*	Indoor Air VOCs (b)*	Indoor Air VOCs (c)*	Indoor Air CO2	Indoor Air Temp &RH	Indoor Air Particles
Overall		89.7	98.5	87.9	70.6	88.4	74.9	72.0	74.6	85.8
School Type	Elem	87.6	98.3	96.3	60.8	83.2	64.4	67.8	70.7	86.7
	Middle	98.9	98.9	81.8	78.3	98.3	90.0	71.3	74.3	77.1
	High	84.8	98.7	68.3	93.0	93.0	90.4	86.7	87.7	93.8
School Location	Urban	99.4	99.4	99.4	41.4	100.0	41.4	82.8	84.4	81.7
	Suburb	89.8	98.2	84.2	76.4	85.9	78.4	71.5	73.5	86.4
	Rural	62.1	100.0	99.8	46.6	100.0	78.0	48.3	60.1	89.4
Geographic Region	North	74.4	98.3	96.3	61.1	76.0	59.4	58.7	65.7	88.3
	South	98.6	98.6	83.1	76.7	96.4	84.9	79.8	79.8	84.3
Classroom Type	Port	91.2	98.1	96.2	76.1	93.1	77.5	70.3	75.5	82.6
	Trad	88.8	98.7	83.4	67.3	85.5	73.3	72.9	74.1	87.5

* (a) other VOCs, (b) carbon tetrachloride and tetrachloroethylene, (c) chloroform

Table 3-8. Weighted Overall Classroom-Level Response Rates for Laboratory and Monitoring Data

Classification	Category	Any School Data	Indoor Air Pollen/ Spores	Indoor Air Aldehydes	Indoor Dust Allergens	Indoor Air VOCs (a)*	Indoor Air VOCs (b)*	Indoor Air VOCs (c)*	Indoor Air CO2	Indoor Air Temp &RH	Indoor Air Particles
Overall		83.0	74.4	81.7	73.0	58.6	73.3	62.2	59.8	61.9	71.2
School Type	Elem	89.8	78.7	88.3	86.5	54.6	74.7	57.8	60.9	63.5	77.9
	Middle	76.3	75.5	75.5	62.5	59.7	75.0	68.7	54.4	56.7	58.9
	High	69.7	59.1	68.8	47.6	64.8	64.8	63.0	60.5	61.1	65.4
School Location	Urban	92.4	91.8	91.8	91.8	38.3	92.4	38.3	76.5	78.0	75.5
	Suburb	79.3	71.2	77.8	66.8	60.6	68.1	62.1	56.7	58.3	68.5
	Rural	100.0	62.1	100.0	99.8	46.6	100.0	78.0	48.3	60.1	89.4
Geographic Region	North	84.5	62.9	83.1	81.4	51.7	64.2	50.2	49.7	55.6	74.6
	South	81.7	80.6	80.6	67.9	62.7	78.8	69.4	65.2	65.2	68.9
Classroom Type	Port	83.0	75.7	81.4	79.9	63.1	77.3	64.4	58.4	62.6	68.5
	Trad	83.0	73.7	81.9	69.2	55.8	71.0	60.8	60.5	61.5	72.6

* (a) other VOCs, (b) carbon tetrachloride and tetrachloroethylene, (c) chloroform

Appendix C results include the following characteristics for the target population of schools:

- These schools are about equally split between Northern and Southern California (45.5% in the north and 54.5% in the south).
- These schools are mostly suburban schools (75.8% suburban, 17.1% urban, and 7.2% rural).
- These schools are mostly elementary schools (59.2% elementary, 20.7% middle, and 20.1% high school, based on the highest grade offered).
- Many of these schools (40.1%) have 30 or fewer total classrooms, but 4.4% are estimated to have over 30 portable classrooms.
- Most of these schools (87.9%) report that they perform regular HVAC inspection and maintenance.
- About half (58.7%) report that they keep HVAC maintenance logs, which are required by State regulations.
- Many of these schools (41.7%) are aware of EPA's Tools for Schools program, but few (18.7%) reported that they were using these tools.

These results are consistent with the Phase I findings, except that the awareness and use of the EPA's Tools for Schools program has increased slightly.

Several differences are noted between the proportions of schools that reported environmental problems with, or complaints regarding, environmental conditions in their portable and traditional classrooms in the past year. Table 3-9 shows that higher percentages of schools reported environmental problems and complaints regarding environmental conditions for their portable classrooms. Higher percentages of schools reporting problems or complaints regarding their portable classrooms is consistent with the Phase I findings; however, the percentages of schools reporting problems or complaints is uniformly lower for both portable and traditional classrooms.

Table 3-9. Percentages of Schools Reporting Environmental Problems or Complaints in the Past Year

Problem/Complaint	Portable (%)	Traditional (%)
Roof leak	24.3	12.0
Plumbing leak	4.3	2.6
Air quality/odor complaint	20.2	7.0
Mold complaint	13.4	4.4
Temperature complaint	15.8	17.2
Noise complaint	4.3	0.1
Environmental conditions complaint	32.2	18.9

As noted in the Phase I report, these school-based results must be interpreted with caution because of differences in the numbers of portable and traditional classrooms in the schools and because of differences in the reported frequencies of complaints for the two types of classrooms. It is more appropriate to compare the classrooms using the classroom-level data.

At the classroom level, most types of environmental complaints were reported by at least half of the teachers, in both portable and traditional classrooms (Table 3-10). Moisture-related problems such as leaks and floods were reported in about one-third of the classrooms. Also, a large fraction of teachers in portable classrooms (68%) reported that they turn off the HVAC system due to high noise levels, an activity that had previously been reported anecdotally, and observed in Phase I and in other studies. This behavior was reported significantly less often for traditional classrooms (42%).

Table 3-10. Percentages of Teachers Reporting Environmental Problems or Complaints Currently or Previously

Problem/Complaint	Portable (%)	Traditional (%)
Stuffy air	53.0	50.7
Musty odor	66.6	62.9
Roof leaks, plumbing leaks, or flood	32.1	43.3
Insects	69.5	67.6
Noise from HVAC (turned off HVAC)	68.3	42.2
Lighting	66.9	74.1

3.4 General Classroom Characteristics Based on Responses to Questionnaires and Checklists

Part 1 of Appendix D characterizes the population of eligible classrooms for selected items from the various data collection forms. Some of the general characteristics estimated for this classroom population are as follows:

- About 63.1% of the classrooms are located in Southern California.
- These classrooms are mostly in suburban schools (75.5% suburban, 17.8% urban, and 6.6% rural).
- These classrooms are mostly in elementary schools (59.0% elementary, 22.9% middle, and 18.1% high school, based on the highest grade offered).
- The estimated distribution of the height of the foundation skirt for portable classrooms is as follows: 42.6% are less than 2", 22.2% are from 2" to 12", and 35.2% are over 12".

The first three results are comparable to those observed in Phase I of the study (skirt height data were not collected in Phase I).

General classroom characteristics that were found to be significantly different (at the 5% significance level) between traditional and portable classrooms are summarized in Table 3-11. This table shows that:

- Portable classrooms usually were newer than traditional classrooms (29.1% versus 83.4% over 15 years old).
- Portable classrooms are much more likely to have had a major addition or replacement in the past 3 years (83.6% portable classrooms versus none observed for traditional classrooms).

- Portable classrooms were more likely to have carpet or rugs on the floor (82.0% versus 62.9%).
- Portable classrooms were more likely to have water stains on the floor (13.1% versus 2.0%).
- Portable classrooms were more likely to have tack board, fiber/particle board, or plywood walls, whereas traditional classrooms were more likely to have sheetrock, plaster, or other wall material.
- Portable classrooms were less likely to have chalk in the room (21.6% versus 40.8%).
- Portable classrooms were more likely to have pressed wood bookcases in the room (73.1% versus 49.8%).
- Portable classrooms were more likely to have a metal roof (28.5% versus 2.5%).
- Portable classrooms were used somewhat less frequently for general classroom instruction (87.9% versus 96.5%).

Table 3-11. Estimated Distributions for General Classroom-level Variables That are Significantly Different by Room Type

Classification Variable	p-Value Wald Chi^2	Category	Sample Size	All Classrooms	Portable Classrooms	Traditional Classrooms
Classroom age (yrs)	0.00	0-3yr	16	5.9	10.3	3.3
		4-5yr	26	15.4	28.5	7.7
		6-10yr	16	8.7	19.6	2.3
		11-15yr	21	6.7	12.5	3.3
		16+yr	57	63.4	29.1	83.4
Major addition or replacement (3 yrs)	0.00	Some	32	13.4	83.6	0.0
		None	7	4.3	16.4	1.9
		NA	53	82.4	0.0	98.1
Carpet/rugs on floor	0.02	Yes	155	69.7	82.0	62.9
		No	43	30.3	18.0	37.1
Water stains on floor	0.01	Yes	21	5.9	13.1	2.0
		No	170	94.1	86.9	98.0
Tackboard walls	0.01	Yes	56	23.5	36.5	16.4
		No	143	76.5	63.5	83.6
Fiber/particle board or plywood walls	0.01	Yes	97	41.4	56.9	32.8
		No	102	58.6	43.1	67.2
Sheetrock or plaster walls	0.00	Yes	33	33.1	3.2	49.6
		No	166	66.9	96.8	50.4
Other wall material	0.00	Yes	41	27.1	8.0	37.5
		No	158	72.9	92.0	62.5
Chalk in room	0.04	Yes	53	34.0	21.6	40.8
		No	145	66.0	78.4	59.2
Bookcase -- pressed wood	0.02	Yes	137	58.2	73.1	49.8
		No	61	41.8	26.9	50.2
Type of roof	0.00	Tar&gravel	101	57.2	58.2	56.6
		Metal	32	12.1	28.5	2.5
		Other/DK	54	30.7	13.3	40.8
General instruction classroom	0.05	Yes	177	93.5	87.9	96.5
		No	17	6.5	12.1	3.5

3.5 HVAC Characteristics

Parts 1, 2, and 6 of Appendix D characterize the population of eligible classrooms for selected items from the various data collection forms, including items related to HVAC systems. Items related to the condition and operation of the HVAC systems serving these classrooms are shown in Tables 3-10 and 3-12. The following differences between portable and traditional classrooms were observed to be significant at the 5% level regarding HVAC characteristics:

- Teachers were more likely to turn off the HVAC system due to high noise levels in portable classrooms (68.3% versus 42.2%).
- The HVAC unit was more likely to be wall mounted for portable classrooms (79.8% versus 9.3%).
- The HVAC unit was more likely to be a heat pump for portable classrooms (96.4% versus 76.9%).
- The heating fuel was more likely to be electricity for portable classrooms (98.1% versus 79.3%).
- The air handling unit was more likely to have good access to its interior for portable classrooms (66.1% versus 35.3%).
- The air filter was more likely to have a light loading of dirt for portable classrooms (51.6% versus 42.9%).
- The size of the gap around the filter was more likely to be less than 1/2" for portable classrooms (71.6% versus 46.3%).
- Mildew or mold was more likely to be found on the filter for portable classrooms (1.3% versus none observed for traditional classrooms).
- The HVAC unit was less likely to have clean condensate drain pans and lines for portable classrooms (30.0% versus 56.7%).
- The HVAC unit was more likely to have standing water in the drain test for portable classrooms (55.3% versus 11.1%).
- A blocked drain was more likely to be observed during the drain test for portable classrooms (36.6% versus 6.8%).
- The HVAC unit was more likely to fail the drain test for portable classrooms (58.5% versus 12.4%).
- The air intake for 11 classrooms was blocked, 10 portables and 1 traditional. The estimated population percent with blocked air intake is 5.6% for all classrooms, 10.8% for portable classrooms, and 2.7% for traditional classrooms.

Appendix D also contains distributional statistics (in Parts 2-5 of the appendix) and hypothesis test results (in Part 6) for the following continuous measurements regarding performance of the HVAC systems serving the sample classrooms:

- Outdoor air flow in three different metrics (cubic feet per minute [cfm], cfm per chair, and cfm per square foot of classroom area).
- Total supply air flow (cfm).
- Age of the HVAC unit (years).

Table 3-12. Estimated Distributions for HVAC Classroom-level Variables that are Significantly Different by Room Type

Classification Variable	p-Value Wald Chi^2	Category	Sample Size	All Classrooms	Portable Classrooms	Traditional Classrooms
Turn off heat/AC due to noise (teacher)	0.02	Yes	106	51.6	68.3	42.2
		No	66	48.4	31.7	57.8
Air handling unit location	0.00	Wall	109	35.0	79.8	9.3
		Window	1	0.8	0.0	1.2
		Rooftop	40	37.2	11.9	51.8
		Other/NA	34	27.0	8.3	37.7
Type heating system	0.05	Forced_air	2	1.6	0.0	2.4
		Radiant	6	4.8	1.1	6.8
		Heat_pump	167	83.9	96.4	76.9
		Other/NA	12	9.8	2.5	13.9
Heating fuel	0.01	Electricity	166	85.9	98.1	79.3
		Natural_gas	19	12.1	1.9	17.6
		Other/NA	3	2.0	0.0	3.1
Ease of access to AHU interior	0.00	Good	105	46.9	66.1	35.3
		Fair	48	29.5	27.3	30.9
		Poor/None	32	23.6	6.7	33.8
Dirt loading on filter	0.01	Heavy	22	8.7	8.6	8.7
		Medium	40	22.7	31.6	17.9
		Light	98	45.9	51.6	42.9
		DK/NA	28	22.8	8.2	30.5
Size of gap around filter	0.01	>=1/2in.	22	11.8	14.3	10.5
		<1/2in.	121	55.4	71.6	46.3
		None	25	12.0	10.5	12.8
		DK/NA	21	20.9	3.6	30.4
Mold or mildew on filter	0.01	Yes	1	0.5	1.3	0.0
		No	162	83.5	96.7	76.6
		DK/NA	19	16.0	1.9	23.4
Clean condensate drain pans & lines	0.00	Yes	72	46.6	30.0	56.7
		No	101	53.4	70.0	43.3
Standing water in drain test	0.00	Yes	62	26.9	55.3	11.1
		No	54	29.6	19.3	35.3
		NA	71	43.5	25.3	53.6

Classification Variable	p-Value Wald Chi^2	Category	Sample Size	All Classrooms	Portable Classrooms	Traditional Classrooms
Blocked drain in drain test	0.00	Yes	43	17.5	36.6	6.8
		No	73	39.0	38.1	39.5
		NA	71	43.5	25.3	53.6
Drain test failure	0.00	Yes	68	28.8	58.5	12.4
		No	48	27.7	16.2	34.0
		NA	71	43.5	25.3	53.6

None of these variables were significantly different (at the 5% level) between portable and traditional classrooms. The mean age of the HVAC units serving portable classrooms was 10.1 years, whereas the mean age was 11.3 years for HVAC units serving traditional classrooms. Table 3-13 summarizes the mean air flow measurements, expressed as outdoor air flow and total supply air flow. For all expressions of air flow, it can be seen that the average air flow in the portable classrooms was greater than the air flow measured in the traditional classrooms, but the differences were not statistically significant at the 0.05 level. One difference was significant at the 0.10 level of significance. (See discussion of CO_2 in Section 3.9 below.)

Table 3-13. Summary of Air Flow Measurements

Air Flow Measurement	Type of Classroom	Est. No. of Classrooms	Mean
Outdoor Air Flow (cfm)	All	118,745	808.7
	Portable	56,653	828.2
	Traditional	62,093	790.9
Outdoor Air Flow (cfm/chair)	All	105,107	24.4
	Portable	54,256	25.4
	Traditional	50,852	23.4
Outdoor Air Flow (cfm/sq. ft.)*	All	109,380	0.87
	Portable	53,766	0.95
	Traditional	55,615	0.80
Total Supply Air Flow (cfm)	All	134,747	593.0
	Portable	59,785	636.3
	Traditional	74,962	558.5

*Significant difference ($p<0.10$) between portable and traditional classrooms.

Part 2 of Appendix D provides estimates of the mean and selected percentiles for these measures separately for all classrooms, portable classrooms, and traditional classrooms. Part 3 of Appendix D provides 95% confidence interval estimates for these same parameters. Part 4 subdivides the estimates further by HVAC mode (heating, cooling, or fan only) but restricts the percentiles for which estimates are provided to the 25th, 50th, and 75th percentiles because of sample size limitations. Part 5 then provides 95% confidence interval estimates of these parameters.

3.6 Indoor Environmental Quality: Light and Noise

The Teacher Questionnaire analysis in Appendix D includes one item regarding whether or not the classroom lighting was satisfactory and one item regarding noise levels. There was no significant difference between portable and traditional classrooms for the teachers' opinions regarding whether or not the classroom lighting was satisfactory. In both cases, most teachers thought the classroom lighting was satisfactory. However, as noted in Section 3.5, teachers in portable classrooms were significantly more likely to turn off the HVAC system due to high noise levels (68.3% versus 42.2%).

Classroom environmental measurements also included light and noise measurements. The light intensity was measured in the middle of the classroom. The mean light intensity was significantly higher for traditional classrooms than for portable classrooms (65.2 versus 55.7 foot-candles). Noise was measured when the HVAC unit was on and again when it was off at two classroom locations: near the center of the classroom and 10 ft from the HVAC return register. In addition, noise was measured outdoors near the HVAC unit both while it was on and while it was off. As shown in Part 6 of Appendix D, none of these six measurements were significantly different (at the 5% significance level) between portable and traditional classrooms. However, the mean noise level was higher at the 0.10 level near the HVAC return register for portables when the HVAC unit was off. Conversely, the mean noise level measured near the center of the classroom was slightly higher in traditional classrooms than in portable classrooms (56.6 versus 56.0). Perhaps this difference reflects the teachers' higher likelihood for turning off the HVAC in portable classrooms (68.3%, versus 42.2% in traditional classrooms).

The Illuminating Engineering Society of North America (IESNA, 2000) suggests light readings greater than 30 foot-candles for viewing materials of high contrast. Measurement results indicate 11 portable classrooms (8.8%) and 3 traditional classrooms (4.4%) did not meet this lighting guideline. IESNA also has a recommendation that greater than 50 foot-candles of light are needed for viewing material of high contrast and small size, or of low contrast and large size. Classroom measurements reveal that 49 Portable classrooms (38.3%) and 17 traditional classrooms (27.2%) did not meet this level of lighting. Thus a higher percentage of the sample portable classrooms failed to meet both recommended levels of classroom lighting than the traditional classrooms.

The American National Standards Institute, Acoustics Society of America (ANSI/ASA, 2002) and the World Health Organization (WHO, 1999) provide classroom acoustics standard guideline values of #35 dBA. All the measured classrooms, both portable and traditional, exceeded this value. Crandell (1992) suggests a value of #45 dBA for unoccupied classrooms. All the portable classrooms exceeded this value, as did 54 traditional classrooms (91.8%). The City of Sacramento and the City of Davis California provide an upper limit standard for nuisance-based outdoor noise of #55 dBA, which is the same value as WHO's Community guidelines for school playgrounds and outdoor areas. Applying this value to the measured indoor noise levels, 61 portable (50%) and 22 traditional (37.5%) classrooms exceeded the guideline value. More portable classrooms failed to meet the recommended guideline value for noise than traditional classrooms.

3.7 Indoor Environmental Quality: Temperature

The Q-Trak monitors provided 1-minute temperature readings for both inside classrooms and outside the sample schools. These data were summarized for each classroom and school in terms of several overall characteristics (e.g., average temperature over the time window of 7am-4pm, or that portion monitored). Hour-specific averages were also determined. All of these measures were then summarized over classrooms or schools. The detailed results are presented in Appendix F, as follows:

Indoor temperature data:

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary temperature measures – for all classrooms and for portables and traditionals.
- Approximate 95% confidence intervals for these parameters (where appropriate).
- Tests (approximate t tests) of differences in the means of the measures for portable and traditional classrooms.

Outdoor temperature data:

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary temperature measures.
- Approximate 95% confidence intervals for these parameters (where appropriate).

Tables 3-14 and 3-15 summarize the major temperature results. For each of the selected measures, Table 3-14 gives the estimated number of classroom represented, along with the number of sample classrooms (n), the weighted mean, median, and 95th percentile. Table 3-15 presents similar results for the outdoor data.

Statistically significant differences between portable and traditional classroom were determined for three of the selected measures:

- Portable classrooms had temperatures below 17˚C (62.6˚F) for more of the time (0.01 level): 6.3% versus 3.2%.
- Portable classrooms had temperatures below 20˚C (68˚F) for more of the time (0.05 level): 27.0% versus 17.0%.
- The mean of the minimum 5-minute temperatures was 17.1˚ (62.8˚F) for portable classrooms versus 17.9˚ (64.2˚F) for traditionals.

Hourly data summaries are given in Appendix F.

Table 3-14. Summary of Indoor Temperature Data

Variable Description	Room Type	n	Est. No. Classrm	Mean	50th Pctl	95th Pctl
% time TEMP<17 deg C (63˚F)**	All	148	195769	4.3	N	28.3
	Port	102	69447	6.3	N	36.0
	Trad	46	126322	3.2	N	16.3
% time TEMP<20 deg C (68˚F)*	All	148	195769	20.5	10.7	80.5
	Port	102	69447	27.0	16.8	95.9
	Trad	46	126322	17.0	5.6	69.6
% time TEMP>23 deg C (73˚F)	All	148	195769	27.2	15.6	81.7
	Port	102	69447	27.0	19.8	70.4
	Trad	46	126322	27.3	14.6	84.2
% time TEMP>26 deg C (79˚F)	All	148	195769	4.4	N	28.5
	Port	102	69447	2.5	N	11.2
	Trad	46	126322	5.4	N	27.7
% time TEMP>29 deg C (84˚F)	All	148	195769	2.3	N	9.6
	Port	102	69447	0.8	N	N
	Trad	46	126322	3.1	N	10.2
Avg temperature (deg C)	All	148	195769	21.8	21.9	24.0
	Port	102	69447	21.4	21.5	23.5
	Trad	46	126322	22.0	21.9	24.0
Max 5-min avg TEMP (deg C)	All	148	195769	24.7	24.5	30.8
	Port	102	69447	24.6	24.5	28.6
	Trad	46	126322	24.7	23.9	30.7
Min 5-min avg TEMP (deg C)*	All	148	195769	17.6	18.0	21.1
	Port	102	69447	17.1	17.6	20.7
	Trad	46	126322	17.9	18.0	21.7
Max hourly avg TEMP (deg C)	All	148	195769	23.3	23.1	26.7
	Port	102	69447	23.2	23.2	26.3
	Trad	46	126322	23.3	22.9	26.7
Min hourly avg TEMP (deg C)	All	148	195769	19.8	20.1	22.5
	Port	102	69447	19.2	19.4	22.3
	Trad	46	126322	20.1	20.3	23.0

*Statistically significant difference in means for portables and traditionals (p=0.05).
** Statistically significant difference in means for portables and traditionals (p=0.01).
N=percentile not estimable.

Table 3-15. Summary of Outdoor Temperature Data

Variable Description	n	Est. No. Schools	Mean	50th Pctl	95th Pctl
Avg temperature (deg C)	52	6506	18.2	14.7	30.2
Max 5-min avg TEMP (deg C)	52	6506	22.6	20.5	35.4
Min 5-min avg TEMP (deg C)	52	6506	12.7	12.8	22.5
Max hourly avg TEMP (deg C)	52	6506	21.2	18.3	34.4
Min hourly avg TEMP (deg C)	52	6506	14.6	13.6	26.8

3.8 Indoor Environmental Quality: Relative Humidity

The Q-Trak monitors were used to also capture relative humidity (RH) data. These data were processed similarly to the temperature data. A significant number of outdoor RH data points were not acquired, so that weighted data analyses for those data were not performed. Appendix F contains the detailed results.

Tables 3-16 and 3-17, which are structured similarly to those for temperature, show the indoor and outdoor RH results, respectively. None of the selected measures exhibited statistically significant differences between the means of the two types of classrooms. However, the portables were estimated to have RH levels over 60% more of the time (an average 16.9% versus 12.6% for traditionals). Average RH levels were about 46%.

Table 3-16. Summary of Indoor Relative Humidity Data

Variable Description	Room Type	n	Est. No. Classrms	Mean	50th Pctl	95th Pctl
% time Rel Humidity<30%	All	148	195769	11.3	N	N
	Port	102	69447	11.0	N	N
	Trad	46	126322	11.4	N	N
% time Rel Humidity>50%	All	148	195769	45.3	29.3	N
	Port	102	69447	44.7	39.8	N
	Trad	46	126322	45.6	20.3	N
% time Rel Humidity>60%	All	148	195769	14.1	0.5	69.5
	Port	102	69447	16.9	0.3	91.5
	Trad	46	126322	12.6	0.9	57.5
Avg relative humidity (%)	All	148	195769	46.2	48.6	62.8
	Port	102	69447	46.8	48.6	63.6
	Trad	46	126322	45.9	46.7	61.4
Max 5-min avg rel. humidity	All	148	195769	58.1	59.4	82.1
	Port	102	69447	57.5	58.6	78.1
	Trad	46	126322	58.4	61.4	82.2
Min 5-min avg rel. humidity	All	148	195769	38.9	40.4	55.1
	Port	102	69447	39.4	41.8	56.2
	Trad	46	126322	38.7	40.0	53.7

Variable Description	Room Type	n	Est. No. Classrms	Mean	50th Pctl	95th Pctl
Max hourly avg rel. humidity	All	148	195769	50.3	52.6	69.8
	Port	102	69447	50.8	52.6	69.7
	Trad	46	126322	50.0	50.7	68.6
Min hourly avg rel. humidity	All	148	195769	41.7	43.8	57.7
	Port	102	69447	42.4	44.1	61.3
	Trad	46	126322	41.3	43.0	55.3

Tests of means showed no significant differences between portable and traditional classrooms.
N=percentile not estimable.

Table 3-17. Summary of Outdoor Relative Humidity Data

Variable Description	n	Est. No. Schools	Mean	50th Pctl	95th Pctl
Avg relative humidity (%)	28	28	47.9	48.6	72.3
Max 5-min avg rel. humidity	29	29	68.2	70.5	93.1
Min 5-min avg rel. humidity	29	29	36.8	36.5	64.8
Max hourly avg rel. humidity	29	29	61.7	62.2	88.9
Min hourly avg rel. humidity	29	29	39.5	40.2	68.0

3.9 Indoor Environmental Quality: CO_2 in Air

The real-time CO_2 data were processed in a manner similar to the temperature and RH data and detailed results are provided in Appendix F. Tables 3-18 and 3-19 summarize the overall CO_2 levels indoors and outdoors, respectively. None of the means of the selected measures were judged to be statistically different between the portable and traditional classrooms. Average indoor levels (1070 ppm) were more than twice as high as outdoor levels (427 ppm). The percent of time that CO_2 concentrations exceeded 1000 ppm in California classrooms averaged about 43%. The percent of time that CO_2 concentrations exceeded 2000 ppm was, on average, 9.2 percent for the portable classrooms and 10.1 percent for the traditional classrooms. These results indicate that a number of classrooms often suffer from inadequate ventilation.

3.10 Indoor Environmental Quality: Particle Counts

One-minute particle counts were obtained every five minutes for each of several size fractions. These data were summarized for each classroom (and outdoors) to produce some summary measures, by hour and overall (7am-4pm) as described in Section 2.7. Characteristics of the distributions of these summary measures were then determined for all classrooms and each type of classroom. The details are in Appendix F.

Table 3-18. Summary of Indoor CO_2 Data

Variable Description	Room Type	n	Est. No. Classrms	Mean	50th Pctl	95th Pctl
% time CO2 conc>1000 ppm	All	136	195769	42.8	39.7	95.9
	Port	92	69447	42.1	41.4	86.6
	Trad	44	126322	43.2	39.5	96.0
% time CO2 conc>2000 ppm	All	136	195769	9.8	N	51.4
	Port	92	69447	9.2	N	40.5
	Trad	44	126322	10.1	N	N
Avg CO2 conc (ppm)	All	136	195769	1070.3	959.8	2030.7
	Port	92	69447	1063.5	947.4	1827.3
	Trad	44	126322	1074.1	959.9	N
Max 5-min avg CO2 conc (ppm)	All	136	195769	1770.7	1574.2	3131.1
	Port	92	69447	1898.9	1727.3	3845.4
	Trad	44	126322	1700.3	1542.7	2943.6
Max hourly avg CO2 conc (ppm)	All	136	195769	1489.1	1344.0	2718.5
	Port	92	69447	1555.6	1305.8	2744.1
	Trad	44	126322	1452.5	1333.0	2711.3

Tests of means showed no significant differences between portable and traditional classrooms.
N=percentile not estimable.

Table 3-19. Summary of Outdoor CO_2 Data

Variable Description	n	Est. No. Schools	Mean	50th Pctl	95th Pctl
Avg CO2 conc (ppm)	49	6506	426.5	424.0	510.5
Max 5-min avg CO2 conc (ppm)	49	6506	521.1	504.7	655.3
Max hourly avg CO2 conc (ppm)	49	6506	456.3	459.1	529.5

Table 3-20 summarizes the results in terms of the weighted means, medians, and 95th percentiles of the various measures. None of the means for particle count measures differed significantly between portables and traditionals. There are large differences in estimated 95 percentile values, with the portable classrooms greater than the traditional classrooms, especially for particles of 2.5 µm or less. Table 3-21 shows comparable statistics for the outdoor particle-count data. In both Tables 3-20 and 3-21, observations were considered valid if particle counts were available for at least 240 minutes within the 7 am – 4 pm time window.

Table 3-20. Summary of Indoor Particle Count Data

Variable Description	Room Type	n	Est. No. Classrms	Mean	50^{th} Pctl	95^{th} Pctl
0.5-2.5 um particles/min	All	169	195769	43863	19552	233869
	Port	113	69447	52683	25108	270444
	Trad	56	126322	39015	17616	119291
2.5-5.0 um particles/min	All	169	195769	2157.8	1545.0	6147.2
	Port	113	69447	2072.9	1804.4	4221.8
	Trad	56	126322	2204.4	1461.4	N
5-10 um particles/min	All	169	195769	607.5	444.6	1784.3
	Port	113	69447	589.7	567.2	1162.9
	Trad	56	126322	617.3	424.1	N
>10 um particles/min	All	169	195769	87.8	45.2	318.5
	Port	113	69447	59.4	33.9	250.7
	Trad	56	126322	103.4	55.7	N
<=10 um particles/min	All	169	195769	46629	22988	236032
	Port	113	69447	55345	27203	274934
	Trad	56	126322	41837	20774	121456

Tests of means showed no significant differences between portable and traditional classrooms.
N=percentile not estimable.

Table 3-21. Summary of Outdoor Particle Count Data

Variable Description	n	Est. No. Schools	Mean	50^{th} Pctl	95^{th} Pctl
0.5-2.5 um particles/min	50	6506	79439	37539	364679
2.5-5.0 um particles/min	50	6506	1470.8	948.8	4722.8
5-10 um particles/min	50	6506	182.0	97.2	556.8
>10 um particles/min	50	6506	53.9	26.4	165.0
<=10 um particles/min	50	6506	81092	38482	366973

3.11 Indoor Environmental Quality: Pollens and Spores in Air

Pollens and spores levels in air were determined via analysis of Allergengo slides. These species can be sources of allergic reactions in sensitive people, and some can provide evidence of a potential moisture source or related problem.

Appendix E provides the following detailed results for the pollens and spores data (and the chemical data described in subsequent subsections):

- Part 1: Weighted summary statistics (sample size [n], percentage measurable, mean, and selected percentiles) for outdoor data, by medium and species. The target population is the eligible schools.
- Part 2: Approximate 95% confidence intervals for the percent measurable, mean, and percentiles.

- Part 3: Weighted summary statistics (sample size [n], percentage measurable, mean, selected percentiles) for indoor data, by medium and species. The target population is the eligible classrooms. Statistics are reported for all classrooms and for portables and traditionals.
- Part 4: Approximate 95% confidence intervals for the percent measurable, mean, and percentiles.
- Part 5: Tests (approximate t tests) of differences in weighted means for portable and traditional classrooms, by medium and species.

Table 3-22 summarizes the results for both outdoor and indoor air levels. In general, there were few spore types that were observed frequently in either the outdoor or indoor environments. Specifically, in the outdoor environment, only six were frequently seen. Amerospores, Ascospores, Cladosporium, Mycelial Fragments, Pollen Count, and Total Fungal Spores were observed in at least 80% of the slides. Five of these six (all but Ascospores) were also found at least 80% of the time in the indoor classroom slides. There were no significant differences (at the 5% level) between portable and traditional classrooms.

3.12 Indoor Environmental Quality: Aldehydes in Air

Aldehydes have been shown to result in various health effects, including skin, eye, and respiratory irritants, as well as probable cancer. As indicated above, aldehyde air samples were collected at the (usually) three classrooms and at one outdoor location. Fourteen specific aldehydes were included in the analysis. However, as noted before, acetone was excluded. In the indoor air, valid concentration data were obtained for 199 classrooms. However, only two of the aldehydes were detected in more than 75% of the samples, formaldehyde and acetaldehyde. The mean, median, and 95th percentiles (weighted analysis) are reported in Table 3-23 and more detailed results are included in Appendix E.

Major results from Table 3-23 are:

- For virtually all of the aldehydes, the indoor levels were higher than the outdoor levels, indicating the presence of indoor sources that contribute to the measured levels. Formaldehyde, for example, had a an overall mean level of 13.3 ppb indoors, but only 3.5 ppb outdoors, while the indoor-air 95th percentile was 3 times higher than the outdoor.
- Statistically significant differences (0.05 level of significance) between mean levels of portable and traditional classrooms occur for two analytes:
- Formaldehyde (mean of 15.1 for portables versus 12.3 ppb for traditionals)
- o,p-tolualdehyde, although this analyte has a low percent measurable (~20%).
- Two other comparisons show statistically higher levels in portable classrooms than in traditional classrooms at the 0.10 level of significance: acetaldehyde and 2,5-dimethylbenzaldehyde.

Table 3-22. Summary of Pollen/Spores in Air (log_{10} [Count/m^3])

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Alternaria	Outdr	6506	62	71.4	1.15	0.91	2.88
	All	195769	185	65.0	0.79	0.83	1.72
	Port	69447	126	63.3	0.73	0.83	1.57
	Trad	126322	59	65.9	0.83	0.83	1.77
Amerospores	Outdr	6506	62	88.7	1.74	1.85	2.48
	All	195769	185	84.5	1.57	1.76	2.59
	Port	69447	126	84.7	1.59	1.82	2.69
	Trad	126322	59	84.4	1.56	1.72	2.41
Arthrinium	Outdr	6506	62	18.9	0.23		1.44
	All	195769	185	11.4	0.11		0.78
	Port	69447	126	11.1	0.11		0.81
	Trad	126322	59	11.5	0.11		0.65
Ascospores	Outdr	6506	62	82.6	1.59	1.72	3.14
	All	195769	185	71.8	0.92	0.92	1.95
	Port	69447	126	68.1	0.88	0.88	1.84
	Trad	126322	59	73.8	0.93	0.93	1.87
Aspergillus/Penicillium-like	Outdr	6506	62	51.4	1.13	0.87	2.77
	All	195769	185	31.4	0.59		2.37
	Port	69447	126	33.3	0.63		2.37
	Trad	126322	59	30.3	0.57		2.27
Aureobasidium	Outdr	6506	62	0.0	0.00		
	All	195769	185	0.0	0.00		
	Port	69447	126	0.0	0.00		
	Trad	126322	59	0.0	0.00		
Basidiospores	Outdr	6506	62	77.0	1.39	1.61	2.64
	All	195769	185	63.8	0.81	0.84	2.03
	Port	69447	126	72.3	0.86	0.84	2.00
	Trad	126322	59	59.2	0.79	0.74	2.11
Bipolaris/Dreschlera	Outdr	6506	62	47.9	0.63		2.27
	All	195769	185	44.7	0.47		1.69
	Port	69447	126	48.3	0.48		1.33
	Trad	126322	59	42.7	0.46		1.73
Botrytis	Outdr	6506	62	0.2	0.00		
	All	195769	185	0.5	0.00		
	Port	69447	126	1.6	0.01		
	Trad	126322	59	0.0	0.00		

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Chaetomium	Outdr	6506	62	15.0	0.14		0.81
	All	195769	185	4.0	0.04		
	Port	69447	126	5.9	0.05		0.82
	Trad	126322	59	3.0	0.03		
Cladosporium	Outdr	6506	62	97.7	2.64	2.60	3.61
	All	195769	185	94.2	1.85	1.91	2.80
	Port	69447	126	89.7	1.76	1.84	2.75
	Trad	126322	59	96.6	1.90	1.93	2.80
Curvularia	Outdr	6506	62	16.7	0.20		1.20
	All	195769	185	19.5	0.21		1.11
	Port	69447	126	19.5	0.17		0.85
	Trad	126322	59	19.5	0.24		1.31
Epicoccum	Outdr	6506	62	0.0	0.00		
	All	195769	185	0.0	0.00		
	Port	69447	126	0.0	0.00		
	Trad	126322	59	0.0	0.00		
Fusarium	Outdr	6506	62	0.0	0.00		
	All	195769	185	0.0	0.00		
	Port	69447	126	0.0	0.00		
	Trad	126322	59	0.0	0.00		
Memnoniella	Outdr	6506	62	0.0	0.00		
	All	195769	185	0.0	0.00		
	Port	69447	126	0.0	0.00		
	Trad	126322	59	0.0	0.00		
Mycelial Fragments	Outdr	6506	62	97.8	1.42	1.26	3.11
	All	195769	185	98.6	1.26	1.24	1.78
	Port	69447	126	99.0	1.22	1.11	1.88
	Trad	126322	59	98.4	1.28	1.24	1.74
Nigrospora	Outdr	6506	62	23.1	0.34		1.81
	All	195769	185	12.2	0.11		0.76
	Port	69447	126	11.0	0.10		0.73
	Trad	126322	59	12.8	0.12		0.77
Oidium/Peronospora	Outdr	6506	62	17.7	0.16		0.88
	All	195769	185	3.7	0.03		
	Port	69447	126	2.0	0.01		
	Trad	126322	59	4.7	0.04		

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Pithomyces/Ulocladium	Outdr	6506	62	20.2	0.28		1.72
	All	195769	185	22.3	0.21		1.02
	Port	69447	126	25.5	0.22		0.93
	Trad	126322	59	20.6	0.20		1.10
Pollen Count	Outdr	6506	62	97.8	1.32	0.94	2.63
	All	195769	185	98.6	0.92	0.49	1.40
	Port	69447	126	99.0	0.90	0.51	1.28
	Trad	126322	59	98.4	0.94	0.49	1.89
Rusts	Outdr	6506	62	29.8	0.38		1.43
	All	195769	185	31.2	0.31		1.39
	Port	69447	126	31.5	0.31		1.16
	Trad	126322	59	31.1	0.32		1.45
Smuts/Myxomycetes	Outdr	6506	62	62.0	0.96	0.61	2.32
	All	195769	185	64.9	0.83	0.88	1.94
	Port	69447	126	58.1	0.74	0.72	1.87
	Trad	126322	59	68.7	0.88	1.00	1.97
Stachybotrys	Outdr	6506	62	3.2	0.03		
	All	195769	185	1.0	0.01		
	Port	69447	126	0.1	0.00		
	Trad	126322	59	1.5	0.01		
Stemphylium	Outdr	6506	62	3.8	0.07		
	All	195769	185	1.1	0.01		
	Port	69447	126	0.7	0.01		
	Trad	126322	59	1.3	0.01		
Torula	Outdr	6506	62	7.9	0.08		0.40
	All	195769	185	2.6	0.02		
	Port	69447	126	4.2	0.03		
	Trad	126322	59	1.8	0.01		
Total Fungal Spores	Outdr	6506	62	97.8	3.11	3.14	4.21
	All	195769	185	98.6	2.46	2.52	3.31
	Port	69447	126	99.0	2.46	2.45	3.37
	Trad	126322	59	98.4	2.46	2.56	3.29
Unidentified Conidia	Outdr	6506	62	21.7	0.23		1.15
	All	195769	185	12.1	0.11		0.83
	Port	69447	126	5.2	0.05		0.11
	Trad	126322	59	15.8	0.14		0.84

Note: From Allergenco Slides
Note: Blank cells indicate cases where the percentile could not be estimated.

Table 3-23. Summary of Aldehyde Concentrations in Air (ppb)

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Formaldehyde*	Outdr	6506	62	100.0	3.48	2.45	8.05
	All	195769	199	100.0	13.29	12.01	23.93
	Port	69447	135	100.0	15.07	14.49	25.78
	Trad	126322	64	100.0	12.31	11.62	22.35
Acetaldehyde	Outdr	6506	62	78.8	5.39	4.36	10.05
	All	195769	199	98.6	6.59	6.17	11.13
	Port	69447	135	100.0	7.02	6.22	12.31
	Trad	126322	64	97.8	6.35	6.09	10.40
Propionaldehyde	Outdr	6506	62	23.4	0.08		0.46
	All	195769	199	54.8	0.27	0.21	0.78
	Port	69447	135	47.0	0.23		0.67
	Trad	126322	64	59.1	0.29	0.22	1.20
Crotonaldehyde	Outdr	6506	62	18.9	0.26		0.99
	All	195769	199	19.5	0.28	0.15	0.94
	Port	69447	135	20.4	0.29	0.18	1.02
	Trad	126322	64	19.0	0.28	0.15	0.85
n-Butyraldehyde	Outdr	6506	62	7.8	0.02		0.05
	All	195769	199	38.9	0.15		0.57
	Port	69447	135	37.6	0.16		0.63
	Trad	126322	64	39.7	0.14		0.57
Benzaldehyde	Outdr	6506	62	21.5	0.09		0.55
	All	195769	199	45.3	0.30		0.97
	Port	69447	135	49.8	0.38	0.17	1.19
	Trad	126322	64	42.9	0.27		0.85
iso-Valeraldehyde	Outdr	6506	62	12.5	0.07		0.48
	All	195769	199	9.8	0.07		0.63
	Port	69447	135	7.6	0.05		0.56
	Trad	126322	64	11.0	0.07		0.62
Valeraldehyde	Outdr	6506	62	10.1	0.01		0.14
	All	195769	199	32.7	0.11		0.39
	Port	69447	135	35.2	0.13		0.51
	Trad	126322	64	31.4	0.10		0.37
Hexanaldehyde	Outdr	6506	62	30.4	0.15		0.82
	All	195769	199	72.9	0.78	0.76	1.86
	Port	69447	135	72.6	0.80	0.67	1.91

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
	Trad	126322	64	73.0	0.77	0.77	1.82
2,5-Dimethylbenzaldehyde	Outdr	6506	62	3.9	0.00		0.02
	All	195769	199	1.5	0.00		
	Port	69447	135	2.6	0.01		
	Trad	126322	64	1.0	0.00		
o,p-tolualdehyde*	Outdr	6506	62	1.7	0.00		
	All	195769	199	19.7	0.46		3.98
	Port	69447	135	24.6	0.91		5.27
	Trad	126322	64	17.0	0.21		0.73
m-Tolualdehyde	Outdr	6506	62	0.0	0.00		
	All	195769	199	13.9	0.50		5.10
	Port	69447	135	18.4	0.38		1.99
	Trad	126322	64	11.5	0.57		5.02

*Portables and traditionals significantly different (p=0.05)
Note: Blank cells indicate cases where the percentile could not be estimated.

The indoor formaldehyde levels were also compared to the draft 8-hour indoor reference exposure level for formaldehyde, 27 ppb (Broadwin, 2000). The percentages of classrooms exceeding 27 ppb were estimated as follows (bracketed values are approximate 95% confidence intervals):

Classroom Type	% > 27 ppb	
All	3.3	[0.0, 6.6]
Portable	4.4	[0.4, 8.4]
Traditional	2.7	[0.0, 6.4]

The distributions of formaldehyde measurements from Phase I and Phase II of this study are compared in Table 3-23. As discussed in Section 2.3.2, it is important to remember the many differences in the data collection methods and protocols when interpreting these data. The Phase I measurements were obtained using PF-1 passive monitoring tubes, which were hung in the sample classrooms for 7 to 10 days, including nights and weekends when the schools were closed and HVAC systems may have been off. In contrast, the Phase II measurements were obtained using an active monitoring device during the 6 to 8 hours when classes were in session and HVAC systems were operating normally. Moreover, the Phase I measurements were obtained in the spring and early summer, whereas the Phase II measurements were obtained in the fall and winter. Given these differences (colder weather and better air exchange during the monitoring period), it is not surprising that the Phase II formaldehyde concentrations are considerably lower than those observed in Phase I, especially at the 95th percentile level.

Table 3-24. Comparison of Phase I and Phase II Formaldehyde Distributions

	Sample size (n)		Mean (ppb)		Median (ppb)		95th Percentile (ppb)	
Location	Phase I	Phase II	Phase I	Phase II	Phase I	Phase II	Phase I	Phase II
Outdoor	NA	62	NA	3.48	NA	2.45	NA	8.05
All classrooms	911	199	27.0	13.29	22.0	12.01	61.7	23.93
Portable	644	135	32.4	15.07	27.1	14.49	71.5	25.78
Traditional	267	64	23.7	12.31	20.0	11.62	55.0	22.35

3.13 Indoor Environmental Quality: VOCs in Air

Similar to the aldehydes, several VOCs have been shown to result in various health effects, including skin, eye, and respiratory irritants, as well as probable cancer. VOC samples were collected in only about half of the sampled schools (usually inside three classrooms and at one outdoor location). Concentrations for nine specific VOC were obtained for the samples collected. Valid concentration data were obtained for varying numbers of classrooms, depending on the particular analyte (73 to 93 classrooms, and 26 to 34 outdoor sites). Seven of the nine had at least 80% of the measured levels above the detection limit. Only benzene and chloroform had less than 80% detectable. The means, medians, and 95th percentiles are shown in Table 3-25 for all the nine measured VOCs. (Detailed results are given in Appendix E.)

Unlike the aldehydes, there was a general tendency for the traditional classrooms to exhibit higher VOC concentrations than the portables. However, none of the differences in mean concentrations were significant statistically, even at a significance level of 0.10. As in most indoor air quality studies, the measured indoor VOC concentrations were higher than those observed outdoors.

3.14 Indoor Environmental Quality: Metals in Floor Dust

Exposure to metals has been shown to be associated with asthma, as well as neurological and developmental effects. For the PCS, metals analyses were obtained from samples collected from floor dust in the classrooms sampled. As noted in Section 2, chemical analysis of dust was done for only a subset of classrooms and dust from the portable classrooms in a given school were composited prior to chemical analysis. Hence population-based weighting (and thus inferences) was not possible and formal testing of differences by classroom type are not considered valid. The data were, however, weighted to reflect the varying numbers of classrooms from school to school and by type of classroom (i.e., inferences are restricted to all classrooms in those schools for which data were obtained).

Tables 3-26 and 3-27 provide a summary of the metal concentration data and the metal loading data, respectively, for the classroom floor dust. Fifteen of the 18 elements were above the detection limit for all of the samples analyzed. The only three metals that were not always above the detection limit were selenium (54%), cobalt (64%), and palladium (34%). For the elements always above the detection limit, the median portable-classroom *concentration* was greater than the median traditional-classroom concentration for 8 of the 15 elements (arsenic, chromium, copper, manganese, vanadium, cesium, iron and strontium. Conversely, the traditionals' medians were higher than the portables' medians for 7 elements (cadmium, lead, nickel, zinc, aluminum, magnesium, and titanium).

Table 3-25. Summary of VOC Concentrations in Air (: g/m^3)

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
1,1,1-Trichloroethane	Outdr	6506	28	100.0	1.04	0.88	2.80
	All	194792	78	100.0	1.05	0.65	2.80
	Port	73112	55	100.0	0.79	0.71	1.47
	Trad	121680	23	100.0	1.21	0.61	
Benzene	Outdr	5712	26	32.9	1.04	0.54	2.97
	All	179743	73	63.7	1.75	1.13	4.13
	Port	67612	51	66.6	1.26	0.93	3.00
	Trad	112131	22	62.0	2.05	1.17	4.62
Carbon tetrachloride	Outdr	6019	32	100.0	1.79	1.67	3.64
	All	179633	87	100.0	1.76	0.86	6.07
	Port	66836	61	100.0	1.35	1.18	2.64
	Trad	112797	26	100.0	2.00	0.76	7.99
Chloroform	Outdr	6506	28	41.9	0.45	0.27	
	All	195769	78	75.8	0.41	0.29	1.07
	Port	74089	54	81.7	0.30	0.25	0.44
	Trad	121680	24	72.2	0.48	0.28	
Ethylbenzene	Outdr	6506	28	100.0	0.79	0.73	1.44
	All	195769	79	100.0	1.85	1.17	2.25
	Port	74089	56	100.0	1.44	0.99	2.23
	Trad	121680	23	100.0	2.10	1.26	2.24
Tetrachloroethylene	Outdr	6506	34	100.0	1.08	0.54	3.59
	All	195769	93	100.0	1.40	1.13	3.16
	Port	74089	65	100.0	1.20	1.08	2.43
	Trad	121680	28	100.0	1.53	1.15	3.16
Toluene	Outdr	5712	26	40.3	2.47	2.11	5.45
	All	180175	73	89.7	6.32	5.62	12.25
	Port	68044	51	93.7	6.12	5.32	13.92
	Trad	112131	22	87.3	6.44	6.27	10.31
m,p-Xylene	Outdr	6506	28	100.0	1.99	2.09	3.66
	All	195769	79	100.0	5.17	3.09	7.07
	Port	74089	56	100.0	3.43	2.80	7.16
	Trad	121680	23	100.0	6.24	3.51	6.99
o-Xylene	Outdr	6506	28	100.0	0.86	0.81	1.65
	All	195769	79	100.0	1.94	1.32	2.87
	Port	74089	56	100.0	1.38	1.15	2.57
	Trad	121680	23	100.0	2.27	1.47	2.84

Note: Blank cells indicate cases where the percentile could not be estimated.

Table 3-26. Summary of Metal Concentrations in Floor Dust (µg/g)

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Arsenic	All	1152	78	100.0	11.57	11.60	17.27
	Port	412	40	100.0	12.74	12.77	18.61
	Trad	740	38	100.0	10.91	11.01	15.33
Cadmium	All	1152	78	100.0	5.00	3.55	13.33
	Port	412	40	100.0	4.81	3.21	8.13
	Trad	740	38	100.0	5.11	3.93	13.38
Chromium	All	1152	78	100.0	36.58	33.10	72.79
	Port	412	40	100.0	35.78	34.44	54.06
	Trad	740	38	100.0	37.02	30.89	73.96
Copper	All	1152	78	100.0	148.81	60.22	287.73
	Port	412	40	100.0	95.11	73.15	193.91
	Trad	740	38	100.0	178.70	57.38	209.41
Lead	All	1152	78	100.0	85.43	61.61	189.51
	Port	412	40	100.0	67.41	57.45	151.64
	Trad	740	38	100.0	95.45	66.76	200.62
Manganese	All	1152	78	100.0	306.47	316.40	416.76
	Port	412	40	100.0	314.48	320.90	395.26
	Trad	740	38	100.0	302.02	301.01	
Nickel	All	1152	78	100.0	41.27	32.24	83.18
	Port	412	40	100.0	36.88	32.00	63.14
	Trad	740	38	100.0	43.71	32.92	85.82
Selenium	All	1152	78	54.1	5.10	1.56	13.50
	Port	412	40	49.5	4.27	0.56	13.28
	Trad	740	38	56.6	5.55	1.82	13.59
Vanadium	All	1152	78	100.0	43.10	39.97	65.04
	Port	412	40	100.0	44.26	42.75	63.39
	Trad	740	38	100.0	42.46	37.87	65.46
Zinc	All	1152	78	100.0	1203.8	980.40	2019.3
	Port	412	40	100.0	1044.7	937.83	1925.4
	Trad	740	38	100.0	1292.3	1026.5	2126.9
Aluminum*	All	1152	78	100.0	47396	47500	60115
	Port	412	40	100.0	44576	43708	59029
	Trad	740	38	100.0	48966	47970	60719

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Cobalt	All	1152	78	64.3	6.18	1.70	13.98
	Port	412	40	71.8	4.69	1.67	14.25
	Trad	740	38	60.1	7.01	1.77	12.83
Cesium	All	1152	78	100.0	2.01	1.85	3.24
	Port	412	40	100.0	2.01	1.93	2.99
	Trad	740	38	100.0	2.01	1.77	
Iron	All	1152	78	100.0	23592	22300	37333
	Port	412	40	100.0	23402	23642	30789
	Trad	740	38	100.0	23698	21723	35203
Magnesium	All	1152	78	100.0	9333.7	8700.6	14282
	Port	412	40	100.0	8733.0	8288.1	13401
	Trad	740	38	100.0	9668.1	8793.7	14643
Palladium	All	1152	78	34.5	5.83		19.01
	Port	412	40	26.5	4.61		18.77
	Trad	740	38	38.9	6.52		18.53
Strontium	All	1152	78	100.0	155.50	139.43	234.58
	Port	412	40	100.0	156.95	138.20	257.36
	Trad	740	38	100.0	154.70	144.79	233.58
Titanium*	All	1152	78	99.6	2404.6	2270.9	3675.0
	Port	412	40	98.8	2183.7	2181.5	3007.2
	Trad	740	38	100.0	2527.5	2320.1	

Note: Blank cells indicate cases where the percentile could not be estimated.
*Portable and traditional classrooms are significantly different (p#0.05).

Table 3-27. Summary of Metal Loadings in Floor Dust (ng/cm^2)

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Arsenic*	All	860	58	100.0	1.85	1.30	5.53
	Port	313	30	100.0	2.31	1.59	5.52
	Trad	547	28	100.0	1.58	1.14	3.40
Cadmium	All	860	58	100.0	0.70	0.39	2.51
	Port	313	30	100.0	0.74	0.40	2.40
	Trad	547	28	100.0	0.68	0.36	1.70
Chromium	All	860	58	100.0	5.86	3.41	17.83
	Port	313	30	100.0	7.21	3.92	23.89
	Trad	547	28	100.0	5.08	3.16	12.62
Copper	All	860	58	100.0	24.80	6.99	133.38
	Port	313	30	100.0	22.69	7.01	
	Trad	547	28	100.0	26.01	6.99	82.68
Lead	All	860	58	100.0	14.74	6.54	58.39
	Port	313	30	100.0	14.83	5.80	57.88
	Trad	547	28	100.0	14.69	7.14	57.53
Manganese	All	860	58	100.0	48.46	37.80	137.87
	Port	313	30	100.0	59.73	46.91	162.80
	Trad	547	28	100.0	42.02	34.14	92.74
Nickel	All	860	58	100.0	6.74	3.40	24.31
	Port	313	30	100.0	8.07	3.93	38.43
	Trad	547	28	100.0	5.98	3.32	17.70
Selenium	All	860	58	50.3	0.84	0.08	2.59
	Port	313	30	55.3	0.97	0.10	
	Trad	547	28	47.5	0.77	0.04	2.25
Vanadium	All	860	58	100.0	7.00	4.64	17.49
	Port	313	30	100.0	8.47	6.53	20.10
	Trad	547	28	100.0	6.17	4.01	13.73
Zinc	All	860	58	100.0	201.92	107.50	821.72
	Port	313	30	100.0	225.93	108.95	666.85
	Trad	547	28	100.0	188.18	102.77	812.82
Aluminum	All	860	58	100.0	7176.2	5673.0	19157
	Port	313	30	100.0	7543.5	6610.0	18554
	Trad	547	28	100.0	6966.1	5375.3	15659

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Cobalt	All	860	58	59.0	1.00	0.10	4.34
	Port	313	30	76.7	1.04	0.11	
	Trad	547	28	48.8	0.97		3.94
Cesium	All	860	58	100.0	0.29	0.24	0.70
	Port	313	30	100.0	0.34	0.26	0.90
	Trad	547	28	100.0	0.27	0.22	0.54
Iron	All	860	58	100.0	3548.2	2858.0	10345
	Port	313	30	100.0	4070.3	3557.9	9993.3
	Trad	547	28	100.0	3249.5	2414.1	7021.4
Magnesium	All	860	58	100.0	1351.2	985.30	4261.5
	Port	313	30	100.0	1484.3	1259.1	4483.8
	Trad	547	28	100.0	1275.1	920.66	2910.6
Palladium	All	860	58	33.1	0.94		4.03
	Port	313	30	28.1	1.05		
	Trad	547	28	36.0	0.88		3.24
Strontium	All	860	58	100.0	25.35	19.57	82.21
	Port	313	30	100.0	30.57	19.95	
	Trad	547	28	100.0	22.35	15.43	54.16
Titanium	All	860	58	100.0	348.18	319.96	877.46
	Port	313	30	100.0	371.28	316.06	914.24
	Trad	547	28	100.0	334.96	253.82	786.76

Note: Blank cells indicate cases where the percentile could not be estimated.
*Portable and traditional classrooms are significantly different (p#0.05).

When the floor dust metals results are reported in terms of a dust loading (see Table 3-27), which adjusts for the area sampled, all of the elements show higher results in the portable classrooms than in traditional classrooms, except for copper. Only the arsenic difference was statistically significant.

3.15 Indoor Environmental Quality: Animal and Arthropod Allergens

Weighted distributional statistics characterizing the allergen levels from sieved dust samples (dust particles less than 500 Fm) that were collected in the sample classrooms are summarized in Appendix E and in Table 3-27. Dog and cat allergens (Canis f1 and Felis d1) were detected in 56% and 74% of the samples, respectively, while the dust mite and cockroach allergens were detected less than 10% of the time. The traditional classrooms had higher estimated mean concentrations for each type of allergen than the portables, but the differences were not statistically significant.

Table 3-28. Summary of Animal and Arthropod Allergen Concentrations in Dust (Fg/g)

Analyte	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Dermatophagoides pteronyssinus	All	195769	187	5.7	0.22		
	Port	69447	129	3.9	0.21		
	Trad	126322	58	6.7	0.23		
Dermatophagoides farinae	All	195769	187	8.7	0.34		0.91
	Port	69447	129	6.7	0.22		0.20
	Trad	126322	58	9.8	0.41		1.57
Canis f1	All	195769	187	56.2	1.93	0.43	3.89
	Port	69447	129	52.2	1.07	0.41	4.18
	Trad	126322	58	58.4	2.39	0.45	3.85
Felis d1	All	195769	187	73.7	0.53	0.26	1.80
	Port	69447	129	74.5	0.46	0.24	1.58
	Trad	126322	58	73.2	0.57	0.28	1.75
Blatella germanica	All	195769	187	0.7	1.00		
	Port	69447	129	0.6	1.00		
	Trad	126322	58	0.8	1.00		

Note: Dust particles <500µm.
Note: Blank cells indicate cases where the percentile could not be estimated.

3.16 Indoor Environmental Quality: Pesticides

Table 3-29 provides a summary of the floor-dust pesticide concentration and loading data for 20 different pesticides. The left-hand portion of the table shows concentration results and the right-hand portion shows loading results. These summary statistics, like the metals, were not population-weighted, but were weighted to reflect the classrooms in those sample schools for which data were available. Four of the pesticides were rarely detected (less than 10% detected) – malathion, lindane, resmethrin, and cyfluthrin. On the other hand, six were detected in over 80% of the samples – chlorpyrifos, cis- and trans-permethrin, o-phenylphenol, piperonyl butoxide, and esfenvalerate. Esfenvalerate had the highest median loading level (0.34 ng/cm^2), while many of the chemicals had median loading levels less than 0.01 ng/cm^2. Examination of the 95th percentiles of the concentration measurements in Table 3-29 showed that nine of the pesticides had measured 95th percentiles above 1.0 Fg/g – chlorpyrifos, cis- and trans-permethrin, resmethrin, piperonyl butoxide, cyfluthrin, cypermethrin, esfenvalerate, and delta-tralomethrin.

In terms of median concentrations, four of the pesticides had higher levels in the traditional classrooms, and three had higher levels in the composite portable classroom samples – (cis- and trans-permethrin, and esfenvalerate). Using the 95th percentile of the distribution as basis of comparison, thirteen pesticides were higher in the traditional classrooms and five pesticides were higher in the portable classroom samples (malathion, propetamphos, resmethrin, cyfluthrin, and delta-tralomethrin). Nevertheless, no statistically significant differences between the means for the portable and traditional classrooms were found for either the concentrations or the loadings.

Table 3-29. Summary of Pesticide Concentrations and Loadings in Floor Dust

		Concentrations (Fg/g)					Loadings (ng/cm^2)				
Analyte	Loc	n	Pct. Meas.	Mean	50th Pctl	95th Pctl	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Diazinon	A	71	57.6	0.358	0.035	0.679	53.000	58.5	0.027	0.002	0.112
	P	36	47.9	0.126	0.003	0.508	26.000	45.9	0.024	0.001	0.175
	T	35	63.1	0.490	0.037	0.634	27.000	65.2	0.028	0.003	0.076
Malathion	A	76	4.5	0.007	0.003	0.004	56.000	3.5	0.001	0.000	0.003
	P	39	7.3	0.010	0.003	0.056	29.000	2.6	0.001	0.001	0.003
	T	37	2.9	0.005	0.003	0.003	27.000	4.0	0.001	0.000	0.002
Chlorpyrifos	A	30	97.0	0.607	0.308	1.906	26.000	96.5	0.088	0.033	
	P	15	91.7	0.636	0.119		12.000	89.3	0.091	0.028	
	T	15	100.0	0.591	0.365	1.384	14.000	100.0	0.086	0.045	
4,4'-DDE	A	74	54.0	0.017	0.008	0.052	54.000	52.7	0.002	0.000	0.009
	P	38	48.1	0.010	0.000	0.043	28.000	40.6	0.002	0.000	0.009
	T	36	57.5	0.022	0.008	0.057	26.000	59.9	0.003	0.000	0.012
Dieldrin	A	75	24.3	0.028		0.154	57.000	25.4	0.004		0.026
	P	37	13.2	0.014		0.070	29.000	17.0	0.002		0.014
	T	38	30.3	0.035		0.164	28.000	30.0	0.004		0.036
cis-Permethrin	A	77	98.6	0.643	0.256	1.870	57.000	98.1	0.095	0.019	0.461
	P	39	100.0	0.329	0.279	0.766	29.000	100.0	0.067	0.026	0.263
	T	38	97.8	0.817	0.226	3.911	28.000	97.1	0.111	0.017	0.567
trans-Permethrin	A	63	100.0	0.691	0.320	2.329	47.000	100.0	0.133	0.037	0.630
	P	36	100.0	0.498	0.381	1.038	27.000	100.0	0.116	0.047	0.483
	T	27	100.0	0.829	0.300	2.865	20.000	100.0	0.146	0.033	0.742
Lindane	A	74	2.1	0.001	0.001	0.001	55.000	1.3	0.000	0.000	0.000
	P	38	5.8	0.002	0.001	0.004	29.000	3.6	0.001	0.000	0.001
	T	36	0.0	0.001	0.001	0.001	26.000	0.0	0.000	0.000	0.000
Pendimethalin	A	44	15.6	0.078	0.005	0.390	34.000	13.8	0.002	0.001	0.011
	P	19	7.1	0.034	0.005	0.163	14.000	2.6	0.001	0.001	0.002
	T	25	19.2	0.097	0.005	0.356	20.000	18.0	0.003	0.001	
Propoxur	A	38	69.3	0.129	0.014	0.633	27.000	65.6	0.024	0.002	0.087
	P	19	77.1	0.128	0.014		15.000	80.5	0.025	0.003	
	T	19	64.5	0.129	0.013		12.000	53.9	0.023	0.001	
o-Phenylphenol	A	77	100.0	0.155	0.063	0.486	57.000	100.0	0.015	0.007	0.087
	P	39	100.0	0.086	0.060	0.249	29.000	100.0	0.014	0.008	0.036
	T	38	100.0	0.193	0.065	0.505	28.000	100.0	0.015	0.006	0.095

		Concentrations (Fg/g)					Loadings (ng/cm^2)				
Analyte	Loc	n	Pct. Meas.	Mean	50th Pctl	95th Pctl	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Propetamphos	A	69	12.7	0.009	0.001	0.066	50.000	8.5	0.002	0.000	0.003
	P	36	16.1	0.012	0.001	0.078	26.000	16.2	0.002	0.000	0.008
	T	33	10.6	0.008	0.001	0.058	24.000	3.8	0.002	0.000	0.001
Resmethrin	A	76	2.9	0.098			56.000	4.0	0.014		
	P	38	6.6	0.221		1.938	28.000	9.1	0.039		0.169
	T	38	0.9	0.032			28.000	1.3	0.001		
Piperonyl Butoxide	A	63	93.3	0.629	0.369	2.195	48.000	94.1	0.101	0.038	0.376
	P	34	90.8	0.343	0.265		26.000	87.9	0.053	0.024	0.201
	T	29	94.8	0.801	0.390	3.230	22.000	97.7	0.130	0.036	0.450
Bifenthrin	A	71	28.7	0.134		0.627	53.000	33.0	0.017		0.099
	P	38	29.2	0.157		0.311	28.000	32.6	0.009		0.045
	T	33	28.5	0.119		0.684	25.000	33.3	0.022		0.146
Cyhalothrin	A	77	25.5	0.081	0.001	0.216	57.000	20.9	0.008	0.000	0.031
	P	39	18.0	0.098	0.001	0.142	29.000	11.8	0.007	0.000	0.033
	T	38	29.7	0.071	0.001	0.217	28.000	26.0	0.009	0.000	0.023
Cyfluthrin	A	74	9.5	0.297		2.586	54.000	8.1	0.022		0.223
	P	38	14.7	0.301		1.797	28.000	16.0	0.039		
	T	36	6.5	0.295		1.335	26.000	3.5	0.012		
Cypermethrin	A	75	12.4	0.178		1.401	55.000	12.6	0.027		0.193
	P	39	20.9	0.208		1.248	29.000	16.7	0.029		0.157
	T	36	7.3	0.161		1.418	26.000	10.2	0.025		
Esfenvalerate	A	66	87.2	4.488	3.830	11.398	49.000	90.9	0.970	0.341	3.978
	P	32	95.1	4.678	4.019	10.423	24.000	93.2	0.897	0.512	2.963
	T	34	83.1	4.392	3.034	12.310	25.000	89.7	1.006	0.304	3.882
Delta/Tralo-methrin	A	77	35.5	0.292	0.010	1.564	57.000	28.3	0.040	0.001	0.149
	P	39	28.9	0.442	0.010	3.057	29.000	18.7	0.065	0.002	
	T	38	39.2	0.209	0.010	1.561	28.000	33.6	0.026	0.001	0.121

Note: Statistics apply to sample classrooms with data.
Note: Loc=Location (A=all classrooms, P=portable classrooms, T=traditional classrooms).
Note: Blank cells indicate cases where the percentile was not estimated.

3.17 Indoor Environmental Quality: PAHs

Table 3-30, in a format similar to the Table 3-29, furnishes a summary of the floor-dust polynuclear aromatic hydrocarbon data for sixteen PAHs. Although most of the PAHs were detected in over 50% of the classroom samples, the concentrations were generally very low. Only five of the PAHs had measured concentrations above 1.0 Fg/g (chrysene, fluoranthene, pyrene, Indeno[1,2,3-cd]pyrene, perylene/benzo[b]fluoranthene). Chrysene, benzo[k]fluoranthene, fluoranthene, phenanthrene, pyrene, naphthalene, fluorene, benzo[g,h,i]perylene, and

Table 3-30. Summary of PAH Concentrations and Loadings in Floor Dust

		Concentrations (Fg/g)					Loadings (ng/cm^2)				
Analyte	Loc	n	Pct. Meas.	Mean	50th Pctl	95th Pctl	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Benzo[a]pyrene*	A	69	58.6	0.115	0.054	0.306	51.000	63.4	0.018	0.008	0.064
	P	35	75.5	0.141	0.072	0.485	26.000	85.5	0.026	0.012	0.065
	T	34	49.3	0.100	0.001	0.290	25.000	51.1	0.013	0.001	0.044
Benzo[a]anthracene*	A	71	79.1	0.166	0.053	0.329	53.000	82.6	0.022	0.005	0.062
	P	37	94.3	0.242	0.064	0.592	28.000	94.0	0.034	0.008	0.104
	T	34	70.0	0.121	0.039	0.166	25.000	75.8	0.015	0.005	0.018
Acenaphthylene	A	53	51.7	0.020	0.002		40.000	58.0	0.003	0.001	0.013
	P	29	39.3	0.012	0.000	0.049	22.000	36.1	0.002	0.000	0.011
	T	24	59.4	0.025	0.005		18.000	71.7	0.004	0.001	
Anthracene	A	69	73.5	0.040	0.007	0.182	52.000	72.5	0.004	0.001	0.006
	P	36	72.8	0.040	0.008	0.199	26.000	72.4	0.006	0.001	0.015
	T	33	74.0	0.040	0.007	0.035	26.000	72.6	0.004	0.001	0.004
Chrysene*	A	75	92.9	0.305	0.149	0.678	55.000	96.7	0.047	0.019	0.199
	P	39	97.1	0.404	0.152	1.012	29.000	97.7	0.074	0.028	0.267
	T	36	90.5	0.247	0.130	0.553	26.000	96.2	0.032	0.014	0.086
Benzo[k]fluoranthene*	A	74	80.0	0.170	0.057	0.378	54.000	80.4	0.023	0.006	0.054
	P	38	90.1	0.239	0.062	0.624	28.000	89.9	0.036	0.012	0.111
	T	36	74.2	0.131	0.053	0.199	26.000	75.0	0.016	0.004	0.024
Fluoranthene	A	76	100.0	0.414	0.184	0.965	56.000	100.0	0.062	0.018	0.239
	P	39	100.0	0.559	0.197	1.360	29.000	100.0	0.094	0.035	0.323
	T	37	100.0	0.332	0.160	0.815	27.000	100.0	0.045	0.015	0.148
Phenanthrene	A	76	100.0	0.375	0.173	0.574	56.000	100.0	0.052	0.024	0.153
	P	39	100.0	0.407	0.172	0.717	29.000	100.0	0.067	0.024	0.182
	T	37	100.0	0.357	0.174	0.564	27.000	100.0	0.044	0.023	0.120
Pyrene	A	76	100.0	0.528	0.201	1.000	56.000	100.0	0.076	0.022	0.319
	P	39	100.0	0.614	0.215	1.457	29.000	100.0	0.098	0.036	0.321
	T	37	100.0	0.480	0.198	0.976	27.000	100.0	0.063	0.020	0.223
Indeno[1,2,3-cd]pyrene	A	74	68.2	0.308	0.049	0.357	56.000	62.6	0.043	0.003	0.097
	P	38	84.6	0.439	0.052	1.178	29.000	83.0	0.066	0.010	0.195
	T	36	58.9	0.233	0.026	0.261	27.000	51.2	0.029	0.002	0.040
Naphthalene	A	69	100.0	0.018	0.014	0.044	52.000	100.0	0.003	0.002	0.008
	P	36	100.0	0.017	0.013	0.038	27.000	100.0	0.004	0.002	0.009
	T	33	100.0	0.019	0.014	0.043	25.000	100.0	0.002	0.002	0.007

		Concentrations (Fg/g)					Loadings (ng/cm^2)				
Analyte	Loc	n	Pct. Meas.	Mean	50th Pctl	95th Pctl	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Fluorene	A	73	100.0	0.047	0.030	0.063	53.000	100.0	0.007	0.004	0.025
	P	38	100.0	0.043	0.027	0.067	28.000	100.0	0.008	0.004	0.020
	T	35	100.0	0.049	0.031	0.062	25.000	100.0	0.007	0.004	0.023
Acenaphthene	A	66	27.2	0.016		0.014	49.000	31.4	0.002		0.002
	P	33	23.7	0.019		0.053	25.000	22.9	0.003		0.008
	T	33	29.1	0.015		0.014	24.000	36.4	0.002		0.002
Dibenz[a,h]anthracene*	A	69	41.4	0.050	0.003	0.081	49.000	36.1	0.007	0.000	0.027
	P	35	57.9	0.081	0.014	0.305	25.000	59.8	0.013	0.001	0.043
	T	34	32.9	0.034	0.002	0.055	24.000	24.0	0.004	0.000	0.006
Benzo[g,h,i]perylene*	A	75	94.0	0.218	0.111	0.390	56.000	96.3	0.034	0.015	0.134
	P	38	94.6	0.281	0.123	0.822	29.000	96.7	0.051	0.019	0.163
	T	37	93.6	0.182	0.103	0.341	27.000	96.1	0.025	0.014	0.065
Perylene/Benzo[b]fluoranthene	A	71	91.4	0.453	0.294	1.078	54.000	94.9	0.080	0.033	0.384
	P	36	93.2	0.646	0.241	1.852	28.000	91.1	0.122	0.043	0.414
	T	35	90.5	0.351	0.311	0.916	26.000	97.0	0.057	0.029	0.161

Note: Statistics apply to sample classrooms with data.
Note: Loc=Location (A=all classrooms, P=portable classrooms, T=traditional classrooms).
* Differences in mean *loadings* between portables and traditionals are statistically significant (p=0.05).
Note: Blank cells indicate cases where the percentile could not be estimated.

perylene/benzo[b]fluoranthene (co-elution) were all detected in over 80% of the samples. No statistically significant differences between the means for the portable and traditional classrooms were found for the concentration data; however, six of the chemicals had significantly higher (p=0.05) mean loadings for the portables than for the traditionals: benzo[a]pyrene, benzo[a]anthracene, chrysene, benzo[k]fluoranthene, benzo[g,h,i]perylene, and dibenz[a,h]anthracene.

Median traditional-classroom concentrations were higher than median portable-classroom concentrations for two PAHs (fluorene and perylene/benzo[b]fluoranthene), whereas nine of the PAHs had higher median concentrations in the composite portable classroom samples. A comparison of the 95th percentiles of the concentration distributions indicated that fifteen of the sixteen PAHs were higher in the portable classrooms. (Naphthalene was measured at equal concentration levels in both types of classrooms.)

3.18 Factors Affecting Indoor Environmental Quality

3.18.1 Modeling Strategy

As an initial effort towards identifying factors affecting IEQ, a series of weighted regression models were fit that related an IEQ variable, Y, to classroom type (portable/traditional indicator) and to other variates. Model inputs were defined as follows:

- R = classroom type indicator (= 1 if portable, = 0 otherwise),
- Z = an outdoor measure corresponding to Y. For example, if Y is the logarithm of the classroom formaldehyde levels, then Z would be the logarithm of the outdoor formaldehyde levels at the schools. (Log-scaled Y variates are used since measurement error variability is generally expected to be larger for higher levels than for lower levels. For example, if there is a constant relative standard deviation, then the log-scaled variates would be expected to have homogeneous measurement-error variance.)
- X and X2 =other potential independent variables. These can be continuous variates or can be discrete variates that are coded as a set of dummy (0,1) variables. The models are structured and denoted as follows:

Three different modeling structures were employed (see Section 2.9 for more detail), as depicted below:

Structure	Model A Terms			Additional Terms In Model B	Additional Terms In Model C
1	R			X	X2
2	R	Z		X	X2
3	R*	Z*	ZR	X	X2

* Since Structure 3 is used to determine if the effect of Z differs for portables and traditionals (i.e., to determine if the ZR term is significant), separate tests for R and Z within Structure 3 are not possible.

As indicated above, the models are identified by letter and structure; for instance, the model containing R, Z, and a single X would be referred to as Model B2. For cases in which there is not an outdoor measurement analogous to Y, only structure 1 is used. For the present study, all of the C models considered contained CLAGE (classroom age, in years) plus one other candidate predictor. Thus a C model would be chosen if <u>both</u> CLAGE and the second predictor variate were statistically significant, a B model would be chosen if only one of the two was statistically significant, and an A model would be chosen if neither was statistically significant. <u>All tests used for selecting models were based on 0.05 significance levels</u>.

Appendix G provides the details of the modeling results. It consists of five parts:

Part 1: An index to the X variables (not all Xs go with all Ys)
Part 2: An index to the X variables and their levels
Part 3: P-values for the Wald F tests associated with the A and B models.
Part 4: P-values for the Wald F tests associated with the C models.
Part 5. Identification of the Preferred Models.

The basic strategy for choosing a model is described in Appendix G, and below:

- The preferred A model for a given Y is first determined as follows. If the ZR term is significant, then Model A3 is preferred over A1 or A2. If not, but the Z term is significant, then Model A2 is the preferred model. If neither Z nor ZR is significant, then Model A1 is preferred.

- The preferred B model for each Y and X combination is determined, using the same logic as above. If the X variate is not significant, then one of the A models is preferred over the B models.
- The preferred C model for each Y, X, and X2 combination is determined, using the same logic as above. One of the A or B models is preferred over the C models except when both X and X2 are statistically significant. (Only C models in which X is the classroom age have been attempted at this point.)
- The overall preferred model is chosen as follows. If both classroom age (CLAGE) and the X2 variable are statistically significant, then the C model is chosen. On the other hand, if only the X variable is statistically significant, then the B model would be chosen. If neither X nor CLAGE are significant, then the A Model is chosen if it has any significant effects. If not, no preferred model is chosen.

3.18.2 Factors Affecting Pollen/Spores

Models for the following Y variables were estimated:

Y1 = $\log_{10}$ (Pollen Count)
Y2 = $\log_{10}$ (Total Fungal Spores).

Independent variables (X or X2) that were examined as potential predictors are listed in Table 3-31, which gives the following:

- the variable name,
- the source of variable (e.g., the original questionnaire variable(s) from which it was derived),
- the description of the variable,
- the definitions of the levels of the predictors.
- Dependent variables (Y) that were modeled appear as headings of the last two columns. An entry in a given Y1 or Y2 column indicates that the candidate predictor in that row was examined for that particular Y. If the model type is A1, A2, or A3, then the predictor was deemed to be not statistically significant.[4] With one exception, this was the case for the pollen count and total fungal spores models. Therefore, for the candidate predictors that were examined, the following conclusions can be reached:
  - There was a statistically significant association between indoor and outdoor levels (since structure 2 was chosen) for both Y1 and Y2. Reference to the selected specific modeling results appearing in Appendix H indicated that the association is truly positive – i.e., higher outdoor levels were associated with higher indoor levels.
  - The tests for significance of the classroom-type effect (R) are summarized in Appendix G. They indicate that the portable and traditional classrooms were not significantly different in terms of their Y1 and Y2 levels.

[4] Except where noted, significance was judged using a 0.05 level. Other associations of interest may be found by examining the specific p-values given in Appendix G.

Table 3-31. Selected Models for Pollen Counts and Total Fungal Spores

Variable Name	Source Variable(s)	Description	Level 1	Level 2	Level 3	Level 4	Y1	Y2
AI2	AI2	Windows open today	Yes	No			B2	
CAIROK	TQ2c	Classroom air (teacher)	Yes	No			A2	
CARPET	AC2_02,07	Carpet/rugs on floor	Yes	No			A2	A2
CEILMOLD	AB6	Mold areas on ceiling	Some	None				A2
CLAGE	CA3,CA1	Classroom Age	continuous				A2	A2
CWATSTAN	AB5	Water stains on ceiling	Yes	No				A2
DRNFAIL	BD13_1,2,10	Drain test failure	Yes	No	NA			A2
FLTRGAP	BG6	Size of gap around filter	>=1/2in.	<1/2in.	None	DK/NA	A2	
FWATSTAN	AC7	Water stains on floor	Yes	No				A2
LCO2CONC	Q-Trak	Log Avg Indr Air CO2 Conc	continuous				A2	A2
MOISTA	BB5a-f	Max wall, ceiling floor moisture (%)	Max=0	Max>0				A2
MOLDAREA	AF11	Mold areas	Some	None				A2
MUSTODOR	TQ5a	Musty odor at times (teacher)	Yes	No				A2
REGION	Sample Frame	Geographic region	North	South			A2	A2
RFQ16B	RFQ16b	Freq of vacuuming/sweeping/dusting	5/wk	3-4/wk	Other		A2	
SCHTYP	Sample Frame	School type	Elem	Middle	High		A2	
TURNOFF	TQ4	Turn off heat/AC due to noise (teacher)	Yes	No			A2	
URBAN	Sampling Fram	Urban School	Yes	No			A2	
WATRLEAK	TQ6a	Leak or flood in room (teacher)	Current	Previous	Never	Unknown		A2

Y1 = $\log_{10}$ (Pollen Count)
Y2 = $\log_{10}$ (Total Fungal Spores)
Entries in the Y1 and Y2 columns indicate the preferred model. Blanks in these columns indicate that the independent variable was not modeled.
Portable and traditional classrooms are not significantly different at the 0.05 level.

– The tests for significance for the candidate predictors (see Appendix G) revealed only one X with statistical significance – namely “windows open” (for Y1). Reference to the detailed modeling results in Appendix H shows that classrooms with “windows open today” tended to have lower pollen counts (statistically significant to 0.05 level of significance).
– The B2 model, which included “windows open today” and the outdoor pollen count covariate, accounted for 17% of the total variation in the indoor levels.
– For the total fungal spores models, the classroom age effect in the C-type models was not significant; hence these models were not selected. However, there were several X factors that did appear significant ($p<0.10$) in those models – namely, water stains on the floor, ceiling mold, and mold areas.

3.18.3 Factors Affecting Indoor-Air Aldehyde Concentrations

Models for the following Y variables were estimated[5]:

Y1=log(Formaldehyde Concentration)
Y2=log(Acetaldehyde Concentration)
Y3=log(o,p-tolualdehyde Concentration.

Independent variables (X or X2) that were examined as potential predictors are listed in Table 3-32, which is structured like the previous table.

Selected models for the three species were quite different. For formaldehyde, the type of classroom was generally statistically significant, with portables having higher levels (i.e., a positive coefficient on the portable/traditional indicator variable, as evidenced in Appendix H). The other two aldehydes showed no classroom type effect; however, the tolualdehyde models showed a significant outdoor-air by room-type interaction. These two aldehydes also showed significant associations with their outdoor levels, while the formaldehyde models generally did not show a relationship with the outdoor levels.

Two variables showed the strongest positive relationships with indoor formaldehyde levels: indoor CO_2 (adjusted for outdoor air formaldehyde levels and classroom type) and indoor relative humidity (adjusted for classroom type). These two models accounted for 22% and 32%, respectively, of the total variation in the indoor levels (See Appendix H).

The formaldehyde model including “pressed wood bookcases” as an X indicator, which also included a significant classroom age variate (positive slope), accounted for only about 14% of the total variation in the indoor formaldehyde levels. However, the effect of this X indicator was 0.304, implying about a 30% increase in formaldehyde levels when pressed wood bookcases were present, and the effect of classroom type was 0.288, implying that portables’ levels were about 30% higher than traditionals. The positive slope for the classroom age variable in this model appears to be driven largely by the lower formaldehyde levels in newer traditionals. This is demonstrated by the (weighted) formaldehyde means shown in Table 3-33 for portables and traditionals of different ages:

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[5] Except when explicitly indicated as $\log_{10}$, all logarithms are natural (base e) logarithms.

Table 3-32. Selected Models for Selected Aldehydes

Variable Name	Source Variable(s)	Description	Level 1	Level 2	Level 3	Level 4	Y1	Y2	Y3
AE11_03	AE11_03	Bookcase -- pressed wood	Yes	No			C1*	B2	A3
BORDWALL	AD1_02,07	Fiber/particle board or plywood walls	Yes	No			A1*	B2	A3
CLAGE	CA3,CA1	Classroom Age	continuous				B1*	A2	A3
FRESHNER	AE6_05	Air freshener	Some	None			B1*	B2	A3
GENINST	AA13	General instruction classroom	Yes	No			B1*	B2	B3
LCO2CONC	Q-Trak	Log Avg Indr Air CO2 Conc	continuous				B2*	A2	A3
RELHUM	Q-Trak	Avg Indoor Rel Humidity	continuous				B1	B2	A3
SCHTYP	Sample Frame	School type	Elem	Middle	High		A1*	A2	B3
TAKWALL	AD1_01	Tackboard walls	Yes	No			A1*	B2	A3
TEMP	Q-Trak	Avg Indoor Temp	continuous				A1*	A2	A3

Y1 = log Formaldehyde Concentration
Y2 = log Acetaldehyde Concentration
Y3 = log o,p-tolualdehyde Concentration
*Portable and traditional classrooms are significantly different (p=0.05).
Entries in the Y1, Y2, and Y3 columns indicate the preferred model.

Table 3-33. Mean Indoor Formaldehyde Concentrations, by Age and Classroom Type (ppb)

Location	Classroom Age (yrs)				
	0-3	4-5	6-10	11-15	16+
Portables, ppb (n):	17.8 (14)	13.9 (23)	16.9 (15)	14.0 (17)	14.0 (24)
Traditionals, ppb (n):	9.4 (10)				13.4 (33)

Unfortunately, separating the effects of age and room type was not feasible, because the age distributions of the two types of rooms were so disparate (see Table 3-11) and because the sample size for newer traditionals was so small (only 2 were less than 4 years old and only 10 were less than 16 years old). Use of air fresheners was another X variate that appeared statistically significant for formaldehyde; a similar association was seen in Phase I.

The model for acetaldehyde that included "pressed wood bookcases" as an X indicator accounted for about 24% of the total variation in the indoor levels of that analyte. The effect for this X variate was 0.131, indicating a significant increase in the indoor levels when the pressed wood was present, but one that was not as large (relative) as for formaldehyde. Indoor relative humidity was also strongly associated with indoor acetaldehyde levels.

Additional details for selected aldehyde models are given in Appendix H.

3.18.4 Factors Affecting Indoor-Air VOC Concentrations

Models were fit for five VOCs, using the candidate predictors given in Table 3-34. The dependent variables included benzene plus the four identified in the right hand columns of the table. Benzene is not shown because no significant effects of any kind were normally detected for that analyte (p=0.05). The C1 model for benzene that included classroom age (positive association, p=0.07) and "presence of carpet/rugs" (positive association, p=0.04) did account for about 21% of variability in indoor benzene levels (see Appendix H). For the VOCs indicated in Table 3-34, there were associations with outdoor levels in virtually all cases (i.e., mostly structures 2 and 3), and these associations appeared somewhat stronger than for the aldehydes. Few of the candidate X predictors were found to be significant. Most of the toluene and m,p-xylene models required structure 3, indicating that the outdoor association varied by classroom type. The toluene model (as well as some others, such as the o,p-tolualdehye) showed no relation with outdoor levels for portables and a positive relation for traditional classrooms.

A number of the significant associations with the X variables are counter-intuitive. For example, for tetrachloroethylene, a significant negative association with presence of carpet/rugs was detected, perhaps reflecting a sink, or removal effect by carpet and carpet padding. For toluene, significantly lower levels were estimated when new construction/repair activities were on-going; this, of course, could reflect the fact that doors and windows might be more frequently closed when those activities were outside of the immediate classroom. The variables in this model accounted for 69% of the total variation in indoor toluene levels.

Additional details for selected VOC models are given in Appendix H.

Table 3-34. Selected Models for Selected VOCs

Variable Name	Source Variable(s)	Description	Level 1	Level 2	Level 3	Level 4	Y1	Y2	Y3	Y4
ACTVOUT	AG1_01,02	New construction/repairs affecting IAQ	Yes	No			A2	A2	C3	A3
AG8_01	AG8_01	Parking lot/roadway within 50 ft.	Yes	No			A2	A2	A3	A3
CARPET	AC2_02,07	Carpet/rugs on floor	Yes	No			A2	B2	A3	A3
CHEMPROD	AE17_11	Chemical products	Some	None			A2	A2	A3	A3
CLAGE	CA3,CA1	Classroom Age	continuous				A2	A2	A3	A3
FRESHNER	AE6_05	Air freshener	Some	None			A2	A2	A3	A3
GENINST	AA13	General instruction classroom	Yes	No			A2	B2	A3	A3
LCO2CONC	Q-Trak	Log Avg Indr Air CO2 Conc	continuous				B3	A2	A3	B1
SCHTYP	Sample Frame	School type	Elem	Middle	High		B2	A2	A3	A3
TEMP	Q-Trak	Avg Indoor Temp	continuous				A2	A2	A3	C1

Y1 = log Chloroform
Y2 = log Tetrachloroethylene
Y3 = log Toluene
Y4 = log m, p-Xylene Concentration
Entries in the last 4 columns indicate the preferred model.
Portable and traditional classrooms are not significantly different at the 0.05 level.

3.18.5 Factors Affecting Indoor-Air CO_2 Concentrations

Two of the summary CO_2 measures were modeled: Y1=log(CO_2 Concentration), and Y2=percent of time CO_2 concentrations exceed 1000 ppm. The candidate predictors are listed in Table 3-35. For both Y1 and Y2, classroom age had a significant positive relationship with the CO_2 levels, and for Y1, there was also a significant positive relation with the outdoor levels. (There was not an corresponding outdoor measurement for Y2.) However, the inclusion of the teacher's rating of IAQ in the Y1 model resulted in an interaction effect between classroom type and outdoor CO_2 levels. A positive relation with the outdoor levels remained for the portables, but not for the traditionals. Based on the log(CO_2) model, the indoor CO_2 levels were estimated to be approximately 30% lower (coefficient on that X was -0.273) when the teachers reported that the IAQ was acceptable. The Y1 and Y2 models both showed a significant effect of school type, with high schools having the highest indoor CO_2 levels. See Appendix H for more details on selected models.

3.18.6 Factors Affecting Indoor-Air Particle Counts

Models for the following Y variables were estimated:

Y1 = log (average number of particles/minute # 2.5 Fm)
Y2 = log (average number of particles/minute # 10 Fm).

Independent variables (X or X2) that were examined as potential predictors are listed in Table 3-36. With the exception of one model, none of the predictors (including classroom age) was statistically significant. Also the room type indicator was not significant except in that one case. The exception was for $PM_{2.5}$; when "presence of carpet rugs" was used as a predictor, then both that predictor and the classroom indicator were statistically significant. Rooms with carpets/rugs and traditional classrooms had lower levels. (See Appendix H for details.) A number of the B- and C-type models (which were not selected because of non-significant X variates) showed significant room-type by outdoor-level interactions; this interaction effect was significant for both $PM_{2.5}$ and PM_{10} at the 0.07 significance level for model A3.

3.18.7 Factors Affecting Noise Associated with HVACs

A single variate was modeled: Y1=the noise level (dBA) measured near the register when the HVAC unit was on. Table 3-37 lists the candidate predictors. In this case, only model structure 1 is relevant since there is no corresponding outdoor measure. Of the candidate X predictors, only classroom age was statistically significant. For that model, classroom age had a positive effect (older rooms had higher noise levels) and the portables had significantly higher noise levels than the traditionals. This model only accounted for only about 11% of the total variation in theY1 measure, however. (See Appendix H.)

Table 3-35. Selected Models for CO_2 Measures

Variable Name	Source Variable(s)	Description	Level 1	Level 2	Level 3	Level 4	Y1	Y2
AG8_01	AG8_01	Parking lot/roadway within 50 ft.	Yes	No			none	none
AHUAXS	BG1	Ease of Access to AHU interior	Good	Fair	Poor/None		none	none
CAIROK	TQ2c	Classroom air (teacher)	Yes	No			C3	C1
CLAGE	CA3,CA1	Classroom Age	continuous				B3	B1*
HVACMODE	BB2	HVAC mode	Heating	Cooling	Fan Only		none	none
OAPERS	BB4_C,AA11	Outdoor air flow/person	continuous				none	none
REGION	Sample Frame	Geographic region	North	South			none	none
SCHTYP	Sample Frame	School type	Elem	Middle	High		C3	C1*
TAIRPERS	BB4_D&_E,AA11	Supply air flow cfm/person	continuous				none	none
TURNOFF	TQ4	Turn off heat/AC due to noise (teacher)	Yes	No			none	none
USETOL	FQ19a,b	Awareness/use of EPA IAQ Tools	Aware/yes	Aware/no	Aware/DK	Unaware	none	none

Y1 = log (average CO_2 concentration)
Y2 = % of time CO_2 >1000 ppm
Entries in the Y1 and Y2 columns indicate the preferred model.
* Portable and traditional classrooms are significantly different (p=0.05).

Table 3-36. Selected Models for Number of Particles

Variable Name	Source Variable(s)	Description	Level 1	Level 2	Level 3	Level 4	Y1	Y2
ACTVOUT	AG1_01,02	New construction/repairs affecting IAQ	Yes	No			A2	A2
AG8_01	AG8_01	Parking lot/roadway within 50 ft.	Yes	No			A2	A2
AHUAXS	BG1	Ease of access to AHU interior	Good	Fair	Poor/None		A2	A2
CARPET	AC2_02,07	Carpet/rugs on floor	Yes	No			B2*	A2
CLAGE	CA3,CA1	Classroom Age	continuous				A2	A2
DUSTMAT	AG6,AC3	Walk-off dust mats	yes	No			A2	A2
FLTRGAP	BG6	Size of gap around filter	>=1/2in.	<1/2in.	None	DK/NA	A2	A2
FLTRLDG	BG5	Dirt loading on filter	Heavy	Medium	Light	DK/NA	A2	A2
LCO2CONC	Q-Trak	Log Avg Indr Air CO2 Conc	continuous				A2	A2
RFQ16B	RFQ16b	Freq of vacuuming/sweeping/dusting	5/wk	3-4/wk	Other		A2	A2
SCHTYP	Sample Frame	School type	Elem	Middle	High		A2	A2

Y1 = Particles/min <=2.5µm
Y2 = Particles/min <=10µm
Entries in the Y1 and Y2 columns indicate the preferred model.
* Portable and traditional classrooms are significantly different (p=0.05).

Table 3-37. Selected Models for Noise Measure (near Register with HVAC on)

Variable Name	Source Variable(s)	Description	Level 1	Level 2	Level 3	Level 4	Y1
AHUAXS	BG1	Ease of access to AHU interior	Good	Fair	Poor/None		none
CAIROK	TQ2c	Classroom air (teacher)	Yes	No			none
CLAGE	CA3,CA1	Classroom Age	continuous				B1*
LCO2CONC	Q-Trak	Log Avg Indr Air CO2 Conc	continuous				none
RBC4	BC4	Air handling unit location	Wall	Window	Rooftop	Other/NA	none
SCHTYP	Sample Frame	School type	Elem	Middle	High		none
TOTSAIR	BB4_D&_E	Supply air flow (cfm)	continuous				none
TURNOFF	TQ4	Turn off heat/AC due to noise (teacher)	Yes	No			none
URBAN	Sampling Frame	Urban School	Yes	No			none

Y1 = Noise (dBA) near register with HVAC on.
Entries in the Y1 column indicate the preferred model.
* Portable and traditional classrooms significantly different (p=0.05).

3.18.8 Factors Affecting Indoor Temperatures

Two types of temperature measures were modeled:

Y1=percent of time that the room was below 20˚C (too cool)
Y2=percent of time that the room was above 23˚C (too warm).

The candidate predictors are shown in Table 3-38. For Y2, only two predictors appeared significant (school type, and awareness and use of EPA IAQ Tools). A meaningful pattern for the latter X variable was not apparent, however, for either Y1 or Y2. Portables and traditionals were not different for Y2, but were significantly different for Y1. The percent of time that the portables had less than 20˚C (68˚F) temperatures was larger (by about 12%) than for the traditional classrooms. Appendix H furnishes more details.

3.19 IEQ Results for Specially Selected Schools

Formaldehyde. As described in Section 2.4.1, 14 schools were specially selected for participation in Phase II based on their Phase I data. In particular, each of these schools had at least two reports of indoor environmental quality problems (e.g., high formaldehyde or observed mold) in Phase I. Thirteen of these schools participated in Phase II of the study. Summary statistics regarding the indoor and outdoor formaldehyde concentrations at these schools in Phase II are reported in Table 3-39.

Comparison with the results for the entire Phase II sample, reported in Table 3-23, shows that the mean formaldehyde concentrations at the specially selected schools are remarkably similar to those for the entire Phase II sample. Moreover, the maximum formaldehyde concentrations observed at these schools are remarkably similar to the estimated 95th percentile concentrations for the population as a whole.

Carbon Dioxide. As indicated in Table 3-18, the mean percentage of time that indoor CO_2 levels exceeded 1000 ppm was estimated for the general population of eligible classrooms to be 42.8% (42.1% for portables). The corresponding mean for the classrooms in the specially-selected schools was 24.0% (32.1% in portable classrooms).

Surface swabs. As described in Section 2.5.3, cotton swab surface samples were collected only in the specially selected schools. They were collected in the classroom during the lunch period when the classroom was vacant. The cotton swab samples were collected only from surfaces (e.g., window sill or door knob) where microbiological growth could be visually determined. In some classrooms, swab samples were collected from more than one surface. The swabs were cultured in the laboratory, and the results are reported in Table 3-40 for each of the swab samples in units of the logarithm (base 10) of the numbers of colony forming units (CFUs) per swab.

Culturable Airborne Microorganisms. As described in Section 2.5.3, Mattsen-Garvin (M-G) bioaerosol samples were collected in the classrooms and outdoors at the specially selected schools. The indoor Mattsen-Garvin samples were collected in the classroom during the lunch period when the classroom was vacant. The M-G samples were collected on Petri dishes and cultured in the laboratory. The results are reported in Appendix E and are summarized in Table 3-41 for both the indoor and outdoor samples in units of logarithm (base 10) of the CFUs per cubic meter of air. Since these data were collected only at the specially selected schools, the data are not weighted and formal tests of hypotheses are not warranted.

Other IEQ Characteristics. Comparison of the classrooms in the specially-selected schools with the general population of eligible classrooms showed that the former were reported to have more moisture-related problems. For instance, teachers reported "musty odors at times" in 92.4% of the specially-selected classrooms (93.6% for portables), as contrasted with 64.2% for the general population (66.6% for portables). Mold areas were reported (Classroom Form) in 7.6% of the specially-selected schools, as contrasted with only 1.1% for the overall population of eligible classrooms.

Table 3-38. Selected Models for Temperature Measures

Variable Name	Source Variable(s)	Description	Level 1	Level 2	Level 3	Level 4	Y1	Y2
AHUAXS	BG1	Ease of access to AHU interior	Good	Fair	Poor/None		A1*	None
CAIROK	TQ2c	Classroom air (teacher)	Yes	No			A1*	None
CLAGE	CA3,CA1	Classroom Age	continuous				A1*	None
OAPERS	BB4_C,AA11	Outdoor air flow/person	continuous				A1*	None
REGION	Sample Frame	Geographic region	North	South			A1*	None
SCHTYP	Sample Frame	School type	Elem	Middle	High		A1*	B1
TAIRPERS	BB4_D&_E,AA11	Supply air flow cfm/person	continuous				A1*	None
TURNOFF	TQ4	Turn off heat/AC due to noise (teacher)	Yes	No			A1*	None
USETOL	FQ19a,b	Awareness/use of EPA IAQ Tools	Aware/yes	Aware/no	Aware/DK	Unaware	B1*	B1

Y1 = % time temp <20°C.
Y2 = % time temp >23°C.
Entries in the Y1 and Y2 columns indicate the preferred model.
* Portable and traditional classrooms significantly different (p=0.05).

Table 3-39. Summary of Formaldehyde Concentrations (ppb)

Location	n	Minimum	Maximum	Mean	Std. Deviation
Outdoor	12	1.0	8.6	3.5	2.7
All classrooms	38	3.4	24.1	15.2	5.2
Portable	28	3.4	24.1	16.1	5.2
Traditional	10	5.4	17.9	12.6	4.3

Table 3-40.List of Culturable Microorganisms Measurements from Surface Samples (log_{10}[CFU/swab])

Classroom*	Sampling Site	Aureobasidium spp.	Yeast	Cladosporium spp	Other
1145P1	Desk	0.000	0.000	0.000	0.000
	Vent	0.000	0.000	0.000	1.477
1145P2	Vent	0.000	0.000	0.000	2.204
1145P3	Vent	0.000	0.000	0.000	0.000
1163P1	ceiling tile	0.000	0.000	0.000	0.000
1163P2	ceiling air vent	0.000	0.000	0.000	1.000
1163T3	Decorations	4.147	3.033	3.297	3.000
1236P1	window countertop	0.000	0.000	0.000	0.000
1236P2	air vent	0.000	0.000	1.297	2.301
	window countertop	2.742	0.000	2.455	1.794
1236T3	Doorknob	0.000	0.000	0.000	0.000
1283P1	wall near air vent	4.041	4.568	0.000	3.301
1283P2	Counter near sink	4.448	4.231	0.000	2.964
1283T3	near air vent	0.000	5.532	4.045	4.267
1306P1	from window sill	0.000	5.633	0.000	0.000
1306P2	from window sill	0.000	5.360	0.000	4.785
1306T3	top of cabinet	0.000	4.078	0.000	3.017
1332P1	heat vent	0.000	0.000	0.000	0.000
1332P2	Fan	0.000	0.000	0.000	0.000
	heat vent	0.000	0.000	0.000	0.000
1332T3	computer mouse	0.000	0.000	0.000	0.000
1435P1	Vent	3.462	0.000	0.000	0.000
1435P2	Vent	3.477	3.301	0.000	0.000
1435T3	students desk	0.000	0.000	0.000	0.000
1482P1	taken from ceiling	0.000	0.000	0.000	0.000
1482P2	taken from ceiling	0.000	0.000	0.000	1.602
1482P3	collected from ceiling	0.000	0.000	0.000	1.778
1537P1	Ceiling	3.571	3.358	0.000	0.000
1537P2	Desk	0.000	0.000	0.000	0.000
	Wall	0.000	2.894	0.000	1.380
1537T3	NA	0.000	0.000	0.000	0.000
2162P1	art table	0.000	0.000	0.000	0.000
2162P2	vent from outside	0.000	3.845	0.000	0.000
2162T3	air vent	0.000	0.000	2.845	0.000
	student desk	0.000	0.000	0.000	0.000

Classroom*	Sampling Site	Aureobasidium spp.	Yeast	Cladosporium spp	Other
2178P1	back of room vent	0.000	0.000	0.000	0.000
2178P2	Doorhandle	0.000	0.000	0.000	0.000
2178T3	drink fountain	0.000	0.000	0.000	0.000
2419P1	Vent	0.000	0.000	0.000	0.000
2419P2	Vent	0.000	0.000	0.996	1.303
2419T3	Doorknob	0.000	0.000	0.000	0.000

*Classroom numbers containing "P" are portable classrooms; those containing "T" are traditional classrooms.

Table 3-41. Summary of Culturable Airborne Microorganisms ($\log_{10}$ [CFU/m^3])

Species	Loc	Est. Pop. Size	n	Pct. Meas.	Mean	50th Pctl	95th Pctl
Cladosporium spp.	Outdr	10	10	100.0	2.57	2.30	
	All	37	37	91.7	1.68	1.61	3.19
	Port	27	27	96.2	1.76	1.79	3.12
	Trad	10	10	80.0	1.46	1.41	
Penicillium spp.	Outdr	10	10	60.0	0.97	1.00	
	All	36	36	52.8	0.72	0.27	2.08
	Port	26	26	50.0	0.72	0.00	1.87
	Trad	10	10	60.0	0.71	0.40	
Aspergillus spp.	Outdr	10	10	0.0	0.00		
	All	36	36	25.0	0.16		1.01
	Port	26	26	23.1	0.15		0.92
	Trad	10	10	30.0	0.19		
Other	Outdr	10	10	70.0	1.14	1.32	
	All	36	36	80.6	0.75	0.83	1.51
	Port	26	26	76.9	0.75	0.87	1.54
	Trad	10	10	90.0	0.75	0.67	
Unknown	Outdr	10	10	80.0	1.45	1.54	
	All	36	36	88.9	1.02	1.06	1.91
	Port	26	26	88.5	1.04	1.06	1.93
	Trad	10	10	90.0	0.97	1.06	

Note: Blank cells indicate cases where the percentile could not be estimated.

4. SUMMARY AND CONCLUSIONS

The Phase II study was an in-person monitoring study conducted from October 2001 through February 2002. It utilized a probability-based sample of California public schools (and random selection of classrooms within the schools) having one or more portable classrooms. The sample of schools selected for the Phase II survey contained 81 eligible schools and was statistically representative of all California public schools that had portable classrooms in the spring and fall of 2001. Statistical estimates of population parameters such as means and proportions were computed using weighted data analysis techniques that generate estimates of means, proportions and regression coefficients and that properly account for features of the sampling design in the estimates of precision (e.g., confidence intervals).

The target population for Phase II of the study is estimated to consist of 6,506 schools containing 69,447 portable classrooms and 126,322 traditional classrooms (195,769 total classrooms). These totals are slightly less than the estimated size of the Phase I population because five schools selected for the Phase II sample were found to have no portable classrooms in the 2001-02 school year. The schools included in the Phase II study population are those California public schools that had traditional classrooms in the spring of 2001 and also have traditional classrooms in the 2001-02 school year.

4.1 Data Completeness and Response Rates

Data were successfully collected (questionnaire data and and/or environmental monitoring data) in 67 of 81 eligible sample schools, resulting in an overall weighted school-level response rate of 83.0%. Such a response rate for school-level participation in Phase II of this study is quite good and limits the possibility for nonresponse bias to seriously affect the results. This high response rate was achieved because we began recruitment early in the school year, obtained written permission from superintendents before contacting principals, and used three experienced staff members for making recruitment calls to superintendents and principals.

In general, conditional classroom-level response rates were good. Exceptions were the following: HVAC status data from HOBO monitors (many of these measurements were judged to be unreliable and hence those data were not weighted); outdoor relative humidity data (not weighted); and CO data (unreliable and not used). On the other hand, the Teacher Questionnaire and the Classroom Form had conditional rates of 93.0% and 98.5%, respectively, which yield overall response rates (i.e., when multiplied by the 83.0% school-level response rate) of 77.2% and 81.7%, respectively. Conditional classroom-level response rates for the other data types varied from 70.6% for some of the VOCs to 98.5% for indoor air aldehydes. When multiplied by the 83.0% school-level response rate, the resulting overall study-level response rates for classroom monitoring data varied from 58.6% for 81.7%.

4.2 Data Quality

Various types of quality control (QC) samples were acquired during Phase II data collection for a subset of the schools/classrooms. These included field blanks, control samples, and duplicate samples. Laboratory performance was monitored through lab controls, lab blanks, and duplicate analysis or duplicate injection methods. In general, the measured levels in the blanks were minimal and relatively uniform. Notable exceptions were acetone and acrolein in the air-aldehyde samples (results not reported) and zinc in the dust-metals. Control recoveries for several analytes (particularly metals in dust) were poor, but most fell within acceptable ranges. Precision was evaluated by computing relative standard deviations (RSDs) for duplicate samples and summarizing them in terms of the median RSD. Similarly, analytical precision was evaluated by computing median RSDs for duplicate analyses and duplicate injections.

4.3 Characteristics of the Target Population of Schools

Weighted estimates of population proportions (and of means and percentiles, for continuous measurements) were generated for selected items from the data collection forms. Among the many estimates produced, the following *school* characteristics were most notable:

- The schools are about equally split between Northern and Southern California (45.5% in the north and 54.5% in the south).
- These schools are mostly suburban schools (75.8% suburban, 17.1% urban, and 7.2% rural).
- These schools are mostly elementary schools (59.2% elementary, 20.7% middle, and 20.1% high school, based on the highest grade offered).
- Many of these schools (40.1%) have 30 or fewer total classrooms, but 4.4% are estimated to have over 30 portable classrooms.
- Most of these schools (87.9%) perform regular HVAC inspection and maintenance.
- Many of these schools (41.7%) are aware of EPA's Tools for Schools program, but few (18.7%) use this program.

These results are consistent with the Phase I findings, except that the awareness and use of the EPA's Tools for Schools program has increased slightly.

Several differences are noted between the proportions of schools that reported environmental problems or complaints regarding environmental conditions in their portable and traditional classrooms in the past year. In particular, higher percentages of schools reported environmental problems and complaints regarding environmental conditions for their portable classrooms. Higher percentages of schools reporting problems or complaints regarding their portable classrooms is consistent with the Phase I findings; however, the percentages of schools reporting problems or complaints is uniformly lower for both portable and traditional classrooms. As noted in the Phase I report, these school-based results must be interpreted with caution because of differences in the numbers of portable and traditional classrooms in the schools and because of differences in the reported frequencies of complaints for the two types of classrooms. It is more appropriate to compare the classrooms using the classroom-level data.

4.4 General Characteristics of the Target Population of Classrooms

Some of the general characteristics of the classroom population are as follows:

- About 63.1% of the classrooms are located in Southern California.

- These classrooms are mostly in suburban schools (75.5% suburban, 17.8% urban, and 6.6% rural).
- These classrooms are mostly in elementary schools (59.0% elementary, 22.9% middle, and 18.1% high school, based on the highest grade offered).

These results are comparable to those observed in Phase I of the study.

General classroom characteristics that were found to be significantly different (at the 5% significance level) between traditional and portable classrooms are highlighted below:

- Portable classrooms usually were newer than traditional classrooms (29.1% versus 83.4% over 15 years old).
- Portable classrooms are much more likely to have had a major addition or replacement in the past three years (83.6% portable classrooms versus none observed for traditional classrooms).
- Portable classrooms were more likely to have carpet or rugs on the floor (82.0% versus 62.9%).
- Portable classrooms were more likely to have water stains on the floor (13.1% versus 2.0%).
- Portable classrooms were more likely to have tack board, fiber/particle board, or plywood walls, whereas traditional classrooms were more likely to have sheetrock, plaster, or other wall material.
- Portable classrooms were less likely to have chalk in the room (21.6% versus 40.8%).
- Portable classrooms were more likely to have pressed wood bookcases in the room (73.1% versus 49.8%).
- Portable classrooms were more likely to have a metal roof (28.5% versus 2.5%).
- Portable classrooms were used somewhat less frequently for general classroom instruction (87.9% versus 96.5%).
-

Moreover, the estimated distribution of the height of the foundation skirt for portable classrooms is as follows: 42.6% are less than 2”, 22.2% are from 2” to 12”, and 35.2% are over 12”.

4.5 HVAC Characteristics

Several of the items from the data collection forms pertain to the condition and operation of the HVAC systems serving the classrooms. Several significant differences between portable and traditional classrooms were observed regarding HVAC characteristics:

- Teachers were more likely to turn off the HVAC system due to high noise levels in portable classrooms (68.3% versus 42.2%).
- The HVAC unit was more likely to be wall mounted for portable classrooms (79.8% versus 9.3%).
- The HVAC unit was more likely to be a heat pump for portable classrooms (94.6% versus 76.9%).
- The heating fuel was more likely to be electricity for portable classrooms (98.1% versus 79.3%).

- The air handling unit was more likely to have good access to its interior for portable classrooms (66.1% versus 35.3%).
- The air filter was more likely to have a light loading of dirt for portable classrooms (51.6% versus 42.9%).
- The size of the gap around the filter was more likely to be less than 1/2" for portable classrooms (71.6% versus 46.3%).
- Mildew or mold was more likely to be found on the filter for portable classrooms (1.3% versus none observed for traditional classrooms).
- The HVAC unit was less likely to have clean condensate drain pans and lines for portable classrooms (30.0% versus 56.7%).
- The HVAC unit was more likely to have standing water in the drain test for portable classrooms (55.3% versus 11.1%).
- A blocked drain was more likely to be observed during the drain test for portable classrooms (36.6% versus 6.8%).
- The HVAC unit was more likely to fail the drain test for portable classrooms (58.5% versus 12.4%).
- The air intake was blocked on the air handling units more often for portable classrooms than for traditional classrooms (10.8% versus 2.7%).

Distributional statistics and hypothesis test results were generated for several continuous measurements related to HVAC performance. These included outdoor air flow (three different metrics: cubic feet per minute [cfm], cfm per chair, and cfm per square foot of classroom area), total supply air flow (cfm), and age of the HVAC unit (years). None of these variables had mean levels that were significantly different (at the 5% level) for portable and traditional classrooms.

The real-time CO_2 data were processed in a manner similar to the temperature and RH data and various summary measures were generated and summarized (e.g., average level, and percent of time that the level exceeded 1000 ppm). None of the means of the selected measures were judged to be statistically different for the portable and traditional classrooms. Average indoor levels (1070 ppm) were more than twice as high as outdoor levels (427 ppm). The indoor levels indicate that classrooms often have inadequate ventilation.

4.6 Lighting and Noise Characteristics

There was no significant difference between portable and traditional classrooms for the teachers' opinions regarding whether or not the classroom lighting was satisfactory. In both cases, most teachers thought the classroom lighting was satisfactory. However, teachers in portable classrooms were significantly more likely to turn off the HVAC system due to high noise levels (68.3% versus 42.2%). It is important to point out that this result is based on a question only about noise. There is some indication that vibration may be a confounding problem that resulted in some teachers deciding to turn the HVAC off. Future studies should pursue this issue. Classroom environmental measurements (HVAC Checklist) also included light and noise measurements. The light intensity was measured in the middle of the classroom. The mean light intensity was significantly higher for traditional classrooms than for portable classrooms (65.2 versus 55.7 foot-candles). Noise was measured both when the HVAC unit was on and again when it was off, in two classroom locations: near the center of the classroom and near the HVAC register. In addition, noise was measured outdoors near the HVAC unit both while it was on and while it was off. None of these six measurements were significantly different (at the 5% significance level) between portable and traditional classrooms.

4.7 Temperature and Humidity Levels

Q-Trak monitoring of temperatures and relative humidity (RH, in %) levels provided data for estimating various summary measures for the monitoring period (confined to at most 7am-4pm). Statistically significant differences between portable and traditional classroom were determined for three of the indoor temperature measures:

- Portable classrooms had temperatures below 17EC (62.6˚F) for more of the time (0.01 level): 6.3% versus 3.2%.
- Portable classrooms had temperatures below 20EC (68˚F) for more of the time (0.05 level): 27.0% versus 17.0%.
- The mean of the minimum 5-minute temperatures was 17.1E (62.8˚F) for portable classrooms versus 17.9E (64.2˚F) for traditionals.

None of the RH summary measures exhibited statistically significant differences between the means of the two types of classrooms. However, the portables were estimated to have RH levels over 60% more of the time (an average 16.9% versus 12.6% for traditionals). Average RH levels were about 46%.

4.8 Pollutant Levels

Particle Counts in Indoor Air. One-minute particle counts were obtained every 5 minutes for each of several size fractions. These data were summarized for each classroom (and outdoors) to produce some summary measures for the 7am-4pm time window (e.g., average number of particles per minute for particles of 2.5 µm and less, and average number of particles per minute for particles of 10 µm and less). Characteristics of the distributions of these summary measures were then determined for all classrooms and each type of classroom. Means of these measures for portables and traditionals were not statistically significantly different.

Pollen/Spores in Air. Allergenco slides were analyzed to determine levels of spores that occurred in the air. In general, there were few spores that were observed frequently in either the outdoor or indoor environments. Total Pollen Count and Total Fungal Spores were observed in at least 80% of the slides. No differences in mean levels between portables and traditionals were found.

Aldehydes in Air. Aldehyde air samples were collected in the sample classrooms and at one outdoor location. Of the thirteen specific aldehydes included in the analysis, only two were detected in more than 75% of the samples -- Formaldehyde and Acetaldehyde. For virtually all of the aldehydes, the indoor levels were higher than the outdoor levels, indicating the presence of indoor sources that contribute to the measured levels. Formaldehyde, for example, had a an overall mean level of 13.3 ppb indoors, but only 3.5 ppb outdoors, while the indoor-air 95th percentile was three times higher than the outdoor. Statistically significant differences (0.05 level of significance) between mean levels of portable and traditional classrooms were found for two analytes:

- Formaldehyde (mean of 15.1 for portables versus 12.3 ppb for traditionals)
- o,p-Tolualdehyde, although this analyte has a low percent measurable (~20%).

The distributions of formaldehyde measurements from Phase I and Phase II of this study were compared, even though many differences in the data collection methods and protocols occurred. The Phase I measurements involved use of PF-1 passive monitoring tubes sampling over 7 to 10 days, including nights and weekends when the schools were closed and HVAC systems may have been off, whereas the Phase II measurements were obtained using an active monitoring device during the 6 to 8 hours when classes were in session and HVAC systems were operating normally. Moreover, the Phase I measurements were obtained mostly in the spring, whereas the Phase II measurements were obtained in the fall and winter. Given these differences (colder weather and better air exchange during the monitoring period), it is not surprising that the Phase II formaldehyde concentrations are considerably different than those observed in Phase I, as noted in Table 4-1.

Table 4-1. Formaldehyde Concentrations, Phases I and II

	Sample size (n)		Mean (ppb)		Median (ppb)		95th Percentile (ppb)	
Location	Phase I	Phase II	Phase I	Phase II	Phase I	Phase II	Phase I	Phase II
Outdoor	NA	62	NA	3.48	NA	2.45	NA	8.05
All classrooms	911	199	27.0	13.29	22.0	12.01	61.7	23.93
Portable	644	135	32.4	15.07	27.1	14.49	71.5	25.78
Traditional	267	64	23.7	12.31	20.0	11.62	55.0	22.35

Volatile Organic Compounds in Air. VOC samples were collected for a subsample of half the sampled schools (usually inside three classrooms and at one outdoor location). Seven of the nine measured VOCs had at least 80% of their measured levels above the detection limit. Only benzene and chloroform had less than 80% detectable. There was a general tendency for the traditional classrooms to exhibit higher VOC concentrations than the portables, but none of the differences in mean concentrations were significant statistically, even at a significance level of 0.10. As in most indoor air quality studies, the measured indoor VOC concentrations were higher than those observed outdoors.

Metals in Floor Dust. For the PCS, metals analyses were obtained from samples collected from the floor dust, reported both in concentration units (ppm) and loading (ng/cm^2) in each of the three classrooms sampled. Dust chemical analyses were done for only a subset of classrooms, and dust samples from the portable classrooms in a given school were composited prior to chemical analysis. Hence population-based weighting (and thus statistical inference to the population) was not possible and formal testing of differences by classroom type is of questionable utility. The data were, however, weighted to reflect the varying numbers of classrooms from school to school and by type of classroom (i.e., to classrooms in those schools for which data were obtained). No important differences between portable and traditional classrooms were determined.

Allergens in Floor Dust. Weighted distributional statistics characterizing the allergen levels from sieved dust samples (dust particles less than 500 Fm) that were collected in the sample classrooms revealed that Canis f1 and Felis d1 were detected in 56% and 74% of the samples, respectively, while the other species were detected less than 10% of the time. The traditional classrooms had higher estimated concentrations for each species than the portables, but the differences were not statistically significant.

Pesticides in Floor Dust. Portable classroom pesticide mean levels were about the same as traditional classroom levels. Six of the twenty measured pesticides were detected in over 80% of the classrooms – chlorpyrifos, cis- and trans-permethrin, o-phenylphenol, piperonyl butoxide, and esfenvalerate. Esfenvalerate had the highest median concentration level (3.83 : g/g). Esfenvalerate had the highest median loading level (0.34 ng/cm^2), while many of the pesticides had median loading levels less than 0.01 ng/cm^2

PAHs in Floor Dust. Six of the PAHs had higher mean loadings (but not concentration levels) for the portables than for the traditional classrooms. The highest PAH levels were found in portable classrooms.

School Reports of Environmental Problems or Complaints in the Past Year. Several differences are noted between the proportions of schools that reported environmental problems with, or complaints regarding, environmental conditions in their portable and traditional classrooms in the past year. Table 4-2 shows that higher percentages of schools reported environmental problems and complaints regarding environmental conditions for their portable classrooms. Higher percentages of schools reporting problems or complaints regarding their portable classrooms is consistent with the Phase I findings; however, the percentages of schools reporting problems or complaints is uniformly lower for both portable and traditional classrooms. Table 3-10 shows that over half of the teachers reported environmental complaints regarding their portable or traditional classrooms.

Table 4-2. Percentages of Schools Reporting Environmental Problems or Complaints in the Past Year

Problem/Complaint	Portable (%)	Traditional (%)
Roof leak	24.3	12.0
Plumbing leak	4.3	2.6
Air quality/odor complaint	20.2	7.0
Mold complaint	13.4	4.4
Temperature complaint	15.8	17.2
Noise complaint	4.3	0.1
Environmental conditions complaint	32.2	18.9

4.9 Factors Affecting Indoor Environmental Quality

Modeling Strategy. Given the massive amount of data generated in the PCS, it is clear that many important and interesting relationships can be examined. As an initial effort towards identifying factors affecting IEQ, a series of weighted regression models were fit that related a selected IEQ variable, Y, to classroom type (portable/traditional indicator) and to other variates. The following notation was defined:

- R = classroom type indicator (= 1 if portable, = 0 otherwise),
- Z = an outdoor measure corresponding to Y. For example, if Y is the logarithm of the classroom formaldehyde levels, then Z would be the logarithm of the outdoor formaldehyde levels at the schools.
- X and X2 =other potential independent variables. These can be continuous variates or can be discrete variates that are coded as a set of dummy (0,1) variables. The models are structured and denoted as follows:

Three different modeling structures were employed, as depicted below:

Structure	Model A Terms			Additional Terms In Model B	Additional Terms In Model C
1	R			X	X2
2	R	Z		X	X2
3	R*	Z*	ZR	X	X2

* Since Structure 3 is used to determine if the effect of Z differs for portables and traditionals (i.e., to determine if the ZR term is significant), separate tests for R and Z within Structure 3 are not possible.

As indicated above, the models are identified by letter and structure; for instance, the model containing R, Z, and a single X would be referred to as Model B2. For cases in which there is not an outdoor measurement analogous to Y, only structure 1 is used. For the present report, all of the C models considered contained CLAGE (classroom age, in years) as one of the two candidate predictors. Thus a C model would be chosen if both CLAGE and the second predictor were statistically significant, a B model would be chosen if only one of the two was statistically significant, and an A model would be chosen if neither was statistically significant. Similarly, a structure 3 model would be used if the ZR interaction is a necessary term, structure 2 would be used if the outdoor covariate Z (but not ZR) is needed, and structure 1 would indicated if neither Z nor ZR were useful predictors.

Factors Affecting Indoor-Air Pollen/Spores. A number of different models for the following Y variables were estimated: Y1 = $\log_{10}$ (Pollen Count), and Y2 = $\log_{10}$ (Total Fungal Spores). Key findings were:

- There was a statistically significant association between indoor and outdoor levels – with higher outdoor levels being associated with higher indoor levels.
- The tests for significance of the classroom-type effect (R) indicated that the portable and traditional classrooms were not significantly different in terms of their Y1 and Y2 levels.
- The tests for significance for the candidate predictors revealed that only one X exhibited statistical significance – namely "windows open" (for Y1), which indicated that classrooms with "windows open today" tended to have lower pollen counts (statistically significant to 0.05 level of significance).

Factors Affecting Indoor-Air Aldehyde Concentrations. Various models for Y1=log(Formaldehyde Concentration), Y2=log(Acetaldehyde Concentration), and Y3=log(o,p-Tolualdehyde Concentration) were estimated; the preferred models for the three species were quite different. For formaldehyde, the type of classroom was generally statistically significant, with portables having higher levels (i.e., a positive coefficient on the portable/traditional indicator variable). The other two aldehydes showed no classroom type effect; however the tolualdehyde models showed a significant outdoor-air by room-type interaction. They also both showed significant associations with their outdoor levels, while the formaldehyde models generally did not show a relationship with the outdoor levels.

Two variables showed the strongest positive relationships with indoor formaldehyde levels: indoor CO_2 (adjusted for outdoor air formaldehyde levels and classroom type) and indoor relative humidity (adjusted for classroom type). These two models accounted for 22% and 32%, respectively, of the total variation in the indoor levels

The model including "pressed wood bookcases" as an X indicator, which also included a significant classroom age variate (positive slope), accounted for only about 14% of the total variation in the indoor formaldehyde levels; however, the effect of this X indicator was 0.303, implying about a 30% increase in formaldehyde levels when pressed wood bookcases were present, and the effect of classroom type was 0.288, implying that portables' levels were about 30% higher than traditionals. The model for acetaldehyde that included "pressed wood bookcases" as an X indicator accounted for about 24% of the total variation in the indoor levels of that analyte. The effect for the X variate was 0.131, indicating a significant increase in the indoor levels when pressed wood bookcases were present, but one that was not as large (relatively) as for formaldehyde. Unfortunately, the disparate classroom age distributions and the small sample sizes for newer traditional classrooms made separation of the classroom type and the classroom age effects infeasible.

Factors Affecting Indoor-Air VOC Concentrations. Models were fit for five VOCs (log scale concentrations) using various candidate predictors. There were significant associations with outdoor levels in virtually all of the models (except for benzene), and these associations appeared somewhat stronger than for the aldehydes. Few of the candidate X predictors were found to be significant. Most of the toluene and m,p-xylene models required structure 3, indicating that the outdoor association varied by classroom type. The toluene and xylene models showed no relation with outdoor levels for portables, and a positive relation for traditional classrooms.

A number of the significant effects for the X variables were counter-intuitive. For example, for tetrachloroethylene, a significant negative association with presence of carpet/rugs was detected. For toluene, significantly lower levels were estimated when new construction/repair activities were on-going (which may reflect the fact that doors and windows might be more frequently closed when those activities were outside of the immediate classroom). The variables in this model accounted for 69% of the total variation in indoor toluene levels.

Factors Affecting Indoor-Air CO_2 Concentrations. Two summary CO_2 measures were modeled: Y1=log(CO_2 Concentration), and Y2=percent of time CO_2 concentrations exceed 1000 ppm. Among the candidate predictors that were considered, classroom age had a significant positive relationship with the CO_2 levels. Also, for Y1, there was a significant positive relation with the outdoor levels. (There was not a corresponding outdoor measurement for Y2.) However, the inclusion of the teacher's rating of IAQ in the Y1 model resulted in an interaction effect between classroom type and outdoor CO_2 levels. A positive relation with the outdoor levels remained for the portables, but not for the traditionals. Based on the log(CO_2) model, the indoor CO_2 levels were estimated to be approximately 30% lower (coefficient on that X was -0.273) when the teachers reported that the IAQ was acceptable. The Y1 and Y2 models both showed a significant effect of school type, with high schools having the highest indoor CO_2 levels.

Factors Affecting Indoor-Air Particle Counts. Models for the following Y variables were estimated: Y1 = log (average number of particles/minute # 2.5 μm and Y2 = log (average number of particles/minute # 10 Fm). Indoor particle levels were significantly associated with outdoor levels. Among the independent variables (X or X2) that were examined as potential predictors, only one was statistically significant: "present of carpets/rugs", with lower $PM_{2.5}$ levels occurring in rooms with carpets/rugs. For that model, the traditional classrooms also showed significantly lower $PM_{2.5}$ levels than the portable classrooms.

Factors Affecting Noise Associated with HVACs. A single variate was modeled: Y1=the noise level (dBA) measured near the register when the HVAC unit was on. In this case, only model structure 1 is relevant since there is no corresponding outdoor measure. Of the candidate X predictors, only classroom age was statistically significant. For that model, classroom age had a positive effect (older rooms had higher noise levels) and the portables had significantly higher noise levels than the traditionals. This model only accounted for only about 11% of the total variation in the Y1 measure, however.

Factors Affecting Indoor Temperatures. Two types of temperature measures were modeled: Y1=percent of time that the room was below 20EC or 68˚F (too cool) and Y2=percent of time that the room was above 23EC or 73˚F (too warm). Among the candidate predictors considered, only two predictors appeared significant (school type, and awareness of EPA IAQ tools) for Y2. A meaningful pattern for the latter X variable was not apparent, however, for either Y1 or Y2. Portables and traditionals were not different for Y2, but were significantly different for Y1. The percent of time that the portables had less than 20EC temperatures was larger (by about 10%) than for the traditional classrooms.

4.10 Specially Selected Schools

Fourteen schools were specially selected into the Phase II sample based on their Phase I results (high complaints of environmental problems or high formaldehyde levels). The Phase II formaldehyde levels for the classrooms at these schools were much lower than in Phase I and appeared to match the estimated levels for the total population. Bioaerosol data and biological measurements from surface swabs were also summarized. CO_2 levels measured in the classrooms of the specially-selected schools tended to be lower, on average, than the levels in the general population. Moisture-related problems (e.g., musty odors, mold areas) were reported more frequently for the classrooms in the specially-selected schools.

4.11 Conclusions

- The CA PCS Phase II data base provides a robust basis for statistical inferences regarding the population of schools with portable classrooms because response rates and data completeness were quite good for most analytes and questionnaire items. The exceptions were relatively poor data completeness for HOBO data regarding on/off cycles of HVAC units, CO data, and outdoor relative humidity data. Eighty-three percent of the eligible sample schools provided both questionnaire data and environmental monitoring data, and overall study-level response rates for the weighted classroom-level data (i.e., the products of school-level and classroom-level response rates) varied from 58.6% to 81.7%.

- Analysis of field blank samples, control samples, and duplicate samples revealed that analyte recovery and precision were reasonably good for most analytes. Hence, the quality control samples verified that the environmental measurement and laboratory data quality were satisfactory.

- Facility managers reported problems or complaints regarding indoor environmental quality (e.g., water leaks, odors, mold, noise, and temperature levels) more frequently for their portable classrooms than for their traditional classrooms. Pest-related problems seemed about the same for portable and traditional classrooms.

- Portable and traditional classrooms tend to be different in a number of respects – for example, classroom age, presence of rugs or carpeting, water stains on the floor, construction materials, and other characteristics cited below. Age of the classroom seems to be an important confounding variable to consider when comparing portable and traditional classrooms. The effect of age, however, is difficult to separate from the classroom type effect because of the disparate age distributions of the different room types.

- With respect to the HVAC characteristics, there were a number of significant differences between traditional and portable classrooms. Those related to structure include: physical location of unit, type of fuel (electricity), type of unit (heat pump), and accessibility. With respect to potential indicators of environmental quality, the positive factors include: air filter dirt loading (portable with *light* loading), and tight fitting filter with less than ½" gap (portable with more tightly fitting filters). On the other hand, the portable HVAC filters showed a higher percentage of mildew or mold, dirtier condensate drain pans, clogged drains, and standing water. Also, teachers were more likely to turn off the HVAC system due to high noise levels in portable classrooms. The air flow measurements in traditional and portable classrooms were not significantly different.

- The mean light intensity measured in the center of the classrooms was significantly higher for traditional classrooms relative to portable classrooms. However, in the teachers' opinion, the percentage of teachers in the portable classrooms who considered the lighting to be satisfactory was no different than the opinion expressed by the teachers in the traditional classrooms.

- All classrooms exceeded the new ANSI acoustic standard for classroom noise levels (35 dBA), and a substantial percentage of both portable and traditional classrooms exceeded outdoor noise limits (45 and 55 dBA) set by some California communities. Noise levels measured in both types of classrooms were not statistically different. However, the teachers in portable classrooms were more likely to turn off the HVAC unit due to noise. This noise effect in portable classrooms was supported in the statistical modeling.

- Noise levels measured in both types of classrooms (without students in the classrooms) were not statistically different. However, the teachers in portable classrooms were more likely to turn off the HVAC unit due to noise. The importance of this noise factor for portable classrooms was supported in the statistical modeling. When the noise levels were modeled against age of the classroom, older classrooms had higher noise levels, and portables had significantly higher noise levels than the traditionals.

- Temperature levels were significantly different, with the portable classrooms cooler than the traditional classrooms. Portables also had RH measurements above 60% more of the time than traditional classrooms.

- Assessment of pollutant and CO_2 levels in air revealed the general tendencies depicted in Table 4-3.

- Assessment of pollutant levels in floor dust revealed the following general tendencies:
  - Metals, animal and arthropod allergens, and pesticides generally had comparable levels (both loadings and concentrations, where applicable) in portable and traditional classrooms.
  - Pesticide residues were found in all floor dust samples, indicating the widespread use of a variety of different products in or near classrooms. Six pesticides were detected in over 80% of the rooms, with esfenvalerate (a common insecticide) showing the highest concentration and loading levels. Some of the pesticides are persistent chemicals, lasting for years, while other have an environmental lifetime lasting just weeks; thus, some of the pesticides were likely applied just a week or two prior to the sampling period at some schools in 2001-2002.
  - Similarly, 15 of the 18 metals analyzed for were detected in the floor dust samples. Some, such as arsenic, were detected at higher levels in portables, while others, like lead, were higher in traditional classrooms. Some of the metals are known to have neurological or carcinogenic effects. Most of the 16 PAHs studied (some of which are also known or suspected carcinogens) also were found in over 80% of the classrooms, but the loading levels were low. Most were found at higher levels in the portable classrooms.
  - Dog and cat allergens were found commonly in floor dust. Dust mite and cockroach allergens were found much less often.
  - Several PAHs exhibited higher loadings in portable classrooms than in traditional classrooms, but levels were low.

- Indoor air formaldehyde concentration levels in Phase II were smaller than those in Phase I; there are many differences in procedures and timing of the two data collections.

Table 4-3. Characteristics of Pollutants and CO_2 Measured in Air

Pollutant Type	Summary Statistics and Comparisons of Pollutant Levels		Modeling Results -- *For Selected Species and Selected Predictors*		
	Indoor Levels Vs. Outdoor Levels	**Portable Classroom Mean Vs. Traditional Classroom Mean Test**	**Portable Classroom Vs. Traditional Classroom Test**	**Indoor Levels Related to Outdoor Levels**	**Other Significant Predictors**
CO_2	Indoor higher	About the same	Depends on outdoor level (some models)	Yes (when applicable), depends on room type	Classroom age, and school type and teacher rating of indoor air quality (when classroom age included)
Particle Counts	Outdoor higher	About the same	About the same (most models)	Yes	Presence of carpets/rugs
Pollens and Spores	Outdoor generally higher	About the same	About the same	Yes	Open windows
Aldehydes					
- Formaldehyde	Indoor much higher	Portables higher	Portables higher (most models)	Generally not	Classroom age, school type, general instruction classroom, others related to materials in room, indoor CO_2 levels, indoor RH
- o,p-Tolualdehyde (low % measurable)	Indoor higher	Portables higher	Depends on outdoor level	Yes	General instruction classroom, materials in room, school type
- Others	Indoor generally Higher	About the same	About the same (acetaldehyde)	Yes (acetaldehyde)	General instruction classroom, indoor RH (acetaldehyde)
VOCs	Indoor higher	About the same	About the same, some depend on outdoor level	Yes, some depend on room type	Only a few, varies by analyte

- Classrooms in specially-selected schools appeared to have indoor air formaldehyde concentration levels comparable to those in the general target population (Phase II), but moisture indicators (mold areas and musty odors) were reported more often for the classrooms in the specially-selected schools.

- The Phase II study was successful in generating a massive amount of information about California schools and classrooms. Although the data summaries and analyses described in this report are quite extensive, they clearly represent only a small fraction of the analyses that could be undertaken to address environmental quality issues and related concerns.

- The results from this large, geographically and temporally disperse field study, provide a snap-shot of the IEQ in classrooms across the State. Where standards and guidelines exist, results indicate that there are areas for improvement. Even in the absence of guidelines and standards, results suggest that there are important issues associated with environmental conditions in California K-12 schools that deserve further attention.

5. RECOMMENDATIONS

Recommendations based on the Phase II study fall into two categories:

- Conducting additional analyses of Phase II data
- Improving data quality, completeness and other characteristics in future studies

<u>Conducting Additional Analyses of Phase II Data</u>

Given the magnitude of the data collected in Phase II, it is clear that many additional analyses of the Phase II data may be desirable.

- Additional modeling is needed to better understand the interaction of factors associated with IEQ in schools. Analysts are encouraged to use weighted data analysis methods (where appropriate), since the field data were derived from a probability-based sample having unequal probabilities of selection. Weighted data analysis techniques are particularly important for analyses involving classroom-level data (the vast majority of the data) because portable classrooms were intentionally over-represented in the sample.
- A specific example of further analysis would be to compare the supply air flows to the sum of outdoor air and return air flow. These results should be modeled to understand the relationship to other measured and reported items. Other studies have observed flow imbalance in classrooms, and these data would provide a better understanding of this relationship.
- With such a rich database, analysts should be encouraged to use exploratory analysis techniques, including data mining, to provide opportunities for further research regarding the IEQ in the classrooms.

<u>Improving Data Quality, Completeness and other Characteristics in Future Studies</u>

- Prior to initiating a large-scale field study , it is essential to develop and pilot test a complete data information shell. As described in Section 2.3.1, the information shell displays the requirements for each participating site, the required monitoring, forms, and field steps – all the essentials for the field technicians, laboratory analysts, data processors, and data analysts for tracking and verifying the completeness of all expected activities. Although a draft pilot version of the information shell was tested in the pilot study, many changes to the equipment, types of sample collection, and the data forms occurred after the pilot test, and even after the monitoring began. In addition, the final version of the data information shell did not include data from other sources, such as the allergen data received from California laboratories. Some data problems resulted from using a system that had not been fully tested.

- The final questionnaires and checklists should be tested by the field personnel in actual school settings, before the study begins. These forms should also be processed through the forms processing system (especially optical-scanning forms)to ensure that the results can be accurately processed into the data system.

- The field technicians must be adequately trained in the operation, maintenance, calibration, and data downloading of all instruments prior to field work data collection. Daily status checking by the "at-home" field support staff can identify when problems are occurring and take steps to resolve the problems. Three types of Phase II data were of questionable quality. All three of the instrument types were not tested in the pilot: (1) the HOBO with a sensor to ascertain when the HVAC system was on or off; (2) the CO data, which were essentially all below the limit of detection, except for very unusual instrument noise; and (3) the RH sensor, which provided excellent data for the indoor measurements, but, outdoor RH measurements were incomplete and erratic.

- The Teacher Questionnaire should ask a specific question about vibrations resulting from operating HVAC units. This may be the reason why HVAC units were turned off, instead of the reported reason given, which was noise.

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GLOSSARY OF TERMS

Term	Definition
Active/Passive Sampling	Active sampling depends on pumping or similar processes to collect the sample, such as was used for VOC and Aldehyde sample collection; whereas passive sampling involves non-mechanical processes, like diffusion, such as was used in Phase I for the formaldehyde sample collection
Air Changes per Hour	Volume of air moved in one hour. One air change per hour is a room, home, or building means that all the air in that environment will be replaced in one hour. (ACH)
Air Conditioning	The process of treating air to meet the requirements of a conditioned space by controlling its temperature, humidity, cleanliness, and distribution.
Air Exchange Rate	The rate at which outside air replaces indoor air in a space. Expressed in units of air changes per hour or cubic feet per minute.
Air Handling Unit	Refers to equipment that includes a blower or fan, heating and/or cooling coils, and related equipment such as controls, condensate drain pans, and air filters. Does not include ductwork, registers, or grilles, or boilers and chillers.
Allergen	A chemical or biological substance (e.g., pollen, animal dander, or house dust mite proteins) that induces an allergic state or reaction, characterized by hypersensitivity.
Bacteria	Microscopic living organism.
Biological Contaminants	Agents derived from or that are living organisms (e.g., viruses, bacteria, fungi, and mammal and bird antigens) that can be inhaled and can cause many types of health effects including allergic reactions, respiratory disorders, hypersensitivity diseases, and infectious diseases. Also referred to as microbiologicals or microbials.
Chemical Classes/Families	Groups of chemicals by common characteristics, such as VOCs, PAHs, Aldehydes, carbonyls, metals, pesticides
Comfort measures	Temperature, relative humidity, noise and light
Composite Samples	Combined samples of similar types to get an overall average result, for example, composite floor dust samples collected in the

	two portable classrooms. Composite samples are also used to obtain detectable amounts of analytes when single samples may be insufficient.
Cross-tabulation	Tabulation of the levels of one categorical variable crossed with the levels of a second categorical variable
Dampers	Controls that vary airflow through an air outlet, inlet, or duct. A damper position may be immovable, manually adjustable, or part of an automated control system.
Diffusers and Grilles	Components of the ventilation system that distribute and diffuse air to promote air circulation in the occupied space. Diffusers supply air and grilles return air.
Distribution	Relative frequency of occurrence of values in a population or sample
Domain	Subpopulation regarding which statistical inferences are defined (e.g., portable classrooms)
Electrostatic Precipitator	An air pollution control device that removes particles from an air stream. The ESP imparts an electrical charge to particles causing them to adhere to metal plates inside the precipitator.
Fungi	A group of organisms that lack chlorophyll, including molds, mildews, yeasts, mushrooms.
Humidity	The measure of moisture in the atmosphere.
Limit of Detection (LOD)	Lowest detectable concentration of a pollutant for a sampling and/or analytical procedure. This can be determined by a number of different methods, depending on the type of sample.
Mail Survey	An information gathering study that utilizes the mail for distributing and returning the information, such as was used in Phase I.
Makeup Air	Outdoor air supplied to replace exhaust air and exfiltration.
Microbes	Microscopic organisms such as algae, insects, viruses, bacteria, fungi, and protozoa, some of which cause diseases.
Microbiologicals	See “Biological Contaminants.”
Micron	A unit of linear measure equal to one millionth of a meter.

Microorganism	A microscopic organism, especially a bacterium, fungus, or protozoan.
Natural Ventilation	The movement of outdoor air into a space through intentionally provided openings, such as windows and doors, or through non-powered ventilators or by infiltration.
Non-response	Lack of data for a sample unit for which data were intended to be collected, due to subjects declining to participate or provide certain information
Phase I	The mail survey conducted in the spring-early summer of 2001. It consisted of two questionnaires, a facilities questionnaire and a teachers' questionnaire, and for a subsample of the schools, passive formaldehyde samplers
Phase II	The field study conducted in October 2001 through February 2002. It consisted of a number of active monitoring and sampling of indoor and outdoor air pollutants, measurement of indoor thermal, noise, and lighting conditions, and questionnaires and inspections regarding building conditions and maintenance practices.
Plenum	Air compartment connected to a duct or ducts.
Portable Classrooms	Classrooms that are designed and constructed to be moveable and transportable over public streets, also known as temporary or relocatable classrooms.
Quality Control (QC)	Internal checks on the operation of sample collection or sample analysis. Methods for determining the operation include blanks, spiked samples, flow checks, duplicate samples. QC measures can be used to determine accuracy, bias, and precision of the data reported.
Real-time Monitoring	This type of environmental measurement gives instantaneous (or nearly so, depending on the sampling rate/time in detector) information at the point of sampling. Examples include measurements for CO, CO_2 , particle counts, temperature, relative humidity, lighting, and noise.
Recirculated Air	Air removed from the conditioned space and used for ventilation, heating, cooling, humidification, or dehumidification.
Reference Exposure Level (REL)	The concentration level at or below which no adverse health effects are anticipated for a specified exposure duration. RELs are based on the most sensitive, relevant, adverse health effect reported in the medical and toxicological literature. RELs

are designed to protect the most sensitive individuals in the population by the inclusion of margins of safety. Since margins of safety are incorporated to address data gaps and uncertainties, exceeding the REL does not automatically indicate an adverse health impact. OEHHA provides acute (1-hour), chronic (lifetime, non-cancer), and indoor (1-hour, non-cancer) RELs for a number of chemicals.

Return Air	Air removed from a space to be then recirculated or exhausted.
Selectivity	Ability to discriminate an analytical response for a specific chemical, biological, or physical characteristic
Sensitivity	Change in the detection method's response (slope) as a function of incremental changes in analyte concentration
Sorbent Material	Types of material used for collecting and retaining the sample for analysis such as Carbotrap, Carbopack.
Sorbent Tubes	Tubes containing some adsorbing/absorbing material for capturing and preconcentrating/enriching the target analytes
Specially-Selected Schools	14 schools and the three respective classrooms in the Phase I sample that appeared to have the greatest potential for indoor environmental quality (IEQ) problems and, hence, were all included in the Phase II sample as a separate strata
Strata	Sub-groups within the target population that were sampled independently. For example, see Table 2-7 for the strata used for the Phase II sample.
Stratified Random Sampling	Random samples are selected from each of the strata. The sampling rate or selection probability for each strata can differ, depending on the study design.
Supply Air	Air delivered to the conditioned space and used for ventilation, heating, cooling, humidification, or dehumidification.
Target population	The set of schools and/or classrooms about which statistical inferences are supported by the study design, specifically all California K-12 public schools that had portable classrooms in both the spring and fall of 2001 (spring of 2001 only for Phase I), and all classrooms in those schools
Traditional classrooms	Site-built classrooms in permanent school buildings

Variable Air Volume System	Air handling system that conditions the air to a constant temperature and varies the outside airflow to ensure thermal comfort.
Ventilation	The process of supplying and removing air by natural or mechanical means to and from any space.
Volatile Organic Compounds	Compounds that evaporate from the many housekeeping, maintenance, and building products made with organic chemicals. These compounds are released from products that are being used and that are in storage.
Weights (or sample weights)	Statistical weighting factors that are used to remove the bias due to differential sampling rates and to reduce the bias due to differential rates of non-response

GLOSSARY OF ABBREVIATIONS AND SYMBOLS

Term	Definition
ACH	air changes per hour
AHU	air handling unit of the HVAC system
ARB	California Air Resources Board
^{o}C	degrees Celsius
CFM	cubic feet per minute
CFU	colony forming units
cm^2	square centimeter
CO	carbon monoxide
CO_2	carbon dioxide
DHS	California Department of Health Services
DNPH	2,4-dinitrophenyl hydrazine
^{o}F	degrees Fahrenheit
GC	gas chromatography
GC/MS	gas chromatography coupled to mass spectrometry
HPLC	high performance liquid chromatography
HVAC	heating, ventilating, and air conditioning. Refers to the system including control equipment servicing the building or classroom.
IAQ	indoor air quality
ICP/MS	inductively coupled plasma-mass spectrometry
IEQ	indoor environmental quality
kg	kilogram
l/min.	liters per minute (flow rate)
LOD	limit of detection
m^2	square meter
m^3	cubic meter
:g	microgram
:g/g	microgram per gram (concentration)
mg	milligram
mg/kg	milligram per kilogram (concentration)
ml	milliliter
ng	nanogram
ng/g	nanogram/gram (concentration)
No.	number
OEHHA	California Office of Environmental Health Hazard Assessment
PAHs	polynulcear aromatic hydrocarbons
PCS	California Portable Classrooms Study
PM2.5	Particles with aerodynamic diameter less than 2.5 microns
PM10	Particles with aerodynamic diameter less than 10 microns
ppb	parts per billion
ppm	parts per million
QC	quality control
REL	Reference Exposure Level
RH	relative humidity

RSD	relative standard deviation, calculated as standard deviation divided by mean, expressed as a %
SD	standard deviation
T	temperature
UV	ultraviolet (light)
VAV	variable air volume system
VOCs	volatile organic compounds, e.g., benzene, toluene.

APPENDIX A

Phase II Questionnaires and Other Data Collection Forms

Appendix A contains the following:

1. Facilities Questionnaire II
2. Teacher Questionnaire II
3. Classroom Form
4. HVAC Assessment Checklist and School Characteristics
5. Consultation with Facilities and HVAC Managers (Part 1)
6. Consultation with Facilities and HVAC Managers (Part 2)
7. Introductory Letter to Superintendent
8. Superintendent Endorsement Form Letter
9. Introductory Letter to Principals
10. Study Brochure
11. Delaine Eastin Letter of Endorsement
12. A List of Monitoring Activities
13. Cover Letter to Teachers
14. Cover Letter to Facility Managers
15. Confirmation Letter
16. Thank You Letter

California Portable Classroom Study: Facilities Questionnaire II

46154

Dear Facility Manager,

Thank you for participating in the California Portable Classrooms Study. Your support is critical to the success of obtaining useful statewide results. Results from this study will be used to identify potential environmental problems, determine if and to what extent they occur, and make recommendations to resolve current and future problems.

The following questionnaire is designed to be completed by the school's facility manager, who may be in the district office. The district facility manager has been notified that he/she may need to assist the schools in completing the questionnaire. Section B of the questionnaire asks about the school site as a whole. Before completing this questionnaire, please review the instructions below. To fill in boxes, use a black ink pen or a #2 pencil to apply dark marks to the questionnaire boxes. Please do not fold this questionnaire.

After you have finished the questionnaire, please return it to the RTI technician visiting the school. If you have any questions about the questionnaire, please call Ms. Rebecca Premock, the RTI Project Coordinator, at 1-800-334-8571, Ext. 7468. Call before 2:00 pm Pacific time or leave a voice mail message.

FILLING IN BOXES:

It is important that you completely fill in (or make a dark X in) the boxes next to your answers and print clearly. Listed to the right are examples of correct and incorrect ways to mark your answers.

<u>Correct</u> Mark (Dark and thick)

■ ☒

<u>Incorrect</u> Marks (Light and thin)

PRINTING NUMBERS IN BOXES:

Print one number per box. Listed to the right are examples of correct and incorrect ways to print text into the boxes. The numbers should be printed with solid connected lines and should not touch or cross any of the box lines. Do not cross zeroes or sevens.

Write digits like this:

1	2	3	4	5	6	7	8	9	0

Do not write digits like this:

1	2	3	4	5	6	7	8	9	0

California Portable Classroom Study: Facilities Questionnaire II

46154

Section A. Respondent Information

Please fill in today's date (mm-dd-yy) Month [ ][ ] Day [ ][ ] Year [ ][ ]

1. Your job category: ☐ facilities manager ☐ assistant manager ☐ maintenance staff ☐ custodial staff ☐ administrative staff ☐ other
2. Your work location is: ☐ district-wide ☐ at this school only ☐ at several sites
3. Years you have worked at this school (in years): ☐ 1 ☐ 2-5 ☐ 6+
4. May we contact you later to verify or clarify your responses, if necessary? ☐ Yes ☐ No
5. If Yes, please enter the following: Phone number [ ][ ][ ] - [ ][ ][ ] - [ ][ ][ ][ ]

   E-mail address: ________________________________

B. School Site Characteristics and Maintenance Practices *(Fill in all that apply for the entire site)*

School Site

6. Year of the school's original construction: [ ][ ][ ][ ]
7. Total number of classrooms at this site: Portable- relocatable [ ][ ][ ] Permanent- traditional [ ][ ][ ]
8. Building density near the school: ☐ Urban ☐ Suburban ☐ Rural
9. Nearby areas or typical activities (within 1/4 mile) : ***(Mark all that apply)***

Roadways:	☐ busy intersection(s)	☐ congested streets	☐ freeways	☐ dirt or gravel roads	☐ serpentine road cover		☐ none
Commercial:	☐ service stations	☐ heavy industrial	☐ light industrial	☐ truck route or depot	☐ rail route or depot		☐ none
Agriculture:	☐ livestock	☐ row crops	☐ orchards	☐ open fields with exposed soil		☐ none	
Diesel engines:	☐ school buses	☐ transit buses	☐ trucks	☐ trains	☐ farm equipment	☐ generators	☐ none
Waste facilities:	☐ sewage treatment	☐ municipal waste	☐ composting	☐ recycling	☐ none		

[ ][ ][ ][ ]

California Portable Classroom Study: Facilities Questionnaire II

46154

HVAC Maintenance:

10. HVAC maintenance done by: ***(Mark all that apply)***
☐ school staff ☐ district staff ☐ contractor ☐ none ☐ don't know ☐ not applicable

11. Where are maintenance logs for HVAC kept? ***(Mark all that apply)***
☐ not kept ☐ on equipment ☐ paper files ☐ computer ☐ contractor ☐ other ☐ don't know

12. Typical thermostat setting during classes (degrees F): Heating ☐☐ Cooling ☐☐

13. Are thermostats usually set back or shut down? ***(Mark all that apply)***
☐ never ☐ nights ☐ weekends ☐ holidays ☐ summer vacation ☐ don't know ☐ not applicable

14. Daily start time of system on school days: ☐ when first class starts ☐ when teacher arrives ☐ 1-2 hours before classes start ☐ don't know ☐ not applicable

15. Regular inspection and maintenance: ☐ Yes ☐ No ☐ not applicable

→ If Yes, how frequently are the following items inspected and maintained (check one in each row)?

Outdoor air damper setting:	☐ monthly	☐ quarterly	☐ annually	☐ longer than annually	☐ never	☐ don't know	☐ not applicable
Coils cleaned:	☐ monthly	☐ quarterly	☐ annually	☐ longer than annually	☐ never	☐ don't know	☐ not applicable
Condensate pan and drain:	☐ monthly	☐ quarterly	☐ annually	☐ longer than annually	☐ never	☐ don't know	☐ not applicable
HVAC filter replaced:	☐ monthly	☐ quarterly	☐ annually	☐ longer than annually	☐ never	☐ don't know	☐ not applicable
Heat exchanger checked:	☐ monthly	☐ quarterly	☐ annually	☐ longer than annually	☐ never	☐ don't know	☐ not applicable

Other Maintenance Practices:

16. Frequency of usual custodial services for classrooms:

Trash removed:	☐ 5 days per week	☐ 3-4 days per week	☐ 1-2 days per week	☐ 1-2 per month	☐ <1 per month
Vacuumed, swept, and dusted:	☐ 5 days per week	☐ 3-4 days per week	☐ 1-2 days per week	☐ 1-2 per month	☐ <1 per month
Carpets steam- or dry-cleaned:	☐ quarterly	☐ annually	☐ >annually	☐ don't know	☐ not applicable

17. General building maintenance and repairs are done by: ***(Mark all that apply)***
☐ school staff ☐ district staff ☐ contractor ☐ none ☐ don't know

18. Number of building maintenance staff assigned to the school (full-time school or contract personnel):
☐ <1 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5+

19. Are you aware of the U.S. EPA's IAQ Tools for Schools Program?
☐ Yes ☐ No → If Yes, does your school use their kit? ☐ Yes ☐ No ☐ don't know

☐☐☐☐

California Portable Classroom Study: Facilities Questionnaire II

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Pesticides Practices:

(For Questions 20 -23, mark all that apply)

20. Types of pesticides used at the school: ☐ lawn care ☐ crack & crevice ☐ spray can ☐ other ☐ none ☐ don't know

21. Regularly scheduled applications: ☐ lawn care ☐ crack & crevice ☐ spray can ☐ other ☐ none ☐ don't know

22. Routine applications done by: ☐ School staff ☐ District staff ☐ Pest control contractor ☐ none ☐ don't know

23. Usual frequency of classroom applications: ☐ weekly ☐ monthly ☐ quarterly ☐ annually ☐ every 2 years or more ☐ don't know ☐ not applicable

24. Have you implemented an Integrated Pest Management (IPM) program at this site?: ☐ Yes ☐ No ☐ don't know

Environmental Complaints

25. In the last year, have major complaints of environmental conditions been made for any classroom at this site? ☐ Yes ☐ No ☐ don't know

→ If Yes, please check the number categories below for each type of complaint for both portable and permanent classrooms.
If No, Go to Question 26.

Type of Complaint	Number of Portable - Relocatable Classrooms					Number of Permanent -Traditional Classrooms				
Roof leak	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+
Plumbing leak or flood	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+
Air quality/odor	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+
Mold	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+
Temperature	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+
Noise	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+	☐ none	☐ 1	☐ 2-4	☐ 5-9	☐ 10+

26. Who responds to environmental complaints or concerns in the school's buildings?: ***(Mark all that apply)***

☐ district maintenance staff ☐ district health & safety staff ☐ district risk management staff
☐ school nurse ☐ outside consultant (industrial hygienist) ☐ other ☐ none ☐ don't know

46154

Comments and/or Observations:

TEACHER QUESTIONNAIRE II

Dear Teacher,

Thank you for participating in the California Portable Classrooms Study. Your support is critical to the success of obtaining useful statewide results. Results from this study will be used to identify potential environmental problems, determine if and to what extent they occur, and make recommendations to resolve current and future problems. Be assured that your responses will remain confidential and will only be reported in summary reports to goverment researchers.

Please complete the following two pages of this questionnaire. This questionnaire refers to your classroom, which has been randomly selected to be sampled for environmental measurements. Please review the instructions below describing the correct and incorrect way to fill in boxes. Use a black ink pen or a #2 pencil to apply dark marks to the questionnaire boxes. Please do not fold this questionnaire. After you have finished the questionnaire please return it to the RTI technician visiting the school.

If you have any questions about the questionnaire, please call Ms. Rebecca Premock, the RTI Project Coordinator, at 1-800-334-8571, ext. 7468. Call before 2:00 pm Pacific time or leave a voice mail message.

FILLING IN BOXES:

Correct Mark (Dark and thick)

Incorrect Marks (Light and thin)

PRINTING NUMBERS IN BOXES:

Write digits like this:

1	2	3	4	5	6	7	8	9	0

Do not write digits like this:

1	2	3	4	5	6	7	8	9	0

TEACHER QUESTIONNAIRE II

Please fill in today's date (mm-dd-yy) Month ☐☐ Day ☐☐ Year ☐☐

Please fill in room number/name: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

1. Your gender and current age: ☐ male ☐ female ☐☐ years

2. Please characterize each of the following as it applies to your room. ***Mark all that apply***:

- Temperature: ☐ generally acceptable ☐ often too cold ☐ often too hot
- Humidity: ☐ generally acceptable ☐ often too humid ☐ often too dry
- Air: ☐ generally acceptable ☐ often too drafty ☐ often too stale or stuffy
- Light: ☐ generally acceptable ☐ too dim ☐ too bright ☐ glare from lights ☐ too much direct sun

3. Are there noises that generally disrupt teaching activities in this room? ***Mark all that apply***:

- Inside: ☐ none ☐ lighting (buzz) ☐ other ☐ ventilation (fan) ☐ next-room voices
- Outside: ☐ none ☐ mower/blower ☐ aircraft ☐ playground ☐ traffic ☐ other

4. Do you ever turn off the heater or air conditioner in this room because of excessive noise?

☐ never ☐ rarely ☐ occasionally ☐ frequently ☐ most of the time

5. Indicate if you have experienced any of the following odors in this room. ***Mark one for each***:

	never	sometimes	often
• Musty odor	☐	☐	☐
• Cleaning products	☐	☐	☐
• Bus/auto exhaust	☐	☐	☐
• New carpet or furniture	☐	☐	☐
• Fresh paint	☐	☐	☐
• Cooking odor	☐	☐	☐
• Pesticides	☐	☐	☐
• Asphalt/tar	☐	☐	☐
• Tobacco smoke	☐	☐	☐
• Trash or dumpster odor	☐	☐	☐
• Sewer/compost	☐	☐	☐
• Fire/smoke odor	☐	☐	☐

☐☐☐☐☐☐☐

Draft

TEACHER QUESTIONNAIRE II

6. Have you observed water leaks, flooding, water stains or visible mold in this room? ***Mark <u>all</u> that apply***:

- Leak or flood: ☐ never ☐ in the past ☐ currently ☐ don't know
  - Type: ☐ roof ☐ window ☐ sink/toilet overflow ☐ sprinkler ☐ plumbing ☐ other
- Water stains: ☐ never ☐ in the past ☐ currently ☐ don't know
  - Where: ☐ walls ☐ ceiling ☐ window sills ☐ carpet/rug/floor ☐ furniture ☐ other
- Visible mold: ☐ never ☐ in the past ☐ currently ☐ don't know
  - Where: ☐ walls ☐ ceiling ☐ window sills ☐ carpet/rug/floor ☐ furniture ☐ other

7. Are you aware of past or current pest problems in this room? ***Mark <u>all</u> that apply***:

- Bugs (ants, etc.): ☐ never ☐ in the past ☐ currently
- Rodents (mice, etc.): ☐ never ☐ in the past ☐ currently

8. Have <u>you</u> applied any of the following pesticides in this room this year? ***Mark <u>all</u> that apply***:

- Sprays: ☐ never ☐ in the past ☐ currently
- Powders: ☐ never ☐ in the past ☐ currently
- Traps: ☐ never ☐ in the past ☐ currently

9. Do you feel the room receives adequate custodial services? ☐ yes ☐ no

- If not, what do you feel is needed? ☐ more frequent ☐ more effective ☐ both

10. How would you generally characterize the overall environmental quality in this classroom?

☐ excellent ☐ good ☐ adequate ☐ poor ☐ very poor

Comments: If you have any comments on classroom or school environmental conditions, or on this study, please indicate below. Thank you for your time.

____

____

____

Draft

Classroom Form
CA PCS Phase II

SECTION A. GENERAL CHARACTERISTICS OF CLASSROOM

A-1. Technician Initials:__________ PERSON THAT COMPLETED FORM.

A-2. Today's Date: _ _/_ _ /_ _

A-3. Start Time: _ _:_ _ am/pm CLASSROOM OBSERVATION BEGINS.

A-4. Classroom Number __ __ __ __ __

A-5. Is Classroom Portable or Traditional?

Portable 1
Traditional 2

A-6. Classroom dimensions __ __ X __ __ X __ __ ft. (L x W x H)

A-7. A. Classroom is on the __ __ floor of the building.

B. There are __ __ floors in the entire building.

UPON FIRST ENTERING THE ROOM, PROVIDE ANSWERS TO THE FOLLOWING:

(BOTH TECHNICIANS SHOULD MAKE THE FOLLOWING OBSERVATION.)
TECHNICIAN, PLEASE "SNIFF" AS YOU ENTER THE ROOM. RECORD IF ANY ODOR NOTICED AT ANY TIME DURING THE MORNING OR AT LUNCH TIME.

A-8. Are there any noticeable smells?

Yes . . . . 1 → CONTINUE
No . . . . 2 → GO TO Q. A-10 .

A-9. Can you identify any of the following smells in the room? (Circle all that apply)

Musty odor 1
Air fresheners 2
Cleaning products 3
Bus/auto exhaust 4
New carpet or furniture 5
Fresh paint 6
Cooking odor 7
Pesticides 11
Asphalt/tar 12
Tobacco smoke 13
Trash or dumpster odor 14
Sewer/compost 15
Fire/smoke odor 16
Other . . . . 8 → Specify:_______________________________________

A-10. List any major source of noise noticed at any time during the day. Specify time, source, duration and/or frequency.

A. Time __ __ : __ __ am/pm

B. Source ___ ___ __ ___ ___ ___ ___

C. Duration ___ ___ ___ ___ ___

D. Frequency___ ____ ___ ___

A-11. How many chairs are in the classroom? __ __ __ chairs. COUNT TEACHER'S CHAIR TOO.

A-12. From what grade(s) are the students that occupy the classroom? (Circle all that apply)

K 1 2 3 4 5 6 7 8 9 10 11 12 DK

A-13. Which term best describes this classroom? (Circle one)

General instruction classroom 1
Art 2
Science lab 3
Ceramic studio 4
Library 5
Computer lab 6
Wood shop 7
Auto/metal shop 11
Music 12
Office 13
Other . . . . 8 → Specify:_______________________________________

SECTION B. THE CLASSROOM'S CEILING

B-1. Suspended ceiling?

Yes 1
No 2

B-2. Condition of ceiling: (Circle one)

Good (clean) 1
Fair (somewhat dirty) 2
Poor (dirty) 3

B-3. With holes or missing panels?

Yes 1
No 2

B-4. Material(s) Ceiling made of: (Circle all that apply):

Acoustic tile 1
Wood 2
Sheet rock 3
Other . . . . 8 → Specify:____

B-5. Number of Water Stains on ceiling ___ ___

B-6. Number of Mold Areas on ceiling ___ ___

B-7. Skylights

Yes . . . . 1 → CONTINUE
No . . . . 2 → GO TO Q. C-1.

B-8. Number of Skylights _____

B-9. Total size of Skylights ___ ___ft x __ ___ft

SECTION C. THE CLASSROOM'S FLOOR

C-1. Condition of classroom floor (Circle one)

Good (clean, maintained) 1
Fair (clean, worn) 2
Poor (dirty, worn) 3

C-2. Material(s) floor is composed of: (Circle all that apply)

Wood 1
Carpet 2
Linoleum 3
Vinyl 4
Rubber 5
Cement/concrete 6
Area rugs 7
Other . . . . 8 → Specify:_______________

C-3. Is there a walk-off mat inside the entrance to the classroom?

Yes 1
No 2

C-4. Type of carpet padding. (Circle one)

Foam 1
Other . . . . 8 → Specify:_______________
None 2
DK 9

C-5. Carpet (ft) ____ x ____

C-6. A. Number of area rugs ____ B. Total area _____ft²

C-7. Number of water stains on floor ____

C-8. Number of mold areas on floor ____

SECTION D. THE CLASSROOM'S INTERIOR WALLS

D-1. Wall Material(s) (Circle all that apply)

Plastic/ vinyl-coated tackable wallboard 1
Pressed fiberboard 2
Sheet rock or plaster 3
Cork board 4
Wood 5
Painted cinder block 6
Plywood or particle board 7
Other . . . . 8 → Specify:_______________

D-2. Condition of walls: (Circle one)

Good (clean, maintained) 1
Fair (dirty, maintained) 2
Poor (dirty, needs painting/renovation) 3

D-3. Are partitions used in the classroom?

Yes 1
No . . . . 2 →SKIP TO Q. D-6.

D-4. Area of partition walls __ __ __sq. ft

D-5. Sliding partition used to separate classrooms?

Yes 1
No 2

D-6. Circle items below that are currently on wall(s): (Circle all that apply)

Dry erase board/white board . . 1
Bulletin board 2
Dry mark board 3
Chalk board 4
Vinyl 5
Wall-paper 6
Paint 7
Wood paneling 11
Cabinets 12
Other . . . . 8 → Specify:____

D-7. Number of water stains on walls ____

D-8. Number of mold areas on walls ____

D-9. How many sides of this room have windows? (Circle one)

One 1
Two 2
Three 3
Four 4
Other . . . . 8 → Specify:____
None 5

D-10. What kinds of windows are in this room? (Circle all that apply)

Windows up to door height (7 ft) 1
Windows up to 9 ft. 2
Windows > 9 ft. 3
NA 10

D-11. Do windows have blinds or curtains? (Circle one)

Yes 1
No 2
NA 10

D-12. Do books or other items obstruct sunlight coming through the windows? (Circle one)

Yes 1
No 2
NA 10

D-13. Sun glare problems? (Circle one)

Yes 1
No 2
NA 10

SECTION E. CLASSROOM CONTENTS

Do you currently see any of the following items in this room?

E-1. Office equipment: (Circle all that apply)

Personal computers 1
Photocopy machine 2
Mimeograph machine 3
Laser printers 4
Carbonless copy paper 5
Laminator 6
Other . . . . 8 → Specify:______________________________
None 7

E-2. Appliances: (Circle all that apply)

Stove or oven 1
Lab burners 2
Refrigerator 3
Washing machine 4
Microwave oven 5
Other . . . . 8 → Specify:______________________________
None 6

E-3. Chemicals: (Circle all that apply)

Cleaning products 1
Lab chemicals 2
Biological specimens stored
in chemicals 3
Other . . . . 8 → Specify:______________________________
None 4

E-4. Paints/pens: (Circle all that apply)

Permanent markers or art pens 1
Oil/acrylic paints 2
Whiteboard markers 3
Chalk 4
Other . . . . 8 → Specify:____
None 5

E-5. Glues/fluids: (Circle all that apply)

Correction fluid 1
Rubber cement 2
Epoxy 3
Other . . . . 8 → Specify:____
None 4

E-6. Air freshener: (Circle all that apply)
TECHNICIAN, IF AIR FRESHENER PRESENT, ASK TEACHER WHY IT IS USED AND ADD TO COMMENTS SECTION.

Plug-in deodorizer 1
Hanging freshener 2
Spray can 3
Potpourri 4
Other . . . . 8 → Specify:____
None 5

E-7. Candles: (Circle all that apply)

Scented candles 1
Unscented candles 2
Incense 3
Other . . . . 8 → Specify:____
None 4

E-8. A. Air Cleaner: (Circle all that apply)

Ozone or ion-generating air purifier . . . 1 → CONTINUE
Portable air (filter) purifier . . . . 2 → CONTINUE
Other . . . . 8 → Specify:__________________________________
None . . . . 3 → GO TO Q. E-9.

B. Brand Name of Purifier ____

E-9. Are any of the following living items kept in this room? (Circle all that are present)

Potted plants/terrarium 1
Birds 2
Rodents/mammals 3
Reptiles/amphibians 4
Fish 5
Bugs 6
Other . . . . 8 → Specify:______________________________
None 7

Please indicate the composition of furnishings in the classroom below. (Circle all that apply)
NOTE THAT PRESSED WOOD = PARTICLE BOARD OR PLYWOOD TYPE MATERIAL.
NONE = NO ITEMS OF THAT TYPE.

E-10. Table and Desks: (Circle all that apply)

Solid wood 1
Plastic 2
Pressed wood 3
Metal 4
Other . . . . 8 → Specify:______________________________
DK 9
None 5

E-11. Bookcases: (Circle all that apply)

Solid wood 1
Plastic 2
Pressed wood 3
Metal 4
Other . . . . 8 → Specify:______________________________
_______DK 9
None 5

E-12. Cabinets: (Circle all that apply)

Solid wood 1
Plastic 2
Pressed wood 3
Metal 4
Other . . . . 8 → Specify:______________________________
_______DK 9
None 5

E-13. Chairs: (Circle all that apply)

Solid wood 1
Plastic 2
Pressed wood 3
Metal 4
Other . . . . 8 → Specify:________________________
_______DK 9
None 5

E-14. Do any of the furnishings above appear new?

Yes . . . . 1 → CONTINUE
No . . . . 2 → GO TO Q. E-16.

E-15. Specify which furnishings appear new. (Circle all that apply)

Table and Desks 1
Bookcases 2
Cabinets 3
Chairs 4
Other . . . . 8 → Specify:________________________

E-16. Pests and pesticide type items present: (Circle all that apply)

Insects or insect parts 1
Rodents or droppings 2
Mouse traps or poison 3
Insect baits 4
Pesticide sprays 5
Pesticide powders 6
Other . . . . 8 → Specify:________________________
None 7

E-17. Other chemical products in classroom or in cabinets/closets: (Circle all that apply):

All purpose cleaner 1
Glass cleaner 2
Floor cleaner 3
Polish 4
Cleaning cloths 5
Cabinets locked 6
Access denied 7
Other . . . . 8 → Specify:________________________
None 11

SECTION F. OTHER INDOOR FACTORS/OBSERVATIONS

F-1. Lighting: (Circle one)

Generally acceptable 1
Too dim 2
Too bright 3
Glare from lights 4
Too much direct sun 5

F-2. Is there a Janitor's closet in room or adjoining classroom?

Yes . . . . 1 → CONTINUE
No . . . . 2 → GO TO Q. F-4.

F-3. Is there an air return in the Janitor's closet?
TECHNICIAN, PLEASE CHECK RETURN AND CONSULT WITH HVAC TECH AS NEEDED.

Yes 1
No 2
Access denied 3
DK 9

F-4. Bathroom in room or in connecting room?

Yes . . . . 1 → CONTINUE
No . . . . 2 → GO TO Q. F-6.
Access denied 3

F-5. Is there an exhaust fan or operable window in the bathroom? (Circle all that apply)

Exhaust fan 1
Window 2
Neither of these 3

F-6. Are there any floor drains in the classroom, janitor closet, or bathroom?

Yes 1
No 2
Access denied 3

F-7. Circle any items seen in the classroom, janitor closet, or bathroom that require plumbing. (Circle all that apply)

Sink 1
Drinking fountain 2
Toilet/urinal 3
Access denied 4
Other . . . . 8 → Specify:____
None 5

F-8. Circle areas with evidence of leakage due to plumbing: (Circle all that apply)

Classroom 1
Janitor's closet 2
Bathroom 3
None 4

F-9. Visible mold on classroom item/furniture?

Yes 1
No 2

F-10. Visible mold in cabinets?

Yes 1
No 2

F-11. What is the approximate size of all mold areas on all surfaces (including walls, floor, ceiling, and cabinets) in the classroom? (circle one)

A few spots 1
< 1 sq. ft. total 2
1-10 sq. ft. total 3
> 10 sq. ft. total 4
None observed 5

F-12. Laboratory, industrial arts shop, or other special purpose room adjacent to the classroom?

Yes 1
No 2

GO OUTSIDE TO COMPLETE THE NEXT SECTION

SECTION G. GROUNDS OUTSIDE THE CLASSROOM/BUILDING

TECHNICIAN, SEVERAL OF THE FOLLOWING ITEMS ARE APPLICABLE TO ALL THREE CLASSROOMS AT SCHOOL. PLEASE COMPLETE ITEMS ACCORDINGLY, AND CONSULT WITH FM IF NECESSARY.

G-1. Current or recent **on-campus** activity that may affect IAQ (including work that may not be in progress that day): (Circle all that apply)

New construction 1
Major repairs 2
Cafeteria 3
Grounds keeping 4
Other . . . . 8 → Specify:________________________
_______DK 9
None 5

G-2. Today's meteorology: (Circle all that apply)

Clear 1
Rain 2
Snow 3
Fog 4
Overcast 5
Windy 6
Dusty 7

G-3. Direction of prevailing wind today: (circle one with longest duration)

North 1
Northwest 2
West 3
Southwest 4
South 5
Southeast 6
East 7
Northeast 11
None 12

G-4. Are any of the following in school's vicinity (1/4 mile or less)? (Circle all that apply)

Dry cleaners 1
Gas station 2
Industrial facility 3
Major Road 4
Bus/Truck Depot 5
Construction 6
Field/agriculture 7
Other . . . . 8 → Specify:________________________

G-5. What type of walkway is immediately outside the classroom's primary entrance? (Circle one)

Indoor 1
Outdoor, covered 2
Outdoor, uncovered 3

G-6. Walk-off mats in outdoor entryway to classroom/building? (Circle one)

Yes 1
No 2
DK 9

G-7. What types of ground cover are found within 50ft. of the classroom/building? (Circle all that apply)

Dirt 1
Gravel 2
Grass 3
Concrete or asphalt . . . 4
Other . . . . 8 → Specify:____

G-8. Are these other activities or sources within 50 ft. of the classroom? (Circle all that apply)

Parking lot or roadway 1
Loading dock 2
Flue exhaust 3
Dumpster 4
Custodial room 5
Bathroom 6
Art room 7
Shop 11
Cafeteria 12
Science lab 13
None 14

SECTION H. OUTDOOR CHARACTERISTICS OF THE CLASSROOM/BUILDING

H-1. Is the floor level of sampled classroom...? (Circle one)

Below grade 1
Ground 2
2nd story or more 3
3rd story or more 4

H-2. Type of building foundation. (Circle all that apply)

Below grade . . . . 1 → SKIP TO Q. H-6.
Slab on grade . . . . 2 → SKIP TO Q. H-6.
Raised Floor (crawlspace) . . . 3 → CONTINUE
Other . . . . 8 → Specify:______________________________

H-3. If raised floor, type of ground cover. (Circle one)

Dirt 1
Gravel 2
Plastic 3
Concrete and asphalt 4
Other . . . . 8 → Specify:______________________________

H-4. If raised floor, inches above ground. (Circle one)

<6 1
6-11 2
12-17 3
18 or more 4
NA 10

H-5. If raised floor, number of outside air vents ___ ___

H-6. If Portable, height of foundation skirt from ground (inches): (Circle one)

0 (on ground) 1
<2" 2
2-6" 3
6-12" 4
>12" 5
NA 10

H-7. Type of roof: (Circle one)

Membrane 1
Composite shingle or roll 2
Shake 3
Metal 4
Tar/gravel 5
Other . . . . 8 → Specify:______________________________
DK 9

H-8. Roof pitch (Circle one)

Flat 1
Sloped 2
Both 3

H-9. If portable, number of inches roof overhang on **side with greatest overhang**. (Circle one)

0-6" 1
7"-12" 2
13-24" 3
>24" 4
NA 10

H-10. If portable, number of inches roof overhang on **side with least overhang**. (Circle one)

0-6" 1
7"-12" 2
13-24" 3
>24" 4
NA 10

Exterior Walls

H-11. Wall Condition: (Circle one)

Good (clean, maintained) 1
Fair (dirty, maintained) 2
Poor (dirty, needs painting/renovation) 3

H-12. Material(s): (Circle all that apply)

Wood 1
Panel board 2
Stucco 3
Rock 4
Masonry 5
Concrete 6
Siding 7
Metal 11
Other . . . . 8 → Specify:____

H-13. Number of water stains on wall(s): _______

H-14. Number of mold areas on wall(s): _______

H-15. What is the approximate size of all mold areas on external walls of classroom/building? (Circle one)

A few spots 1
< 1 sq. ft. total 2
1-10 sq. ft. total 3
> 10 sq. ft. total 4
None observed 5

H-16. Items seen on wall(s): (Circle all that apply)

Graffiti 1
Chipped or peeling paint 2
Algae 3
Moss 4
Plant growth 5
Other . . . . 8 →Specify:__________________
None 6

H-17. Do lawn sprinklers spray the outside wall(s)? (Circle one)

Yes 1
No 2
DK 9

H-18. Signs of leakage or overflow from gutters? (Circle one)

Yes 1
No 2
DK 9
NA 10

H-19. Location of gutter downspouts (average distance from foundation): (Circle one)

< 2 feet 1
2 - 6 feet 2
> 6 feet 3
DK 9
NA 10

SECTION I. OTHER OBSERVATIONS

IF ANSWER IS NOT APPARENT, TECHNICIAN MAY NEED TO ASK CLASSROOM TEACHER.

I-1. Did the same students stay in the classroom, or did they change each class period?

Yes, stayed 1
No, changed 2

I-2. Were there any windows open today?

Yes . . . . 1 → CONTINUE
No . . . . 2 → GO TO Q. I-4.

I-3. How many windows were open today? __ __

I-4. Is there an outside door to the room?

Yes . . . . 1 → CONTINUE
No . . . . 2 → GO TO Q. I-6.

I-5. How many doors open to outside? _____

I-6. Was **any** classroom door(s) left open today? (During class or change of classes, etc.)

Yes 1
No 2

I-7. Try to find out how often the floors in the room are swept, vacuumed, or wet washed. (Circle one)

Daily 1
2-3/week 2
Weekly 3
1-2/month 4
Less than 1/month 5
DK 9

I-8. What type of vacuum cleaner is used in the room? (Circle one)

Beater brush/powerhead 1
HEPA/special filter 2
Canister only 3
"Dust sensor?" 4
Other . . . . 8 → Specify:____
DK 9

I-9. End Time: _ _:_ _ am/pm CLASSROOM OBSERVATION ENDS.

I-10. Provide additional comments or observations in space below.

____
____
____
____
____

HVAC Assessment Checklist and School Characteristics
CA PCS Phase II

SECTION A. BACKGROUND INFORMATION

	Classroom #1	Classroom #2	Classroom #3
A-1. Classroom Number	__ __ __ __ __	__ __ __ __ __	__ __ __ __ __
A-2. Portable Classroom?	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2
A-3. Today's Date:	__ __/__ __ /__ __	__ __/__ __ /__ __	__ __/__ __ /__ __
A-4. Start Time: (TIME OBSERVATION BEGINS)	__ __:__ __ am/pm	__ __:__ __ am/pm	__ __:__ __ am/pm
A-5. Technician Initials: (PERSON THAT COMPLETED FORM.)			
A-6. Name(s) of person(s) responsible for HVAC repair and maintenance:	A. ____________________ B. ____________________	A. ____________________ B. ____________________	A. ____________________ B. ____________________
A-7. Title of above Person(s)	A. ____________________ B. ____________________	A. ____________________ B. ____________________	A. ____________________ B. ____________________
A-8. Contractor?	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2
A-9. A. HVAC Maintenance Person's Telephone No.	(_ _ _) _ _ _- _ _ _ _ EXT. _ _ _ _	(_ _ _) _ _ _- _ _ _ _ EXT. _ _ _ _	(_ _ _) _ _ _- _ _ _ _ EXT. _ _ _ _
B. Email address	__ __ __ __ __ __ __ __ __ __ __ __ __ __ __	__ __ __ __ __ __ __ __ __ __ __ __ __ __ __	__ __ __ __ __ __ __ __ __ __ __ __ __ __ __
(Note, if two people are responsible for repair and/or maintenance, obtain names and phone numbers for both)			

ID:

SECTION B. CLASSROOM MEASUREMENTS

TECHNICIAN, PLEASE GO INTO CLASSROOM AND TAKE THE FOLLOWING MEASUREMENTS.

	Classroom #1	Classroom #2	Classroom #3
B-1. Monitor Numbers	A. HOBO (motor sensor) __ __ __ __ B. Light __ __ __ __ C. Moisture __ __ __ __ D. Decibel __ __ __ __ E. Qtrak __ __ __ __	A. HOBO (motor sensor) __ __ __ __ B. Light __ __ __ __ C. Moisture __ __ __ __ D. Decibel __ __ __ __ E. Qtrak __ __ __ __	A. HOBO (motor sensor) __ __ __ __ B. Light __ __ __ __ C. Moisture __ __ __ __ D. Decibel __ __ __ __ E. Qtrak __ __ __ __
B-2. HVAC Mode during measurements:	Heating . . . . 1 Cooling . . . . 2 Fan only . . . . 3 DK . . . . 9 NA 10	Heating . . . . 1 Cooling . . . . 2 Fan only . . . . 3 DK . . . . 9 NA 10	Heating . . . . 1 Cooling . . . . 2 Fan only . . . . 3 DK . . . . 9 NA 10
B-3. Temperatures of AHU (Degrees F)	A. Current Time: __ __ : __ __ B. Supply air __ __ __ degrees C. Room air __ __ __ degrees D. Return air __ __ __ degrees E. Outdoor air __ __ __ degrees	A. Current Time: __ __ : __ __ B. Supply air __ __ __ degrees C. Room air __ __ __ degrees D. Return air __ __ __ degrees E. Outdoor air __ __ __ degrees	A. Current Time: __ __ : __ __ B. Supply air __ __ __ degrees C. Room air __ __ __ degrees D. Return air __ __ __ degrees E. Outdoor air __ __ __ degrees

	Classroom #1	Classroom #2	Classroom #3
B-4. Air Flow Measurements (Hood)	A. Current Time: _ _:_ _ am/pm B. Outdoor air _ _ _ cfm C. Return air _ _ _ cfm D. Supply air _ _ _ cfm E. In room air _ _ _ cfm	A. Current Time: _ _:_ _ am/pm B. Outdoor air _ _ _ cfm C. Return air _ _ _ cfm D. Supply air _ _ _ cfm E. In room air _ _ _ cfm	A. Current Time: _ _:_ _ am/pm B. Outdoor air _ _ _ cfm C. Return air _ _ _ cfm D. Supply air _ _ _ cfm E. In room air _ _ _ cfm
B-5. Wall Moisture sensor reading:(%) (Take in location with mold or water stains, otherwise, take in center of wall, and under window, if present. Obtain sensor reading on floor and ceiling if mold/water stains.) Indicate location moisture reading taken by writing mold, water stain, center of wall, under window or other, beside "Location" entry.	A. Wall 1: __________ Location 1: __________ B. Wall 2: __________ Location 2: __________ C. Wall 3: __________ Location 3: __________ D. Wall 4: __________ Location 4: __________ E. Floor 5: __________ Location 5: __________ F. Ceiling 6: __________ Location 6: __________ **Comments** ______________________________ ______________________________ ______________________________	A. Wall 1: __________ Location 1: __________ B. Wall 2: __________ Location 2: __________ C. Wall 3: __________ Location 3: __________ D. Wall 4: __________ Location 4: __________ E. Floor 5: __________ Location 5: __________ F. Ceiling 6: __________ Location 6: __________ **Comments** ______________________________ ______________________________ ______________________________	A. Wall 1: __________ Location 1: __________ B. Wall 2: __________ Location 2: __________ C. Wall 3: __________ Location 3: __________ D. Wall 4: __________ Location 4: __________ E. Floor 5: __________ Location 5: __________ F. Ceiling 6: __________ Location 6: __________ **Comments** ______________________________ ______________________________ ______________________________

	Classroom #1	Classroom #2	Classroom #3
B-6. Light Measurements (Take at least 3 readings, one at desk near window, one in the center of the room, and one on the far side.)	A. Current Time: _ _:_ _ am/pm B. Near Windows Reading ____________ C. Middle Reading ____________ D. Far Reading ____________	A. Current Time: _ _:_ _ am/pm B. Near Windows Reading ____________ C. Middle Reading ____________ D. Far Reading ____________	A. Current Time: _ _:_ _ am/pm B. Near Windows Reading ____________ C. Middle Reading ____________ D. Far Reading ____________
B-7. **Noise Reading (dBA)** Obtain noise readings in an empty classroom at break time or at the end of the day. Obtain 2 readings in the classroom for each table below, one in the center of room, and one 10 ft. away from return register. If there is no return register, take reading in noisiest area of room with HVAC running. Take one reading outside of the classroom on the noisiest side for each table below. Add notes to comment section for noisiest exterior wall, any major outdoor sources of noise (e.g., traffic), and also note whether or not nearby playgrounds were being used at the time of reading.			
A. **HVAC ON** — Measurement 1 **Location:** Indoor-Center → Indoor-Register/noisy area → Out →	Current Time: _ _:_ _ am/pm **Readings:** ____________ ____________ ____________ **Comments** ____________ ____________ ____________	Current Time: _ _:_ _ am/pm **Readings:** ____________ ____________ ____________ **Comments** ____________ ____________ ____________	Current Time: _ _:_ _ am/pm **Readings:** ____________ ____________ ____________ **Comments** ____________ ____________ ____________

	Classroom #1	Classroom #2	Classroom #3
B. **HVAC ON** — Measurement 2 **Location:** Indoor-Center → Indoor-Register/noisy area → Out →	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________
C. **HVAC OFF** — Measurement 1 **Location:** Indoor-Center → Indoor-Register/noisy area → Out →	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________

	Classroom #1	Classroom #2	Classroom #3
D. **HVAC OFF** — Measurement 2 **Location:** Indoor-Center → Indoor-Register/noisy area → Out →	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________	Current Time: _ _:_ _ am/pm **Readings:** ________ ________ ________ **Comments** ________ ________ ________

SECTION C. HVAC SYSTEM TYPE

TECHNICIAN, IDENTIFY THE PRIMARY HVAC SYSTEM (MOST FREQUENTLY USED) USED IN THE CLASSROOM AND ANSWER QUESTIONS BELOW. CONSULT THE FM AS NEEDED.

	Classroom #1	Classroom #2	Classroom #3
C-1. Is there a **secondary** HVAC system also being used? TECHNICIAN, FOR THE FOLLOWING QUESTIONS, THE SECONDARY SYSTEM WILL BE USED LESS OFTEN THAN THE PRIMARY SYSTEM AND CAN INCLUDE WINDOW AC UNITS.	Yes . . . . . 1 →CONTINUE No . . . . . . 2 →SKIP TO Q. C-4. DK . . . . . 3 →SKIP TO Q. C-4.	Yes . . . . . 1 →CONTINUE No . . . . . . 2 →SKIP TO Q. C-4. DK . . . . . 3 →SKIP TO Q. C-4.	Yes . . . . . 1 →CONTINUE No . . . . . . 2 →SKIP TO Q. C-4. DK . . . . . 3 →SKIP TO Q. C-4.

	Classroom #1	Classroom #2	Classroom #3
C-2. How often is the secondary HVAC system used? (Circle one):	1-9% of time . . . . 1 10-29% of the time . . . . 2 30-50% of the time . . . . 3 Other . . . . 8 Specify:______________________ ___________________________	1-9% of time . . . . 1 10-29% of the time . . . . 2 30-50% of the time . . . . 3 Other . . . . 8 Specify:______________________ ___________________________	1-9% of time . . . . 1 10-29% of the time . . . . 2 30-50% of the time . . . . 3 Other . . . . 8 Specify:______________________ ___________________________
C-3. Location of AHU for secondary HVAC Unit (Circle one)	Wall . . . . 1 Window . . . . 2 Rooftop . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ NA 10	Wall . . . . 1 Window . . . . 2 Rooftop . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ NA 10	Wall . . . . 1 Window . . . . 2 Rooftop . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ NA 10
END OF QUESTIONS ON SECONDARY HVAC SYSTEM.			
C-4. Location of Air Handling Unit (AHU) for **primary** HVAC Unit (Circle one)	Wall . . . . 1 Window . . . . 2 Rooftop . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ NA 10	Wall . . . . 1 Window . . . . 2 Rooftop . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ NA 10	Wall . . . . 1 Window . . . . 2 Rooftop . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ NA 10
C-5. Type of main heating system for **primary** system: (Circle one)	Forced air . . . . 1 Radiant . . . . 2 Heat pump . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ DK . . . . 9 NA 10	Forced air . . . . 1 Radiant . . . . 2 Heat pump . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ DK . . . . 9 NA 10	Forced air . . . . 1 Radiant . . . . 2 Heat pump . . . . 3 Other . . . . 8 Specify:______________________ ___________________________ DK . . . . 9 NA 10

	Classroom #1	Classroom #2	Classroom #3
C-6. Heating fuel or energy type for primary system: (Circle one)	Electric . . . . 1 Natural gas . . . . 2 Propane . . . . 3 Solid Fuel . . . . 4 Solar . . . . 5 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10	Electric . . . . 1 Natural gas . . . . 2 Propane . . . . 3 Solid Fuel . . . . 4 Solar . . . . 5 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10	Electric . . . . 1 Natural gas . . . . 2 Propane . . . . 3 Solid Fuel . . . . 4 Solar . . . . 5 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10
C-7. Primary system's energy rating (SEER)	______________________ DK . . . . -999	______________________ DK . . . . -999	______________________ DK . . . . -999
C-8. Type of primary cooling system: (Circle one)	Central AC . . . . 1 Window AC . . . . 2 Swamp . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10	Central AC . . . . 1 Window AC . . . . 2 Swamp . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10	Central AC . . . . 1 Window AC . . . . 2 Swamp . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10
C-9. Name of manufacturer (primary HVAC unit)			
C-10. Model Number (primary HVAC unit)			
C-11. Year built (primary HVAC unit):	__ __ __ __	__ __ __ __	__ __ __ __
C-12. If the system is being operated today, what is current temperature setting on the thermostat?	__ __ __ degrees F DK . . . . -99 NA . . . . -10	__ __ __ degrees F DK . . . . -99 NA . . . . -10	__ __ __ degrees F DK . . . . -99 NA . . . . -10

	Classroom #1	Classroom #2	Classroom #3
C-13. Type of **return** air systems: (Circle all that apply) DUCTED REFERS TO SYSTEM WITH REGISTER FAR AWAY FROM AHU BUT ANOTHER RETURN COULD BE FOUND AT THE AHU.	Wall register . . . . 1 Open plenum . . . . . . 2 Ducted . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10	Wall register . . . . 1 Open plenum . . . . . . 2 Ducted . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10	Wall register . . . . 1 Open plenum . . . . . . 2 Ducted . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK . . . . 9 NA 10
C-14. Number of return vent registers	__ __	__ __	__ __
C-15. Return vent registers clean? (Include nearby surfaces) (Circle one)	Clean . . . . 1 Some dirt or dust . . . 2 Very dirty . . . . 3 DK . . . . 9 NA 10	Clean . . . . 1 Some dirt or dust . . . 2 Very dirty . . . . 3 DK . . . . 9 NA 10	Clean . . . . 1 Some dirt or dust . . . 2 Very dirty . . . . 3 DK . . . . 9 NA 10
C-16. Number of **supply** vent registers	__ __	__ __	__ __
C-17. Supply vent registers clean? (Include nearby surfaces) (Circle one)	Clean . . . . 1 Some dirt or dust . . . 2 Very dirty . . . . 3 DK . . . . 9 NA 10	Clean . . . . 1 Some dirt or dust . . . 2 Very dirty . . . . 3 DK . . . . 9 NA 10	Clean . . . . 1 Some dirt or dust . . . 2 Very dirty . . . . 3 DK . . . . 9 NA 10
C-18. For **all vents**, how many are blocked? (Circle one)	1. . . . . 1 2. . . . . 2 3. . . . . 3 4 or more. 4 DK. . . . . . 9 → SKIP TO Q. D-1. NA. . . . . 10 → SKIP TO Q. D-1. None . . . . 5 → SKIP TO Q. D-1.	1. . . . . 1 2. . . . . 2 3. . . . . 3 4 or more. 4 DK. . . . . . 9 → SKIP TO Q. D-1. NA. . . . . 10 → SKIP TO Q. D-1. None . . . . 5 → SKIP TO Q. D-1.	1. . . . . 1 2. . . . . 2 3. . . . . 3 4 or more. 4 DK. . . . . . 9 → SKIP TO Q. D-1. NA. . . . . 10 → SKIP TO Q. D-1. None . . . . 5 → SKIP TO Q. D-1.

	Classroom #1	Classroom #2	Classroom #3
C-19. Grills or registers are blocked by: (Circle all that apply)	Furniture . . . . 1 Paper . . . . 2 Other . . . . 8 Specify:____________________ ____________________	Furniture . . . . 1 Paper . . . . 2 Other . . . . 8 Specify:____________________ ____________________	Furniture . . . . 1 Paper . . . . 2 Other . . . . 8 Specify:____________________ ____________________

SECTION D. AUXILIARY EQUIPMENT

	Classroom #1	Classroom #2	Classroom #3
D-1. Portable space heaters observed in classroom (Circle all that apply):	Electric . . . . 1 Gas . . . . 2 Propane . . . . 3 Kerosene . . . . 4 Solid fuel . . . . 5 Other . . . . 8 Specify:____________________ ____________________ None 6	Electric . . . . 1 Gas . . . . 2 Propane . . . . 3 Kerosene . . . . 4 Solid fuel . . . . 5 Other . . . . 8 Specify:____________________ ____________________ None 6	Electric . . . . 1 Gas . . . . 2 Propane . . . . 3 Kerosene . . . . 4 Solid fuel . . . . 5 Other . . . . 8 Specify:____________________ ____________________ None 6
D-2. Fans observed in the classroom (Circle all that apply):?	Ceiling . . . . 1 Window . . . . 2 Floor . . . . 3 Desktop . . . . 4 Lab or Range hood . . 5 Other . . . . 8 Specify:____________________ ____________________ None 6	Ceiling . . . . 1 Window . . . . 2 Floor . . . . 3 Desktop . . . . 4 Lab or Range hood . . 5 Other . . . . 8 Specify:____________________ ____________________ None 6	Ceiling . . . . 1 Window . . . . 2 Floor . . . . 3 Desktop . . . . 4 Lab or Range hood . . 5 Other . . . . 8 Specify:____________________ ____________________ None 6
D-3. Do the range hood and/or lab hoods exhaust air? TURN ON THE FAN AND VERIFY DUCTING TO THE OUTSIDE)	Yes . . . . 1 No . . . . 2 NA 10	Yes . . . . 1 No . . . . 2 NA 10	Yes . . . . 1 No . . . . 2 NA 10

	Classroom #1	Classroom #2	Classroom #3
D-4. Is there any humidity control equipment used in the classroom? (Circle one)	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10

SECTION E. SYSTEM CONTROL

	Classroom #1	Classroom #2	Classroom #3
E-1. Outside Air Control (Circle all that apply)	Timer . . . . 1 Night shutdown . . . . 2 CO_2 . . . . 3 Temperature . . . . 4 Occupancy . . . . 5 Other . . . . 8 Specify:__________ __________ None 6	Timer . . . . 1 Night shutdown . . . . 2 CO_2 . . . . 3 Temperature . . . . 4 Occupancy . . . . 5 Other . . . . 8 Specify:__________ __________ None 6	Timer . . . . 1 Night shutdown . . . . 2 CO_2 . . . . 3 Temperature . . . . 4 Occupancy . . . . 5 Other . . . . 8 Specify:__________ __________ None 6
E-2. If system is operated today, what is main mode of supply fan operation today? (Circle one)	Auto (only when heating or cooling) . . . . 1 Always on . . . . 2 Always off . . . . 3 Other . . . . 8 Specify:__________ __________ DK . . . . 9 NA 10	Auto (only when heating or cooling) . . . . 1 Always on . . . . 2 Always off . . . . 3 Other . . . . 8 Specify:__________ __________ DK . . . . 9 NA 10	Auto (only when heating or cooling) . . . . 1 Always on . . . . 2 Always off . . . . 3 Other . . . . 8 Specify:__________ __________ DK . . . . 9 NA 10

	Classroom #1	Classroom #2	Classroom #3
E-3. How many rooms or zones are served by the primary system? (Circle one)	1 . . . . 1 2 . . . . 2 3 . . . . 3 4 . . . . 4 5 . . . . 5 Greater than 5 . . . . . . 6 DK 9	1 . . . . 1 2 . . . . 2 3 . . . . 3 4 . . . . 4 5 . . . . 5 Greater than 5 . . . . . . 6 DK 9	1 . . . . 1 2 . . . . 2 3 . . . . 3 4 . . . . 4 5 . . . . 5 Greater than 5 . . . . . . 6 DK 9
E-4. Is there a thermostat in each zone/room? (Circle one)	Yes . . . . 1 No . . . . 2 DK 9	Yes . . . . 1 No . . . . 2 DK 9	Yes . . . . 1 No . . . . 2 DK 9
E-5. What is the system's method of air flow control? (Circle one)	Constant . . . . 1 Variable . . . . 2 DK 9	Constant . . . . 1 Variable . . . . 2 DK 9	Constant . . . . 1 Variable . . . . 2 DK 9
E-6. Does this system have an economizer? (Circle one)	Yes . . . . . 1 → CONTINUE No . . . . . . 2 → SKIP TO Q E-8. DK . . . . . 9 → SKIP TO Q E-8. NA . . . . . 10 → SKIP TO Q E-8.	Yes . . . . . 1 → CONTINUE No . . . . . . 2 → SKIP TO Q E-8. DK . . . . . 9 → SKIP TO Q E-8. NA . . . . . 10 → SKIP TO Q E-8.	Yes . . . . . 1 → CONTINUE No . . . . . . 2 → SKIP TO Q E-8. DK . . . . . 9 → SKIP TO Q E-8. NA . . . . . 10 → SKIP TO Q E-8.
E-7. What type of economizer controls are there? (Circle one)	Temperature . . . . 1 Other . . . . 8 Specify:______________________ ______________________________ NA 10	Temperature . . . . 1 Other . . . . 8 Specify:______________________ ______________________________ NA 10	Temperature . . . . 1 Other . . . . 8 Specify:______________________ ______________________________ NA 10
E-8. Thermostat controled by: (Circle all that apply)	Maintenance staff (locked) . 1 Teacher (unlocked) . . . . 2 EMS (central control) . . . . . 3 Other . . . . 8 Specify:______________________ ______________________________ DK . . . . 9 NA 10	Maintenance staff (locked) . 1 Teacher (unlocked) . . . . 2 EMS (central control) . . . . . 3 Other . . . . 8 Specify:______________________ ______________________________ DK . . . . 9 NA 10	Maintenance staff (locked) . 1 Teacher (unlocked) . . . . 2 EMS (central control) . . . . . 3 Other . . . . 8 Specify:______________________ ______________________________ DK . . . . 9 NA 10

	Classroom #1	Classroom #2	Classroom #3
E-9. When does thermostat setback? (Circle all that apply)	When teacher leaves ..... 1 Nights .... 2 Weekend .... 3 Holidays .... 4 Never .... 5 Other .... 8 Specify:__________ __________ DK .... 9 NA 10	When teacher leaves ..... 1 Nights .... 2 Weekend .... 3 Holidays .... 4 Never .... 5 Other .... 8 Specify:__________ __________ DK .... 9 NA 10	When teacher leaves ..... 1 Nights .... 2 Weekend .... 3 Holidays .... 4 Never .... 5 Other .... 8 Specify:__________ __________ DK .... 9 NA 10

SECTION F. MACHINE ROOM

COMPLETE THIS SECTION ONLY IF THERE IS A BUILT UP HVAC SYSTEM. **SKIP TO SECTION G IF YOU ARE OBSERVING A CLASSROOM WITH A PACKAGE UNIT.**

	Classroom #1	Classroom #2	Classroom #3
F-1. Air inlet/return to AHU in Machine Room? (Circle one)	Yes .... 1 → GO TO Q. F-2. No .... 2 → GO TO Q. F-3. Not accessible ... 3 → SKIP TO Q. G-1. DK .... 9 → GO TO Q. F-3.	Yes .... 1 → GO TO Q. F-2. No .... 2 → GO TO Q. F-3. Not accessible ... 3 → SKIP TO Q. G-1. DK .... 9 → GO TO Q. F-3.	Yes .... 1 → GO TO Q. F-2. No .... 2 → GO TO Q. F-3. Not accessible ... 3 → SKIP TO Q. G-1. DK .... 9 → GO TO Q. F-3.
F-2. Are the Filters on inlet? (Circle one)	Yes .... 1 No .... 2 DK 9	Yes .... 1 No .... 2 DK 9	Yes .... 1 No .... 2 DK 9
F-3. Chemical storage in Machine Room? (Circle one)	Yes .... 1 No .... 2 Not accessible ..... 3 DK 9	Yes .... 1 No .... 2 Not accessible ..... 3 DK 9	Yes .... 1 No .... 2 Not accessible ..... 3 DK 9

	Classroom #1	Classroom #2	Classroom #3
F-4. Is the Machine Room air-conditioned? (Circle one)	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2
F-5. Water/humidity problems in Machine Room? (Circle one)	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2
F-6. Is Machine Room clean? (Circle one)	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2
F-7. Please add notes regarding chemical storage, water problems, etc. in the machine room.	______ ______ ______	______ ______ ______	______ ______ ______

SECTION G. OUTSIDE ACCESS

	Classroom #1	Classroom #2	Classroom #3
G-1. Ease of access to AHU interior. (Circle one)	Good . . . . 1 Fair . . . . 2 Poor . . . . 3 None . . . . 4 DK 9	Good . . . . 1 Fair . . . . 2 Poor . . . . 3 None . . . . 4 DK 9	Good . . . . 1 Fair . . . . 2 Poor . . . . 3 None . . . . 4 DK 9
G-2. What is the condition of the exhaust flue? (Circle one)	Blocked . . . . 1 Crimped . . . . 2 Corroded . . . . 3 Other . . . . 8 Specify:______ ______ DK . . . . 9 NA 10	Blocked . . . . 1 Crimped . . . . 2 Corroded . . . . 3 Other . . . . 8 Specify:______ ______ DK . . . . 9 NA 10	Blocked . . . . 1 Crimped . . . . 2 Corroded . . . . 3 Other . . . . 8 Specify:______ ______ DK . . . . 9 NA 10

	Classroom #1	Classroom #2	Classroom #3
G-3. Filter Type: (Circle all that apply)	Fiberglass mesh . . . . 1 Pleated . . . . 2 High efficiency . . . . . 3 Other . . . . 8 Specify:____________ ________________ DK . . . . 9 NA 10	Fiberglass mesh . . . . 1 Pleated . . . . 2 High efficiency . . . . . 3 Other . . . . 8 Specify:____________ ________________ DK . . . . 9 NA 10	Fiberglass mesh . . . . 1 Pleated . . . . 2 High efficiency . . . . . 3 Other . . . . 8 Specify:____________ ________________ DK . . . . 9 NA 10
G-4. Placement of Filter: (Circle one)	Coil/AHU . . . . 1 Duct . . . . 2 Both . . . . 3 None . . . . 4 NA 5	Coil/AHU . . . . 1 Duct . . . . 2 Both . . . . 3 None . . . . 4 NA 5	Coil/AHU . . . . 1 Duct . . . . 2 Both . . . . 3 None . . . . 4 NA 5
G-5. Loading of dirt on Filter: (Circle one)	Heavy . . . . 1 Medium . . . . 2 Light . . . . 3 DK . . . . 9 NA 10	Heavy . . . . 1 Medium . . . . 2 Light . . . . 3 DK . . . . 9 NA 10	Heavy . . . . 1 Medium . . . . 2 Light . . . . 3 DK . . . . 9 NA 10
G-6. Gaps around filters: (Circle one)	½ inch or more . . . . . 1 less than ½ inch . . . . 2 None . . . . 3 DK . . . . 9 NA 10	½ inch or more . . . . . 1 less than ½ inch . . . . 2 None . . . . 3 DK . . . . 9 NA 10	½ inch or more . . . . . 1 less than ½ inch . . . . 2 None . . . . 3 DK . . . . 9 NA 10
G-7. Mold/Mildew on Filter? (Circle one)	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10

	Classroom #1	Classroom #2	Classroom #3
G-8. Type of supply ductwork: (Circle all that apply)	Flexible .... 1 Sheet metal .... 2 Other 8 Specify:____________________ ____________________ DK .... 9 NA 10	Flexible .... 1 Sheet metal .... 2 Other .... 8 Specify:____________________ ____________________ DK .... 9 NA 10	Flexible .... 1 Sheet metal .... 2 Other .... 8 Specify:____________________ ____________________ DK .... 9 NA 10
G-9. Number of Coils in a row: (Circle one)	__ __ __ DK .... -99 NA .... -10	__ __ __ DK .... -99 NA .... -10	__ __ __ DK .... -99 NA .... -10
G-10. Condition of Coils (Circle all that apply)	Clean .... 1 Dirty .... 2 Mold/Mildew/Algae . 3 Leaks 4	Clean .... 1 Dirty .... 2 Mold/Mildew/Algae . 3 Leaks 4	Clean .... 1 Dirty .... 2 Mold/Mildew/Algae . 3 Leaks 4
G-11. Condensate drain pans and lines (Circle all that apply):	Clean .... 1 Dirty .... 2 Mineral buildup .... 3 Biological buildup .. 4 Leaks .... 5 Odors .... 6 Other .... 8 Specify:____________________ ____________________	Clean .... 1 Dirty .... 2 Mineral buildup .... 3 Biological buildup .. 4 Leaks .... 5 Odors .... 6 Other .... 8 Specify:____________________ ____________________	Clean .... 1 Dirty .... 2 Mineral buildup .... 3 Biological buildup .. 4 Leaks .... 5 Odors .... 6 Other .... 8 Specify:____________________ ____________________
G-12. Is there a P-trap for the drain line? (Circle one)	Yes .... 1 No .... 2 DK .... 9 NA 10	Yes .... 1 No .... 2 DK .... 9 NA 10	Yes .... 1 No .... 2 DK .... 9 NA 10

	Classroom #1	Classroom #2	Classroom #3
Note: conduct drainage test: add 6 oz of water into the condensation drain pan and check for plugged outlet if there does not appear to be adequate drainage.			
G-13. Results of drainage tests: (Circle all that apply)	Standing water left . . . . . . 1 Water exits drain line . . . . 2 Other . . . . 8 Specify:________________ ______________________ NA 10	Standing water left . . . . 1 Water exits drain line . . . . . 2 Other . . . . 8 Specify:________________ ______________________ NA 10	Standing water left . . . . . . 1 Water exits drain line . . . . 2 Other . . . . 8 Specify:________________ ______________________ NA 10
G-14. Condensate drain outlet location: (Circle all that apply)	Bottom of AHU . . . . 1 Exterior wall . . . . 2 On ground within 5 ft. of building . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK 9	Bottom of AHU . . . . 1 Exterior wall . . . . 2 On ground within 5 ft. of building . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK 9	Bottom of AHU . . . . 1 Exterior wall . . . . 2 On ground within 5 ft. of building . . . . 3 Other . . . . 8 Specify:________________ ______________________ DK 9
G-15. A. Outdoor air Intake cleanliness (Circle one)	Good . . . . 1 Fair . . . . 2 Poor 3	Good . . . . 1 Fair . . . . 2 Poor 3	Good . . . . 1 Fair . . . . 2 Poor 3
G-15. B. Is there blockage in the Intake? (Circle one)	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10
G-15. C. Possible contamination sources (describe)	______________________ ______________________	______________________ ______________________	______________________ ______________________
G-16. Exhaust outlet within 25 feet? (Circle one)	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10	Yes . . . . 1 No . . . . 2 DK . . . . 9 NA 10

	Classroom #1	Classroom #2	Classroom #3
G-17. Describe the Bird screen: (Circle all that apply)	In place . . . . 1 Obstructed . . . . 2 None 3	In place . . . . 1 Obstructed . . . . 2 None 3	In place . . . . 1 Obstructed . . . . 2 None 3
G-18. Circle all that appear inside the AHU. (Circle all that apply)	Standing water . . . . 1 Slime . . . . 2 Mineral deposits . . . . 3 Other . . . . 8 Specify:__________________ ________________________ None 4	Standing water . . . . 1 Slime . . . . 2 Mineral deposits . . . . 3 Other . . . . 8 Specify:__________________ ________________________ None 4	Standing water . . . . 1 Slime . . . . 2 Mineral deposits . . . . 3 Other . . . . 8 Specify:__________________ ________________________ None 4
G-19. Condition of AHU fan blades: (Circle one)	Clean . . . . 1 Dirty . . . . 2 Corrosion . . . . 3 DK . . . . 9 NA 10	Clean . . . . 1 Dirty . . . . 2 Corrosion . . . . 3 DK . . . . 9 NA 10	Clean . . . . 1 Dirty . . . . 2 Corrosion . . . . 3 DK . . . . 9 NA 10
G-20. AHU vibration and noise: (Circle one)	Very loud . . . . 1 Loud . . . . 2 Quiet . . . . 3 NA 10	Very loud . . . . 1 Loud . . . . 2 Quiet . . . . 3 NA 10	Very loud . . . . 1 Loud . . . . 2 Quiet . . . . 3 NA 10
G-21. End Time:	__ __ : __ __ am/pm TIME OBSERVATION ENDS	__ __ : __ __ am/pm TIME OBSERVATION ENDS	__ __ : __ __ am/pm TIME OBSERVATION ENDS
Notes and Observations on the HVAC Systems			

Consultation with Facilities and HVAC Managers (Part 1)
CA PCS Phase II

Instructions to field staff: Complete this form once per school. First review responses from the Facilities Questionnaire. Pay particular attention to questions that had been left blank. Ask FM if he/she needs clarification on any questions from the questionnaire and try to complete any questions that had been left blank.

Obtain information for all 3 classrooms. Section A is to be completed by the Facility Manager. Consult with HVAC Manager to complete Section B.
Ask Facility Manager to also complete Part 2, which is a separate form.

SECTION A. CLASSROOM INFORMATION

A-1. Today's Date: __ __/__ __/__ __

A-2. Facility Manager's Name: ____

Instructions: Complete this section for each classroom below.

	Classroom #1	Classroom #2	Classroom #3
Room Number:	________	________	________
A-3. Date the classroom building was constructed or acquired by district:	__ __/__ __ __ __ (MM/YYYY)	__ __/__ __ __ __ (MM/YYYY)	__ __/__ __ __ __ (MM/YYYY)
PORTABLE CLASSROOMS MAY HAVE A PLATE ON THE OUTSIDE WITH MANUFACTURE DATE. BUILDING MANUFACTURE DATES WILL NEED TO BE OBTAINED FROM THE FACILITY MANAGER (FM). TRADITIONAL CLASSROOM BUILDING CONSTRUCTION DATES WILL HAVE TO BE OBTAINED FROM THE FM.			
A-4. Is classroom a portable or traditional type? (Circle one)	Portable .... 1→CONTINUE Traditional .. 2→SKIP TO Q. A-8.	Portable .... 1→CONTINUE Traditional .. 2→SKIP TO Q. A-8.	Portable .... 1→CONTINUE Traditional .. 2→SKIP TO Q. A-8.

	Classroom #1	Classroom #2	Classroom #3
A-5. A. Was the portable unit acquired new or used? (Circle one)	New . . . . 1 Used. . . . . 2 → B. Estimate age of unit __ __ yrs. DK. 9	New. . . .. 1 Used. . . . . 2 → B. Estimate age of unit __ __ yrs. DK. 9	New. . . .. 1 Used. . . . . 2 → B. Estimate age of unit __ __ yrs. DK. 9
A-6. What sort of design approval does the portable unit have? (Circle one)	DSA . . . . 1 DOH . . . . 2 DK 9	DSA . . . . 1 DOH . . . . 2 DK 9	DSA . . . . 1 DOH . . . . 2 DK 9
A-7. A. Is the portable in its original location on the school's campus? (Circle one)	Yes . . . . 1 No . . . . 2 →B. How many times has it been moved __ __ →C. How many times has it been moved in the last 3 yrs? __ __ DK 9	Yes . . . . 1 No . . . . 2 →B. How many times has it been moved __ __ →C. How many times has it been moved in the last 3 yrs? __ __ DK 9	Yes . . . . 1 No . . . . 2 →B. How many times has it been moved __ __ →C. How many times has it been moved in the last 3 yrs? __ __ DK 9
A-8. A. For classroom being sampled, please indicate if any of the following items have been replaced **within the last 3 years.** (Circle all that apply):	Addition . . . 1 Lighting . . . 2 HVAC . . . . 3 Roof . . . . . . 4 Floor . . . . . . 5 Wall . . . . . . 6 Plumbing . . 7 Carpet . . . . . 11 Other . . . . . . 8 →Specify:________ ______________________________ ______________________________	Addition . . . 1 Lighting . . . 2 HVAC . . . . 3 Roof . . . . . . 4 Floor . . . . . . 5 Wall . . . . . . 6 Plumbing . . 7 Carpet . . . . . 11 Other . . . . . . 8 →Specify:________ ______________________________ ______________________________	Addition . . . 1 Lighting . . . 2 HVAC . . . . 3 Roof . . . . . . 4 Floor . . . . . . 5 Wall . . . . . . 6 Plumbing . . 7 Carpet . . . . . 11 Other . . . . . . 8 →Specify:________ ______________________________ _ ______________________________ _

	Classroom #1	Classroom #2	Classroom #3
A-9. Major remediations (Circle all that apply):	Asbestos . . . 1 Lead . . . . . . 2 Mold . . . . . . 3 Other . . . . . . 8→Specify:________ ______________________________ ______________________________ DK . . . . 9 None 4	Asbestos . . . 1 Lead . . . . . . 2 Mold . . . . . . 3 Other . . . . . . 8→Specify:________ ______________________________ ______________________________ DK . . . . 9 None 4	Asbestos . . . 1 Lead . . . . . . 2 Mold . . . . . . 3 Other . . . . . . 8→Specify:________ ______________________________ ______________________________ DK . . . . 9 None 4
A-10. Type of insulation in classroom (Circle all that apply):	Rolled fiberglass . . . 1 Blown paper . . . . . . 2 Insulation board . . . 3 Foam . . . . 4 Other . . . . 8→Specify:___ _______________________________ _______________________________ DK 9	Rolled fiberglass . . . 1 Blown paper . . . . . . 2 Insulation board . . . 3 Foam . . . . 4 Other . . . . 8→Specify:___ _______________________________ _______________________________ DK 9	Rolled fiberglass . . . 1 Blown paper . . . . . . 2 Insulation board . . . 3 Foam . . . . 4 Other . . . . 8→Specify:___ ______________________________ _ ______________________________ _ DK 9
A-11. Overhead Lighting Fixture Type. (Circle all that apply)	T8 Fluorescent . . . . 1 T12 Fluorescent . . . . 2 Fluorescent, Full spectrum . . . . . . 3 Fluorescent, DK Type . . . . 4 Incandescent . . . . 5 DK . . . . 9 None 6	T8 Fluorescent . . . . 1 T12 Fluorescent . . . . 2 Fluorescent, Full spectrum . . . . . . 3 Fluorescent, DK Type . . . . 4 Incandescent . . . . 5 DK . . . . 9 None 6	T8 Fluorescent . . . . 1 T12 Fluorescent . . . . 2 Fluorescent, Full spectrum . . . . . . 3 Fluorescent, DK Type . . . . 4 Incandescent . . . . 5 DK . . . . 9 None 6
A-12. Roof last replaced (years) (Circle one)	Original . . . . 1 1-4 . . . . 2 5-9 . . . . 3 10-19 . . . . 4 >19 . . . . 5 DK 9	Original . . . . 1 1-4 . . . . 2 5-9 . . . . 3 10-19 . . . . 4 >19 . . . . 5 DK 9	Original . . . . 1 1-4 . . . . 2 5-9 . . . . 3 10-19 . . . . 4 >19 . . . . 5 DK 9

	Classroom #1	Classroom #2	Classroom #3
Ducts			
A-13. Type of supply ductwork in classroom (Circle all that apply):	Sheet metal . . . . . . 1 Fiberboard . . . . . . 2 Flexible . . . . 3 Other . . . . 8→Specify:___ _______________________________ _______________________________ DK . . . . 9 None 5	Sheet metal . . . . . . 1 Fiberboard . . . . . . 2 Flexible . . . . 3 Other . . . . 8→Specify:___ _______________________________ _______________________________ DK . . . . 9 None 5	Sheet metal . . . . . . 1 Fiberboard . . . . . . 2 Flexible . . . . 3 Other . . . . 8→Specify:___ ______________________________ _ ______________________________ _ DK . . . . 9 None 5
A-14. What kind of ductwork insulation is there in classroom? (Circle all that apply)	Lined (inside duct) 1 Wrapped (outside the duct) . . . . 2 Other . . . . 8→Specify:___ _______________________________ _______________________________ DK . . . . 9 None 3	Lined (inside duct) 1 Wrapped (outside the duct) . . . . 2 Other . . . . 8→Specify:___ _______________________________ _______________________________ DK . . . . 9 None 3	Lined (inside duct) . . . . 1 Wrapped (outside the duct) 2 Other 8→Specify:___ _______________________________ _______________________________ DK 9 None 3
A-15. Have the ducts in this classroom been professionally cleaned? (Circle one)	Yes . . . . 1→Please provide date __ __ /__ __ __ __ (MM/YYYY) No . . . . . 2 DK 9	Yes . . . . 1→Please provide date __ __ /__ __ __ __ (MM/YYYY) No . . . . . 2 DK 9	Yes . . . . 1→Please provide date __ __ /__ __ __ __ (MM/YYYY) No . . . . . 2 DK 9
A-16. Provide additional comments or observations in space below. (Note anything related to classroom renovations/remediations, ductwork, insulation, etc.)	_______________________________ _______________________________ _______________________________ _______________________________ _______________________________ _______________________________	_______________________________ _______________________________ _______________________________ _______________________________ _______________________________ _______________________________	______________________________ _ ______________________________ _ ______________________________ _ ______________________________ _ ______________________________ _ ______________________________ _

SECTION B. HVAC SYSTEMS

IN CONSULTATION WITH HVAC MANAGER. PLEASE REFER TO PRIMARY HVAC UNIT.

B-1. HVAC MANAGER'S NAME ____

	Classroom #1	Classroom #2	Classroom #3
B-2. Design total supply air flow	__ __ __ cfm DK .... -99 NA .... -10	__ __ __ cfm DK .... -99 NA .... -10	__ __ __ cfm DK .... -99 NA .... -10
B-3. Design outside air flow	__ __ __ cfm DK .... -99 NA .... -10	__ __ __ cfm DK .... -99 NA .... -10	__ __ __ cfm DK .... -99 NA .... -10
B-4. Date last tested and balanced	__ __ /__ __ __ __ (MM/YYYY) DK .... -9/-999 NA .... -1/-100	__ __ /__ __ __ __ (MM/YYYY) DK .... -9/-999 NA .... -1/-100	__ __ /__ __ __ __ (MM/YYYY) DK .... -9/-999 NA .... -1/-100
B-5. Minimum setting of outdoor air damper (%):	_____% DK .... -9 NA .... -1	_____% DK .... -9 NA .... -1	_____% DK .... -9 NA .... -1
B-6. What written HVAC records are available? (Circle all that apply)	Adjustments, testing, and balancing .... 1 Up-to-date maintenance log .... 2 Standardized protocol or manual .... 3 Protocol/manual for maintenance .... 4 DK .... 9 NA .... 10 None 5	Adjustments, testing, and balancing .... 1 Up-to-date maintenance log .... 2 Standardized protocol or manual .... 3 Protocol/manual for maintenance .... 4 DK .... 9 NA .... 10 None 5	Adjustments, testing, and balancing .... 1 Up-to-date maintenance log .... 2 Standardized protocol or manual .... 3 Protocol/manual for maintenance .... 4 DK .... 9 NA .... 10 None 5
B-7. How often do inspections occur: (Circle one)	Yearly .... 1 Quarterly .... 2 Monthly .... 3 Other 4	Yearly .... 1 Quarterly .... 2 Monthly .... 3 Other 4	Yearly .... 1 Quarterly .... 2 Monthly .... 3 Other 4

	Classroom #1	Classroom #2	Classroom #3
B-8. Date of last inspection;	__ __ /__ __ __ __ (MM/YYYY)	__ __ /__ __ __ __ (MM/YYYY)	__ __ /__ __ __ __ (MM/YYYY)
B-9. A. Has there been an HVAC system replacement or major repair for this classroom? ENTER YEAR FOR MOST RECENT. (Circle all that apply)	Replacement . . . . 1→B. Year_____ Repair . . . . 2→C. Year_____ DK . . . . 9 NA . . . . 10 None 3	Replacement . . 1→B. Year______ Repair . . . . 2→C. Year______ DK . . . . 9 NA . . . . 10 None 3	Replacement . . . . 1→B. Year_____ Repair . . . . 2→C. Year_____ DK . . . . 9 NA . . . . 10 None 3
B-10. Provide additional comments or observations in space below. (Note anything related to classroom renovations/remediations, ductwork, insulation, etc.)	______ ______ ______ ______ ______ ______	______ ______ ______ ______ ______ ______	______ ______ ______ ______ ______ ______

Consultation with Facilities and HVAC Managers (Part 2)
CA PCS Phase II

FACILITY MANAGER, PLEASE COMPLETE THE FOLLOWING QUESTIONS **ONCE** FOR THE ENTIRE SCHOOL SITE. IF YOU CANNOT COMPLETE "PART 2" AT THE PRESENT TIME, PLEASE ASK TECHNICIAN FOR RETURN ENVELOPE TO MAIL IT TO RTI.

TECHNICIAN, PLEASE COMPLETE THE IDENTIFYING INFORMATION BELOW.

SECTION C. OTHER SCHOOL INFORMATION/CHARACTERISTICS

C-1. Today's Date: __ __/__ __/__ __

C-2. Facility Manager's Name: ____

C-3. School Type: (Circle all that apply)

Elementary 1
Middle 2
High 3
Other . . . . 8 → Specify:____

C-4. Number of students attending this school: ________

C-5. Grades at this school (Circle all that apply) K 1 2 3 4 5 6 7 8 9 10 11 12

C-6. How many student days are scheduled for this school year? ________

C-7. Are there pre-kindergarten aged children in an on-campus pre-school or day-care facility at any time during the day?

Yes 1
No 2

C-8. Which of the following events have occurred at the school in the past 5 years? (Circle all that apply)

Hazardous waste spills . . . 1
Fires 2
Major water leaks 3
Floods 4

C-9. Have there been any overheated, burning or leaking ballasts or transformers currently or in the past? (Circle all that apply)

Yes 1
No 2
DK 9

C-10. How often is there standing water or wet low spots within 50 feet of the classroom (including underneath the classroom)? (Circle one)

Never 1
Occasionally 2
Frequently 3
DK 9

SECTION D. OTHER

D-1. What is the source of the school's potable water? (Circle one)

On-site well 1
Regulated public water supply . . . . 2 → D-1a. Is this from surface water or ground water?
DK 9

Surface (e.g. river or reservoir . . 1
Groundwater (public wells) 2
Both 3
DK 9

D-2. Do students shower anywhere on campus? (Circle one)

Yes 1
No 2
DK 9

D-3. Are crops such as fruits or vegetables grown on campus and consumed by students? (Circle one)

Yes 1
No 2

Please go to next page.

D-4. If pesticides are applied at the school, fill in table below (if known):

Notes to technician: If school uses a contractor, request a pesticides application report from the contract service.
Obtain copy of IPM report on Pesticides used, if available.

INDOORS Product Name	EPA #	Schedule for use: (D=daily, W=weekly, M=monthly, Q=quarterly, A=annually, N=as needed, R=rarely)	Who Applies Pesticide? (maintenance staff, teachers, contractor, other)
		D W M Q A N R	
		D W M Q A N R	
		D W M Q A N R	
		D W M Q A N R	
OUTDOORS Product Name	EPA #	Schedule for use:	Who Applies Pesticide?
		D W M Q A N R	
		D W M Q A N R	
		D W M Q A N R	
		D W M Q A N R	

California Portable Classrooms Study

A joint project of the California Air Resources Board and Department of Health Services

California Environmental Protection Agency

Air Resources Board

Gray Davis, Governor

Department of Health Services

June 23, 2003

«district»
Attn: «distcontactname1»
«distaddrline1»
«distcity», «diststate» «distzip»

Dear «distcontactname1»:

We are writing to request your support for participation of some of your district's schools in Phase II of the California Portable Classrooms Study (Phase I was conducted this past spring). The California Air Resources Board (ARB) and the California Department of Health Services (DHS) are conducting this study to learn more about the environmental health conditions in California's portable classrooms.

As you may already know, this study has been mandated by the California Legislature. It also is endorsed by the Superintendent of Public Instruction, Ms. Delaine Eastin (see enclosed letter). The study results will be used to make recommendations to the Legislature to remedy any unhealthful conditions found. These recommendations will help shape future programs and funding decisions at the State level.

The ARB and DHS have contracted with Research Triangle Institute (RTI) to conduct the study. Within the next week, RTI staff will be calling to request your support.

The schools in your district listed on the enclosed form have been randomly selected to participate in Phase II of this study. After obtaining your support, RTI staff will contact the principals of the selected schools to set a mutually convenient date for the study. Each participating school will receive a check for $100 as a "Thank You" for their participation. More importantly, participating schools will have contributed important information needed to assess our portable classrooms and will help identify any state-level changes needed to improve environmental conditions in our classrooms.

Phase II of the study will be conducted by RTI and will require very little time from staff in your office or at the school. RTI will ask the facilities manager to provide current lists of portable and permanent classrooms, from which RTI staff will select the study classrooms. Two portable classrooms and one traditional classroom will be selected for study from each participating school. Two RTI staff members will visit each school for one day and conduct the following activities in each study classroom: air sampling; assessment of the heating, ventilation, and air conditioning (HVAC) systems; floor dust collection, and temperature and humidity monitoring.

To minimize the impact on classroom instruction, the sampling equipment will be set up before classes begin and removed after classes have ended. The monitoring equipment is quiet and unobtrusive. In addition, comparable air monitoring will be conducted outdoors at each school.

We will ask for assistance from the facilities manager for each school to complete a brief questionnaire regarding the school. In addition, on the day that we visit the school, we will request that the facilities manager, or someone knowledgeable about the HVAC system at the school, accompany RTI's technician during assessment activities.

We hope that you will support this study because we can produce the most definitive results only if we obtain data from all of the randomly selected schools. The information collected from the participating schools and staff will remain strictly confidential; the names of individual schools and staff members will not be reported to our agencies or any other government agencies. We ask that you approve your schools' participation in this important research and take time to talk with the RTI staff who will call you in the next week or so. If you would like to receive the results for schools in your district, you can request them from RTI.

We would appreciate a faxed letter indicating your support. A sample letter of support is enclosed. Please copy this letter onto your district's letterhead, then date and sign the letter, and fax it to RTI at (919) 541-6854. We will send a copy of this letter to the principals of the schools on the enclosed list to inform them of your approval.

If you have questions or concerns about this study, please call us at the numbers below or call the RTI Project Director, Dr. Roy Whitmore, at (800) 334-8571, Ext. 5809, between 8 am and 5 pm, Eastern time. We have enclosed a brochure describing the study. Additional information about the project can be found at our website at http://www.arb.ca.gov/research/indoor/pcs/pcs.htm.

Sincerely,

Peggy L. Jenkins
ARB Project Officer
(916) 445-0753

Jed Waldman
DHS Project Officer
(510) 540-2469

cc: Dr. Roy Whitmore, RTI
Enclosures: (1) Letter from Delaine Eastin
(2) Study brochure
(3) Letter of approval to be copied to your letterhead, signed, and faxed to RTI
(4) List of schools in your district that were randomly selected for Phase II

DATE: ________________________

Dr. Roy W. Whitmore
Project Director, California Portable Classrooms Study
Research Triangle Institute
Research Triangle Park, NC

Dear Dr. Whitmore:

The _______________________ School District is pleased to support the California Portable Classrooms Study. The study results will be used to help improve the quality of the school environment for California's youth. We encourage schools in our district to cooperate and participate in the upcoming study.

We understand that all information gathered is confidential.

Sincerely yours,

Name: ____

Title: ____

Phone Number: ________________________

California Portable Classrooms Study

A joint project of the California Air Resources Board and Department of Health Services

California Environmental Protection Agency

Air Resources Board

Gray Davis, Governor

Department of Health Services

«school»
Attn: «principalname1»
«schooladdrline1»
«schoolcity», «schoolstate» «schoolzip»

Dear «principalname1»:

I am writing to request your school's participation in Phase II of the California Portable Classrooms Study (Phase I was conducted this past spring). The California Air Resources Board (ARB) and the California Department of Health Services (DHS) are conducting this study to learn more about the environmental health conditions in California's portable classrooms. **Your superintendent has given us verbal approval for you to participate in this study.**

As you may already know, this study has been mandated by the California Legislature. It also is endorsed by the Superintendent of Public Instruction, Ms. Delaine Eastin (see enclosed letter). The study results will be used to make recommendations to the Legislature to address unhealthful environmental conditions found in portable classrooms. These recommendations will help shape future programs and funding decisions at the state level.

The State has contracted with my organization, Research Triangle Institute (RTI), to assist in conducting the fieldwork of the study. Within the next week, we will be calling to request your school's participation. Your school has been randomly selected from California's public schools to participate in Phase II of this study. If you participate, your school will receive a check for $100 as a token of appreciation. More importantly, you will have contributed important information needed to assess portable classrooms and to help identify any state-level changes needed to improve environmental conditions in California's classrooms.

This study will require very little time from staff at your school. We will ask you or your facilities manager to provide current lists of portable and permanent classrooms, as well as a site map, from which RTI staff will select the study classrooms. Two portable classrooms and one traditional classroom will be selected for study. We also will ask for assistance from your facilities manager to complete a brief questionnaire regarding the school. In addition, on the day that we visit your school, we will request that your facilities manager, or someone knowledgeable about the ventilation systems at your school, accompany RTI's technician during assessment activities.

On the study date, two RTI staff members will conduct the following activities in each study classroom: air sampling; assessment of the heating, ventilation, and air conditioning (HVAC) systems; floor dust collection, and temperature and humidity monitoring. To minimize the impact on classroom instruction, the air sampling equipment will be set up before classes begin and removed after classes have ended. In addition, comparable air monitoring will be conducted at one outdoor location at the school. The monitoring equipment is quiet and unobtrusive.

The information collected from the participating schools and staff will remain strictly confidential; the names of individual schools and staff members will not be reported to the public, State agencies, or any other government agencies. If you would like to receive the results for your school, you can request them from your district superintendent; the specific results for your school will not be provided to anyone else.

We hope that you will participate in this study. We need data from all of the randomly selected schools in order to accurately identify priority areas of need and develop effective recommendations to address them. We ask that you approve your school's participation in this important research when we call you in the next week or so.

If you have questions or concerns regarding this study, please call me at the number below between 8 a.m. and 5 p.m., Eastern time, or call Peggy Jenkins, ARB Project Officer, at 916-445-0753, or Jed Waldman, DHS Project Officer, at 510-540-2469. Additional information about the project can be found in the enclosed brochure and at the study website at http://www.arb.ca.gov/research/indoor/pcs/pcs.htm.

Sincerely,

Rebecca G. Premock

Rebecca G. Premock
RTI Project Coordinator
(800) 334-8571, Ext. 7468

Enclosures: (1) Letter from Delaine Eastin
(2) Study brochure

Cc: Peggy L. Jenkins, ARB
Jed Waldman, Ph.D., DHS

California Portable Classrooms Study

A joint project of the California Air Resources Board and Department of Health Services

California Environmental Protection Agency

Air Resources Board

Gray Davis, Governor

Department of Health Services

«schoolname»
Attn: «prinname»
«prinaddress»
«princity», «prinstate» «prinzip»

Dear «prinname»:

I am writing to request your school's participation in Phase II of the California Portable Classrooms Study (Phase I was conducted this past spring). The California Air Resources Board (ARB) and the California Department of Health Services (DHS) are conducting this study to learn more about the environmental health conditions in California's portable classrooms. **Your superintendent has given us verbal approval for you to participate in this study.**

As you may already know, this study has been mandated by the California Legislature. It also is endorsed by the Superintendent of Public Instruction, Ms. Delaine Eastin (see enclosed letter). The study results will be used to make recommendations to the Legislature to address unhealthful environmental conditions found in portable classrooms. These recommendations will help shape future programs and funding decisions at the state level.

The State has contracted with my organization, Research Triangle Institute (RTI), to assist in conducting the fieldwork of the study. Within the next week, we will be calling to request your school's participation. Your school has been randomly selected from California's public schools to participate in Phase II of this study. If you participate, your school will receive a check for $100 as a token of appreciation. More importantly, you will have contributed important information needed to assess portable classrooms and to help identify any state-level changes needed to improve environmental conditions in California's classrooms.

This study will require very little time from staff at your school. Two portable classrooms and one traditional classroom will be selected for study. If possible, we would like to re-visit the same classrooms selected for Phase I of the study this past Spring. We also will ask for assistance from your facilities manager to complete a brief questionnaire regarding the school. In addition, on the day that we visit your school, we will request that your facilities manager, or someone knowledgeable about the ventilation systems at your school, accompany RTI's technician during assessment activities.

On the study date, two RTI staff members will conduct the following activities in each study classroom: air sampling; assessment of the heating, ventilation, and air conditioning (HVAC) systems; floor dust collection, and temperature and humidity monitoring. To minimize the impact on classroom instruction, the air sampling equipment will be set up before classes begin and removed after classes have ended. In addition, comparable air monitoring will be conducted at one outdoor location at the school. The monitoring equipment is quiet and unobtrusive.

The information collected from the participating schools and staff will remain strictly confidential; the names of individual schools and staff members will not be reported to the public, State agencies, or any other government agencies. If you would like to receive the results for your school, you can request them from your district superintendent; the specific results for your school will not be provided to anyone else.

We hope that you will participate in this study. We need data from all of the randomly selected schools in order to accurately identify priority areas of need and develop effective recommendations to address them. We ask that you approve your school's participation in this important research when we call you in the next week or so.

If you have questions or concerns regarding this study, please call me at the number below between 8 a.m. and 5 p.m., Eastern time, or call Peggy Jenkins, ARB Project Officer, at 916-445-0753, or Jed Waldman, DHS Project Officer, at 510-540-2469. Additional information about the project can be found in the enclosed brochure and at the study website at http://www.arb.ca.gov/research/indoor/pcs/pcs.htm.

Sincerely,

Rebecca G. Premock

Rebecca G. Premock
RTI Project Coordinator
(800) 334-8571, Ext. 7468

Enclosures: (1) Letter from Delaine Eastin
(2) Study brochure

Cc: Peggy L. Jenkins, ARB
Jed Waldman, Ph.D., DHS

What Will Happen to These Data Once They Are Collected?

At RTI, the questionnaire and environmental data will be entered into a computer database and analyzed. Before State agencies receive the results from RTI, individual names and all other school and classroom identifiers will be removed. The study results will then be used by State researchers to develop a report on the system-wide status of environmental conditions in California public schools. With input from interested stakeholders, the State researchers will also recommend actions that can be taken to remedy and/or prevent unhealthful environmental conditions in portable classrooms.

When Will the Study Results Be Available?

The Legislature has required that ARB and DHS finish the study and submit their report by June 30, 2002. You can sign up on our LISTSERV at:
www.arb.ca.gov/research/indoor/pcs/pcs.htm
for regular updates on study progress.

You can find study updates at the California Portable Classrooms Study Web site:
www.arb.ca.gov/research/indoor/pcs/pcs.htm

Whom May I Call If I Have Further Questions?

If you have any questions or comments regarding any aspect of this study, please call:

Mr. Michael Phillips, RTI Survey Manager, at 800-334-8571, ext. 6276

Ms. Peggy Jenkins, California Air Resources Board, at 916-445-0753

Dr. Jed Waldman, California Department of Health Services, at 510-540-2469

E-mail should be sent to **CAPCS@arb.ca.gov**

Additional resources on Healthy Schools can be found at:

U.S. EPA IAQ Tools for Schools:
www.epa.gov/iaq/schools/tools4s2.html

Collaborative for High Performance Schools:
www.chps.net

Please feel free to copy this brochure and distribute it to others at your school.

Questions & Answers about the California Portable Classrooms Study

Sponsored by
California Air Resources Board (ARB)
and
California Department of Health Services (DHS)

Conducted by
Research Triangle Institute
Research Triangle Park, NC 27709

What Is the California Portable Classrooms Study?

This is a statewide study to learn more about environmental health conditions in California's portable classrooms. The State Air Resources Board (ARB) and the Department of Health Services (DHS) are jointly conducting the study. Study scientists will identify how widespread any potential problems may be, and make recommendations, in consultation with stakeholders, for actions that can be taken to solve any problems identified and prevent future problems.

Why Is This Study Being Conducted?

The California Portable Classrooms Study was proposed by Governor Gray Davis and is supported by the California State Legislature. Delaine Eastin, State Superintendent of Public Instruction, has endorsed the study.

How Was Our School Selected?

Your school is one of 1000 schools randomly chosen from all public schools in the State.

Why Is It So Important That Our School Participates?

Because the study uses a representative, statewide sample of schools, every school selected in the sample is important. Because your school was one of those randomly selected, we cannot replace it with another. If your school does not participate, study results will be less representative of statewide conditions.

How Will Portable Classrooms Be Studied?

There are two main components to the California Portable Classrooms Study. The first is a mail survey of 1000 schools, which will collect information from facility managers and teachers. In addition, air sampling for formaldehyde will be conducted in some schools. Several months after the mail survey, 60 schools will be recruited for more extensive environmental monitoring of their classrooms. In addition to portable classrooms, the study will include some traditional classrooms.

Will Much Effort Be Required by School Staff?

At each school, a "study coordinator" will receive a packet with instructions for selecting three classrooms, giving out questionnaires, placing formaldehyde monitoring tubes, and mailing these items back. The questionnaires for facility managers and teachers typically take about 20 minutes to complete. In the second part of the study in the fall, air samples and other environmental measurements will be taken by study scientists in several classrooms in each of the 60 schools selected for further environmental monitoring.

Are There Other Reasons Our School Should Participate?

Participating in this study offers you the opportunity to contribute to knowledge needed to promote healthier environmental conditions for school children in California. The results of this study will help shape future programs and funding decisions at the State level.

How Will Information I Provide Be Kept Confidential?

Research Triangle Institute (RTI) has been hired by the State to conduct the study, and they are required to keep all study information they receive ***confidential***. Researchers will use the information you provide for statistical purposes only. Individual participant and school names will not be shared with any government agencies. Specific formaldehyde monitoring results for your school will only be provided to your school district superintendent.

CALIFORNIA
DEPARTMENT
OF
EDUCATION

721 Capitol Mall
Sacramento
CA 95814
Phone: (916) 657-4766
Fax: (916) 657-4975

DELAINE EASTIN
State Superintendent of Public Instruction

August 7, 2001

Dear District and County Superintendents and Charter School Administrators:

Study of Environmental Conditions in California's Portable Classrooms

This past spring, the State Air Resources Board (ARB) and the Department of Health Services (DHS) asked schools in your district to complete surveys for the California Portable Classrooms Study. We appreciate the efforts of those who participated. I am writing now to request your support for, and participation in, Phase II of the study. In Phase II, ARB and DHS, with assistance from the Research Triangle Institute (RTI), will conduct a field study at a subset of the schools previously surveyed. Phase II activities will be conducted this fall and winter, and will require minimal effort on the part of district and school staff. Because schools in your district are among those selected for Phase II, I ask that you actively participate in the study as requested in the enclosed materials.

The findings from the California Portable Classrooms Study will form the primary basis for recommendations that ARB and DHS must make to the Governor and the Legislature in June 2002 regarding ways to remedy and prevent unhealthful conditions found in portable classrooms. As you may know, the State is facing rising concerns about environmental health conditions in California portable classrooms. The information that ARB and DHS gather in this study will help determine whether publicized problems are isolated occurrences or system-wide concerns, and whether state-level assistance is needed to address them.

If you have any questions regarding the sampling schedule or study plans, please contact the ARB, DHS, or RTI contacts indicated in the enclosed materials. You can also find further information about the study at the following web site: http://www.arb.ca.gov/research/indoor/pcs/pcs.htm.

I appreciate your assistance in supporting the California Portable Classrooms Study. The success of this study is important to the health of California school children.

Sincerely,

Delaine Eastin

DELAINE EASTIN
State Superintendent of Public Instruction

DE:db/ss

Enclosures

cc: Jed Waldman, Chief Indoor Air Quality Program, DHS
Peggy Jenkins, Manager, Indoor Exposure Assessment Section, ARB

California Portable Classrooms Study

A joint project of the California Air Resources Board and Department of Health Services

California Environmental Protection Agency

Air Resources Board

Gray Davis, Governor

Department of Health Services

MONITORING FOR THE CA PORTABLE CLASSROOMS STUDY

GENERAL DATA-GATHERING CRITERIA

- **Noise**: minimal noise (a quiet purring) will be made by air monitoring equipment, which will be located away from students and teachers
- **Space**: a small box (1.5 x 3 x 1 ft) will contain all of the indoor monitoring equipment
- **Security**: the monitoring equipment will be secured with ties to prevent tampering; only a small tube will protrude from the box.
- **Randomly selected classrooms**: to ensure statistical validity, 2 portable classrooms and 1 traditional classroom will be selected randomly from each school
- **Confidentiality**: the names of the schools, districts, or persons will not be released to government agencies or the public; participating schools can request the results for their school through their district superintendent

COMFORT

- **Measurements**: temperature and relative humidity
- **Where collected**: 3 selected classrooms and outside
- **When collected**: equipment is set up in the morning before class starts and taken down at the end of the day after class ends

CHEMICALS

- **Measurements**: airborne particle counts and gaseous chemicals such as formaldehyde; soil and dust samples
- **Where collected**: 3 selected classrooms and outside
- **When collected**: for particle counts and gaseous chemicals, samplers will be set up in the morning before class and taken down after class ends; dust (indoors) and soil samples (outdoors) will be collected at the end of the school day when no students are present

MOLDS

- **Measurements**: swabs of areas, slides and biological cultures
- **Where collected**: in a limited number of classrooms
- **When collected**: 5 to 15 minute samples when students not present**,** during the lunch break if possible

LIGHT

- **Measurement**: light meter
- **Where collected**: 3 selected classrooms
- **When collected**: 5 minutes in each classroom when no students are present; mid-day or at the end of the school day

NOISE

- **Measurement**: decibel levels
- **Where collected**: 3 selected classrooms
- **When collected**: when no students are present; mid-day or at the end of the school day

MOISTURE

- **Measurement**: moisture reading on inside walls
- **Where collected**: 3 selected classrooms
- **When collected**: 5 minutes in each classroom when no students are present; mid-day or at the end of the school day

VENTILATION

- **Measurements**: air flow and carbon dioxide levels
- **Where collected**: 3 selected classrooms and outside
- **When collected**: air flow is a 5 minute measurement taken when no students are present; carbon dioxide instruments are set up in the morning before class starts and taken down at the end of the day after class ends

VIDEO

- **Measurements**: inside to capture the layout of equipment and areas where potential indoor sources are visible; outside to capture possible nearby sources, e.g., service stations. **Absolutely no students, teachers, or any school identifiers will be on video.** Videos will be used only to help investigators understand the monitoring results.
- **Where collected**: 3 selected classrooms and outside as described above
- **When collected**: at convenient times throughout the day during periods when students are not present in the selected classrooms

California Portable Classrooms Study

A joint project of the California Air Resources Board and Department of Health Services

California Environmental Protection Agency

Air Resources Board

Gray Davis, Governor

Department of Health Services

Dear Teacher:

Your school has agreed to participate in the California Portable Classrooms Study. Research Triangle Institute (RTI) is conducting this study on behalf of the California Air Resources Board (ARB) and the California Department of Health Services (DHS) to learn more about the environmental health conditions in California's portable classrooms.

Three teachers in your school were randomly chosen to participate in this study based on classroom assignment. The results from the study will be used by the ARB, DHS, and other state agencies to assess the potential for adverse health conditions and to recommend effective actions that can be taken to remedy or prevent any unhealthful conditions that may be found.

Please complete the "Teacher Questionnaire" enclosed. It should take about 10 minutes. Return the questionnaire to the RTI field technician at your school.

Your participation and the participation of your school are voluntary. However, your participation is critical to the success of the study. RTI will keep all school information strictly confidential. Neither individual questionnaire responses nor specific results for any individual schools will be reported to any government agencies. Government agencies will receive data and summary results that exclude identifiers for individual participants, classrooms, and schools.

If you have any questions about this study, please call me at the number listed below. If you have any questions about your rights as a study participant, you can call RTI's Office of Research Protection at 1-866-214-2043 (a toll-free number).

It is only with the help of individual schools, such as yours, that this research can be successful and provide results that are accurate and useful. Thank you for your assistance and participation.

Sincerely,

Rebecca G. Premock

Rebecca G. Premock
RTI Project Coordinator
(800) 334-8571, Ext. 7468

California Portable Classrooms Study

A joint project of the California Air Resources Board and Department of Health Services

California Environmental Protection Agency
Air Resources Board

Gray Davis, Governor

Department of Health Services

October 11, 2001

Contact
School
Street
City, CA ZIP

Dear Contact:

<School> has agreed to participate in the California Portable Classrooms Study. Research Triangle Institute (RTI) is conducting this study on behalf of the California Air Resources Board (ARB) and the California Department of Health Services (DHS) to learn more about the environmental health conditions in California's portable classrooms.

> **Please complete the "Facility Manager Questionnaire" enclosed. It should take about 20 minutes. You may be asked to accompany the RTI field technician when the monitoring at the school is being performed. Please return the questionnaire to the RTI field technician when you meet him at Adams Elementary School. If you do not meet with the RTI technician, please return the questionnaire in the envelope provided. The site visit to <school name> has been scheduled for <date>.**

Your participation in this study is voluntary. However, your participation is critical to the success of the study. RTI will keep all school information strictly confidential. Neither individual questionnaire responses nor specific results for any individual schools will be reported to any government agencies. Government agencies will receive data and summary results that exclude identifiers for individual participants, classrooms, and schools.

If you have any questions about this study, please call me at the number listed below. If you have any questions about your rights as a study participant, you can call RTI's Office of Research Protection at 1-866-214-2043 (a toll-free number).

It is only with the help of individual schools, such as yours, that this research can be successful and provide results that are accurate and useful. Thank you for your assistance and participation.

Sincerely,

Rebecca G. Premock

Rebecca G. Premock
RTI Project Coordinator
(800) 334-8571, Ext. 7468

California Portable Classrooms Study

A joint project of the California Air Resources Board and Department of Health Services

California Environmental Protection Agency

Air Resources Board

Gray Davis, Governor

Department of Health Services

DATE

SCHOOL NAME
ATTN: SCHOOL CONTACT
ADDRESS
CITY, CA ZIP

Dear CONTACT NAME:

I am writing to thank you for your school's upcoming participation in Phase II of the California Portable Classrooms Study. You have already received a phone call from a RTI staff member to schedule the date for this study at your school. The site visit to <school> has been scheduled for <date>. Please notify your staff of the date of the site visit.

The enclosed chart describes the monitoring portion of the study. In addition to monitoring, the facilities manager and the teachers of three selected classrooms will complete short questionnaires. Our RTI field staff also will use checklists to collect information by observation.

Please remember that the information collected will remain strictly confidential; the names of individual schools and staff members will not be reported to the public, State agencies, or any other government agencies. If you would like to receive the results for your school, you can request them from your district superintendent; the specific results for your school will not be provided to anyone else.

If you have questions or concerns regarding this study, please call me at the number below between 8 a.m. and 5 p.m., Eastern time. If you have any questions about your rights as a study participant, you can call RTI's Office of Research Protection at 1-866-214-2043 (a toll-free number). Additional information about the project can be found at the study website at http://www.arb.ca.gov/research/indoor/pcs/pcs.htm or RTI's website for this study at http://www.rti.org/units/shsp/projects/cpcs.cfm.

Sincerely,

Rebecca G. Premock

Rebecca G. Premock
RTI Project Coordinator
(800) 334-8571, Ext. 7468

California Portable Classrooms Study

A joint project of the California Air Resources Board and Department of Health Services

California Environmental Protection Agency

Air Resources Board

Gray Davis, Governor

Department of Health Services

December 27, 2001

School name
Attn: Our Contact
Address
City, CA Zip

Dear Our Contact:

Thank you for your school's participation in Phase II of the California Portable Classrooms Study. We appreciate you allowing our field staff to visit your school this fall. Please accept the enclosed check as thanks for your time and help.

The California Air Resources Board (ARB) and the California Department of Health Services (DHS) are conducting this study to learn more about the environmental health conditions in California's portable classrooms. The information we collected at your school is invaluable to the success of this study.

A copy of the final report will be sent to your district next year. The study results will be used to make recommendations to the Legislature to address unhealthful environmental conditions found in portable classrooms. These recommendations will help shape future programs and funding decisions at the state level.

If you have any questions regarding this study, please call me at the number below between 8 a.m. and 5 p.m., Eastern time, or call Peggy Jenkins, ARB Project Officer, at 916-445-0753, or Jed Waldman, DHS Project Officer, at 510-540-2469. Additional information about the project can be found at the study website at http://www.arb.ca.gov/research/indoor/pcs/pcs.htm.

Sincerely,

Roy W. Whitmore
RTI Project Director

Enclosures: check

Cc: Peggy L. Jenkins, ARB
Jed Waldman, Ph.D., DHS

APPENDIX B

QC Results

Appendix B provides summaries of various types of quality control data. There are several parts, as indicated below:

Part 1: Summary of blank samples. This table gives the following summary statistics of the observed levels (usually in mass units), by medium and analyte and type of blank (FB = field blank, LB = laboratory blank, LR = lab reagent blank, LM = lab matrix blank): the number of blank samples (n), their mean and standard deviation, and the minimum and maximum values.

It should be noted that the pesticide and PAH analyses of the dust samples involved use of second-order calibration curves. The lowest point on a calibration curve was adopted as a quantitation limit. All observed values falling below that limit were considered non-detects and were also flagged as "suspect" cases (since they were outside the calibration range). Since cases with zero peak areas are in this category, a number of samples may yield the same "measured" value, which could be either positive or negative (without further censoring). Since blank samples were not (and should not be) subjected to further censorings and since zero peak areas for blanks were generally observed, all of the blank samples for these chemicals tend to have the same (possibly negative) value.

Part 2: Summary of percent recoveries for control samples. This table gives the following summary statistics of the percent recoveries, by medium and analyte and type of control sample (LFB = lab fortified blank, LFM = lab fortified matrix, LC = laboratory control, SRM = standard reference material): the number of control samples; their mean, median, standard deviation, and coefficient of variation (CV); the minimum and maximum recoveries, and the percent of the control samples that were detected.

Part 3: Summary of duplicate samples. This table characterizes the precision of duplicate samples that were obtained at a subset of the schools and classrooms for certain media. For each analyte and each such pair, a standard deviation was first calculated. A pooled standard deviation was then determined. In addition to this statistic, the table reports the number of pairs and the median and maximum standard deviation. It also gives the mean, median, and maximum of the relative standard deviations (RSDs). The median RSD is regarded as the most appropriate measure of precision. Note that whenever one member of pair has a zero value, then the RSD will be 141.4% (the square root of 2 times 100%).

Part 4: Summary of duplicate samples for cases where both samples have detectable values. The same statistics as for Part 3 are presented, but cases with non-detects are excluded. This reduces the number of pairs in many situations, but there is less distortion of the RSDs.

Part 5: Summary of duplicate analyses. For certain media and types of analytes, duplicate analyses (DA) or duplicate injections (DI) were used to assess these components of analytical precision. This table characterizes the precision of these types of duplicates, which were obtained for a subset of the field samples. For each analyte and each such pair, a standard deviation was first calculated. A pooled standard deviation was then determined. In addition to this statistic, the table reports the number of pairs and the median and maximum standard deviation. It also gives the mean, median, and maximum of the relative standard deviations (RSDs). The median RSD is regarded as the most appropriate measure of precision. Note that whenever one member of pair has a zero value, then the RSD will be 141.4% (the square root of 2 times 100%).

Part 6: Summary of duplicate analyses for cases where both analyses produced detectable values. The same statistics as for Part 5 are presented, but cases with non-detects are excluded. This reduces the number of pairs in many situations, but there is less distortion of the RSDs.

Part 7: Summary of detection limits. In general, detection limits were not explicitly used to censor the data. Percent measurable statistics reported for the field data, however, are based on whether measured values exceed the limits. Detection limits were generally calculated (i.e., whenever possible) as shown in the table below. Because the limits are reported in concentration or loading units, the limits vary from sample to sample due to different sampling volumes or masses. As a result, a single constant detection limit for a given analyte and medium often does not exist. Part 7 of the appendix therefore reports summary statistics characterizing the set of such limits that occurred – namely, the mean and median of the detection limits occurring in the field data, by medium and analyte, along with the number of observations.

HANDLING OF NON-DETECTS

MATRIX	ANALYTES	THRESHOLD DEFINITIONS/SOURCES DL = detection limit, MDL=method DL, MQL=method quantitation limit	THRESHOLD VALUE FOR DECLARING DETECTION	NON-DETECT CENSORING STRATEGY*
AIR	Pollen/spores, biologicals	Constant DL for given species provided by lab	0	A
SURFACE	Biologicals	Constant DL for given species provided by lab	0	A
AIR	VOCs, aldehydes	MDL=($t_{0.99}$)(std. dev. of all blanks)/sample volume MQL=lowest calibration concentration/sample volume	MDL**	B
DUST#	Pesticides, PAHs	MQL=lowest calibration concentration/sample size, computed independently for concentrations and loadings	MQL	B
DUST	Metals	MDL=($t_{0.99}$)(std. dev. of all blanks)/sample volume MQL=lowest calibration concentration/sample volume, computed independently for concentrations and loadings	MDL**	B
DUST MAT, SOIL	Metals	Constant DL for given analyte provided by lab	DL	C
DUST	Allergens	Constant DL for given allergen provided by lab	DL	C

* Strategies are defined as follows:
A - Non-detects are reported as zeros. Detection limits (DLs) are not generally available.
B - Negative values are converted to zeros for the data set and the display of results; for QC purposes the data are not censored. DLs vary by sample
C - Non-detects are set equal to the DL, which is constant across samples for a given analyte or species.
** If the MDL is missing or zero, then the MQL is used.
# A second-order calibration curve was used for these cases. All observations with values below the MQL were flagged with a data quality code of 1 (suspect data). Observations with zero peak areas are included among these cases; consequently, blank samples with zero peak areas, for example, will all have the same value.

Medium	Type Blank	Analyte	Units	n	Mean	Std. Dev.	Minimum	Median	Maximum
Air	FB	Alternaria	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
Pollen Spores		Amerospores	logcnt/m3	10	0.17	0.55	0.00	0.00	1.72
		Arthrinium	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Ascospores	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Aspergillus/Penicillium-like	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Aureobasidium	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Basidiospores	logcnt/m3	10	0.08	0.27	0.00	0.00	0.85
		Bipolaris/Dreschlera	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Botrytis	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Chaetomium	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Cladosporium	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Curvularia	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Epicoccum	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Fusarium	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Memnoniella	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Mycelial Fragments	logcnt/m3	10	0.85	0.00	0.85	0.85	0.85
		Nigrospora	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Oidium/Peronospora	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Pithomyces/Ulocladium	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Pollen Count	logcnt/m3	10	0.85	0.00	0.85	0.85	0.85
		Rusts	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Smuts/Myxomycetes	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Stachybotrys	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Stemphylium	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Torula	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
		Total Fungal Spores	logcnt/m3	10	0.93	0.28	0.85	0.85	1.72
		Unidentified Conidia	logcnt/m3	10	0.00	0.00	0.00	0.00	0.00
Air	FB	Formaldehyde	ng	36	0.09	0.10	0.00	0.00	0.28
		Acetaldehyde	ng	36	1.95	0.86	0.35	2.05	3.36
		Propionaldehyde	ng	36	0.00	0.00	0.00	0.00	0.00
		Crotonaldehyde	ng	36	0.27	0.27	0.00	0.22	0.62
		n-Butyraldehyde	ng	36	0.00	0.00	0.00	0.00	0.00
		Benzaldehyde	ng	36	0.04	0.14	0.00	0.00	0.54
		iso-Valeraldehyde	ng	36	0.11	0.19	0.00	0.00	0.54
		Valeraldehyde	ng	36	0.00	0.00	0.00	0.00	0.00
		Hexanaldehyde	ng	36	0.00	0.00	0.00	0.00	0.00
		2,5-Dimethylbenzaldehyde	ng	36	0.00	0.00	0.00	0.00	0.00
		o,p-Tolualdehyde	ng	36	0.00	0.00	0.00	0.00	0.00

Medium	Type Blank	Analyte	Units	n	Mean	Std. Dev.	Minimum	Median	Maximum
		m-Tolualdehyde	ng	36	0.00	0.00	0.00	0.00	0.00
Air	LB	Formaldehyde	ng	5	0.16	0.04	0.12	0.15	0.23
Aldehydes		Acetaldehyde	ng	5	1.87	0.21	1.64	1.97	2.08
		Propionaldehyde	ng	5	0.03	0.03	0.00	0.03	0.06
		Crotonaldehyde	ng	5	0.20	0.19	0.10	0.11	0.54
		n-Butyraldehyde	ng	5	0.03	0.03	0.00	0.04	0.06
		Benzaldehyde	ng	5	0.12	0.07	0.00	0.14	0.16
		iso-Valeraldehyde	ng	5	0.07	0.16	0.00	0.00	0.35
		Valeraldehyde	ng	5	0.14	0.08	0.00	0.16	0.20
		Hexanaldehyde	ng	5	0.10	0.09	0.00	0.13	0.19
		2,5-Dimethylbenzaldehyde	ng	5	0.02	0.05	0.00	0.00	0.10
		o,p-Tolualdehyde	ng	5	0.00	0.00	0.00	0.00	0.00
		m-Tolualdehyde	ng	5	0.01	0.03	0.00	0.00	0.06
Air	FB	1,1,1-Trichloroethane	ng	7	1.53	0.30	1.38	1.42	2.22
VOCs		Benzene	ng	7	1.32	1.56	0.00	1.16	4.13
		Carbon tetrachloride	ng	7	2.25	0.60	1.93	2.01	3.60
		Chloroform	ng	7	0.75	0.35	0.53	0.63	1.54
		Ethylbenzene	ng	7	0.47	0.05	0.42	0.48	0.55
		Tetrachloroethylene	ng	8	0.38	0.04	0.33	0.37	0.44
		Toluene	ng	7	0.00	0.00	0.00	0.00	0.00
		m,p-Xylene	ng	7	0.59	0.10	0.48	0.63	0.71
		o-Xylene	ng	7	0.40	0.07	0.33	0.41	0.48
Air		Cladosporium spp.	logCFU/m3	1	0.00	.	0.00	0.00	0.00
Biologicals		Penicillium spp.	logCFU/m3	1	0.00	.	0.00	0.00	0.00
		Aspergillus spp.	logCFU/m3	1	0.00	.	0.00	0.00	0.00
		Other	logCFU/m3	1	0.00	.	0.00	0.00	0.00
		Unknown	logCFU/m3	1	0.00	.	0.00	0.00	0.00
Surface	FB	Aureobasidium spp.	logCFU/sw	1	0.00	.	0.00	0.00	0.00
Biologicals		Yeast	logCFU/sw	1	0.00	.	0.00	0.00	0.00
		Cladosporium spp.	logCFU/sw	1	0.00	.	0.00	0.00	0.00
		Other	logCFU/sw	1	0.00	.	0.00	0.00	0.00
Dust	LM	Diazinon	pg/uL	7	3.09	0.00	3.09	3.09	3.09
Pesticides		Malathion	pg/uL	7	3.41	0.00	3.41	3.41	3.41
		Chlorpyrifos	pg/uL	7	-0.15	0.00	-0.15	-0.15	-0.15
		4,4'-DDE	pg/uL	7	0.36	0.00	0.36	0.36	0.36
		Dieldrin	pg/uL	7	-0.78	0.00	-0.78	-0.78	-0.78
		cis-Permethrin	pg/uL	7	-16.36	0.00	-16.36	-16.36	-16.36
		trans-Permethrin	pg/uL	6	-32.48	0.00	-32.48	-32.48	-32.48

Medium	Type Blank	Analyte	Units	n	Mean	Std. Dev.	Minimum	Median	Maximum
		Lindane	pg/uL	7	1.12	0.00	1.12	1.12	1.12
		Pendimethalin	pg/uL	7	4.72	0.00	4.72	4.72	4.72
		Propoxur	pg/uL	7	1.40	0.00	1.40	1.40	1.40
		o-Phenylphenol	pg/uL	7	1.80	0.00	1.80	1.80	1.80
		Propetamphos	pg/uL	7	1.28	0.00	1.28	1.28	1.28
		Resmethrin	pg/uL	7	-9.27	0.00	-9.27	-9.27	-9.27
		Piperonyl Butoxide	pg/uL	7	0.86	0.00	0.86	0.86	0.86
		Bifenthrin	pg/uL	7	-0.21	0.00	-0.21	-0.21	-0.21
		Cyhalothrin	pg/uL	7	0.55	0.00	0.55	0.55	0.55
		Cyfluthrin	pg/uL	7	-4.46	0.00	-4.46	-4.46	-4.46
		Cypermethrin	pg/uL	7	-3.88	0.00	-3.88	-3.88	-3.88
		Esfenvalerate	pg/uL	6	-0.31	0.00	-0.31	-0.31	-0.31
		Delta/Tralo-methrin	pg/uL	7	10.10	0.00	10.10	10.10	10.10
Dust	LR	Diazinon	pg/uL	7	3.09	0.00	3.09	3.09	3.09
Pesticides		Malathion	pg/uL	7	3.41	0.00	3.41	3.41	3.41
		Chlorpyrifos	pg/uL	7	-0.15	0.00	-0.15	-0.15	-0.15
		4,4'-DDE	pg/uL	7	0.36	0.00	0.36	0.36	0.36
		Dieldrin	pg/uL	7	-0.78	0.00	-0.78	-0.78	-0.78
		cis-Permethrin	pg/uL	7	-16.36	0.00	-16.36	-16.36	-16.36
		trans-Permethrin	pg/uL	6	-32.48	0.00	-32.48	-32.48	-32.48
		Lindane	pg/uL	7	1.12	0.00	1.12	1.12	1.12
		Pendimethalin	pg/uL	6	4.72	0.00	4.72	4.72	4.72
		Propoxur	pg/uL	7	1.40	0.00	1.40	1.40	1.40
		o-Phenylphenol	pg/uL	7	1.80	0.00	1.80	1.80	1.80
		Propetamphos	pg/uL	7	1.28	0.00	1.28	1.28	1.28
		Resmethrin	pg/uL	7	-9.27	0.00	-9.27	-9.27	-9.27
		Piperonyl Butoxide	pg/uL	7	0.86	0.00	0.86	0.86	0.86
		Bifenthrin	pg/uL	7	-0.21	0.00	-0.21	-0.21	-0.21
		Cyhalothrin	pg/uL	7	0.55	0.00	0.55	0.55	0.55
		Cyfluthrin	pg/uL	7	-4.46	0.00	-4.46	-4.46	-4.46
		Cypermethrin	pg/uL	7	-3.88	0.00	-3.88	-3.88	-3.88
		Esfenvalerate	pg/uL	7	-0.31	0.00	-0.31	-0.31	-0.31
		Delta/Tralo-methrin	pg/uL	7	10.10	0.00	10.10	10.10	10.10
Dust	LM	Benzo[a]pyrene	pg/uL	7	-1.99	2.41	-3.92	-3.92	0.58
PAHs		Benzo[a]anthracene	pg/uL	7	-0.80	0.21	-0.96	-0.96	-0.57
		Acenaphthylene	pg/uL	7	-0.07	0.15	-0.19	-0.19	0.09
		Anthracene	pg/uL	7	0.56	0.21	0.34	0.73	0.73
		Chrysene	pg/uL	6	0.41	0.45	0.12	0.27	1.28

Medium	Type Blank	Analyte	Units	n	Mean	Std. Dev.	Minimum	Median	Maximum
		Benzo[k]fluoranthene	pg/uL	7	-0.03	1.03	-0.86	-0.86	1.07
		Fluoranthene	pg/uL	7	4.79	1.30	2.67	5.05	6.44
		Phenanthrene	pg/uL	7	12.55	4.01	5.83	14.09	16.66
		Pyrene	pg/uL	7	3.88	1.12	1.93	4.34	5.32
		Indeno[1,2,3-cd]pyrene	pg/uL	7	3.34	0.06	3.28	3.38	3.38
		Naphthalene	pg/uL	7	2.05	1.19	0.55	2.00	4.06
		Fluorene	pg/uL	7	-1.13	1.06	-2.53	-1.24	-0.07
		Acenaphthene	pg/uL	7	-0.82	0.59	-1.30	-1.30	-0.18
		Dibenz[a,h]anthracene	pg/uL	7	2.70	0.74	2.11	2.11	3.49
		Benzo[g,h,i]perylene	pg/uL	7	0.28	3.04	-2.16	-2.16	3.53
		Perylene/Benzo[b]fluoranthene	pg/uL	1	4.77	.	4.77	4.77	4.77
Dust	LR	Benzo[a]pyrene	pg/uL	7	-1.96	2.44	-3.92	-3.92	0.77
PAHs		Benzo[a]anthracene	pg/uL	7	-0.79	0.22	-0.96	-0.96	-0.51
		Acenaphthylene	pg/uL	7	-0.07	0.16	-0.19	-0.19	0.12
		Anthracene	pg/uL	7	0.57	0.20	0.34	0.73	0.73
		Chrysene	pg/uL	7	0.25	0.17	0.12	0.12	0.47
		Benzo[k]fluoranthene	pg/uL	7	-0.02	1.04	-0.86	-0.86	1.14
		Fluoranthene	pg/uL	7	0.02	0.34	-0.15	-0.15	0.78
		Phenanthrene	pg/uL	7	-0.66	1.03	-1.46	-1.46	0.94
		Pyrene	pg/uL	7	-0.45	0.05	-0.52	-0.43	-0.40
		Indeno[1,2,3-cd]pyrene	pg/uL	7	3.43	0.21	3.28	3.38	3.89
		Naphthalene	pg/uL	7	3.00	1.99	0.56	2.91	5.84
		Fluorene	pg/uL	7	-1.39	1.43	-2.53	-2.53	0.51
		Acenaphthene	pg/uL	7	-0.81	0.61	-1.30	-1.30	-0.12
		Dibenz[a,h]anthracene	pg/uL	7	2.73	0.78	2.11	2.11	3.71
		Benzo[g,h,i]perylene	pg/uL	7	0.29	3.05	-2.16	-2.16	3.60
		Perylene/Benzo[b]fluoranthene	pg/uL	1	6.61	.	6.61	6.61	6.61
Dust	LB	Arsenic	ng/mL	4	0.01	0.02	0.00	0.01	0.03
Metals		Cadmium	ng/mL	4	0.03	0.03	0.00	0.03	0.06
		Chromium	ng/mL	4	0.00	0.00	0.00	0.00	0.00
		Copper	ng/mL	4	0.05	0.05	0.00	0.04	0.10
		Lead	ng/mL	4	0.09	0.10	0.00	0.09	0.19
		Manganese	ng/mL	4	0.00	0.00	0.00	0.00	0.00
		Nickel	ng/mL	4	0.00	0.00	0.00	0.00	0.00
		Selenium	ng/mL	4	0.05	0.06	0.00	0.05	0.11
		Vanadium	ng/mL	4	0.00	0.00	0.00	0.00	0.00
		Zinc	ng/mL	4	5.14	5.59	1.22	2.98	13.36
		Aluminum	ng/mL	4	1.59	0.47	1.10	1.55	2.17

SUMMARY OF BLANK SAMPLES

Medium	Type Blank	Analyte	Units	n	Mean	Std. Dev.	Minimum	Median	Maximum
		Cobalt	ng/mL	4	0.01	0.02	0.00	0.00	0.03
		Cesium	ng/mL	4	0.00	0.00	0.00	0.00	0.00
		Iron	ng/mL	4	3.31	1.78	1.98	2.72	5.82
		Magnesium	ng/mL	4	0.58	0.67	0.00	0.56	1.21
		Palladium	ng/mL	4	0.30	0.53	0.00	0.05	1.08
		Strontium	ng/mL	4	0.02	0.03	0.00	0.01	0.06
		Titanium	ng/mL	4	0.26	0.09	0.17	0.27	0.35

SUMMARY OF RECOVERIES FOR CONTROL SAMPLES

Medium	Type Control	Analyte	No. Samples	Mean Recov	Std. Dev. Recov	Recov CV(%)	Min Recov	Median Recov	Max Recov	Percent Meas
Air	LC	Formaldehyde	11	101.2	9.6	9.5	79.7	104.4	117.7	100.0
Aldehydes		Acetaldehyde	11	138.5	39.7	28.7	101.3	124.2	237.8	100.0
		Propionaldehyde	11	76.1	26.1	34.4	0.0	85.1	89.3	100.0
		Crotonaldehyde	11	85.0	10.9	12.9	59.6	87.7	96.4	100.0
		n-Butyraldehyde	11	73.7	26.4	35.8	0.0	81.7	91.4	100.0
		Benzaldehyde	11	108.2	11.1	10.2	86.4	111.9	120.7	100.0
		iso-Valeraldehyde	11	91.6	14.5	15.8	60.0	98.4	104.8	100.0
		Valeraldehyde	11	76.1	24.2	31.7	6.0	85.0	90.4	100.0
		Hexanaldehyde	11	76.5	26.7	34.9	0.0	85.9	94.1	100.0
		2,5-Dimethylbenzaldehyde	11	85.1	28.7	33.7	0.0	94.0	102.7	100.0
		o,p-Tolualdehyde	11	90.1	31.6	35.0	7.6	97.3	140.0	100.0
		m-Tolualdehyde	11	87.6	33.1	37.8	0.0	92.2	138.6	100.0
Dust	LFB	Diazinon	9	105.9	52.7	49.8	73.5	90.1	242.4	100.0
Pesticides		Malathion	9	76.9	68.1	88.5	11.7	75.1	230.8	100.0
		Chlorpyrifos	9	109.6	56.4	51.5	75.4	90.1	258.3	100.0
		4,4'-DDE	9	110.5	55.1	49.9	78.5	91.8	255.6	100.0
		Dieldrin	9	122.3	59.4	48.6	86.2	105.2	279.3	100.0
		cis-Permethrin	9	94.7	62.0	65.5	24.4	88.2	250.2	100.0
		trans-Permethrin	8	66.2	76.6	115.6	-67.6	65.2	216.7	100.0
		Lindane	9	102.8	50.0	48.6	69.6	85.5	230.8	100.0
		Pendimethalin	8	129.7	64.4	49.7	89.0	110.7	287.3	100.0
		Propoxur	9	71.4	60.1	84.2	11.8	75.8	205.9	100.0
		o-Phenylphenol	9	33.2	31.2	93.9	6.7	20.3	105.0	100.0
		Propetamphos	9	37.1	17.7	47.8	17.9	31.0	66.3	100.0
		Resmethrin	8	66.8	33.2	49.7	39.4	61.0	144.3	100.0
		Piperonyl Butoxide	9	58.1	53.4	91.9	8.4	59.4	184.5	100.0
		Bifenthrin	9	108.7	56.2	51.7	73.4	95.3	257.0	100.0
		Cyhalothrin	9	107.8	55.9	51.8	75.9	95.3	254.7	100.0
		Cyfluthrin	9	96.7	56.2	58.1	59.0	86.1	242.3	100.0
		Cypermethrin	9	116.0	62.5	53.9	75.0	95.3	269.6	100.0
		Esfenvalerate	9	111.6	61.1	54.8	61.7	95.1	269.1	100.0
		Delta/Tralo-methrin	9	126.1	66.4	52.6	72.6	106.4	288.1	100.0
Dust	LFM	Diazinon	6	97.6	28.4	29.1	71.6	92.3	135.7	100.0
Pesticides		Malathion	5	48.5	53.7	110.7	8.7	9.7	107.6	100.0
		Chlorpyrifos	6	98.2	23.0	23.4	76.0	92.6	130.1	100.0
		4,4'-DDE	6	101.3	22.7	22.4	79.3	95.8	128.8	100.0
		Dieldrin	6	114.2	25.9	22.7	87.4	112.3	150.2	100.0
		cis-Permethrin	6	85.1	21.3	25.1	60.9	85.6	110.1	100.0

Medium	Type Control	Analyte	No. Samples	Mean Recov	Std. Dev. Recov	Recov CV(%)	Min Recov	Median Recov	Max Recov	Percent Meas
		trans-Permethrin	5	35.1	59.0	168.1	-65.7	46.5	89.0	100.0
		Lindane	6	97.1	31.5	32.4	67.3	86.1	142.6	100.0
		Pendimethalin	5	110.2	31.4	28.5	85.9	93.3	158.4	100.0
		Propoxur	6	45.7	44.8	97.9	10.6	22.5	105.9	100.0
		o-Phenylphenol	6	23.0	21.3	92.8	3.1	19.2	55.0	100.0
		Propetamphos	6	41.2	27.4	66.7	4.2	40.7	80.8	100.0
		Resmethrin	6	47.1	19.1	40.6	30.1	39.2	80.5	100.0
		Piperonyl Butoxide	5	32.4	31.1	96.2	8.0	11.8	74.0	100.0
		Bifenthrin	6	89.3	19.2	21.4	68.3	88.5	119.5	100.0
		Cyhalothrin	6	84.9	26.6	31.3	58.5	76.4	128.0	100.0
		Cyfluthrin	6	75.3	25.7	34.0	48.3	76.3	105.0	100.0
		Cypermethrin	6	90.5	29.3	32.3	58.3	91.4	121.9	100.0
		Esfenvalerate	6	90.0	30.0	33.3	58.2	85.5	132.4	100.0
		Delta/Tralo-methrin	6	106.4	42.5	40.0	59.6	103.7	153.1	100.0
Dust	LFB	Benzo[a]pyrene	7	70.6	28.4	40.3	20.4	83.4	94.4	100.0
PAHs		Benzo[a]anthracene	7	91.7	11.1	12.1	74.8	92.0	106.8	100.0
		Acenaphthylene	7	76.7	15.6	20.3	60.9	75.5	104.8	100.0
		Anthracene	7	73.8	17.2	23.3	56.3	77.7	104.7	100.0
		Chrysene	7	95.8	11.9	12.5	80.5	96.0	113.3	100.0
		Benzo[k]fluoranthene	7	83.7	16.3	19.5	65.4	89.5	110.7	100.0
		Fluoranthene	7	93.1	10.7	11.5	73.3	95.3	108.1	100.0
		Phenanthrene	7	88.7	13.0	14.6	68.3	89.6	109.6	100.0
		Pyrene	7	92.1	11.4	12.3	71.8	92.9	110.1	100.0
		Indeno[1,2,3-cd]pyrene	7	85.7	18.9	22.0	57.3	85.9	115.6	100.0
		Naphthalene	7	74.9	15.5	20.7	59.7	71.3	106.2	100.0
		Fluorene	7	83.0	15.2	18.4	65.3	84.3	110.6	100.0
		Acenaphthene	7	81.2	13.9	17.1	64.7	83.0	106.4	100.0
		Dibenz[a,h]anthracene	5	106.9	22.4	21.0	73.8	105.6	128.2	100.0
		Benzo[g,h,i]perylene	6	89.6	9.2	10.3	77.1	91.1	99.2	100.0
		Perylene/Benzo[b]fluoranthene	7	95.1	12.9	13.6	77.8	96.2	111.1	100.0
Dust	LFM	Benzo[a]pyrene	7	45.6	29.1	63.8	21.7	37.1	91.7	100.0
PAHs		Benzo[a]anthracene	7	95.1	14.4	15.2	80.5	91.5	117.4	100.0
		Acenaphthylene	7	82.5	27.7	33.6	43.8	73.9	126.4	100.0
		Anthracene	7	82.0	25.3	30.9	49.9	76.2	125.7	100.0
		Chrysene	7	102.4	17.5	17.1	85.1	99.7	127.7	100.0
		Benzo[k]fluoranthene	7	76.3	13.8	18.1	59.5	69.6	96.2	100.0
		Fluoranthene	7	103.9	25.3	24.3	84.2	91.9	144.3	100.0
		Phenanthrene	7	105.6	43.3	40.9	67.4	87.9	194.3	100.0

Medium	Type Control	Analyte	No. Samples	Mean Recov	Std. Dev. Recov	Recov CV(%)	Min Recov	Median Recov	Max Recov	Percent Meas
		Pyrene	7	101.9	24.8	24.3	81.9	89.1	144.1	100.0
		Indeno[1,2,3-cd]pyrene	7	85.3	29.8	35.0	56.9	81.0	142.6	100.0
		Naphthalene	7	78.7	31.4	39.9	42.8	65.7	136.9	100.0
		Fluorene	7	88.2	28.9	32.8	51.4	77.1	132.5	100.0
		Acenaphthene	7	88.3	31.7	35.9	47.3	76.0	139.0	100.0
		Dibenz[a,h]anthracene	7	93.5	22.7	24.3	60.3	94.4	127.4	100.0
		Benzo[g,h,i]perylene	6	87.6	21.5	24.5	60.8	84.4	114.4	100.0
		Perylene/Benzo[b]fluoranthene	7	94.5	15.6	16.5	75.3	94.1	115.4	100.0
Dust	LFB	Arsenic	3	62.7	3.3	5.3	59.2	63.3	65.7	100.0
Metals		Cadmium	3	65.4	4.5	6.9	60.5	66.4	69.4	100.0
		Chromium	3	112.0	20.6	18.4	88.9	118.7	128.4	100.0
		Copper	3	94.8	4.8	5.1	89.4	96.2	98.8	100.0
		Lead	3	121.8	15.7	12.9	111.2	114.4	139.9	100.0
		Manganese	3	103.7	15.3	14.8	89.8	101.1	120.2	100.0
		Nickel	3	94.0	15.6	16.6	79.2	92.5	110.4	100.0
		Selenium	3	60.6	2.2	3.6	59.1	59.7	63.1	100.0
		Vanadium	3	101.4	16.9	16.6	82.3	107.5	114.3	100.0
		Zinc	3	121.9	30.1	24.7	87.7	133.7	144.3	100.0
		Aluminum	4	529.3	149.0	28.1	390.5	493.5	739.7	100.0
		Cobalt	3	99.5	17.7	17.8	81.2	100.6	116.6	100.0
		Cesium	3	102.4	4.9	4.8	97.1	103.1	106.8	100.0
		Iron	4	144.2	18.6	12.9	131.5	136.8	171.8	100.0
		Magnesium	4	289.2	97.9	33.8	158.2	302.5	393.6	100.0
		Palladium	3	7.5	7.7	101.5	0.0	7.3	15.3	100.0
		Strontium	3	104.7	5.4	5.1	98.6	106.5	108.9	100.0
		Titanium	4	235.8	31.6	13.4	207.5	227.3	281.1	100.0
Dust	SRM	Arsenic	4	87.8	15.5	17.6	67.2	91.1	101.8	100.0
Metals		Cadmium	4	85.3	12.8	15.0	67.3	89.8	94.5	100.0
		Chromium	4	19.5	2.2	11.3	17.4	19.0	22.4	100.0
		Copper	4	87.1	8.4	9.6	75.7	89.3	94.0	100.0
		Lead	4	95.6	10.9	11.4	81.3	98.0	105.2	100.0
		Manganese	4	85.3	8.5	10.0	73.4	87.9	92.1	100.0
		Nickel	3	96.3	18.3	19.0	78.4	95.5	115.0	100.0
		Selenium	4	86.4	32.0	37.1	45.7	90.4	118.8	100.0
		Vanadium	4	77.0	6.5	8.4	71.8	75.2	85.7	100.0
		Zinc	4	78.4	6.4	8.1	73.1	76.3	87.6	100.0
		Aluminum	4	87.0	28.3	32.5	45.3	97.3	108.2	100.0
		Cobalt	2	101.1	6.7	6.7	96.4	101.1	105.9	100.0

SUMMARY OF RECOVERIES FOR CONTROL SAMPLES

Medium	Type Control	Analyte	No. Samples	Mean Recov	Std. Dev. Recov	Recov CV(%)	Min Recov	Median Recov	Max Recov	Percent Meas
		Cesium	3	85.9	9.7	11.3	74.9	89.8	93.1	100.0
		Iron	4	80.3	9.3	11.6	67.0	83.4	87.6	100.0
		Magnesium	4	96.1	14.2	14.7	76.6	100.5	106.7	100.0
		Titanium	4	59.3	17.7	29.8	33.1	65.9	72.2	100.0

Medium	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
Indoor Air	Alternaria	logcnt/m3	18	0.52	0.13	0.92	79.9	141.4	141.4
Pollen/Spores	Amerospores	logcnt/m3	18	0.58	0.15	1.59	37.4	10.9	141.4
	Arthrinium	logcnt/m3	18	0.16	0.00	0.60	85.7	85.7	141.4
	Ascospores	logcnt/m3	18	0.52	0.31	0.92	61.2	32.5	141.4
	Aspergillus/Penicillium-like	logcnt/m3	18	0.66	0.00	1.67	78.4	88.5	141.4
	Aureobasidium	logcnt/m3	18	0.00	0.00	0.00	.	.	.
	Basidiospores	logcnt/m3	18	0.39	0.19	0.92	56.3	12.4	141.4
	Bipolaris/Dreschlera	logcnt/m3	18	0.41	0.08	0.79	92.6	141.4	141.4
	Botrytis	logcnt/m3	18	0.14	0.00	0.60	141.4	141.4	141.4
	Chaetomium	logcnt/m3	18	0.32	0.00	0.92	110.9	141.4	141.4
	Cladosporium	logcnt/m3	18	0.28	0.20	0.62	15.8	11.5	48.4
	Curvularia	logcnt/m3	18	0.45	0.00	1.07	126.2	141.4	141.4
	Epicoccum	logcnt/m3	18	0.00	0.00	0.00	.	.	.
	Fusarium	logcnt/m3	18	0.00	0.00	0.00	.	.	.
	Memnoniella	logcnt/m3	18	0.00	0.00	0.00	.	.	.
	Mycelial Fragments	logcnt/m3	18	0.20	0.17	0.37	12.5	12.1	30.0
	Nigrospora	logcnt/m3	18	0.25	0.00	0.60	110.5	141.4	141.4
	Oidium/Peronospora	logcnt/m3	18	0.14	0.00	0.60	141.4	141.4	141.4
	Pithomyces/Ulocladium	logcnt/m3	18	0.35	0.00	0.79	107.2	141.4	141.4
	Pollen Count	logcnt/m3	18	0.13	0.00	0.41	5.6	0.0	36.4
	Rusts	logcnt/m3	18	0.43	0.00	1.01	107.8	141.4	141.4
	Smuts/Myxomycetes	logcnt/m3	18	0.56	0.32	1.18	88.2	141.4	141.4
	Stachybotrys	logcnt/m3	18	0.00	0.00	0.00	.	.	.
	Stemphylium	logcnt/m3	18	0.00	0.00	0.00	.	.	.
	Torula	logcnt/m3	18	0.14	0.00	0.60	141.4	141.4	141.4
	Total Fungal Spores	logcnt/m3	18	0.29	0.15	0.66	10.1	6.6	50.3
	Unidentified Conidia	logcnt/m3	18	0.19	0.00	0.79	80.4	80.4	141.4
Outdoor Air	Alternaria	logcnt/m3	1	0.12	0.12	0.12	8.0	8.0	8.0
Pollen/Spores	Amerospores	logcnt/m3	1	0.06	0.06	0.06	2.7	2.7	2.7
	Arthrinium	logcnt/m3	1	0.79	0.79	0.79	141.4	141.4	141.4
	Ascospores	logcnt/m3	1	0.16	0.16	0.16	8.3	8.3	8.3
	Aspergillus/Penicillium-like	logcnt/m3	1	0.74	0.74	0.74	45.4	45.4	45.4
	Aureobasidium	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Basidiospores	logcnt/m3	1	0.15	0.15	0.15	8.3	8.3	8.3
	Bipolaris/Dreschlera	logcnt/m3	1	0.92	0.92	0.92	141.4	141.4	141.4
	Botrytis	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Chaetomium	logcnt/m3	1	0.60	0.60	0.60	141.4	141.4	141.4
	Cladosporium	logcnt/m3	1	0.07	0.07	0.07	2.4	2.4	2.4

Medium	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
	Curvularia	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Epicoccum	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Fusarium	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Memnoniella	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Mycelial Fragments	logcnt/m3	1	0.04	0.04	0.04	2.2	2.2	2.2
	Nigrospora	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Oidium/Peronospora	logcnt/m3	1	0.60	0.60	0.60	141.4	141.4	141.4
	Pithomyces/Ulocladium	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Pollen Count	logcnt/m3	1	0.00	0.00	0.00	0.0	0.0	0.0
	Rusts	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Smuts/Myxomycetes	logcnt/m3	1	0.05	0.05	0.05	2.8	2.8	2.8
	Stachybotrys	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Stemphylium	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Torula	logcnt/m3	1	0.00	0.00	0.00	.	.	.
	Total Fungal Spores	logcnt/m3	1	0.01	0.01	0.01	0.2	0.2	0.2
	Unidentified Conidia	logcnt/m3	1	0.13	0.13	0.13	11.0	11.0	11.0
Indoor Air	Formaldehyde	ppb	34	3.38	0.60	17.44	14.2	8.3	141.4
Aldehydes	Acetaldehyde	ppb	34	1.86	0.44	7.02	12.6	7.8	85.0
	Propionaldehyde	ppb	34	0.79	0.00	4.55	54.2	17.1	141.4
	Crotonaldehyde	ppb	34	0.16	0.00	0.70	31.2	6.4	141.4
	n-Butyraldehyde	ppb	34	0.09	0.00	0.30	81.1	141.4	141.4
	Benzaldehyde	ppb	34	0.10	0.00	0.27	40.7	21.2	141.4
	iso-Valeraldehyde	ppb	34	0.10	0.00	0.35	119.3	141.4	141.4
	Valeraldehyde	ppb	34	0.10	0.00	0.30	75.6	79.3	141.4
	Hexanaldehyde	ppb	34	0.29	0.08	0.98	46.9	15.5	141.4
	2,5-Dimethylbenzaldehyde	ppb	34	0.00	0.00	0.00	.	.	.
	o,p-Tolualdehyde	ppb	34	1.74	0.00	8.22	73.4	75.6	141.4
	m-Tolualdehyde	ppb	34	1.25	0.00	7.05	73.9	75.8	141.4
Outdoor Air	Formaldehyde	ppb	9	0.54	0.17	1.26	15.9	5.7	98.3
Aldehydes	Acetaldehyde	ppb	9	0.96	0.35	2.36	13.3	11.9	32.4
	Propionaldehyde	ppb	9	0.12	0.00	0.28	81.7	82.5	141.4
	Crotonaldehyde	ppb	9	0.23	0.01	0.56	61.5	14.1	141.4
	n-Butyraldehyde	ppb	9	0.08	0.00	0.25	141.4	141.4	141.4
	Benzaldehyde	ppb	9	0.13	0.00	0.25	68.2	33.6	141.4
	iso-Valeraldehyde	ppb	9	0.14	0.00	0.41	141.4	141.4	141.4
	Valeraldehyde	ppb	9	0.00	0.00	0.00	.	.	.
	Hexanaldehyde	ppb	9	0.21	0.00	0.47	141.4	141.4	141.4
	2,5-Dimethylbenzaldehyde	ppb	9	0.00	0.00	0.00	.	.	.

Medium	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
	o,p-Tolualdehyde	ppb	9	0.08	0.00	0.23	141.4	141.4	141.4
	m-Tolualdehyde	ppb	9	0.00	0.00	0.00	.	.	.
Indoor Air	1,1,1-Trichloroethane	ug/m3	7	0.27	0.17	0.49	27.2	22.7	54.4
VOCs	Benzene	ug/m3	6	1.08	0.40	2.44	62.3	43.8	141.4
	Carbon tetrachloride	ug/m3	8	0.46	0.21	1.01	29.1	21.4	64.8
	Chloroform	ug/m3	7	0.12	0.08	0.21	30.2	32.3	62.4
	Ethylbenzene	ug/m3	7	1.41	0.78	3.21	42.1	14.1	123.2
	Tetrachloroethylene	ug/m3	9	0.91	0.06	2.11	38.3	7.0	130.1
	Toluene	ug/m3	6	4.17	1.56	7.97	48.0	27.6	141.4
	m,p-Xylene	ug/m3	7	2.35	1.22	3.98	39.5	14.5	132.6
	o-Xylene	ug/m3	7	0.85	0.79	1.53	42.6	17.0	127.8
Indoor Air	Cladosporium spp.	logCFU/m3	1	0.36	0.36	0.36	23.4	23.4	23.4
Biologicals	Penicillium spp.	logCFU/m3	1	0.00	0.00	0.00	.	.	.
	Aspergillus spp.	logCFU/m3	1	0.00	0.00	0.00	.	.	.
	Other	logCFU/m3	1	0.26	0.26	0.26	141.4	141.4	141.4
	Unknown	logCFU/m3	1	0.46	0.46	0.46	141.4	141.4	141.4
Outdoor Air	Cladosporium spp.	logCFU/m3	1	0.20	0.20	0.20	4.7	4.7	4.7
Biologicals	Penicillium spp.	logCFU/m3	1	0.00	0.00	0.00	.	.	.
	Aspergillus spp.	logCFU/m3	1	0.00	0.00	0.00	.	.	.
	Other	logCFU/m3	1	0.00	0.00	0.00	.	.	.
	Unknown	logCFU/m3	1	0.00	0.00	0.00	.	.	.

SUMMARY OF DUPLICATE SAMPLES - INCLUDING ONLY CASES WHERE BOTH SAMPLES ARE DETECTED

Medium	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
Indoor Air	Alternaria	logcnt/m3	6	0.16	0.03	0.35	8.2	2.1	25.4
Pollen/Spores	Amerospores	logcnt/m3	14	0.21	0.09	0.55	7.7	4.5	25.4
	Arthrinium	logcnt/m3	1	0.32	0.32	0.32	30.0	30.0	30.0
	Ascospores	logcnt/m3	11	0.30	0.13	0.66	17.5	11.0	50.3
	Aspergillus/Penicillium-like	logcnt/m3	4	0.38	0.31	0.53	15.5	10.4	35.6
	Basidiospores	logcnt/m3	9	0.17	0.18	0.25	8.9	9.2	19.4
	Bipolaris/Dreschlera	logcnt/m3	4	0.13	0.08	0.19	7.1	4.6	19.4
	Chaetomium	logcnt/m3	1	0.19	0.19	0.19	19.4	19.4	19.4
	Cladosporium	logcnt/m3	17	0.28	0.21	0.62	15.8	11.5	48.4
	Curvularia	logcnt/m3	1	0.19	0.19	0.19	19.4	19.4	19.4
	Mycelial Fragments	logcnt/m3	18	0.20	0.17	0.37	12.5	12.1	30.0
	Nigrospora	logcnt/m3	1	0.22	0.22	0.22	17.6	17.6	17.6
	Pithomyces/Ulocladium	logcnt/m3	2	0.29	0.28	0.35	21.5	21.5	25.4
	Pollen Count	logcnt/m3	18	0.13	0.00	0.41	5.6	0.0	36.4
	Rusts	logcnt/m3	2	0.10	0.10	0.11	6.8	6.8	6.8
	Smuts/Myxomycetes	logcnt/m3	6	0.25	0.24	0.32	17.3	18.4	30.0
	Total Fungal Spores	logcnt/m3	18	0.29	0.15	0.66	10.1	6.6	50.3
	Unidentified Conidia	logcnt/m3	1	0.19	0.19	0.19	19.4	19.4	19.4
Outdoor Air	Alternaria	logcnt/m3	1	0.12	0.12	0.12	8.0	8.0	8.0
Pollen/Spores	Amerospores	logcnt/m3	1	0.06	0.06	0.06	2.7	2.7	2.7
	Ascospores	logcnt/m3	1	0.16	0.16	0.16	8.3	8.3	8.3
	Aspergillus/Penicillium-like	logcnt/m3	1	0.74	0.74	0.74	45.4	45.4	45.4
	Basidiospores	logcnt/m3	1	0.15	0.15	0.15	8.3	8.3	8.3
	Cladosporium	logcnt/m3	1	0.07	0.07	0.07	2.4	2.4	2.4
	Mycelial Fragments	logcnt/m3	1	0.04	0.04	0.04	2.2	2.2	2.2
	Pollen Count	logcnt/m3	1	0.00	0.00	0.00	0.0	0.0	0.0
	Smuts/Myxomycetes	logcnt/m3	1	0.05	0.05	0.05	2.8	2.8	2.8
	Total Fungal Spores	logcnt/m3	1	0.01	0.01	0.01	0.2	0.2	0.2
	Unidentified Conidia	logcnt/m3	1	0.13	0.13	0.13	11.0	11.0	11.0
Indoor Air	Formaldehyde	ppb	33	1.59	0.60	5.19	10.4	8.2	94.3
Aldehydes	Acetaldehyde	ppb	33	1.88	0.46	7.02	13.0	8.3	85.0
	Propionaldehyde	ppb	10	0.08	0.04	0.19	10.6	8.0	30.8
	Crotonaldehyde	ppb	3	0.02	0.01	0.02	2.1	2.2	2.5
	n-Butyraldehyde	ppb	4	0.04	0.01	0.07	5.8	4.0	14.7
	Benzaldehyde	ppb	12	0.10	0.03	0.21	12.7	7.1	29.9
	Valeraldehyde	ppb	6	0.04	0.03	0.07	9.9	11.8	17.2
	Hexanaldehyde	ppb	22	0.13	0.08	0.29	12.6	7.7	53.4
	o,p-Tolualdehyde	ppb	4	0.16	0.04	0.31	5.3	5.4	9.8

SUMMARY OF DUPLICATE SAMPLES - INCLUDING ONLY CASES WHERE BOTH SAMPLES ARE DETECTED

Medium	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
	m-Tolualdehyde	ppb	2	0.12	0.11	0.16	6.5	6.5	10.2
Outdoor Air	Formaldehyde	ppb	8	0.36	0.16	0.85	5.6	5.0	10.1
Aldehydes	Acetaldehyde	ppb	7	1.06	0.35	2.36	13.0	6.6	32.4
	Propionaldehyde	ppb	2	0.08	0.08	0.11	21.9	21.9	23.6
	Crotonaldehyde	ppb	2	0.13	0.12	0.17	11.2	11.2	14.1
	Benzaldehyde	ppb	3	0.11	0.13	0.14	19.3	24.2	33.6
Indoor Air	1,1,1-Trichloroethane	ug/m3	7	0.27	0.17	0.49	27.2	22.7	54.4
VOCs	Benzene	ug/m3	1	0.21	0.21	0.21	8.5	8.5	8.5
	Carbon tetrachloride	ug/m3	8	0.46	0.21	1.01	29.1	21.4	64.8
	Chloroform	ug/m3	4	0.12	0.10	0.18	26.6	24.3	51.1
	Ethylbenzene	ug/m3	7	1.41	0.78	3.21	42.1	14.1	123.2
	Tetrachloroethylene	ug/m3	9	0.91	0.06	2.11	38.3	7.0	130.1
	Toluene	ug/m3	5	2.86	1.36	5.94	29.3	17.9	77.4
	m,p-Xylene	ug/m3	7	2.35	1.22	3.98	39.5	14.5	132.6
	o-Xylene	ug/m3	7	0.85	0.79	1.53	42.6	17.0	127.8
Indoor Air Biologicals	Cladosporium spp.	logCFU/m3	1	0.36	0.36	0.36	23.4	23.4	23.4
Outdoor Air Biologicals	Cladosporium spp.	logCFU/m3	1	0.20	0.20	0.20	4.7	4.7	4.7

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
Dust Conc	DA	Diazinon	ug/g	6	0.01	0.00	0.03	3.3	3.8	6.4
Pesticides		Malathion	ug/g	8	0.00	0.00	0.00	1.6	1.0	5.6
		Chlorpyrifos	ug/g	4	0.01	0.00	0.03	1.0	1.0	1.7
		4,4'-DDE	ug/g	7	0.00	0.00	0.01	26.6	9.1	135.8
		Dieldrin	ug/g	8	0.03	0.00	0.08	19.9	-0.7	143.2
		cis-Permethrin	ug/g	8	0.02	0.02	0.04	10.3	6.6	26.6
		trans-Permethrin	ug/g	7	0.03	0.03	0.05	5.6	4.3	13.4
		Lindane	ug/g	7	0.01	0.00	0.02	20.3	1.0	132.5
		Pendimethalin	ug/g	3	0.00	0.00	0.00	1.2	1.1	2.1
		Propoxur	ug/g	3	0.00	0.00	0.01	4.6	4.9	6.9
		o-Phenylphenol	ug/g	8	0.05	0.00	0.14	3.7	4.6	8.8
		Propetamphos	ug/g	5	0.01	0.00	0.01	5.8	2.1	13.4
		Resmethrin	ug/g	7	0.00	0.00	0.00	-1.7	-1.0	-0.3
		Piperonyl Butoxide	ug/g	7	0.02	0.01	0.03	4.1	2.6	10.8
		Bifenthrin	ug/g	7	0.01	0.00	0.02	21.6	3.4	143.4
		Cyhalothrin	ug/g	8	0.02	0.00	0.05	20.8	1.1	139.5
		Cyfluthrin	ug/g	7	0.04	0.00	0.10	-0.5	-1.0	7.5
		Cypermethrin	ug/g	8	0.03	0.00	0.08	-0.0	-1.0	9.3
		Esfenvalerate	ug/g	6	3.18	0.95	7.45	53.5	12.1	141.5
		Delta/Tralo-methrin	ug/g	8	0.00	0.00	0.01	3.2	1.6	10.7
Dust Conc	DI	Diazinon	ug/g	12	0.01	0.00	0.02	1.5	0.0	6.8
Pesticides		Malathion	ug/g	11	0.00	0.00	0.01	0.7	0.0	8.2
		Chlorpyrifos	ug/g	5	0.02	0.02	0.03	4.7	2.2	16.9
		4,4'-DDE	ug/g	12	0.00	0.00	0.00	5.0	4.0	10.9
		Dieldrin	ug/g	12	0.00	0.00	0.01	0.8	0.0	6.7
		cis-Permethrin	ug/g	12	0.03	0.01	0.07	7.1	4.0	35.6
		trans-Permethrin	ug/g	11	0.05	0.03	0.14	7.6	6.5	19.5
		Lindane	ug/g	10	0.00	0.00	0.00	0.0	0.0	0.0
		Pendimethalin	ug/g	10	0.00	0.00	0.00	0.0	0.0	0.0
		Propoxur	ug/g	7	0.00	0.00	0.01	5.6	2.7	18.2
		o-Phenylphenol	ug/g	12	0.00	0.00	0.00	2.6	2.3	5.7
		Propetamphos	ug/g	11	0.00	0.00	0.00	0.1	0.0	0.4
		Resmethrin	ug/g	11	0.00	0.00	0.00	0.0	0.0	0.0
		Piperonyl Butoxide	ug/g	12	0.01	0.01	0.03	4.1	1.5	30.4
		Bifenthrin	ug/g	11	0.01	0.00	0.02	1.0	0.0	5.1
		Cyhalothrin	ug/g	12	0.02	0.00	0.08	5.3	0.0	29.7
		Cyfluthrin	ug/g	12	0.00	0.00	0.00	0.0	0.0	0.1
		Cypermethrin	ug/g	12	0.00	0.00	0.01	0.3	0.0	3.3

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Esfenvalerate	ug/g	10	0.26	0.07	0.60	2.3	1.3	7.6
		Delta/Tralo-methrin	ug/g	12	0.04	0.00	0.14	3.2	0.0	12.8
Dust Loading	DA	Diazinon	ng/cm2	5	0.01	0.00	0.03	2.6	3.5	4.6
Pesticides		Malathion	ng/cm2	7	0.00	0.00	0.00	1.0	1.0	2.1
		Chlorpyrifos	ng/cm2	4	0.00	0.00	0.01	1.0	1.0	1.7
		4,4'-DDE	ng/cm2	6	0.00	0.00	0.01	29.6	9.1	135.8
		Dieldrin	ng/cm2	7	0.03	0.00	0.07	19.6	-0.9	143.2
		cis-Permethrin	ng/cm2	7	0.01	0.00	0.01	10.6	5.2	26.6
		trans-Permethrin	ng/cm2	6	0.02	0.00	0.04	5.8	4.9	13.4
		Lindane	ng/cm2	6	0.01	0.00	0.02	22.7	1.0	132.5
		Pendimethalin	ng/cm2	3	0.00	0.00	0.00	1.2	1.1	2.1
		Propoxur	ng/cm2	3	0.00	0.00	0.00	4.6	4.9	6.9
		o-Phenylphenol	ng/cm2	7	0.00	0.00	0.01	3.6	4.4	8.8
		Propetamphos	ng/cm2	4	0.00	0.00	0.01	4.1	1.3	13.4
		Resmethrin	ng/cm2	6	0.00	0.00	0.00	-1.1	-1.0	-0.3
		Piperonyl Butoxide	ng/cm2	7	0.01	0.00	0.02	4.1	2.6	10.8
		Bifenthrin	ng/cm2	6	0.00	0.00	0.01	26.1	4.1	143.4
		Cyhalothrin	ng/cm2	7	0.00	0.00	0.00	20.9	1.0	139.5
		Cyfluthrin	ng/cm2	6	0.01	0.00	0.02	0.3	-1.0	7.5
		Cypermethrin	ng/cm2	7	0.01	0.00	0.01	0.8	-1.0	9.3
		Esfenvalerate	ng/cm2	5	2.86	0.21	6.37	63.2	14.9	141.5
		Delta/Tralo-methrin	ng/cm2	7	0.00	0.00	0.00	2.1	1.0	5.9
Dust Loading	DI	Diazinon	ng/cm2	10	0.00	0.00	0.01	1.1	0.0	3.3
Pesticides		Malathion	ng/cm2	9	0.00	0.00	0.00	0.9	0.0	8.2
		Chlorpyrifos	ng/cm2	5	0.00	0.00	0.00	4.7	2.2	16.9
		4,4'-DDE	ng/cm2	10	0.00	0.00	0.00	3.8	3.8	10.5
		Dieldrin	ng/cm2	10	0.00	0.00	0.00	1.0	0.0	6.7
		cis-Permethrin	ng/cm2	10	0.00	0.00	0.01	7.5	4.0	35.6
		trans-Permethrin	ng/cm2	9	0.04	0.00	0.11	8.3	6.6	19.5
		Lindane	ng/cm2	9	0.00	0.00	0.00	0.0	0.0	0.0
		Pendimethalin	ng/cm2	9	0.00	0.00	0.00	0.0	0.0	0.0
		Propoxur	ng/cm2	5	0.00	0.00	0.00	3.2	1.6	11.5
		o-Phenylphenol	ng/cm2	10	0.00	0.00	0.00	2.4	2.3	5.3
		Propetamphos	ng/cm2	9	0.00	0.00	0.00	0.0	0.0	0.2
		Resmethrin	ng/cm2	10	0.00	0.00	0.00	0.0	0.0	0.0
		Piperonyl Butoxide	ng/cm2	10	0.00	0.00	0.01	1.5	1.5	4.1
		Bifenthrin	ng/cm2	10	0.00	0.00	0.01	1.1	0.0	5.1
		Cyhalothrin	ng/cm2	10	0.01	0.00	0.02	4.4	0.0	29.7

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Cyfluthrin	ng/cm2	10	0.00	0.00	0.00	0.0	0.0	0.0
		Cypermethrin	ng/cm2	10	0.00	0.00	0.00	0.0	0.0	0.0
		Esfenvalerate	ng/cm2	9	0.05	0.01	0.12	2.5	1.6	7.6
		Delta/Tralo-methrin	ng/cm2	10	0.01	0.00	0.02	3.1	0.0	12.8
Dust Conc	DA	Benzo[a]pyrene	ug/g	7	0.07	0.01	0.11	65.0	5.4	150.6
PAHs		Benzo[a]anthracene	ug/g	7	0.00	0.00	0.01	-2.7	2.8	5.3
		Acenaphthylene	ug/g	5	0.01	0.00	0.01	-22.0	6.6	144.0
		Anthracene	ug/g	7	0.00	0.00	0.00	47.4	27.1	121.3
		Chrysene	ug/g	8	0.06	0.02	0.12	31.8	6.3	141.2
		Benzo[k]fluoranthene	ug/g	8	0.03	0.01	0.05	43.1	11.0	144.6
		Fluoranthene	ug/g	8	0.02	0.01	0.04	4.6	2.7	17.9
		Phenanthrene	ug/g	8	0.02	0.01	0.03	7.2	4.6	27.4
		Pyrene	ug/g	8	0.02	0.01	0.03	4.8	2.5	16.0
		Indeno[1,2,3-cd]pyrene	ug/g	8	0.03	0.01	0.06	23.0	8.0	125.5
		Naphthalene	ug/g	8	0.00	0.00	0.01	16.2	17.5	45.6
		Fluorene	ug/g	8	0.00	0.00	0.00	3.0	2.3	6.8
		Acenaphthene	ug/g	8	0.00	0.00	0.01	81.6	7.5	297.4
		Dibenz[a,h]anthracene	ug/g	7	0.01	0.00	0.01	14.0	10.9	39.6
		Benzo[g,h,i]perylene	ug/g	8	0.05	0.01	0.13	25.8	8.1	144.6
		Perylene/Benzo[b]fluoranthene	ug/g	8	0.08	0.01	0.22	8.6	5.2	32.9
Dust Conc	DI	Benzo[a]pyrene	ug/g	11	0.05	0.00	0.15	17.0	0.2	146.6
PAHs		Benzo[a]anthracene	ug/g	11	0.02	0.00	0.06	19.0	5.5	144.9
		Acenaphthylene	ug/g	5	0.00	0.00	0.01	32.4	3.8	148.9
		Anthracene	ug/g	8	0.00	0.00	0.00	4.8	3.8	10.6
		Chrysene	ug/g	12	0.02	0.01	0.05	8.7	6.8	36.5
		Benzo[k]fluoranthene	ug/g	12	0.01	0.01	0.02	18.8	9.0	148.8
		Fluoranthene	ug/g	12	0.01	0.00	0.02	2.5	2.0	7.0
		Phenanthrene	ug/g	12	0.00	0.00	0.01	3.9	2.3	11.6
		Pyrene	ug/g	12	0.01	0.00	0.01	2.4	2.4	5.6
		Indeno[1,2,3-cd]pyrene	ug/g	12	0.01	0.01	0.02	25.0	10.9	115.0
		Naphthalene	ug/g	11	0.00	0.00	0.00	5.6	5.0	14.6
		Fluorene	ug/g	11	0.00	0.00	0.00	2.9	2.2	10.1
		Acenaphthene	ug/g	7	0.00	0.00	0.01	15.8	0.0	217.1
		Dibenz[a,h]anthracene	ug/g	11	0.02	0.00	0.03	58.5	39.1	130.0
		Benzo[g,h,i]perylene	ug/g	12	0.01	0.01	0.02	7.6	6.0	25.5
		Perylene/Benzo[b]fluoranthene	ug/g	10	0.14	0.02	0.34	32.1	13.2	154.7
Dust Loading	DA	Benzo[a]pyrene	ng/cm2	6	0.06	0.01	0.10	75.6	77.0	150.6
PAHs		Benzo[a]anthracene	ng/cm2	6	0.00	0.00	0.00	-3.3	3.2	5.3

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Acenaphthylene	ng/cm2	5	0.00	0.00	0.00	-22.0	6.6	144.0
		Anthracene	ng/cm2	6	0.00	0.00	0.00	54.1	39.9	121.3
		Chrysene	ng/cm2	7	0.06	0.00	0.10	35.7	7.8	141.2
		Benzo[k]fluoranthene	ng/cm2	7	0.03	0.00	0.05	47.8	11.3	144.6
		Fluoranthene	ng/cm2	7	0.00	0.00	0.00	4.7	2.5	17.9
		Phenanthrene	ng/cm2	7	0.01	0.00	0.01	7.6	5.3	27.4
		Pyrene	ng/cm2	7	0.01	0.00	0.02	5.0	1.9	16.0
		Indeno[1,2,3-cd]pyrene	ng/cm2	7	0.01	0.00	0.03	24.1	8.0	125.5
		Naphthalene	ng/cm2	7	0.00	0.00	0.00	15.9	17.3	45.6
		Fluorene	ng/cm2	7	0.00	0.00	0.00	3.2	2.8	6.8
		Acenaphthene	ng/cm2	7	0.00	0.00	0.00	92.3	8.9	297.4
		Dibenz[a,h]anthracene	ng/cm2	6	0.00	0.00	0.00	14.3	6.0	39.6
		Benzo[g,h,i]perylene	ng/cm2	7	0.01	0.00	0.02	28.3	7.9	144.6
		Perylene/Benzo[b]fluoranthene	ng/cm2	7	0.08	0.00	0.20	9.1	5.2	32.9
Dust Loading	DI	Benzo[a]pyrene	ng/cm2	3	0.01	0.00	0.02	50.5	4.7	146.6
PAHs		Benzo[a]anthracene	ng/cm2	4	0.00	0.00	0.00	6.3	6.0	9.4
		Acenaphthylene	ng/cm2	2	0.00	0.00	0.00	74.4	74.4	148.9
		Anthracene	ng/cm2	2	0.00	0.00	0.00	1.4	1.4	2.7
		Chrysene	ng/cm2	4	0.00	0.00	0.00	5.6	4.9	12.7
		Benzo[k]fluoranthene	ng/cm2	4	0.00	0.00	0.00	1.9	1.0	5.7
		Fluoranthene	ng/cm2	4	0.00	0.00	0.00	2.1	2.2	3.6
		Phenanthrene	ng/cm2	4	0.00	0.00	0.00	6.3	5.7	11.6
		Pyrene	ng/cm2	4	0.00	0.00	0.00	2.7	2.0	5.6
		Indeno[1,2,3-cd]pyrene	ng/cm2	4	0.00	0.00	0.00	31.3	11.3	99.3
		Naphthalene	ng/cm2	4	0.00	0.00	0.00	7.5	7.3	14.6
		Fluorene	ng/cm2	3	0.00	0.00	0.00	2.4	3.3	3.7
		Acenaphthene	ng/cm2	2	0.00	0.00	0.00	-53.2	-53.2	0.0
		Dibenz[a,h]anthracene	ng/cm2	4	0.00	0.00	0.00	24.1	0.4	95.5
		Benzo[g,h,i]perylene	ng/cm2	4	0.00	0.00	0.00	13.3	11.8	25.5
		Perylene/Benzo[b]fluoranthene	ng/cm2	4	0.00	0.00	0.00	11.0	10.2	21.6
Dust Conc	DA	Arsenic	ug/g	8	1.12	1.16	1.64	8.8	8.3	18.2
Metals		Cadmium	ug/g	8	0.40	0.19	0.98	8.5	6.4	33.5
		Chromium	ug/g	8	3.48	2.59	6.15	8.5	7.5	17.3
		Copper	ug/g	8	11.76	5.84	23.86	13.7	11.9	29.4
		Lead	ug/g	8	6.06	4.93	10.36	7.7	5.9	13.2
		Manganese	ug/g	8	32.81	28.59	59.91	8.7	7.9	18.1
		Nickel	ug/g	8	5.48	2.05	13.90	9.1	6.0	29.7
		Selenium	ug/g	8	1.51	0.18	3.69	26.3	12.5	77.0

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Vanadium	ug/g	8	5.70	5.31	8.26	10.2	11.5	15.9
		Zinc	ug/g	8	97.79	73.84	197.39	6.5	5.9	13.4
		Aluminum	ug/g	8	7975.23	2319.14	20781.4	16.3	5.6	89.8
		Cobalt	ug/g	8	1.62	0.71	3.99	69.7	59.3	141.4
		Cesium	ug/g	8	0.11	0.10	0.18	6.0	5.7	11.1
		Iron	ug/g	8	5138.70	1111.74	13629.2	15.9	5.3	92.6
		Magnesium	ug/g	8	2575.24	420.99	7034.66	16.4	6.5	92.6
		Palladium	ug/g	8	0.93	0.00	2.16	9.1	10.8	15.4
		Strontium	ug/g	8	8.69	7.62	13.16	5.6	4.6	13.4
		Titanium	ug/g	8	602.03	133.87	1276.61	17.6	6.6	85.8
Dust Conc	DI	Arsenic	ug/g	12	0.26	0.14	0.58	2.3	2.0	6.1
Metals		Cadmium	ug/g	12	0.37	0.09	1.16	3.6	2.5	13.1
		Chromium	ug/g	12	1.35	0.62	2.85	2.3	1.8	7.8
		Copper	ug/g	12	3.28	1.31	7.20	4.1	3.6	9.8
		Lead	ug/g	12	2.95	1.75	8.16	3.2	3.4	7.5
		Manganese	ug/g	12	12.27	9.23	22.02	3.6	3.4	6.7
		Nickel	ug/g	12	2.04	0.82	5.04	4.0	3.5	12.5
		Selenium	ug/g	12	0.28	0.15	0.59	13.6	5.4	63.4
		Vanadium	ug/g	12	1.47	1.18	2.88	2.9	2.7	5.4
		Zinc	ug/g	12	24.93	20.53	48.18	2.0	2.0	5.6
		Aluminum	ug/g	7	3139.66	1550.67	6859.60	5.3	3.3	15.5
		Cobalt	ug/g	12	0.56	0.41	1.21	23.4	9.7	75.8
		Cesium	ug/g	12	0.07	0.05	0.12	3.0	3.3	5.7
		Iron	ug/g	7	902.23	557.55	1711.59	3.4	2.6	10.3
		Magnesium	ug/g	7	724.87	189.18	1632.29	5.9	2.3	24.8
		Palladium	ug/g	12	0.72	0.00	1.58	7.6	7.7	10.6
		Strontium	ug/g	12	8.13	3.29	25.69	3.0	2.5	10.9
		Titanium	ug/g	7	146.89	115.29	284.16	6.3	5.5	17.3
Dust Loading	DA	Arsenic	ng/cm2	7	0.46	0.21	1.07	8.4	7.9	18.2
Metals		Cadmium	ng/cm2	7	0.07	0.03	0.14	4.9	5.8	8.5
		Chromium	ng/cm2	7	2.18	0.39	5.26	8.4	7.2	17.3
		Copper	ng/cm2	7	5.86	0.98	14.25	11.5	9.7	26.7
		Lead	ng/cm2	7	3.55	0.91	7.77	8.0	6.7	13.2
		Manganese	ng/cm2	7	23.35	4.78	51.25	8.3	7.3	18.1
		Nickel	ng/cm2	7	4.57	0.37	11.89	10.0	6.1	29.7
		Selenium	ng/cm2	7	0.32	0.00	0.74	9.4	6.5	18.5
		Vanadium	ng/cm2	7	3.69	0.89	7.33	9.8	10.7	15.9
		Zinc	ng/cm2	7	70.18	21.67	168.86	6.6	5.7	13.4

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Aluminum	ng/cm2	7	6756.51	847.03	17777.3	18.2	5.8	89.8
		Cobalt	ng/cm2	7	1.32	0.08	3.42	71.4	68.0	141.4
		Cesium	ng/cm2	7	0.07	0.03	0.14	6.5	5.7	11.1
		Iron	ng/cm2	7	4410.50	131.25	11659.0	16.7	4.2	92.6
		Magnesium	ng/cm2	7	2276.79	79.58	6017.77	17.4	6.3	92.6
		Palladium	ng/cm2	7	0.19	0.00	0.37	9.1	10.8	15.4
		Strontium	ng/cm2	7	5.17	1.25	11.26	6.3	5.6	13.4
		Titanium	ng/cm2	7	413.53	27.20	1092.07	16.2	3.7	85.8
Dust Loading	DI	Arsenic	ng/cm2	8	0.06	0.02	0.15	2.3	1.8	6.1
Metals		Cadmium	ng/cm2	8	0.04	0.01	0.12	2.5	2.5	5.3
		Chromium	ng/cm2	8	0.25	0.18	0.55	2.9	2.5	7.8
		Copper	ng/cm2	8	2.20	0.35	6.16	4.8	4.2	9.8
		Lead	ng/cm2	8	0.72	0.42	1.58	3.8	3.6	7.5
		Manganese	ng/cm2	8	6.06	0.62	16.23	3.1	2.2	6.7
		Nickel	ng/cm2	8	0.52	0.11	1.31	3.9	3.5	10.1
		Selenium	ng/cm2	8	0.05	0.02	0.13	6.0	5.4	11.8
		Vanadium	ng/cm2	8	0.51	0.18	1.28	3.4	3.0	5.4
		Zinc	ng/cm2	8	4.40	2.79	8.99	1.7	1.8	3.6
		Aluminum	ng/cm2	6	217.22	151.96	375.57	3.6	3.1	7.3
		Cobalt	ng/cm2	8	0.19	0.06	0.53	23.6	8.8	75.8
		Cesium	ng/cm2	8	0.02	0.00	0.03	2.7	2.6	5.7
		Iron	ng/cm2	6	120.10	38.13	255.31	2.3	2.3	5.1
		Magnesium	ng/cm2	6	43.22	12.57	92.95	2.8	1.9	9.6
		Palladium	ng/cm2	8	0.11	0.00	0.24	8.0	8.9	10.6
		Strontium	ng/cm2	8	2.22	0.62	4.69	3.8	3.1	10.9
		Titanium	ng/cm2	6	16.36	9.66	32.62	4.5	4.7	7.0

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
Dust Conc	DA	Diazinon	ug/g	5	0.01	0.00	0.03	3.8	4.1	6.4
Pesticides		Chlorpyrifos	ug/g	4	0.01	0.00	0.03	1.0	1.0	1.7
		4,4'-DDE	ug/g	5	0.00	0.00	0.00	10.1	9.1	16.6
		Dieldrin	ug/g	1	0.02	0.02	0.02	22.0	22.0	22.0
		cis-Permethrin	ug/g	8	0.02	0.02	0.04	10.3	6.6	26.6
		trans-Permethrin	ug/g	7	0.03	0.03	0.05	5.6	4.3	13.4
		Propoxur	ug/g	3	0.00	0.00	0.01	4.6	4.9	6.9
		o-Phenylphenol	ug/g	8	0.05	0.00	0.14	3.7	4.6	8.8
		Propetamphos	ug/g	2	0.01	0.01	0.01	13.1	13.1	13.4
		Piperonyl Butoxide	ug/g	6	0.02	0.01	0.03	4.6	3.2	10.8
		Bifenthrin	ug/g	3	0.01	0.01	0.01	5.4	4.8	8.1
		Cyhalothrin	ug/g	1	0.01	0.01	0.01	20.3	20.3	20.3
		Cyfluthrin	ug/g	1	0.10	0.10	0.10	7.5	7.5	7.5
		Cypermethrin	ug/g	2	0.05	0.04	0.08	5.5	5.5	9.3
		Esfenvalerate	ug/g	4	0.71	0.49	1.19	9.5	9.2	14.9
		Delta/Tralo-methrin	ug/g	4	0.01	0.01	0.01	5.3	5.1	10.7
Dust Conc	DI	Diazinon	ug/g	5	0.01	0.01	0.02	3.5	3.0	6.8
Pesticides		Malathion	ug/g	1	0.01	0.01	0.01	8.2	8.2	8.2
		Chlorpyrifos	ug/g	5	0.02	0.02	0.03	4.7	2.2	16.9
		4,4'-DDE	ug/g	9	0.00	0.00	0.00	5.4	4.0	10.8
		Dieldrin	ug/g	3	0.00	0.00	0.01	3.4	2.5	6.7
		cis-Permethrin	ug/g	12	0.03	0.01	0.07	7.1	4.0	35.6
		trans-Permethrin	ug/g	11	0.05	0.03	0.14	7.6	6.5	19.5
		Propoxur	ug/g	2	0.01	0.01	0.01	2.1	2.1	2.7
		o-Phenylphenol	ug/g	12	0.00	0.00	0.00	2.6	2.3	5.7
		Propetamphos	ug/g	2	0.00	0.00	0.00	0.3	0.3	0.4
		Piperonyl Butoxide	ug/g	10	0.01	0.01	0.03	4.9	2.1	30.4
		Bifenthrin	ug/g	5	0.01	0.00	0.02	2.2	1.1	5.1
		Cyhalothrin	ug/g	5	0.04	0.01	0.08	12.8	8.1	29.7
		Cyfluthrin	ug/g	1	0.00	0.00	0.00	0.1	0.1	0.1
		Cypermethrin	ug/g	1	0.01	0.01	0.01	3.3	3.3	3.3
		Esfenvalerate	ug/g	8	0.29	0.09	0.60	2.9	1.9	7.6
		Delta/Tralo-methrin	ug/g	5	0.06	0.00	0.14	7.6	6.8	12.8
Dust Loading	DA	Diazinon	ng/cm2	4	0.01	0.00	0.03	3.2	3.8	4.6
Pesticides		Chlorpyrifos	ng/cm2	4	0.00	0.00	0.01	1.0	1.0	1.7
		4,4'-DDE	ng/cm2	4	0.00	0.00	0.00	10.3	9.1	16.6
		cis-Permethrin	ng/cm2	7	0.01	0.00	0.01	10.6	5.2	26.6
		trans-Permethrin	ng/cm2	6	0.02	0.00	0.04	5.8	4.9	13.4

SUMMARY OF DUPLICATE ANALYSES - INCLUDING ONLY CASES WHERE BOTH MEMBERS ARE DETECTED

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Propoxur	ng/cm2	3	0.00	0.00	0.00	4.6	4.9	6.9
		o-Phenylphenol	ng/cm2	7	0.00	0.00	0.01	3.6	4.4	8.8
		Propetamphos	ng/cm2	1	0.01	0.01	0.01	13.4	13.4	13.4
		Piperonyl Butoxide	ng/cm2	6	0.01	0.00	0.02	4.6	3.2	10.8
		Bifenthrin	ng/cm2	3	0.01	0.00	0.01	5.4	4.8	8.1
		Cyfluthrin	ng/cm2	1	0.02	0.02	0.02	7.5	7.5	7.5
		Cypermethrin	ng/cm2	2	0.01	0.01	0.01	5.5	5.5	9.3
		Esfenvalerate	ng/cm2	3	0.13	0.06	0.21	11.1	9.2	14.9
		Delta/Tralo-methrin	ng/cm2	3	0.00	0.00	0.00	3.5	4.3	5.9
Dust Loading	DI	Diazinon	ng/cm2	4	0.00	0.00	0.01	2.7	3.0	3.3
Pesticides		Malathion	ng/cm2	1	0.00	0.00	0.00	8.2	8.2	8.2
		Chlorpyrifos	ng/cm2	5	0.00	0.00	0.00	4.7	2.2	16.9
		4,4'-DDE	ng/cm2	8	0.00	0.00	0.00	4.7	4.0	10.5
		Dieldrin	ng/cm2	3	0.00	0.00	0.00	3.4	2.5	6.7
		cis-Permethrin	ng/cm2	10	0.00	0.00	0.01	7.5	4.0	35.6
		trans-Permethrin	ng/cm2	9	0.04	0.00	0.11	8.3	6.6	19.5
		Propoxur	ng/cm2	2	0.00	0.00	0.00	2.1	2.1	2.7
		o-Phenylphenol	ng/cm2	10	0.00	0.00	0.00	2.4	2.3	5.3
		Propetamphos	ng/cm2	1	0.00	0.00	0.00	0.2	0.2	0.2
		Piperonyl Butoxide	ng/cm2	8	0.00	0.00	0.01	1.9	1.5	4.1
		Bifenthrin	ng/cm2	5	0.01	0.00	0.01	2.2	1.1	5.1
		Cyhalothrin	ng/cm2	3	0.01	0.01	0.02	14.8	8.1	29.7
		Esfenvalerate	ng/cm2	7	0.06	0.01	0.12	3.3	2.1	7.6
		Delta/Tralo-methrin	ng/cm2	3	0.01	0.00	0.02	10.5	11.9	12.8
Dust Conc	DA	Benzo[a]pyrene	ug/g	3	0.01	0.00	0.01	2.7	1.5	5.4
PAHs		Benzo[a]anthracene	ug/g	6	0.00	0.00	0.01	3.0	3.2	5.3
		Acenaphthylene	ug/g	1	0.00	0.00	0.00	6.6	6.6	6.6
		Anthracene	ug/g	4	0.00	0.00	0.00	10.5	7.2	27.1
		Chrysene	ug/g	7	0.05	0.02	0.12	16.2	4.7	78.0
		Benzo[k]fluoranthene	ug/g	6	0.02	0.01	0.04	10.3	10.5	16.5
		Fluoranthene	ug/g	8	0.02	0.01	0.04	4.6	2.7	17.9
		Phenanthrene	ug/g	8	0.02	0.01	0.03	7.2	4.6	27.4
		Pyrene	ug/g	8	0.02	0.01	0.03	4.8	2.5	16.0
		Indeno[1,2,3-cd]pyrene	ug/g	6	0.03	0.01	0.06	9.1	8.0	15.8
		Naphthalene	ug/g	8	0.00	0.00	0.01	16.2	17.5	45.6
		Fluorene	ug/g	8	0.00	0.00	0.00	3.0	2.3	6.8
		Acenaphthene	ug/g	2	0.00	0.00	0.00	7.5	7.5	8.9
		Dibenz[a,h]anthracene	ug/g	3	0.01	0.01	0.01	20.8	12.1	39.6

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Benzo[g,h,i]perylene	ug/g	7	0.02	0.01	0.03	8.9	7.9	16.3
		Perylene/Benzo[b]fluoranthene	ug/g	8	0.08	0.01	0.22	8.6	5.2	32.9
Dust Conc	DI	Benzo[a]pyrene	ug/g	5	0.01	0.00	0.02	8.0	5.5	21.7
PAHs		Benzo[a]anthracene	ug/g	10	0.00	0.00	0.01	6.4	5.5	10.9
		Acenaphthylene	ug/g	2	0.00	0.00	0.00	6.6	6.6	9.4
		Anthracene	ug/g	8	0.00	0.00	0.00	4.8	3.8	10.6
		Chrysene	ug/g	12	0.02	0.01	0.05	8.7	6.8	36.5
		Benzo[k]fluoranthene	ug/g	10	0.01	0.01	0.02	7.7	9.0	13.6
		Fluoranthene	ug/g	12	0.01	0.00	0.02	2.5	2.0	7.0
		Phenanthrene	ug/g	12	0.00	0.00	0.01	3.9	2.3	11.6
		Pyrene	ug/g	12	0.01	0.00	0.01	2.4	2.4	5.6
		Indeno[1,2,3-cd]pyrene	ug/g	10	0.01	0.00	0.02	8.5	10.5	15.7
		Naphthalene	ug/g	11	0.00	0.00	0.00	5.6	5.0	14.6
		Fluorene	ug/g	11	0.00	0.00	0.00	2.9	2.2	10.1
		Dibenz[a,h]anthracene	ug/g	3	0.00	0.00	0.00	16.6	9.9	39.1
		Benzo[g,h,i]perylene	ug/g	11	0.01	0.01	0.02	8.3	6.8	25.5
		Perylene/Benzo[b]fluoranthene	ug/g	9	0.13	0.02	0.34	18.4	8.2	51.6
Dust Loading	DA	Benzo[a]pyrene	ng/cm2	2	0.00	0.00	0.00	3.4	3.4	5.4
PAHs		Benzo[a]anthracene	ng/cm2	5	0.00	0.00	0.00	3.4	3.5	5.3
		Acenaphthylene	ng/cm2	1	0.00	0.00	0.00	6.6	6.6	6.6
		Anthracene	ng/cm2	3	0.00	0.00	0.00	11.6	7.2	27.1
		Chrysene	ng/cm2	6	0.04	0.00	0.10	18.1	5.2	78.0
		Benzo[k]fluoranthene	ng/cm2	5	0.00	0.00	0.00	10.4	10.6	16.5
		Fluoranthene	ng/cm2	7	0.00	0.00	0.00	4.7	2.5	17.9
		Phenanthrene	ng/cm2	7	0.01	0.00	0.01	7.6	5.3	27.4
		Pyrene	ng/cm2	7	0.01	0.00	0.02	5.0	1.9	16.0
		Indeno[1,2,3-cd]pyrene	ng/cm2	5	0.00	0.00	0.01	7.7	8.0	10.3
		Naphthalene	ng/cm2	7	0.00	0.00	0.00	15.9	17.3	45.6
		Fluorene	ng/cm2	7	0.00	0.00	0.00	3.2	2.8	6.8
		Acenaphthene	ng/cm2	1	0.00	0.00	0.00	8.9	8.9	8.9
		Dibenz[a,h]anthracene	ng/cm2	2	0.00	0.00	0.00	25.2	25.2	39.6
		Benzo[g,h,i]perylene	ng/cm2	6	0.01	0.00	0.02	8.9	7.0	16.3
		Perylene/Benzo[b]fluoranthene	ng/cm2	7	0.08	0.00	0.20	9.1	5.2	32.9
Dust Loading	DI	Benzo[a]pyrene	ng/cm2	2	0.00	0.00	0.00	2.5	2.5	4.7
PAHs		Benzo[a]anthracene	ng/cm2	4	0.00	0.00	0.00	6.3	6.0	9.4
		Anthracene	ng/cm2	2	0.00	0.00	0.00	1.4	1.4	2.7
		Chrysene	ng/cm2	4	0.00	0.00	0.00	5.6	4.9	12.7
		Benzo[k]fluoranthene	ng/cm2	3	0.00	0.00	0.00	2.6	1.3	5.7

SUMMARY OF DUPLICATE ANALYSES - INCLUDING ONLY CASES WHERE BOTH MEMBERS ARE DETECTED

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Fluoranthene	ng/cm2	4	0.00	0.00	0.00	2.1	2.2	3.6
		Phenanthrene	ng/cm2	4	0.00	0.00	0.00	6.3	5.7	11.6
		Pyrene	ng/cm2	4	0.00	0.00	0.00	2.7	2.0	5.6
		Indeno[1,2,3-cd]pyrene	ng/cm2	3	0.00	0.00	0.00	8.6	10.7	11.9
		Naphthalene	ng/cm2	4	0.00	0.00	0.00	7.5	7.3	14.6
		Fluorene	ng/cm2	3	0.00	0.00	0.00	2.4	3.3	3.7
		Dibenz[a,h]anthracene	ng/cm2	1	0.00	0.00	0.00	0.8	0.8	0.8
		Benzo[g,h,i]perylene	ng/cm2	4	0.00	0.00	0.00	13.3	11.8	25.5
		Perylene/Benzo[b]fluoranthene	ng/cm2	4	0.00	0.00	0.00	11.0	10.2	21.6
Dust Conc	DA	Arsenic	ug/g	8	1.12	1.16	1.64	8.8	8.3	18.2
Metals		Cadmium	ug/g	8	0.40	0.19	0.98	8.5	6.4	33.5
		Chromium	ug/g	8	3.48	2.59	6.15	8.5	7.5	17.3
		Copper	ug/g	8	11.76	5.84	23.86	13.7	11.9	29.4
		Lead	ug/g	8	6.06	4.93	10.36	7.7	5.9	13.2
		Manganese	ug/g	8	32.81	28.59	59.91	8.7	7.9	18.1
		Nickel	ug/g	8	5.48	2.05	13.90	9.1	6.0	29.7
		Selenium	ug/g	4	2.14	1.41	3.69	26.3	12.5	77.0
		Vanadium	ug/g	8	5.70	5.31	8.26	10.2	11.5	15.9
		Zinc	ug/g	8	97.79	73.84	197.39	6.5	5.9	13.4
		Aluminum	ug/g	8	7975.23	2319.14	20781.4	16.3	5.6	89.8
		Cobalt	ug/g	5	2.02	0.73	3.99	41.0	18.6	117.3
		Cesium	ug/g	8	0.11	0.10	0.18	6.0	5.7	11.1
		Iron	ug/g	8	5138.70	1111.74	13629.2	15.9	5.3	92.6
		Magnesium	ug/g	8	2575.24	420.99	7034.66	16.4	6.5	92.6
		Palladium	ug/g	3	1.51	1.47	2.16	9.1	10.8	15.4
		Strontium	ug/g	8	8.69	7.62	13.16	5.6	4.6	13.4
		Titanium	ug/g	8	602.03	133.87	1276.61	17.6	6.6	85.8
Dust Conc	DI	Arsenic	ug/g	12	0.26	0.14	0.58	2.3	2.0	6.1
Metals		Cadmium	ug/g	12	0.37	0.09	1.16	3.6	2.5	13.1
		Chromium	ug/g	12	1.35	0.62	2.85	2.3	1.8	7.8
		Copper	ug/g	12	3.28	1.31	7.20	4.1	3.6	9.8
		Lead	ug/g	12	2.95	1.75	8.16	3.2	3.4	7.5
		Manganese	ug/g	12	12.27	9.23	22.02	3.6	3.4	6.7
		Nickel	ug/g	12	2.04	0.82	5.04	4.0	3.5	12.5
		Selenium	ug/g	6	0.37	0.26	0.59	5.3	3.5	11.8
		Vanadium	ug/g	12	1.47	1.18	2.88	2.9	2.7	5.4
		Zinc	ug/g	12	24.93	20.53	48.18	2.0	2.0	5.6
		Aluminum	ug/g	7	3139.66	1550.67	6859.60	5.3	3.3	15.5

SUMMARY OF DUPLICATE ANALYSES - INCLUDING ONLY CASES WHERE BOTH MEMBERS ARE DETECTED

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Cobalt	ug/g	10	0.61	0.44	1.21	23.4	9.7	75.8
		Cesium	ug/g	12	0.07	0.05	0.12	3.0	3.3	5.7
		Iron	ug/g	7	902.23	557.55	1711.59	3.4	2.6	10.3
		Magnesium	ug/g	7	724.87	189.18	1632.29	5.9	2.3	24.8
		Palladium	ug/g	4	1.24	1.15	1.58	7.6	7.7	10.6
		Strontium	ug/g	12	8.13	3.29	25.69	3.0	2.5	10.9
		Titanium	ug/g	7	146.89	115.29	284.16	6.3	5.5	17.3
Dust Loading	DA	Arsenic	ng/cm2	7	0.46	0.21	1.07	8.4	7.9	18.2
Metals		Cadmium	ng/cm2	7	0.07	0.03	0.14	4.9	5.8	8.5
		Chromium	ng/cm2	7	2.18	0.39	5.26	8.4	7.2	17.3
		Copper	ng/cm2	7	5.86	0.98	14.25	11.5	9.7	26.7
		Lead	ng/cm2	7	3.55	0.91	7.77	8.0	6.7	13.2
		Manganese	ng/cm2	7	23.35	4.78	51.25	8.3	7.3	18.1
		Nickel	ng/cm2	7	4.57	0.37	11.89	10.0	6.1	29.7
		Selenium	ng/cm2	3	0.49	0.39	0.74	9.4	6.5	18.5
		Vanadium	ng/cm2	7	3.69	0.89	7.33	9.8	10.7	15.9
		Zinc	ng/cm2	7	70.18	21.67	168.86	6.6	5.7	13.4
		Aluminum	ng/cm2	7	6756.51	847.03	17777.3	18.2	5.8	89.8
		Cobalt	ng/cm2	4	1.74	0.49	3.42	36.4	11.9	117.3
		Cesium	ng/cm2	7	0.07	0.03	0.14	6.5	5.7	11.1
		Iron	ng/cm2	7	4410.50	131.25	11659.0	16.7	4.2	92.6
		Magnesium	ng/cm2	7	2276.79	79.58	6017.77	17.4	6.3	92.6
		Palladium	ng/cm2	3	0.28	0.29	0.37	9.1	10.8	15.4
		Strontium	ng/cm2	7	5.17	1.25	11.26	6.3	5.6	13.4
		Titanium	ng/cm2	7	413.53	27.20	1092.07	16.2	3.7	85.8
Dust Loading	DI	Arsenic	ng/cm2	8	0.06	0.02	0.15	2.3	1.8	6.1
Metals		Cadmium	ng/cm2	8	0.04	0.01	0.12	2.5	2.5	5.3
		Chromium	ng/cm2	8	0.25	0.18	0.55	2.9	2.5	7.8
		Copper	ng/cm2	8	2.20	0.35	6.16	4.8	4.2	9.8
		Lead	ng/cm2	8	0.72	0.42	1.58	3.8	3.6	7.5
		Manganese	ng/cm2	8	6.06	0.62	16.23	3.1	2.2	6.7
		Nickel	ng/cm2	8	0.52	0.11	1.31	3.9	3.5	10.1
		Selenium	ng/cm2	5	0.06	0.03	0.13	6.0	5.4	11.8
		Vanadium	ng/cm2	8	0.51	0.18	1.28	3.4	3.0	5.4
		Zinc	ng/cm2	8	4.40	2.79	8.99	1.7	1.8	3.6
		Aluminum	ng/cm2	6	217.22	151.96	375.57	3.6	3.1	7.3
		Cobalt	ng/cm2	7	0.21	0.08	0.53	23.6	8.8	75.8
		Cesium	ng/cm2	8	0.02	0.00	0.03	2.7	2.6	5.7

SUMMARY OF DUPLICATE ANALYSES - INCLUDING ONLY CASES WHERE BOTH MEMBERS ARE DETECTED

Medium	Type Dup	Analyte	Units	No. Pairs	Pooled Std. Dev.	Median Std. Dev.	Max Std. Dev.	Mean RSD	Median RSD	Max RSD
		Iron	ng/cm2	6	120.10	38.13	255.31	2.3	2.3	5.1
		Magnesium	ng/cm2	6	43.22	12.57	92.95	2.8	1.9	9.6
		Palladium	ng/cm2	3	0.18	0.18	0.24	8.0	8.9	10.6
		Strontium	ng/cm2	8	2.22	0.62	4.69	3.8	3.1	10.9
		Titanium	ng/cm2	6	16.36	9.66	32.62	4.5	4.7	7.0

SUMMARY OF DETECTION LIMITS FOR FIELD DATA

Medium	Analyte	Units	No. Obs.	Mean of Detection Limits	Median of Detection Limits
Indoor Air	Alternaria	logcnt/m3	185	0.8241	0.8241
Pollen/Spores	Amerospores	logcnt/m3	185	0.8241	0.8241
	Arthrinium	logcnt/m3	185	0.8241	0.8241
	Ascospores	logcnt/m3	185	0.8241	0.8241
	Aspergillus/Penicillium-like	logcnt/m3	185	0.8241	0.8241
	Aureobasidium	logcnt/m3	185	0.8241	0.8241
	Basidiospores	logcnt/m3	185	0.8241	0.8241
	Bipolaris/Dreschlera	logcnt/m3	185	0.8241	0.8241
	Botrytis	logcnt/m3	185	0.8241	0.8241
	Chaetomium	logcnt/m3	185	0.8241	0.8241
	Cladosporium	logcnt/m3	185	0.8241	0.8241
	Curvularia	logcnt/m3	185	0.8241	0.8241
	Epicoccum	logcnt/m3	185	0.8241	0.8241
	Fusarium	logcnt/m3	185	0.8241	0.8241
	Memnoniella	logcnt/m3	185	0.8241	0.8241
	Mycelial Fragments	logcnt/m3	185	0.8241	0.8241
	Nigrospora	logcnt/m3	185	0.8241	0.8241
	Oidium/Peronospora	logcnt/m3	185	0.8241	0.8241
	Pithomyces/Ulocladium	logcnt/m3	185	0.8241	0.8241
	Pollen Count	logcnt/m3	185	0.8241	0.8241
	Rusts	logcnt/m3	185	0.8241	0.8241
	Smuts/Myxomycetes	logcnt/m3	185	0.8241	0.8241
	Stachybotrys	logcnt/m3	185	0.8241	0.8241
	Stemphylium	logcnt/m3	185	0.8241	0.8241
	Torula	logcnt/m3	185	0.8241	0.8241
	Total Fungal Spores	logcnt/m3	185	0.8241	0.8241
	Unidentified Conidia	logcnt/m3	185	0.8241	0.8241
Outdoor Air	Alternaria	logcnt/m3	62	0.8241	0.8241
Pollen/Spores	Amerospores	logcnt/m3	62	0.8241	0.8241
	Arthrinium	logcnt/m3	62	0.8241	0.8241
	Ascospores	logcnt/m3	62	0.8241	0.8241
	Aspergillus/Penicillium-like	logcnt/m3	62	0.8241	0.8241
	Aureobasidium	logcnt/m3	62	0.8241	0.8241
	Basidiospores	logcnt/m3	62	0.8241	0.8241
	Bipolaris/Dreschlera	logcnt/m3	62	0.8241	0.8241
	Botrytis	logcnt/m3	62	0.8241	0.8241
	Chaetomium	logcnt/m3	62	0.8241	0.8241
	Cladosporium	logcnt/m3	62	0.8241	0.8241

SUMMARY OF DETECTION LIMITS FOR FIELD DATA

Medium	Analyte	Units	No. Obs.	Mean of Detection Limits	Median of Detection Limits
	Curvularia	logcnt/m3	62	0.8241	0.8241
	Epicoccum	logcnt/m3	62	0.8241	0.8241
	Fusarium	logcnt/m3	62	0.8241	0.8241
	Memnoniella	logcnt/m3	62	0.8241	0.8241
	Mycelial Fragments	logcnt/m3	62	0.8241	0.8241
	Nigrospora	logcnt/m3	62	0.8241	0.8241
	Oidium/Peronospora	logcnt/m3	62	0.8241	0.8241
	Pithomyces/Ulocladium	logcnt/m3	62	0.8241	0.8241
	Pollen Count	logcnt/m3	62	0.8241	0.8241
	Rusts	logcnt/m3	62	0.8241	0.8241
	Smuts/Myxomycetes	logcnt/m3	62	0.8241	0.8241
	Stachybotrys	logcnt/m3	62	0.8241	0.8241
	Stemphylium	logcnt/m3	62	0.8241	0.8241
	Torula	logcnt/m3	62	0.8241	0.8241
	Total Fungal Spores	logcnt/m3	62	0.8241	0.8241
	Unidentified Conidia	logcnt/m3	62	0.8241	0.8241
Indoor Air	Formaldehyde	ppb	199	0.6759	0.5848
Aldehydes	Acetaldehyde	ppb	199	3.2288	3.1742
	Propionaldehyde	ppb	199	0.0403	0.0396
	Crotonaldehyde	ppb	199	0.656	0.6449
	n-Butyraldehyde	ppb	199	0.0314	0.0308
	Benzaldehyde	ppb	199	0.2225	0.2187
	iso-Valeraldehyde	ppb	199	0.3743	0.3679
	Valeraldehyde	ppb	199	0.1062	0.1044
	Hexanaldehyde	ppb	199	0.0757	0.0744
	2,5-Dimethylbenzaldehyde	ppb	199	0.0213	0.021
	o,p-Tolualdehyde	ppb	199	0.1643	0.1615
	m-Tolualdehyde	ppb	199	0.0143	0.014
Outdoor Air	Formaldehyde	ppb	62	0.6286	0.592
Aldehydes	Acetaldehyde	ppb	62	3.4351	3.2348
	Propionaldehyde	ppb	62	0.0428	0.0403
	Crotonaldehyde	ppb	62	0.6979	0.6572
	n-Butyraldehyde	ppb	62	0.0334	0.0314
	Benzaldehyde	ppb	62	0.2367	0.2229
	iso-Valeraldehyde	ppb	62	0.3982	0.3749
	Valeraldehyde	ppb	62	0.113	0.1064
	Hexanaldehyde	ppb	62	0.0806	0.0759
	2,5-Dimethylbenzaldehyde	ppb	62	0.0227	0.0214

Medium	Analyte	Units	No. Obs.	Mean of Detection Limits	Median of Detection Limits
	o,p-Tolualdehyde	ppb	62	0.1748	0.1646
	m-Tolualdehyde	ppb	62	0.0152	0.0143
Indoor Air	1,1,1-Trichloroethane	ug/m3	78	0.2089	0.1814
VOCs	Benzene	ug/m3	73	1.1163	0.9698
	Carbon tetrachloride	ug/m3	87	0.4022	0.3529
	Chloroform	ug/m3	78	0.245	0.2147
	Ethylbenzene	ug/m3	79	0.0365	0.032
	Tetrachloroethylene	ug/m3	93	0.0246	0.0218
	Toluene	ug/m3	73	2.4622	2.1308
	m,p-Xylene	ug/m3	79	0.0729	0.0639
	o-Xylene	ug/m3	79	0.049	0.0429
Outdoor Air	1,1,1-Trichloroethane	ug/m3	28	0.3214	0.2196
VOCs	Benzene	ug/m3	26	1.7407	1.1624
	Carbon tetrachloride	ug/m3	32	0.5836	0.4103
	Chloroform	ug/m3	28	0.3723	0.2505
	Ethylbenzene	ug/m3	28	0.0561	0.0383
	Tetrachloroethylene	ug/m3	34	0.0352	0.0255
	Toluene	ug/m3	26	3.8138	2.5467
	m,p-Xylene	ug/m3	28	0.1121	0.0766
	o-Xylene	ug/m3	28	0.0753	0.0515
Dust Conc	Diazinon	ug/g	72	0.0049	0.0049
Pesticides	Malathion	ug/g	77	0.0049	0.0049
	Chlorpyrifos	ug/g	30	0.0049	0.0049
	4,4'-DDE	ug/g	75	0.0049	0.0049
	Dieldrin	ug/g	76	0.0049	0.0049
	cis-Permethrin	ug/g	78	0.0195	0.0196
	trans-Permethrin	ug/g	64	0.0195	0.0196
	Lindane	ug/g	74	0.0049	0.0049
	Pendimethalin	ug/g	44	0.0098	0.0098
	Propoxur	ug/g	39	0.0049	0.0049
	o-Phenylphenol	ug/g	78	0.0049	0.0049
	Propetamphos	ug/g	70	0.0049	0.0049
	Resmethrin	ug/g	76	0.0097	0.0098
	Piperonyl Butoxide	ug/g	64	0.0049	0.0049
	Bifenthrin	ug/g	72	0.0049	0.0049
	Cyhalothrin	ug/g	78	0.0049	0.0049
	Cyfluthrin	ug/g	75	0.0195	0.0196
	Cypermethrin	ug/g	76	0.0487	0.0491

SUMMARY OF DETECTION LIMITS FOR FIELD DATA

Medium	Analyte	Units	No. Obs.	Mean of Detection Limits	Median of Detection Limits
	Esfenvalerate	ug/g	67	0.0098	0.0098
	Delta/Tralo-methrin	ug/g	78	0.0195	0.0196
Dust Loading	Diazinon	ng/c	27	0.0007	0.0005
Pesticides	Malathion	ng/c	27	0.0008	0.0005
	Chlorpyrifos	ng/c	14	0.0007	0.0007
	4,4'-DDE	ng/c	26	0.0006	0.0005
	Dieldrin	ng/c	28	0.0007	0.0005
	cis-Permethrin	ng/c	28	0.0029	0.0022
	trans-Permethrin	ng/c	20	0.0034	0.0024
	Lindane	ng/c	26	0.0007	0.0005
	Pendimethalin	ng/c	20	0.0013	0.0011
	Propoxur	ng/c	12	0.0005	0.0005
	o-Phenylphenol	ng/c	28	0.0007	0.0005
	Propetamphos	ng/c	24	0.0008	0.0005
	Resmethrin	ng/c	28	0.0015	0.0011
	Piperonyl Butoxide	ng/c	22	0.0008	0.0006
	Bifenthrin	ng/c	25	0.0008	0.0005
	Cyhalothrin	ng/c	28	0.0007	0.0005
	Cyfluthrin	ng/c	26	0.003	0.0022
	Cypermethrin	ng/c	26	0.0076	0.0055
	Esfenvalerate	ng/c	25	0.0015	0.0011
	Delta/Tralo-methrin	ng/c	28	0.0029	0.0022
Dust Conc	Benzo[a]pyrene	ug/g	70	0.0079	0.0095
PAHs	Benzo[a]anthracene	ug/g	72	0.001	0.001
	Acenaphthylene	ug/g	54	0.001	0.001
	Anthracene	ug/g	70	0.001	0.001
	Chrysene	ug/g	76	0.001	0.001
	Benzo[k]fluoranthene	ug/g	75	0.0078	0.0094
	Fluoranthene	ug/g	77	0.001	0.001
	Phenanthrene	ug/g	77	0.001	0.001
	Pyrene	ug/g	77	0.001	0.001
	Indeno[1,2,3-cd]pyrene	ug/g	75	0.0098	0.0098
	Naphthalene	ug/g	70	0.001	0.001
	Fluorene	ug/g	74	0.001	0.001
	Acenaphthene	ug/g	67	0.001	0.001
	Dibenz[a,h]anthracene	ug/g	70	0.0066	0.005
	Benzo[g,h,i]perylene	ug/g	76	0.0068	0.005
	Perylene/Benzo[b]fluoranthene	ug/g	72	0.0098	0.0098

SUMMARY OF DETECTION LIMITS FOR FIELD DATA

Medium	Analyte	Units	No. Obs.	Mean of Detection Limits	Median of Detection Limits
Dust Loading	Benzo[a]pyrene	ng/c	25	0.0014	0.001
PAHs	Benzo[a]anthracene	ng/c	25	0.0002	0.0001
	Acenaphthylene	ng/c	18	0.0002	0.0001
	Anthracene	ng/c	26	0.0001	0.0001
	Chrysene	ng/c	26	0.0002	0.0001
	Benzo[k]fluoranthene	ng/c	26	0.0013	0.0009
	Fluoranthene	ng/c	27	0.0001	0.0001
	Phenanthrene	ng/c	27	0.0001	0.0001
	Pyrene	ng/c	27	0.0001	0.0001
	Indeno[1,2,3-cd]pyrene	ng/c	27	0.0015	0.0011
	Naphthalene	ng/c	25	0.0002	0.0001
	Fluorene	ng/c	25	0.0002	0.0001
	Acenaphthene	ng/c	24	0.0001	0.0001
	Dibenz[a,h]anthracene	ng/c	24	0.0008	0.0007
	Benzo[g,h,i]perylene	ng/c	27	0.0009	0.0007
	Perylene/Benzo[b]fluoranthene	ng/c	26	0.0015	0.0011
Dust 500 um	Dermatophagoides pteronyssinus	ug/g	172	0.2	0.2
Biologicals	Dermatophagoides farinae	ug/g	175	0.2	0.2
	Canis f1	ug/g	78	0.4	0.4
	Felis d1	ug/g	40	0.1	0.1
	Blatella germanica	units/g	185	1	1
Dust 150 um	Dermatophagoides pteronyssinus	ug/g	6	0.2	0.2
Biologicals	Dermatophagoides farinae	ug/g	6	0.2	0.2
	Canis f1	ug/g	3	0.4	0.4
	Felis d1	ug/g	6	0.1	0.1
	Blatella germanica	units/g	6	1	1
Dust Conc	Arsenic	ug/g	78	0.3197	0.3204
Metals	Cadmium	ug/g	78	0.6385	0.6399
	Chromium	ug/g	78	2.3468	2.3519
	Copper	ug/g	78	1.121	1.1234
	Lead	ug/g	78	2.2217	2.2264
	Manganese	ug/g	78	4.6936	4.7037
	Nickel	ug/g	78	4.6936	4.7037
	Selenium	ug/g	78	1.2949	1.2977
	Vanadium	ug/g	78	0.4694	0.4704
	Zinc	ug/g	78	119.07	119.33
	Aluminum	ug/g	78	1361.8	1364.7
	Cobalt	ug/g	78	0.3197	0.3204

SUMMARY OF DETECTION LIMITS FOR FIELD DATA

Medium	Analyte	Units	No. Obs.	Mean of Detection Limits	Median of Detection Limits
	Cesium	ug/g	78	0.4694	0.4704
	Iron	ug/g	78	2780.8	2786.8
	Magnesium	ug/g	78	2454.1	2459.4
	Palladium	ug/g	78	11.199	11.223
	Strontium	ug/g	78	0.6028	0.6041
	Titanium	ug/g	78	520.15	521.27
Dust Loading	Arsenic	ng/c	58	0.0528	0.0364
Metals	Cadmium	ng/c	58	0.1054	0.0727
	Chromium	ng/c	58	0.3873	0.2673
	Copper	ng/c	58	0.185	0.1277
	Lead	ng/c	58	0.3666	0.2531
	Manganese	ng/c	58	0.7745	0.5347
	Nickel	ng/c	58	0.7745	0.5347
	Selenium	ng/c	58	0.2137	0.1475
	Vanadium	ng/c	58	0.0775	0.0535
	Zinc	ng/c	58	19.649	13.564
	Aluminum	ng/c	58	224.72	155.13
	Cobalt	ng/c	58	0.0528	0.0364
	Cesium	ng/c	58	0.0775	0.0535
	Iron	ng/c	58	458.88	316.79
	Magnesium	ng/c	58	404.96	279.57
	Palladium	ng/c	58	1.8479	1.2757
	Strontium	ng/c	58	0.0995	0.0687
	Titanium	ng/c	58	85.833	59.255

APPENDIX C

Estimated Population Distributions of Schools

Appendix C characterizes the population of eligible schools for selected items from the Facilities Questionnaire and the Consultation Form (Part 2). The schools are classified by several school-level variables (e.g., region) and the estimated percentages of the schools falling into each category (e.g., north, south) are shown. The table also gives, for each estimated percentage, the sample size (number of schools) upon which the estimate is based and the approximate 95% confidence intervals for the percentages. Intervals ending in 0 and 100 have been truncated and indicate (a) cases where the coverage probability is actually less than 0.95 and (b) cases where the relative precision is likely to be poor. The estimates are based on weighted data and thus reflect the target population of schools.

Variable	Description	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
REGION	Geographic region	North	36	45.5	40.1	50.9
		South	45	54.5	49.1	59.9
POPSTAT	School location	Urban	13	17.1	7.9	26.2
		Suburb	63	75.8	65.8	85.7
		Rural	5	7.2	2.8	11.5
SCHTYP	School type	Elem	47	59.2	57.1	61.3
		Middle	16	20.7	12.7	28.8
		High	18	20.1	11.9	28.2
NUMPORT	Number of portable classrooms	1-10	24	46.1	29.8	62.4
		11-20	24	43.0	27.1	58.8
		21-30	3	6.5	0.0	14.3
		>30	2	4.4	0.0	10.4
NUMTRAD	Number of traditional classrooms	1-20	25	49.9	34.0	65.9
		21-40	22	47.2	31.1	63.3
		41-60	0	0.0	0.0	0.0
		>60	2	2.9	0.0	8.4
NUMTOT	Total number classrooms	1-30	21	40.1	24.0	56.2
		31-60	25	54.4	37.6	71.2
		61-100	3	5.5	0.0	12.9
		>100	0	0.0	0.0	0.0
HVACLOG	HVAC maintenance logs kept	Yes	31	58.7	43.2	74.2
		No	7	18.5	4.5	32.4
		DK	13	22.8	9.4	36.2
FQ15A	Regular HVAC inspection/maintenance	Yes	48	87.9	78.0	97.8
		No	4	6.9	0.0	14.0
		NA	3	5.2	0.0	12.4
RFQ16B	Freq of vacuuming/sweeping/dusting	5/wk	26	56.1	42.3	69.9
		3-4/wk	23	39.8	25.8	53.8
		Other	5	4.0	0.0	9.1
USETOL	Awareness/use of EPA IAQ Tools	Aware/yes	11	18.7	8.3	29.0
		Aware/no	8	11.0	1.7	20.2
		Aware/DK	6	12.1	1.5	22.7
		Unaware	30	58.3	43.9	72.7
FQ25	Any major complaints of envir cond	Yes	18	33.0	19.5	46.5

Variable	Description	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
		No	30	64.3	50.3	78.2
		DK	3	2.7	0.0	7.6
RFQ25AA	Roof leak complaint last yr: Port	None	39	75.7	62.7	88.7
		Some	13	24.3	11.3	37.3
RFQ25BA	Roof leak complaint last yr: Trad	None	45	88.0	77.4	98.6
		Some	7	12.0	1.4	22.6
RFQ25AB	Plumbing leak complaint last yr: Port	None	48	95.7	89.9	100.0
		Some	4	4.3	0.0	10.1
RFQ25BB	Plumbing leak complaint last yr: Trad	None	49	97.4	92.6	100.0
		Some	3	2.6	0.0	7.4
RFQ25AC	Air/odor complaint last yr: Port	None	40	79.8	67.6	92.1
		Some	12	20.2	7.9	32.4
RFQ25BC	Air/odor complaint last yr: Trad	None	47	93.0	86.1	99.8
		Some	5	7.0	0.2	13.9
RFQ25AD	Mold complaint last yr: Port	None	44	86.6	75.9	97.3
		Some	8	13.4	2.7	24.1
RFQ25BD	Mold complaint last yr: Trad	None	50	95.6	89.8	100.0
		Some	2	4.4	0.0	10.2
RFQ25AE	Temperature complaint last yr: Port	None	42	84.2	73.2	95.2
		Some	10	15.8	4.8	26.8
RFQ25BE	Temperature complaint last yr: Trad	None	43	82.8	71.3	94.4
		Some	9	17.2	5.6	28.7
RFQ25AF	Noise complaint last yr: Port	None	48	95.7	89.9	100.0
		Some	4	4.3	0.0	10.1
RFQ25BF	Noise complaint last yr: Trad	None	51	99.9	99.6	100.0
		Some	1	0.1	0.0	0.4
PORTCP	Port classroom envir complaints	Yes	20	32.2	18.3	46.1
		No	32	65.2	51.0	79.5
		DK	3	2.6	0.0	7.2
TRADCP	Trad classroom envir complaints	Yes	11	18.9	7.7	30.0
		No	41	78.6	66.7	90.4
		DK	3	2.6	0.0	7.2
SCHTYPE	School type (Consultant Form part 2)	Elem	38	59.1	55.3	63.0
		Middle	12	21.6	11.5	31.7

Variable	Description	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
		High	9	14.6	4.1	25.1
		Other/Mix	2	4.7	0.0	11.3
DC8_3	Major water leaks last 5 yrs	Yes	12	18.7	8.8	28.5
		No	47	81.3	71.5	91.2
RDC9	Ballasts/transformer problems	Yes	19	31.7	17.4	46.0
		No	34	58.6	43.3	73.9
		DK	5	9.7	1.3	18.1
RDC10	Standing water	Never	16	31.3	18.0	44.7
		Occasly	31	50.1	34.8	65.3
		Frequent	8	14.6	4.0	25.1
		DK	2	4.0	0.0	9.8

APPENDIX D

Estimated Population Distributions of Classrooms

Appendix D characterizes the population of eligible classrooms for selected items in the various questionnaires and checklist. It consists of six parts.

In **Part 1**, the classrooms are classified for various categorical items; the estimated percentages of the classrooms falling into each category are shown. The statistics are presented for all classrooms, portable classrooms, and traditional classrooms. The table gives, for each estimated percentage, the sample size (number of classrooms) upon which the estimate is based and the approximate 95% confidence intervals for the percentages. Intervals ending in 0 and 100 have been truncated and indicate (a) cases where the coverage probability is actually less than 0.95 and (b) cases where the relative precision is likely to be poor. The estimates are based on weighted data and thus reflect the target population of classrooms.

Part 2 provides estimated distribution parameters for various continuous variables (e.g., number of chairs in room, or air flow rate). The sample size is given, along with the estimated mean and selected percentiles. The estimates are based on weighted data and thus reflect the target population of classrooms.

Part 3 provides approximate 95% confidence intervals for the variates included in Part 2.

Part 4 provides estimated distribution parameters for various continuous various variables, by HVAC mode (cooling, heating, fan only). The sample size is given, along with the estimated mean and selected percentiles. The estimates are based on weighted data and thus reflect the target population of classrooms. Sample sizes are often small, however.

Part 5 provides approximate 95% confidence intervals for the variates and categories included in Part 4.

Part 6 provides t-test results for comparing the means of portable versus traditional classrooms – for the variables of Part 2.

Note: In Parts 2 through 5, inestimable quantities are denoted by “N”.

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
All	All classrooms		All	206	100.0	100.0	100.0
Port	All classrooms		All	139	100.0	100.0	100.0
Trad	All classrooms		All	67	100.0	100.0	100.0
All	School location	0.98	Urban	36	17.8	6.5	29.2
			Suburb	155	75.5	63.3	87.8
			Rural	15	6.6	1.8	11.5
Port	School location		Urban	26	18.4	6.1	30.8
			Suburb	102	74.8	61.9	87.8
			Rural	11	6.7	2.3	11.2
Trad	School location		Urban	10	17.5	5.1	29.9
			Suburb	53	75.9	62.5	89.3
			Rural	4	6.6	0.9	12.3
All	Geographic region	0.81	North	92	36.9	29.4	44.3
			South	114	63.1	55.7	70.6
Port	Geographic region		North	63	37.7	28.8	46.5
			South	76	62.3	53.5	71.2
Trad	Geographic region		North	29	36.4	27.5	45.3
			South	38	63.6	54.7	72.5
All	School type	0.36	Elem	131	59.0	51.9	66.1
			Middle	37	22.9	12.3	33.5
			High	38	18.1	4.9	31.3
Port	School type		Elem	86	63.5	55.6	71.4
			Middle	25	18.8	9.0	28.5
			High	28	17.7	6.6	28.9
Trad	School type		Elem	45	56.5	47.3	65.8
			Middle	12	25.2	12.7	37.7
			High	10	18.3	2.7	33.9
All	Pesticide use past yr (teacher)	0.18	Current	6	1.7	0.0	3.5
			Previous	34	14.4	7.5	21.3
			Never	138	83.9	76.6	91.2
Port	Pesticide use past yr (teacher)		Current	5	3.8	0.0	7.9
			Previous	24	19.6	7.9	31.4
			Never	90	76.5	63.8	89.3
Trad	Pesticide use past yr (teacher)		Current	1	0.6	0.0	1.9

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
			Previous	10	11.7	3.3	20.1
			Never	48	87.6	79.1	96.2
All	Classroom air (teacher)	0.82	Yes	91	51.5	39.6	63.4
			No	95	48.5	36.6	60.4
Port	Classroom air (teacher)		Yes	57	53.0	41.3	64.8
			No	69	47.0	35.2	58.7
Trad	Classroom air (teacher)		Yes	34	50.7	33.6	67.8
			No	26	49.3	32.2	66.4
All	Classroom light (teacher)	0.41	Yes	121	71.5	61.9	81.2
			No	65	28.5	18.8	38.1
Port	Classroom light (teacher)		Yes	76	66.9	55.7	78.0
			No	50	33.1	22.0	44.3
Trad	Classroom light (teacher)		Yes	45	74.1	60.7	87.5
			No	15	25.9	12.5	39.3
All	Turn off heat/AC due to noise (teacher)	0.02	Yes	106	51.6	40.6	62.5
			No	66	48.4	37.5	59.4
Port	Turn off heat/AC due to noise (teacher)		Yes	81	68.3	57.9	78.8
			No	34	31.7	21.2	42.1
Trad	Turn off heat/AC due to noise (teacher)		Yes	25	42.2	25.3	59.1
			No	32	57.8	40.9	74.7
All	Bug problems in room (teacher)	0.90	Current	43	25.6	15.7	35.5
			Previous	79	42.6	31.6	53.7
			Never	51	31.8	20.9	42.6
Port	Bug problems in room (teacher)		Current	28	24.1	13.7	34.6
			Previous	52	45.4	33.8	57.0
			Never	35	30.5	18.5	42.4
Trad	Bug problems in room (teacher)		Current	15	26.4	12.9	39.9
			Previous	27	41.2	25.4	56.9
			Never	16	32.4	15.9	49.0
All	Rodent problems in room (teacher)	0.31	Current	9	7.0	0.0	15.2
			Previous	36	29.6	16.1	43.0
			Never	111	63.4	49.5	77.3

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Port	Rodent problems in room (teacher)		Current	7	8.0	0.0	16.2
			Previous	19	21.0	10.0	32.0
			Never	79	71.0	58.4	83.6
Trad	Rodent problems in room (teacher)		Current	2	6.5	0.0	17.9
			Previous	17	34.0	16.4	51.6
			Never	32	59.5	41.1	77.9
All	Musty odor at times (teacher)	0.65	Yes	116	64.2	52.5	75.8
			No	58	35.8	24.2	47.5
Port	Musty odor at times (teacher)		Yes	81	66.6	55.7	77.4
			No	35	33.4	22.6	44.3
Trad	Musty odor at times (teacher)		Yes	35	62.9	47.7	78.1
			No	23	37.1	21.9	52.3
All	Leak or flood in room (teacher)	0.30	Current	21	11.0	4.6	17.3
			Previous	41	28.6	15.8	41.5
			Never	92	47.9	36.7	59.0
			Unknown	19	12.5	3.9	21.2
Port	Leak or flood in room (teacher)		Current	15	12.1	4.0	20.2
			Previous	25	20.0	10.6	29.3
			Never	65	59.4	48.4	70.3
			Unknown	13	8.6	2.3	14.8
Trad	Leak or flood in room (teacher)		Current	6	10.3	1.1	19.6
			Previous	16	33.3	15.7	51.0
			Never	27	41.7	24.5	58.8
			Unknown	6	14.7	1.5	27.9
All	Classroom age (yrs)	0.00	0-3yr	16	5.9	0.4	11.3
			4-5yr	26	15.4	6.1	24.7
			6-10yr	16	8.7	2.2	15.2
			11-15yr	21	6.7	1.6	11.8
			16+yr	57	63.4	50.2	76.5
Port	Classroom age (yrs)		0-3yr	14	10.3	3.0	17.7
			4-5yr	23	28.5	15.0	42.1
			6-10yr	15	19.6	5.9	33.3
			11-15yr	17	12.5	3.0	22.0
			16+yr	24	29.1	12.5	45.6

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Trad	Classroom age (yrs)		0-3yr	2	3.3	0.0	9.5
			4-5yr	3	7.7	0.0	15.9
			6-10yr	1	2.3	0.0	6.9
			11-15yr	4	3.3	0.0	7.9
			16+yr	33	83.4	71.4	95.4
All	Major addition or replacement (3 yrs)	0.00	Some	32	13.4	7.5	19.3
			None	7	4.3	0.0	9.9
			NA	53	82.4	75.5	89.2
Port	Major addition or replacement (3 yrs)		Some	32	83.6	64.4	100.0
			None	6	16.4	0.0	35.6
			NA	0	0.0	0.0	0.0
Trad	Major addition or replacement (3 yrs)		Some	0	0.0	0.0	0.0
			None	1	1.9	0.0	5.9
			NA	53	98.1	94.1	100.0
All	Floor area (sq. ft.)	0.17	<=1000sqft	140	78.6	66.0	91.2
			>1000sqft	19	21.4	8.8	34.0
Port	Floor area (sq. ft.)		<=1000sqft	101	88.4	77.3	99.6
			>1000sqft	9	11.6	0.4	22.7
Trad	Floor area (sq. ft.)		<=1000sqft	39	72.8	54.0	91.6
			>1000sqft	10	27.2	8.4	46.0
All	Ceiling holes or missing panels	0.86	Yes	43	24.0	11.7	36.4
			No	154	76.0	63.6	88.3
Port	Ceiling holes or missing panels		Yes	31	24.9	14.9	34.9
			No	102	75.1	65.1	85.1
Trad	Ceiling holes or missing panels		Yes	12	23.5	7.0	40.0
			No	52	76.5	60.0	93.0
All	Water stains on ceiling	0.10	Yes	55	30.2	20.9	39.5
			No	142	69.8	60.5	79.1
Port	Water stains on ceiling		Yes	31	21.3	12.1	30.6
			No	102	78.7	69.4	87.9
Trad	Water stains on ceiling		Yes	24	35.1	21.3	48.8
			No	40	64.9	51.2	78.7
All	Mold areas on ceiling	0.12	Some	6	1.1	0.0	2.5
			None	189	98.9	97.5	100.0

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Port	Mold areas on ceiling		Some	6	3.1	0.0	6.9
			None	126	96.9	93.1	100.0
Trad	Mold areas on ceiling		Some	0	0.0	0.0	0.0
			None	63	100.0	100.0	100.0
All	Carpet/rugs on floor	0.02	Yes	155	69.7	57.0	82.3
			No	43	30.3	17.7	43.0
Port	Carpet/rugs on floor		Yes	112	82.0	70.6	93.5
			No	22	18.0	6.5	29.4
Trad	Carpet/rugs on floor		Yes	43	62.9	47.0	78.8
			No	21	37.1	21.2	53.0
All	Indoor walk-off mat	0.53	Yes	92	40.4	29.5	51.3
			No	107	59.6	48.7	70.5
Port	Indoor walk-off mat		Yes	64	43.7	30.5	56.9
			No	71	56.3	43.1	69.5
Trad	Indoor walk-off mat		Yes	28	38.5	25.0	52.1
			No	36	61.5	47.9	75.0
All	Water stains on floor	0.01	Yes	21	5.9	2.6	9.2
			No	170	94.1	90.8	97.4
Port	Water stains on floor		Yes	19	13.1	5.4	20.8
			No	111	86.9	79.2	94.6
Trad	Water stains on floor		Yes	2	2.0	0.0	4.8
			No	59	98.0	95.2	100.0
All	Tackboard walls	0.01	Yes	56	23.5	14.3	32.8
			No	143	76.5	67.2	85.7
Port	Tackboard walls		Yes	44	36.5	22.2	50.9
			No	91	63.5	49.1	77.8
Trad	Tackboard walls		Yes	12	16.4	6.9	25.8
			No	52	83.6	74.2	93.1
All	Fiber/particle board or plywood walls	0.01	Yes	97	41.4	29.5	53.3
			No	102	58.6	46.7	70.5
Port	Fiber/particle board or plywood walls		Yes	76	56.9	42.0	71.8
			No	59	43.1	28.2	58.0
Trad	Fiber/particle board or plywood walls		Yes	21	32.8	19.1	46.6
			No	43	67.2	53.4	80.9

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
All	Sheetrock or plaster walls	0.00	Yes	33	33.1	21.7	44.6
			No	166	66.9	55.4	78.3
Port	Sheetrock or plaster walls		Yes	5	3.2	0.0	7.4
			No	130	96.8	92.6	100.0
Trad	Sheetrock or plaster walls		Yes	28	49.6	33.8	65.5
			No	36	50.4	34.5	66.2
All	Other wall material	0.00	Yes	41	27.1	16.2	37.9
			No	158	72.9	62.1	83.8
Port	Other wall material		Yes	18	8.0	2.1	13.9
			No	117	92.0	86.1	97.9
Trad	Other wall material		Yes	23	37.5	20.8	54.2
			No	41	62.5	45.8	79.2
All	Paints/pens in room	0.92	Yes	109	55.7	43.5	68.0
			No	89	44.3	32.0	56.5
Port	Paints/pens in room		Yes	76	55.1	40.8	69.4
			No	58	44.9	30.6	59.2
Trad	Paints/pens in room		Yes	33	56.1	40.5	71.6
			No	31	43.9	28.4	59.5
All	Whiteboard markers in room	0.77	Yes	151	77.0	66.9	87.1
			No	47	23.0	12.9	33.1
Port	Whiteboard markers in room		Yes	103	75.1	63.8	86.5
			No	31	24.9	13.5	36.2
Trad	Whiteboard markers in room		Yes	48	77.9	63.3	92.6
			No	16	22.1	7.4	36.7
All	Chalk in room	0.04	Yes	53	34.0	21.5	46.5
			No	145	66.0	53.5	78.5
Port	Chalk in room		Yes	28	21.6	11.1	32.2
			No	106	78.4	67.8	88.9
Trad	Chalk in room		Yes	25	40.8	24.2	57.5
			No	39	59.2	42.5	75.8
All	Air freshener	0.13	Some	37	15.3	9.3	21.3
			None	160	84.7	78.7	90.7
Port	Air freshener		Some	27	22.5	11.4	33.7
			None	107	77.5	66.3	88.6

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Trad	Air freshener		Some	10	11.3	3.6	19.0
			None	53	88.7	81.0	96.4
All	Animals and plants	0.92	Some	65	27.1	18.2	36.0
			None	132	72.9	64.0	81.8
Port	Animals and plants		Some	40	26.6	16.5	36.8
			None	94	73.4	63.2	83.5
Trad	Animals and plants		Some	25	27.4	15.9	38.8
			None	38	72.6	61.2	84.1
All	Bookcase -- pressed wood	0.02	Yes	137	58.2	46.8	69.5
			No	61	41.8	30.5	53.2
Port	Bookcase -- pressed wood		Yes	100	73.1	62.0	84.1
			No	35	26.9	15.9	38.0
Trad	Bookcase -- pressed wood		Yes	37	49.8	34.3	65.3
			No	26	50.2	34.7	65.7
All	Cabinet -- pressed wood	0.75	Yes	105	53.1	40.3	65.8
			No	93	46.9	34.2	59.7
Port	Cabinet -- pressed wood		Yes	68	54.8	40.8	68.7
			No	66	45.2	31.3	59.2
Trad	Cabinet -- pressed wood		Yes	37	52.1	36.4	67.8
			No	27	47.9	32.2	63.6
All	New bookcases/cabinets	0.64	Yes	25	9.0	3.5	14.5
			No	174	91.0	85.5	96.5
Port	New bookcases/cabinets		Yes	18	10.5	4.5	16.4
			No	117	89.5	83.6	95.5
Trad	New bookcases/cabinets		Yes	7	8.2	0.3	16.0
			No	57	91.8	84.0	99.7
All	New desks/tables/chairs	0.20	Yes	58	29.3	17.6	41.1
			No	141	70.7	58.9	82.4
Port	New desks/tables/chairs		Yes	39	22.3	13.1	31.6
			No	96	77.7	68.4	86.9
Trad	New desks/tables/chairs		Yes	19	33.1	17.1	49.2
			No	45	66.9	50.8	82.9
All	Pests or pesticides	0.63	Some	23	8.8	3.0	14.6
			None	173	91.2	85.4	97.0

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Port	Pests or pesticides		Some	14	7.3	0.9	13.7
			None	120	92.7	86.3	99.1
Trad	Pests or pesticides		Some	9	9.7	1.6	17.7
			None	53	90.3	82.3	98.4
All	Chemical products	0.25	Some	129	70.6	59.0	82.2
			None	68	29.4	17.8	41.0
Port	Chemical products		Some	82	63.7	51.8	75.7
			None	52	36.3	24.3	48.2
Trad	Chemical products		Some	47	74.4	58.4	90.5
			None	16	25.6	9.5	41.6
All	Mold areas	0.15	Some	7	1.1	0.0	2.6
			None	184	98.9	97.4	100.0
Port	Mold areas		Some	6	3.0	0.0	7.0
			None	123	97.0	93.0	100.0
Trad	Mold areas		Some	1	0.1	0.0	0.3
			None	61	99.9	99.7	100.0
All	New construction/repairs affecting IAQ	0.10	Yes	35	19.4	5.7	33.2
			No	154	80.6	66.8	94.3
Port	New construction/repairs affecting IAQ		Yes	24	13.2	3.2	23.2
			No	106	86.8	76.8	96.8
Trad	New construction/repairs affecting IAQ		Yes	11	23.0	6.3	39.8
			No	48	77.0	60.2	93.7
All	Other campus activities affecting IAQ	0.79	Yes	28	16.9	4.3	29.4
			No	161	83.1	70.6	95.7
Port	Other campus activities affecting IAQ		Yes	20	15.6	4.6	26.7
			No	110	84.4	73.3	95.4
Trad	Other campus activities affecting IAQ		Yes	8	17.6	1.5	33.6
			No	51	82.4	66.4	98.5
All	Outdoor walk-off mats	0.13	Yes	15	8.0	1.5	14.6
			No	181	92.0	85.4	98.5
			DK	0	0.0	0.0	0.0
Port	Outdoor walk-off mats		Yes	8	3.3	0.0	6.6
			No	124	96.7	93.4	100.0
			DK	0	0.0	0.0	0.0

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Trad	Outdoor walk-off mats		Yes	7	10.6	1.1	20.1
			No	57	89.4	79.9	98.9
			DK	0	0.0	0.0	0.0
All	Parking lot/roadway within 50 ft.	0.85	Yes	93	51.0	37.8	64.3
			No	102	49.0	35.7	62.2
Port	Parking lot/roadway within 50 ft.		Yes	64	52.0	38.7	65.2
			No	67	48.0	34.8	61.3
Trad	Parking lot/roadway within 50 ft.		Yes	29	50.5	34.4	66.7
			No	35	49.5	33.3	65.6
All	Foundation skirt height (portables)	0.00	<=2in.	51	14.4	8.8	20.0
			2-12in.	33	7.5	3.9	11.1
			>12in.	42	11.9	7.1	16.8
			NA	61	66.1	60.8	71.4
Port	Foundation skirt height (portables)		<=2in.	51	42.6	28.2	57.0
			2-12in.	33	22.2	12.4	32.0
			>12in.	42	35.2	21.1	49.3
			NA	0	0.0	0.0	0.0
Trad	Foundation skirt height (portables)		<=2in.	0	0.0	0.0	0.0
			2-12in.	0	0.0	0.0	0.0
			>12in.	0	0.0	0.0	0.0
			NA	61	100.0	100.0	100.0
All	Type of roof	0.00	Tar&gravel	101	57.2	43.6	70.8
			Metal	32	12.1	6.9	17.3
			Other/DK	54	30.7	19.6	41.8
Port	Type of roof		Tar&gravel	72	58.2	43.8	72.6
			Metal	30	28.5	16.6	40.4
			Other/DK	25	13.3	5.0	21.6
Trad	Type of roof		Tar&gravel	29	56.6	40.4	72.8
			Metal	2	2.5	0.0	6.3
			Other/DK	29	40.8	24.7	56.9
All	Pitch of roof	0.95	Flat/both	79	41.4	29.1	53.7
			Sloped	117	58.6	46.3	70.9
Port	Pitch of roof		Flat/both	58	41.8	27.4	56.3
			Sloped	75	58.2	43.7	72.6

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Trad	Pitch of roof		Flat/both	21	41.2	25.3	57.1
			Sloped	42	58.8	42.9	74.7
All	Exterior wall condition	0.29	Good	116	60.0	47.9	72.1
			Fair/poor	79	40.0	27.9	52.1
Port	Exterior wall condition		Good	75	53.8	40.7	66.9
			Fair/poor	56	46.2	33.1	59.3
Trad	Exterior wall condition		Good	41	63.3	47.8	78.7
			Fair/poor	23	36.7	21.3	52.2
All	Mold areas on exterior walls	0.37	Some	10	2.6	0.1	5.2
			None	185	97.4	94.8	99.9
Port	Mold areas on exterior walls		Some	9	4.2	0.2	8.2
			None	124	95.8	91.8	99.8
Trad	Mold areas on exterior walls		Some	1	1.7	0.0	5.3
			None	61	98.3	94.7	100.0
All	Chipped paint on exterior wall	0.07	Yes	48	23.8	12.9	34.6
			No	149	76.2	65.4	87.1
Port	Chipped paint on exterior wall		Yes	37	33.4	20.1	46.7
			No	96	66.6	53.3	79.9
Trad	Chipped paint on exterior wall		Yes	11	18.6	5.5	31.6
			No	53	81.4	68.4	94.5
All	Windows open today	0.18	Yes	8	5.5	0.7	10.4
			No	186	94.5	89.6	99.3
Port	Windows open today		Yes	3	2.1	0.0	4.7
			No	128	97.9	95.3	100.0
Trad	Windows open today		Yes	5	7.4	0.0	14.8
			No	58	92.6	85.2	100.0
All	Door(s) open today	0.66	Yes	97	54.0	41.0	66.9
			No	98	46.0	33.1	59.0
Port	Door(s) open today		Yes	64	51.5	38.2	64.7
			No	68	48.5	35.3	61.8
Trad	Door(s) open today		Yes	33	55.3	38.8	71.9
			No	30	44.7	28.1	61.2

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
All	Vacuum type	0.63	B_brsh/powr	67	58.5	41.3	75.7
			Cannister	22	15.6	3.4	27.9
			Other/DK	42	25.9	11.0	40.7
Port	Vacuum type		B_brsh/powr	46	53.9	33.7	74.1
			Cannister	14	18.7	2.6	34.8
			Other/DK	29	27.4	9.5	45.4
Trad	Vacuum type		B_brsh/powr	21	61.4	43.4	79.3
			Cannister	8	13.7	1.4	26.0
			Other/DK	13	24.9	9.1	40.7
All	Musty odor at times	0.38	Yes	72	31.5	19.4	43.6
			No	123	68.5	56.4	80.6
Port	Musty odor at times		Yes	51	35.5	23.4	47.5
			No	80	64.5	52.5	76.6
Trad	Musty odor at times		Yes	21	29.4	14.9	43.9
			No	43	70.6	56.1	85.1
All	Air freshener odor at times	0.15	Yes	38	17.4	9.7	25.1
			No	157	82.6	74.9	90.3
Port	Air freshener odor at times		Yes	27	23.9	11.7	36.0
			No	104	76.1	64.0	88.3
Trad	Air freshener odor at times		Yes	11	14.0	5.7	22.4
			No	53	86.0	77.6	94.3
All	New carpet/furniture odor at times	0.29	Yes	17	2.9	0.8	4.9
			No	178	97.1	95.1	99.2
Port	New carpet/furniture odor at times		Yes	13	4.5	0.6	8.3
			No	118	95.5	91.7	99.4
Trad	New carpet/furniture odor at times		Yes	4	2.0	0.0	4.5
			No	60	98.0	95.5	100.0
All	General instruction classroom	0.05	Yes	177	93.5	88.6	98.5
			No	17	6.5	1.5	11.4
Port	General instruction classroom		Yes	118	87.9	79.7	96.1
			No	12	12.1	3.9	20.3
Trad	General instruction classroom		Yes	59	96.5	91.6	100.0
			No	5	3.5	0.0	8.4

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
All	HVAC mode	0.92	Heating	81	38.8	25.3	52.3
			Cooling	88	52.2	39.3	65.2
			Fan_only	18	6.4	1.1	11.6
			NA	3	2.6	0.0	5.6
Port	HVAC mode		Heating	56	38.6	24.4	52.8
			Cooling	58	52.0	38.6	65.4
			Fan_only	14	7.5	2.3	12.8
			NA	1	1.9	0.0	5.5
Trad	HVAC mode		Heating	25	39.0	22.9	55.0
			Cooling	30	52.4	36.8	68.0
			Fan_only	4	5.7	0.0	12.2
			NA	2	2.9	0.0	7.2
All	Max wall, ceiling, floor moisture (%)	0.12	Max=0	152	82.9	75.3	90.5
			Max>0	38	17.1	9.5	24.7
Port	Max wall, ceiling, floor moisture (%)		Max=0	108	88.5	80.2	96.7
			Max>0	21	11.5	3.3	19.8
Trad	Max wall, ceiling, floor moisture (%)		Max=0	44	79.9	70.1	89.7
			Max>0	17	20.1	10.3	29.9
All	Air handling unit location	0.00	Wall	109	35.0	26.3	43.7
			Window	1	0.8	0.0	2.3
			Rooftop	40	37.2	25.9	48.6
			Other/NA	34	27.0	15.5	38.5
Port	Air handling unit location		Wall	103	79.8	68.7	90.8
			Window	0	0.0	0.0	0.0
			Rooftop	12	11.9	4.6	19.2
			Other/NA	13	8.3	0.5	16.2
Trad	Air handling unit location		Wall	6	9.3	1.0	17.6
			Window	1	1.2	0.0	3.7
			Rooftop	28	51.8	35.2	68.4
			Other/NA	21	37.7	21.6	53.9
All	Type heating system	0.05	Forced_air	2	1.6	0.0	4.6
			Radiant	6	4.8	0.0	12.1
			Heat_pump	167	83.9	74.0	93.8
			Other/NA	12	9.8	3.0	16.6

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Port	Type heating system		Forced_air	1	0.0	0.0	0.1
			Radiant	4	1.1	0.0	3.3
			Heat_pump	120	96.4	92.1	100.0
			Other/NA	3	2.5	0.0	6.3
Trad	Type heating system		Forced_air	1	2.4	0.0	7.2
			Radiant	2	6.8	0.0	17.1
			Heat_pump	47	76.9	62.6	91.3
			Other/NA	9	13.9	3.7	24.0
All	Heating fuel	0.01	Electricity	166	85.9	76.0	95.7
			Natural_gas	19	12.1	2.7	21.6
			Other/NA	3	2.0	0.0	4.8
Port	Heating fuel		Electricity	119	98.1	95.6	100.0
			Natural_gas	8	1.9	0.0	4.4
			Other/NA	0	0.0	0.0	0.0
Trad	Heating fuel		Electricity	47	79.3	65.4	93.2
			Natural_gas	11	17.6	4.3	30.9
			Other/NA	3	3.1	0.0	7.3
All	Ease of access to AHU interior	0.00	Good	105	46.9	33.4	60.4
			Fair	48	29.5	16.3	42.7
			Poor/None	32	23.6	13.6	33.6
Port	Ease of access to AHU interior		Good	86	66.1	50.0	82.1
			Fair	33	27.3	12.7	41.8
			Poor/None	10	6.7	0.3	13.1
Trad	Ease of access to AHU interior		Good	19	35.3	18.1	52.5
			Fair	15	30.9	13.2	48.5
			Poor/None	22	33.8	18.2	49.4
All	Dirt loading on filter	0.01	Heavy	22	8.7	2.5	14.9
			Medium	40	22.7	10.6	34.7
			Light	98	45.9	31.0	60.8
			DK/NA	28	22.8	9.9	35.6
Port	Dirt loading on filter		Heavy	15	8.6	1.0	16.2
			Medium	29	31.6	16.0	47.2
			Light	70	51.6	35.9	67.4
			DK/NA	13	8.2	1.2	15.2

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Trad	Dirt loading on filter		Heavy	7	8.7	1.7	15.8
			Medium	11	17.9	5.8	30.1
			Light	28	42.9	25.8	59.9
			DK/NA	15	30.5	14.1	46.9
All	Size of gap around filter	0.01	>=1/2in.	22	11.8	2.6	21.0
			<1/2in.	121	55.4	41.9	68.8
			None	25	12.0	3.9	20.1
			DK/NA	21	20.9	8.4	33.3
Port	Size of gap around filter		>=1/2in.	17	14.3	3.1	25.5
			<1/2in.	90	71.6	59.2	84.0
			None	14	10.5	3.2	17.8
			DK/NA	8	3.6	0.0	7.9
Trad	Size of gap around filter		>=1/2in.	5	10.5	0.6	20.4
			<1/2in.	31	46.3	30.4	62.3
			None	11	12.8	2.5	23.1
			DK/NA	13	30.4	13.3	47.5
All	Mold or mildew on filter	0.01	Yes	1	0.5	0.0	1.4
			No	162	83.5	72.4	94.7
			DK/NA	19	16.0	4.9	27.1
Port	Mold or mildew on filter		Yes	1	1.3	0.0	4.1
			No	116	96.7	92.9	100.0
			DK/NA	7	1.9	0.0	4.6
Trad	Mold or mildew on filter		Yes	0	0.0	0.0	0.0
			No	46	76.6	60.9	92.3
			DK/NA	12	23.4	7.7	39.1
All	Clean condensate drain pans & lines	0.00	Yes	72	46.6	33.0	60.1
			No	101	53.4	39.9	67.0
Port	Clean condensate drain pans & lines		Yes	44	30.0	18.8	41.2
			No	76	70.0	58.8	81.2
Trad	Clean condensate drain pans & lines		Yes	28	56.7	39.5	73.9
			No	25	43.3	26.1	60.5
All	Standing water in drain test	0.00	Yes	62	26.9	17.5	36.3
			No	54	29.6	18.0	41.1
			NA	71	43.5	30.9	56.1

Classroom Type	Classification Variable	p-Value Wald Chi^2	Category	Sample Size	Est. Pop. Percent	Approx. Lower 95% Limit	Approx. Upper 95% Limit
Port	Standing water in drain test		Yes	57	55.3	41.2	69.5
			No	30	19.3	9.0	29.7
			NA	40	25.3	12.5	38.2
Trad	Standing water in drain test		Yes	5	11.1	1.6	20.6
			No	24	35.3	19.9	50.7
			NA	31	53.6	37.4	69.8
All	Blocked drain in drain test	0.00	Yes	43	17.5	10.4	24.6
			No	73	39.0	27.3	50.7
			NA	71	43.5	30.9	56.1
Port	Blocked drain in drain test		Yes	39	36.6	21.4	51.9
			No	48	38.1	23.6	52.6
			NA	40	25.3	12.5	38.2
Trad	Blocked drain in drain test		Yes	4	6.8	0.0	14.7
			No	25	39.5	23.3	55.7
			NA	31	53.6	37.4	69.8
All	Drain test failure	0.00	Yes	68	28.8	19.4	38.2
			No	48	27.7	16.2	39.2
			NA	71	43.5	30.9	56.1
Port	Drain test failure		Yes	61	58.5	44.1	72.8
			No	26	16.2	6.1	26.4
			NA	40	25.3	12.5	38.2
Trad	Drain test failure		Yes	7	12.4	2.8	21.9
			No	22	34.0	18.6	49.5
			NA	31	53.6	37.4	69.8
All	Air intake blocked	0.06	Yes	11	5.6	0.0	12.7
			No	152	81.7	72.0	91.4
			DK/NA	25	12.7	5.4	19.9
Port	Air intake blocked		Yes	10	10.8	0.0	21.8
			No	105	80.1	66.5	93.7
			DK/NA	13	9.2	0.5	17.8
Trad	Air intake blocked		Yes	1	2.7	0.0	8.0
			No	47	82.7	72.1	93.3
			DK/NA	12	14.6	5.2	24.1

PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CALIFORNIA CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Floor area (sq.ft.)	All	159	155018	960.45	662.11	743.7	878.74	899.41	947.52	1202.9	1630.4
	Port	110	57144	903.06	599.55	692.61	826.31	895.23	919.97	1059.1	1175.9
	Trad	49	97874	993.96	654.18	743.03	883.83	899.65	974.4	1285.1	1679.7
Number chairs in room	All	188	174915	34.524	19.516	25.152	28.467	33.588	38.811	42.476	49.965
	Port	128	65365	34.178	18.221	24.982	28.553	33.765	37.741	42.293	46.384
	Trad	60	109550	34.731	19.569	25.236	28.117	33.547	39.225	42.95	52.45
Outdoor air flow (cfm)	All	139	118745	808.66	311.75	426.6	660.78	851.31	942.05	1058.9	1148.2
	Port	107	56653	828.17	326.68	413.99	722.44	871.17	935.23	1092.5	1197.7
	Trad	32	62093	790.86	283	404.75	602.53	831.86	1000.4	1011.6	1054.3
Outdoor air flow (cfm/chair)	All	133	105107	24.416	8.807	11.652	19.515	23.871	27.918	36.249	41.645
	Port	103	54256	25.367	10.093	13.344	19.926	23.711	30.02	37.092	41.996
	Trad	30	50852	23.401	N	10.348	18.712	24.004	25.81	33.034	39.176
Outdoor air flow (cfm/sq.ft.)	All	120	109380	0.8737	0.3179	0.3938	0.6689	0.9156	1.0487	1.2673	1.3854
	Port	94	53766	0.9465	0.3614	0.4696	0.7696	0.957	1.1217	1.3884	1.4554
	Trad	26	55615	0.8033	N	0.3302	0.6557	0.7856	0.9821	1.0979	1.1412
Total supply air flow (cfm)	All	151	134747	593.02	183.69	241.19	422.44	600.93	733.48	960.52	1054.7
	Port	112	59785	636.31	241.85	274.2	509.33	625.06	746.64	961.79	1064.4
	Trad	39	74962	558.49	77.883	188.36	356.84	571.22	656.92	933.34	1043.5
Mid-room light (ft. candles)	All	191	191705	61.814	29.46	36.452	47.877	61.218	75.933	84.858	92.732
	Port	129	67562	55.682	21.066	33.03	44.426	54.908	67.403	78.995	81.358
	Trad	62	124142	65.151	31.315	41.859	48.219	65.878	77.453	90.354	94.801

PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CALIFORNIA CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Noise-indoor center-HVAC on (dBA)	All	179	182163	56.371	43.658	46.697	52.645	56.291	60.353	65.541	67.692
	Port	121	63635	55.958	46.523	47.045	50.71	55.041	60.017	65.03	68.285
	Trad	58	118528	56.594	42.331	45.501	52.909	57.069	61.19	65.534	66.688
Noise-near register-HVAC on (dBA)	All	181	179267	59.046	45.563	49.383	54.809	58.896	61.684	70.223	75.711
	Port	124	65006	59.212	48.531	49.903	54.688	59.085	61.896	69.288	72.081
	Trad	57	114260	58.952	43.703	47.553	54.469	58.578	61.425	70.355	N
Noise-outdoor-HVAC on (dBA)	All	182	184147	55.802	46.184	47.129	50.914	54.068	59.879	66.305	69.518
	Port	123	61673	55.946	46.626	46.935	51.006	54.612	60.571	64.959	68.619
	Trad	59	122473	55.729	45.684	47.144	50.747	53.52	58.433	66.789	69.743
Noise-indoor center-HVAC off (dBA)	All	133	149876	56.804	47.507	51.069	52.598	56.121	60.831	65.494	67.171
	Port	90	54137	57.386	41.283	49.829	52.822	57.209	62.64	66.923	68.136
	Trad	43	95739	56.475	47.062	51.079	52.58	55.98	58.329	65.057	66.692
Noise-near register-HVAC off (dBA)	All	135	155321	56.284	46.198	49.323	52.55	55.227	59.642	64.92	68.917
	Port	90	54137	57.598	47.068	49.728	52.935	57.637	62.685	65.058	68.124
	Trad	45	101184	55.581	45.571	48.403	52.301	54.464	56.231	63.415	68.511
Noise-outdoor-HVAC off (dBA)	All	181	180343	54.515	46.739	47.567	49.734	52.751	58.56	64.196	66.351
	Port	123	62137	54.401	46.089	47.13	50.283	53.374	58.601	61.664	65.077
	Trad	58	118206	54.575	46.946	47.691	49.362	52.654	57.915	64.199	66.104
HVAC age (yrs)	All	145	143762	10.876	1.5928	2.1812	3.7909	6.855	12.633	22.58	32.792
	Port	104	55323	10.133	2.0977	2.7048	4.1099	6.3945	14.349	20.494	23.432
	Trad	41	88438	11.34	1.437	2.0015	3.0038	7.0182	11.979	26.574	35.965

APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Floor area (sq.ft.)	All	Lower	897.47	481.97	693.63	793.42	897.65	920.92	964.24	1157.6
	All	Upper	1023.4	787.7	851.01	897.84	924.02	1133.3	1639.4	1795.3
	Port	Lower	847.49	444.94	594.06	744.37	892.26	911.82	924.29	938.22
	Port	Upper	958.63	733.35	805.4	893.02	918.52	973.34	1182.3	N
	Trad	Lower	897.8	567.12	639.57	753.52	897.65	899.89	960.12	1013.5
	Trad	Upper	1090.1	873.9	889.26	899.37	946.79	1200.8	1723	N
Number chairs in room	All	Lower	32.289	14.446	20.985	27.783	32.509	36.621	40.026	41.7
	All	Upper	36.759	25.809	27.883	31.347	36.156	41.685	N	N
	Port	Lower	32.089	12.25	16.446	27.101	31.829	36.21	39.297	41.517
	Port	Upper	36.268	25.998	27.521	31.235	35.753	40.821	46.498	48.497
	Trad	Lower	31.638	16.207	19.053	26.618	30.586	35.209	39.177	39.8
	Trad	Upper	37.823	27.142	27.906	32.206	35.828	41.711	53.899	55.507
Outdoor air flow (cfm)	All	Lower	734.66	197.46	310.23	574.88	744.31	885.8	942.83	1005.9
	All	Upper	882.66	549.33	645.96	773.83	893.95	1041.5	1149.7	N
	Port	Lower	760.14	187.14	321.51	643.97	805.62	900.82	950.9	997.14
	Port	Upper	896.19	647.49	699.08	826.5	896.71	1054	1213.5	N
	Trad	Lower	661.88	172.17	239.62	427.11	617.53	832.1	886.82	908.34
	Trad	Upper	919.83	603.12	633	831.6	1000.3	1006.9	N	N
Outdoor air flow (cfm/chair)	All	Lower	21.791	8.1478	8.751	15.121	21.691	25.047	29.903	33.792
	All	Upper	27.041	14.851	17.401	22.007	25.571	30.603	39.981	N
	Port	Lower	22.066	5.2048	9.5145	15.364	22.52	26.1	30.648	33.114
	Port	Upper	28.668	15.964	19.451	22.793	27.196	32.758	42.701	N
	Trad	Lower	19.506	N	N	10.469	19.194	24.122	25.453	25.821

APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Trad	Upper	27.296	18.751	19.558	23.807	25.442	29.665	39.457	N
Outdoor air flow (cfm/sq.ft.)	All	Lower	0.7894	0.1891	0.2954	0.4897	0.7952	0.9786	1.0746	1.2206
	All	Upper	0.9579	0.4877	0.6439	0.8086	1.0024	1.1481	1.3333	1.5505
	Port	Lower	0.8484	0.1873	0.3137	0.6599	0.8436	1.0303	1.1517	1.3329
	Port	Upper	1.0445	0.6777	0.7679	0.8528	1.0599	1.2931	1.445	N
	Trad	Lower	0.6689	N	N	0.3326	0.6635	0.779	0.9756	0.9895
	Trad	Upper	0.9377	0.6585	0.6914	0.8085	0.9796	1.0782	N	N
Total supply air flow (cfm)	All	Lower	521.14	8.5839	155.63	301.34	544.86	641.33	742.88	807.07
	All	Upper	664.9	269.83	375.79	544.48	645.25	877.43	1053.8	1106.4
	Port	Lower	564.62	202.12	241.84	325.56	566.95	702.22	750.91	867.35
	Port	Upper	707.99	374.86	468.53	567.85	724.93	901.33	1063.3	1135.7
	Trad	Lower	460.3	N	27.236	236.12	445.82	577.11	644.75	692.54
	Trad	Upper	656.69	281.49	379.34	536.94	630.25	836.33	N	N
Mid-room light (ft. candles)	All	Lower	57.519	22.387	29.761	45.498	52.281	68.05	79.595	83.713
	All	Upper	66.109	37.735	44.549	51.473	67.138	79.788	92.134	N
	Port	Lower	50.174	16.303	20.975	36.833	51.309	61.205	69.159	74.776
	Port	Upper	61.191	34.74	38.081	49.804	60.935	74.386	82.16	N
	Trad	Lower	59.018	23.489	30.299	46.669	50.43	68.58	80.048	86.721
	Trad	Upper	71.284	45.874	48.15	61.346	74.513	84.529	N	N
Noise-indoor center-HVAC on (dBA)	All	Lower	54.644	41.664	43.692	50.56	54.9	57.868	62.45	64.648
	All	Upper	58.099	47.832	51.613	54.793	58.23	63.909	67.667	69.011
	Port	Lower	54.243	43.735	46.537	49.237	53.744	57.562	61.99	63.421
	Port	Upper	57.673	48.253	50.029	54.015	57.873	62.974	68.281	N

APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Trad	Lower	54.517	N	42.258	51.36	54.798	57.33	61.231	63.105
	Trad	Upper	58.67	51.43	52.717	56.083	58.537	65.142	67.581	N
Noise-near register-HVAC on (dBA)	All	Lower	56.805	42.943	46.472	51.801	57.759	60.24	63.14	65.905
	All	Upper	61.288	50.352	52.707	58.228	60.282	65.836	N	N
	Port	Lower	57.496	45.873	48.649	52.48	56.957	60.904	62.919	65.956
	Port	Upper	60.928	51.678	53.824	57.676	60.87	64.421	N	N
	Trad	Lower	55.966	N	N	50.806	57.369	58.95	61.415	64.521
	Trad	Upper	61.938	50.878	52.894	58.326	60.529	68.497	N	N
Noise-outdoor-HVAC on (dBA)	All	Lower	54.231	42.893	45.861	49.046	52.735	57.022	62.552	65.323
	All	Upper	57.372	48.433	49.608	52.995	56.454	62.839	69.469	N
	Port	Lower	54.296	43.228	46.64	47.909	52.851	57.651	62.599	64.376
	Port	Upper	57.596	47.4	49.041	53.325	57.887	63.357	68.622	N
	Trad	Lower	53.61	N	45.324	49.108	52.357	54.659	60.007	63.963
	Trad	Upper	57.848	49.377	50.745	53.149	56.608	63.815	N	N
Noise-indoor center-HVAC off (dBA)	All	Lower	54.987	44.024	47.496	52.162	53.762	57.026	61.687	64.279
	All	Upper	58.621	52.037	52.602	55.302	57.199	64.283	67.179	69.262
	Port	Lower	54.998	40.733	41.176	51.973	54.438	57.984	62.598	64.831
	Port	Upper	59.774	52.035	52.762	55.975	61.12	65.128	68.216	N
	Trad	Lower	54.517	42.5	46.447	51.829	53.399	56.357	58.142	61.288
	Trad	Upper	58.433	52.516	53.382	55.59	56.819	64.329	66.694	N
Noise-near register-HVAC off (dBA)	All	Lower	54.455	42.753	45.985	50.465	54.156	56.11	61.95	63.39
	All	Upper	58.113	50.352	52.31	54.418	56.222	63.027	68.915	N
	Port	Lower	55.308	41.14	45.926	51.672	55.001	58.673	62.666	63.178

APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Port	Upper	59.887	51.591	52.536	55.759	61.619	64.349	68.215	N
	Trad	Lower	53.592	41.418	44.728	49.8	53.097	54.855	56.222	60.145
	Trad	Upper	57.57	51.782	52.32	54.071	56.03	62.509	68.918	N
Noise-outdoor-HVAC off (dBA)	All	Lower	53.191	45.283	46.759	48.42	52.107	55.501	60.603	64.161
	All	Upper	55.84	47.82	48.681	51.994	55.326	61.389	66.291	66.983
	Port	Lower	52.958	45.035	46.122	48.693	52.234	54.991	58.801	60.13
	Port	Upper	55.845	48.192	49.762	52.137	55.603	60.429	64.981	66.601
	Trad	Lower	52.835	N	46.931	48.356	51.371	55.349	59.185	63.396
	Trad	Upper	56.316	48.244	49.06	52.278	55.73	63.584	66.188	N
HVAC age (yrs)	All	Lower	8.491	1.2092	1.6293	2.5807	4.6333	10.035	17.575	20.294
	All	Upper	13.26	2.5944	3.4292	4.6441	9.7679	19.432	32.88	38.604
	Port	Lower	7.5685	1.4523	2.133	3.2321	4.685	8.3499	14.388	15.906
	Port	Upper	12.697	3.2793	4.0435	4.8522	10.39	18.783	23.854	32.334
	Trad	Lower	7.7901	1.0965	1.4029	2.2136	4.1139	8.0449	12.425	19.532
	Trad	Upper	14.891	2.8847	4.0822	4.9175	10.597	20.98	37.265	40.862

PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CALIFORNIA CLASSROOMS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	n	Est. No. Classrms	Mean	25th Pctl	50th Pctl	75th Pctl
Outdoor air flow (cfm)	All	All	139	118745	808.66	660.78	851.31	942.05
	All	Heating	50	36834	840.04	666.85	838.67	902.97
	All	Cooling	74	75250	770.98	606.97	840.77	939.48
	All	Fan Only	15	6662	1060.7	875.99	996	1183.3
	All	NA	0	0	N	N	N	N
	Port	All	107	56653	828.17	722.44	871.17	935.23
	Port	Heating	41	20608	848.47	761.58	867.97	919.5
	Port	Cooling	53	30987	764.86	630.45	843.18	912.27
	Port	Fan Only	13	5058	1133.3	977.21	1087.9	1240.8
	Port	NA	0	0	N	N	N	N
	Trad	All	32	62093	790.86	602.53	831.86	1000.4
	Trad	Heating	9	16226	829.34	502.92	623.46	862.31
	Trad	Cooling	21	44263	775.26	597.88	836.68	1001.8
	Trad	Fan Only	2	1604	832	N	N	N
	Trad	NA	0	0	N	N	N	N
Outdoor air flow (cfm/chair)	All	All	133	105107	24.416	19.515	23.871	27.918
	All	Heating	48	35369	26.313	19.893	23.654	29.343
	All	Cooling	71	63323	22.669	16.858	23.596	27.757
	All	Fan Only	14	6415	31.2	24.047	31.314	35.815
	All	NA	0	0	N	N	N	N
	Port	All	103	54256	25.367	19.926	23.711	30.02
	Port	Heating	39	19143	27.262	20.403	24.411	29.392
	Port	Cooling	52	30301	23.064	16.864	22.565	27.839

PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CALIFORNIA CLASSROOMS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	n	Est. No. Classrms	Mean	25th Pctl	50th Pctl	75th Pctl
	Port	Fan Only	12	4811	32.337	27.264	31.942	36.875
	Port	NA	0	0	N	N	N	N
	Trad	All	30	50852	23.401	18.712	24.004	25.81
	Trad	Heating	9	16226	25.194	18.908	21.269	25.737
	Trad	Cooling	19	33022	22.307	16.481	23.981	25.351
	Trad	Fan Only	2	1604	27.789	N	N	N
	Trad	NA	0	0	N	N	N	N
Outdoor air flow (cfm/sq.ft.)	All	All	120	109380	0.8737	0.6689	0.9156	1.0487
	All	Heating	41	33162	0.827	0.7097	0.7793	1.0153
	All	Cooling	66	70019	0.8691	0.6643	0.9366	1.0348
	All	Fan Only	13	6199	1.175	0.8743	1.1785	1.2716
	All	NA	0	0	N	N	N	N
	Port	All	94	53766	0.9465	0.7696	0.957	1.1217
	Port	Heating	33	18856	0.9077	0.7582	0.9239	1.04
	Port	Cooling	50	30315	0.9234	0.7435	0.965	1.1267
	Port	Fan Only	11	4595	1.2581	1.1558	1.2489	1.4251
	Port	NA	0	0	N	N	N	N
	Trad	All	26	55615	0.8033	0.6557	0.7856	0.9821
	Trad	Heating	8	14306	0.7205	0.2861	0.7055	0.9014
	Trad	Cooling	16	39705	0.8277	0.6623	0.8349	0.9827
	Trad	Fan Only	2	1604	0.937	N	N	N
	Trad	NA	0	0	N	N	N	N

PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CALIFORNIA CLASSROOMS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	n	Est. No. Classrms	Mean	25th Pctl	50th Pctl	75th Pctl
Total supply air flow (cfm)	All	All	151	134747	593.02	422.44	600.93	733.48
	All	Heating	53	39394	543.66	372.92	540.68	662.75
	All	Cooling	81	83170	591.19	397.42	618.51	736.58
	All	Fan Only	17	12183	765.06	585.29	685.59	1053.2
	All	NA	0	0	N	N	N	N
	Port	All	112	59785	636.31	509.33	625.06	746.64
	Port	Heating	43	21657	584.78	430.87	578.81	682.36
	Port	Cooling	56	33071	650.88	476.26	622.3	817.06
	Port	Fan Only	13	5058	761.62	608.55	741.31	751.27
	Port	NA	0	0	N	N	N	N
	Trad	All	39	74962	558.49	356.84	571.22	656.92
	Trad	Heating	10	17737	493.46	325.77	524.64	538.57
	Trad	Cooling	25	50100	551.79	295.47	579.63	656.49
	Trad	Fan Only	4	7125	767.5	N	N	N
	Trad	NA	0	0	N	N	N	N

APPROXIMATE 95% CONFIDENCE LIMITS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	Conf. Limit	Mean	25th Pctl	50th Pctl	75th Pctl
Outdoor air flow (cfm)	All	All	Lower	734.66	574.88	744.31	885.8
	All	All	Upper	882.66	773.83	893.95	1047.6
	All	Heating	Lower	700.58	588.78	669.59	862.7
	All	Heating	Upper	979.51	773.53	879.5	N
	All	Cooling	Lower	673.83	439.85	655.65	869.05
	All	Cooling	Upper	868.12	840.05	925.82	1047.5
	All	Fan Only	Lower	928.17	841.19	877.04	1010.6
	All	Fan Only	Upper	1193.3	984.29	1158.7	N
	All	NA	Lower	N	N	N	N
	All	NA	Upper	N	N	N	N
	Port	All	Lower	760.14	643.97	805.62	900.82
	Port	All	Upper	896.19	826.5	896.71	1054
	Port	Heating	Lower	789.59	730.91	787.69	892.21
	Port	Heating	Upper	907.35	849.03	897.59	965.24
	Port	Cooling	Lower	666.13	363.1	714.87	857.09
	Port	Cooling	Upper	863.6	822.32	893.05	N
	Port	Fan Only	Lower	907.46	851.35	967.28	999.67
	Port	Fan Only	Upper	1359.1	1160.8	1219.6	N
	Port	NA	Lower	N	N	N	N
	Port	NA	Upper	N	N	N	N
	Trad	All	Lower	661.88	457.23	626.13	832.1
	Trad	All	Upper	919.83	831.6	1000.3	1006.9

APPROXIMATE 95% CONFIDENCE LIMITS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	Conf. Limit	Mean	25th Pctl	50th Pctl	75th Pctl
	Trad	Heating	Lower	518.67	N	N	N
	Trad	Heating	Upper	1140	774.76	898.31	N
	Trad	Cooling	Lower	633.84	343.35	599.78	827.96
	Trad	Cooling	Upper	916.68	873.61	1002.3	1006.8
	Trad	Fan Only	Lower	704.88	N	N	N
	Trad	Fan Only	Upper	959.12	N	N	N
	Trad	NA	Lower	N	N	N	N
	Trad	NA	Upper	N	N	N	N
Outdoor air flow (cfm/chair)	All	All	Lower	21.791	15.121	21.691	25.047
	All	All	Upper	27.041	22.007	25.571	30.603
	All	Heating	Lower	20.205	15.535	20.488	23.128
	All	Heating	Upper	32.421	23.753	27.65	N
	All	Cooling	Lower	20.221	13.661	20.056	24.295
	All	Cooling	Upper	25.117	22.908	25.185	28.955
	All	Fan Only	Lower	26.647	20.842	24.205	31.383
	All	Fan Only	Upper	35.753	31.009	34.282	39.385
	All	NA	Lower	N	N	N	N
	All	NA	Upper	N	N	N	N
	Port	All	Lower	22.066	15.364	22.52	26.1
	Port	All	Upper	28.668	22.793	27.196	32.758
	Port	Heating	Lower	21.049	19.349	21.009	25.616
	Port	Heating	Upper	33.475	23.828	28.155	N

APPROXIMATE 95% CONFIDENCE LIMITS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	Conf. Limit	Mean	25th Pctl	50th Pctl	75th Pctl
	Port	Cooling	Lower	19.607	12.797	19.985	23.485
	Port	Cooling	Upper	26.52	22.033	26.08	31.351
	Port	Fan Only	Lower	25.803	15.673	22.443	30.534
	Port	Fan Only	Upper	38.871	32.534	36.663	40.754
	Port	NA	Lower	N	N	N	N
	Port	NA	Upper	N	N	N	N
	Trad	All	Lower	19.506	11.139	19.208	24.153
	Trad	All	Upper	27.296	23.878	25.526	N
	Trad	Heating	Lower	15.045	N	N	N
	Trad	Heating	Upper	35.343	24.329	29.38	39.335
	Trad	Cooling	Lower	18.803	10.863	16.736	23.872
	Trad	Cooling	Upper	25.811	24.079	25.295	28.142
	Trad	Fan Only	Lower	22.357	N	N	N
	Trad	Fan Only	Upper	33.221	N	N	N
	Trad	NA	Lower	N	N	N	N
	Trad	NA	Upper	N	N	N	N
Outdoor air flow (cfm/sq.ft.)	All	All	Lower	0.7894	0.4897	0.7952	0.9786
	All	All	Upper	0.9579	0.8086	1.0024	1.1481
	All	Heating	Lower	0.6757	N	0.7405	0.922
	All	Heating	Upper	0.9782	0.7599	0.9716	N
	All	Cooling	Lower	0.7666	0.4783	0.7839	0.9689
	All	Cooling	Upper	0.9716	0.8898	1.011	1.1317

APPROXIMATE 95% CONFIDENCE LIMITS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	Conf. Limit	Mean	25th Pctl	50th Pctl	75th Pctl
	All	Fan Only	Lower	1.0475	0.4993	0.9073	1.1911
	All	Fan Only	Upper	1.3024	1.1613	1.2699	N
	All	NA	Lower	N	N	N	N
	All	NA	Upper	N	N	N	N
	Port	All	Lower	0.8484	0.6599	0.8436	1.0303
	Port	All	Upper	1.0445	0.8528	1.0599	1.2931
	Port	Heating	Lower	0.7902	0.6377	0.7531	0.9198
	Port	Heating	Upper	1.0251	0.9301	0.9859	N
	Port	Cooling	Lower	0.7811	0.4795	0.8181	0.9875
	Port	Cooling	Upper	1.0656	0.8975	1.0913	1.3448
	Port	Fan Only	Lower	1.0406	0.5888	1.1414	1.1904
	Port	Fan Only	Upper	1.4756	1.2702	1.3074	N
	Port	NA	Lower	N	N	N	N
	Port	NA	Upper	N	N	N	N
	Trad	All	Lower	0.6689	0.3326	0.6635	0.779
	Trad	All	Upper	0.9377	0.8085	0.9796	1.0782
	Trad	Heating	Lower	0.3936	N	N	0.3358
	Trad	Heating	Upper	1.0475	N	N	N
	Trad	Cooling	Lower	0.6937	0.384	0.6626	0.7807
	Trad	Cooling	Upper	0.9617	0.9745	0.9818	1.0487
	Trad	Fan Only	Lower	0.875	N	N	N
	Trad	Fan Only	Upper	0.999	N	N	N

APPROXIMATE 95% CONFIDENCE LIMITS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	Conf. Limit	Mean	25th Pctl	50th Pctl	75th Pctl
	Trad	NA	Lower	N	N	N	N
	Trad	NA	Upper	N	N	N	N
Total supply air flow (cfm)	All	All	Lower	521.14	301.34	544.86	641.33
	All	All	Upper	664.9	544.48	645.25	878.57
	All	Heating	Lower	489.04	305.86	404.7	540.93
	All	Heating	Upper	598.28	540.44	626.01	736.92
	All	Cooling	Lower	487.6	241.57	539.32	629.25
	All	Cooling	Upper	694.79	572.76	686.19	948.08
	All	Fan Only	Lower	571.26	454.91	586.84	608.6
	All	Fan Only	Upper	958.85	748	1060.6	1079.8
	All	NA	Lower	N	N	N	N
	All	NA	Upper	N	N	N	N
	Port	All	Lower	564.62	332.76	566.95	702.22
	Port	All	Upper	707.99	567.85	724.93	902.94
	Port	Heating	Lower	522.29	287.22	546.98	625.21
	Port	Heating	Upper	647.26	565.33	678.89	N
	Port	Cooling	Lower	533.33	288.68	544.83	639.42
	Port	Cooling	Upper	768.44	615.91	774.07	N
	Port	Fan Only	Lower	618.7	510.43	579.55	723.47
	Port	Fan Only	Upper	904.55	746.24	753.6	1122.2
	Port	NA	Lower	N	N	N	N
	Port	NA	Upper	N	N	N	N

APPROXIMATE 95% CONFIDENCE LIMITS — BY HVAC MODE

Variable Description	Room Type	HVAC Mode	Conf. Limit	Mean	25th Pctl	50th Pctl	75th Pctl
	Trad	All	Lower	460.3	235.54	476.83	577.11
	Trad	All	Upper	656.69	555.48	636.59	N
	Trad	Heating	Lower	388.19	247.59	302.57	387.15
	Trad	Heating	Upper	598.73	529.46	540	N
	Trad	Cooling	Lower	428.79	146.2	384.17	577.12
	Trad	Cooling	Upper	674.79	623.09	637.01	876.01
	Trad	Fan Only	Lower	453.66	N	N	N
	Trad	Fan Only	Upper	1081.3	N	N	N
	Trad	NA	Lower	N	N	N	N
	Trad	NA	Upper	N	N	N	N

ESTIMATED MEAN DIFFERENCES

Variable Description	No. Obs	Est. Pop Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
Floor area (sq.ft.)	159	155018	903.06	993.96	-90.89	55.372	-1.64	0.106
Number chairs in room	188	174915	34.178	34.731	-0.552	1.6877	-0.33	0.745
Outdoor air flow (cfm)	139	118745	828.17	790.86	37.311	72.823	0.51	0.610
Outdoor air flow (cfm/chair)	133	105107	25.367	23.401	1.9661	2.4944	0.79	0.434
Outdoor air flow (cfm/sq.ft.)	120	109380	0.9465	0.8033	0.1432	0.0787	1.82	0.074
Total supply air flow (cfm)	151	134747	636.31	558.49	77.812	50.835	1.53	0.131
Mid-room light (ft. candles)	191	191705	55.682	65.151	-9.469	4.2176	-2.25	0.029
Noise-indoor center-HVAC on (dBA)	179	182163	55.958	56.594	-0.636	0.9771	-0.65	0.518
Noise-near register-HVAC on (dBA)	181	179267	59.212	58.952	0.2601	1.3569	0.19	0.849
Noise-outdoor-HVAC on (dBA)	182	184147	55.946	55.729	0.2166	1.2667	0.17	0.865
Noise-indoor center-HVAC off (dBA)	133	149876	57.386	56.475	0.911	1.1708	0.78	0.440
Noise-near register-HVAC off (dBA)	135	155321	57.598	55.581	2.017	1.1401	1.77	0.082
Noise-outdoor-HVAC off (dBA)	181	180343	54.401	54.575	-0.174	1.0229	-0.17	0.866
HVAC age (yrs)	145	143762	10.133	11.34	-1.208	2.1803	-0.55	0.582

APPENDIX E

Estimated Distributions of Pollutant Levels

Appendix E summarizes the laboratory data. It consists of the following sections:

Part 1: Weighted summary statistics (sample size [n], percentage measurable, mean, selected percentiles) for outdoor data, by medium and species. The target population is the eligible schools.

Part 2: Approximate 95% confidence intervals for the same cases.

Part 3: Weighted summary statistics (sample size [n], percentage measurable, mean, selected percentiles) for indoor data, by medium and species. The target population is the eligible classrooms. Statistics are reported for all classrooms and for portables and traditionals.

Part 4: Approximate 95% confidence intervals for the same cases.

Part 5: Tests (approximate t tests) of differences in weighted means for portable and traditional classrooms, by medium and species for cases for which population-based weighting is appropriate.

Part 6: Unweighted summary statistics for outdoor data – for media and species for which population-based weighting was not appropriate.

Part 7: Summary statistics (sample size [n], percentage measurable, mean, selected percentiles) for indoor data, by medium and species, for cases where population-based weighting was not appropriate. The target population in this case is the eligible classrooms in the *sample* schools for which data were obtained (i.e., weights reflect the different distributions of portables and traditionals within and among those sample schools, but inferences to the population of eligible classrooms is not warranted.) Statistics are reported for all classrooms and for portables and traditionals.

Part 8: Tests (approximate t tests) of differences in the sample-weighted means for portable and traditional classrooms, by medium and species, for cases for which population-based weighting is inappropriate.

Note: Percentiles and confidence intervals that were not estimable are shown as blank cells in the tables.

WEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
ESTIMATES

Medium/ Location	Units	Analyte	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Outdoor Air	logcnt/m3	Alternaria	62	71.4	1.15				0.91	1.66	2.63	2.88
Pollen/Spores		Amerospores	62	88.7	1.74			1.57	1.85	2.22	2.42	2.48
		Arthrinium	62	18.9	0.23						0.98	1.44
		Ascospores	62	82.6	1.59			0.85	1.72	2.08	2.58	3.14
		Aspergillus/Penicillium-like	62	51.4	1.13				0.87	2.18	2.53	2.77
		Aureobasidium	62	0.0	0.00							
		Basidiospores	62	77.0	1.39			0.52	1.61	1.89	2.29	2.64
		Bipolaris/Dreschlera	62	47.9	0.63					0.76	1.87	2.27
		Botrytis	62	0.2	0.00							
		Chaetomium	62	15.0	0.14						0.65	0.81
		Cladosporium	62	97.7	2.64	1.21	1.67	2.07	2.60	3.19	3.51	3.61
		Curvularia	62	16.7	0.20						0.65	1.20
		Epicoccum	62	0.0	0.00							
		Fusarium	62	0.0	0.00							
		Memnoniella	62	0.0	0.00							
		Mycelial Fragments	62	97.8	1.42	0.09	0.24	0.72	1.26	1.68	2.01	3.11
		Nigrospora	62	23.1	0.34						1.14	1.81
		Oidium/Peronospora	62	17.7	0.16						0.72	0.88
		Pithomyces/Ulocladium	62	20.2	0.28						1.06	1.72
		Pollen Count	62	97.8	1.32	0.05	0.15	0.43	0.94	1.66	2.22	2.63
		Rusts	62	29.8	0.38					0.43	1.33	1.43
		Smuts/Myxomycetes	62	62.0	0.96				0.61	1.54	2.05	2.32
		Stachybotrys	62	3.2	0.03							
		Stemphylium	62	3.8	0.07							
		Torula	62	7.9	0.08							0.40
		Total Fungal Spores	62	97.8	3.11	2.27	2.38	2.68	3.14	3.41	3.80	4.21
		Unidentified Conidia	62	21.7	0.23						0.90	1.15

WEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
ESTIMATES

Medium/ Location	Units	Analyte	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Outdoor Air	ppb	Formaldehyde	62	100.0	3.48	1.20	1.24	1.81	2.45	4.28	6.94	8.05
Aldehydes		Acetaldehyde	62	78.8	5.39	2.14	3.12	3.42	4.36	5.31	8.22	10.05
		Propionaldehyde	62	23.4	0.08						0.24	0.46
		Crotonaldehyde	62	18.9	0.26					0.42	0.84	0.99
		n-Butyraldehyde	62	7.8	0.02							0.05
		Benzaldehyde	62	21.5	0.09					0.02	0.28	0.55
		iso-Valeraldehyde	62	12.5	0.07						0.41	0.48
		Valeraldehyde	62	10.1	0.01						0.11	0.14
		Hexanaldehyde	62	30.4	0.15					0.26	0.42	0.82
		2,5-Dimethylbenzaldehyde	62	3.9	0.00							0.02
		o,p-Tolualdehyde	62	1.7	0.00							
		m-Tolualdehyde	62	0.0	0.00							
Outdoor Air	ug/m3	1,1,1-Trichloroethane	28	100.0	1.04		0.47	0.66	0.88	1.06	1.21	2.80
VOCs		Benzene	26	32.9	1.04			0.20	0.54	1.79	2.01	2.97
		Carbon tetrachloride	32	100.0	1.79	0.62	0.77	0.99	1.67	2.05	2.45	3.64
		Chloroform	28	41.9	0.45	0.14	0.16	0.20	0.27	0.32	1.12	
		Ethylbenzene	28	100.0	0.79		0.28	0.36	0.73	1.00	1.28	1.44
		Tetrachloroethylene	34	100.0	1.08	0.14	0.19	0.28	0.54	1.12	2.46	3.59
		Toluene	26	40.3	2.47		0.08	0.96	2.11	3.61	3.91	5.45
		m,p-Xylene	28	100.0	1.99		0.54	0.97	2.09	2.39	2.96	3.66
		o-Xylene	28	100.0	0.86		0.25	0.41	0.81	1.11	1.28	1.65
Soil	mg/kg	Arsenic	67	36.1	7.67					9.20	10.40	16.64
Metals		Barium	67	100.0	94.22	42.53	50.38	64.18	88.78	115.05	154.59	163.51
		Cadmium	67	81.6	1.36			0.67	1.02	1.69	2.61	3.24
		Chromium	67	100.0	26.72	7.30	8.07	12.58	18.40	33.14	49.81	76.99
		Copper	67	100.0	25.53	8.27	10.47	14.95	22.23	34.22	43.70	51.25
		Lead	67	97.9	37.57	8.82	9.18	12.22	16.52	34.23	92.66	148.74
		Nickel	67	100.0	28.57	3.61	5.83	7.80	13.78	26.53	64.85	115.84

WEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
ESTIMATES

Medium/ Location	Units	Analyte	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Selenium	67	0.0	7.78							
		Vanadium	67	100.0	32.81	15.86	19.71	22.88	30.25	37.69	43.47	59.37
		Zinc	67	100.0	182.95	43.87	56.34	72.00	104.45	161.08	306.36	412.18
		Beryllium	67	91.3	0.52		0.28	0.36	0.48	0.58	0.72	1.02
		Cobalt	67	100.0	8.43	3.28	4.32	5.33	8.00	10.20	13.79	16.42
		Molybdenum	67	3.8	5.34							7.05
		Thallium	67	0.0	10.37							

WEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Outdoor Air	logcnt/m3	Alternaria	L	58.37	0.88				0.35	1.18	1.82	2.00
			U	84.43	1.42			0.47	1.39	2.01	2.97	
Outdoor Air	logcnt/m3	Amerospores	L	79.41	1.54			1.15	1.75	2.04	2.31	2.40
			U	98.00	1.94	1.15	1.50	1.77	2.05	2.40	2.49	
Outdoor Air	logcnt/m3	Arthrinium	L	8.40	0.09							0.83
			U	29.45	0.38					0.82	1.59	1.81
Outdoor Air	logcnt/m3	Ascospores	L	70.77	1.30				1.46	1.99	2.10	2.28
			U	94.40	1.88		0.64	1.55	2.00	2.30	3.32	3.46
Outdoor Air	logcnt/m3	Aspergillus/Penicillium-like	L	36.72	0.78					1.70	2.25	2.37
			U	66.10	1.48				1.90	2.38	2.87	
Outdoor Air	logcnt/m3	Aureobasidium	L	0.00	0.00							
			U	0.00	0.00							
Outdoor Air	logcnt/m3	Basidiospores	L	64.02	1.12				1.30	1.71	1.93	2.12
			U	90.00	1.65		0.01	1.42	1.78	2.13	2.64	2.92
Outdoor Air	logcnt/m3	Bipolaris/Dreschlera	L	34.55	0.41					0.35	0.96	1.20
			U	61.30	0.84				0.34	1.19	2.40	
Outdoor Air	logcnt/m3	Botrytis	L	0.00	0.00							
			U	0.57	0.01							
Outdoor Air	logcnt/m3	Chaetomium	L	3.68	0.03							
			U	26.33	0.25					0.32	0.83	1.07
Outdoor Air	logcnt/m3	Cladosporium	L	93.21	2.41		1.05	1.77	2.24	2.98	3.32	3.49
			U	100.00	2.87	1.85	2.04	2.31	2.97	3.45	3.62	
Outdoor Air	logcnt/m3	Curvularia	L	6.51	0.06							0.20
			U	26.98	0.34					0.15	1.26	
Outdoor Air	logcnt/m3	Epicoccum	L	0.00	0.00							
			U	0.00	0.00							
Outdoor Air	logcnt/m3	Fusarium	L	0.00	0.00							
			U	0.00	0.00							

WEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Outdoor Air	logcnt/m3	Memnoniella	L	0.00	0.00							
			U	0.00	0.00							
Outdoor Air	logcnt/m3	Mycelial Fragments	L	93.34	1.24		0.08	0.44	0.99	1.40	1.77	1.93
			U	100.00	1.59			1.03	1.43	1.94	3.12	
Outdoor Air	logcnt/m3	Nigrospora	L	10.83	0.13						0.11	0.76
			U	35.29	0.54					0.78	1.88	
Outdoor Air	logcnt/m3	Oidium/Peronospora	L	6.51	0.06							
			U	28.86	0.26					0.58	0.89	1.01
Outdoor Air	logcnt/m3	Pithomyces/Ulocladium	L	9.85	0.13							0.64
			U	30.62	0.44					0.40	1.77	
Outdoor Air	logcnt/m3	Pollen Count	L	93.34	1.14		0.05	0.28	0.66	1.26	1.70	2.06
			U	100.00	1.50				1.39	2.07	2.64	2.69
Outdoor Air	logcnt/m3	Rusts	L	16.46	0.19						0.72	1.02
			U	43.16	0.57					1.05	1.81	
Outdoor Air	logcnt/m3	Smuts/Myxomycetes	L	47.89	0.69					1.03	1.58	1.92
			U	76.12	1.23			0.06	1.12	1.93	2.36	
Outdoor Air	logcnt/m3	Stachybotrys	L	0.00	0.00							
			U	7.53	0.07							0.31
Outdoor Air	logcnt/m3	Stemphylium	L	0.00	0.00							
			U	8.91	0.16							1.25
Outdoor Air	logcnt/m3	Torula	L	0.37	0.00							
			U	15.47	0.15						0.44	0.94
Outdoor Air	logcnt/m3	Total Fungal Spores	L	93.34	2.89		2.25	2.45	2.92	3.31	3.54	3.66
			U	100.00	3.33	2.48	2.65	2.98	3.34	3.68	4.22	
Outdoor Air	logcnt/m3	Unidentified Conidia	L	9.88	0.10							0.55
			U	33.43	0.35					0.53	1.19	1.45
Outdoor Air	ppb	Formaldehyde	L	100.00	2.81	1.08	1.18	1.30	2.29	2.91	5.14	6.66
			U	100.00	4.15	1.31	1.69	2.32	3.02	6.58	8.29	

WEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Outdoor Air	ppb	Acetaldehyde	L	66.64	3.89		2.12	3.25	3.68	4.87	5.59	5.95
			U	91.06	6.90	3.24	3.39	3.79	5.00	5.92	10.44	
Outdoor Air	ppb	Propionaldehyde	L	11.42	0.03						0.07	0.19
			U	35.42	0.12					0.19	0.47	0.58
Outdoor Air	ppb	Crotonaldehyde	L	9.19	0.15					0.10	0.51	0.80
			U	28.53	0.37				0.09	0.74	1.02	
Outdoor Air	ppb	n-Butyraldehyde	L	0.53	0.00							
			U	15.04	0.04						0.06	
Outdoor Air	ppb	Benzaldehyde	L	10.96	0.04						0.12	0.25
			U	32.03	0.13					0.26	0.57	
Outdoor Air	ppb	iso-Valeraldehyde	L	2.21	0.01							
			U	22.73	0.12						0.52	
Outdoor Air	ppb	Valeraldehyde	L	1.88	0.00							
			U	18.37	0.03						0.15	
Outdoor Air	ppb	Hexanaldehyde	L	17.58	0.07						0.30	0.38
			U	43.25	0.22					0.38	0.85	
Outdoor Air	ppb	2,5-Dimethylbenzaldehyde	L	0.00	0.00							
			U	9.51	0.00						0.02	
Outdoor Air	ppb	o,p-Tolualdehyde	L	0.00	0.00							
			U	5.12	0.01							
Outdoor Air	ppb	m-Tolualdehyde	L	0.00	0.00							
			U	0.00	0.00							
Outdoor Air	ug/m3	1,1,1-Trichloroethane	L	100.00	0.76			0.49	0.68	0.89	0.94	1.06
			U	100.00	1.32	0.67	0.72	0.88	1.00	1.21		
Outdoor Air	ug/m3	Benzene	L	10.02	0.57				0.22	0.54	1.20	1.77
			U	55.77	1.50	0.24	0.32	0.54	1.68	2.01	3.21	3.48
Outdoor Air	ug/m3	Carbon tetrachloride	L	100.00	1.38	0.23	0.44	0.79	1.14	1.68	2.03	2.06
			U	100.00	2.19	0.86	1.12	1.62	2.04	2.42	5.01	

WEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Outdoor Air	ug/m3	Chloroform	L	18.06	0.22			0.17	0.21	0.27	0.31	0.33
			U	65.64	0.68	0.20	0.22	0.27	0.31	1.06		
Outdoor Air	ug/m3	Ethylbenzene	L	100.00	0.62			0.28	0.44	0.74	0.98	1.02
			U	100.00	0.95	0.37	0.48	0.73	0.93	1.24	1.69	1.72
Outdoor Air	ug/m3	Tetrachloroethylene	L	100.00	0.50	0.05	0.11	0.22	0.33	0.56	1.12	1.25
			U	100.00	1.65	0.23	0.26	0.39	0.93	2.20	3.74	
Outdoor Air	ug/m3	Toluene	L	15.84	1.66			0.22	1.37	2.11	2.89	3.60
			U	64.71	3.28	0.92	1.38	2.11	3.59	3.82	5.71	6.07
Outdoor Air	ug/m3	m,p-Xylene	L	100.00	1.55			0.55	1.27	2.10	2.38	2.50
			U	100.00	2.43	0.98	1.49	2.07	2.38	2.95	3.89	4.05
Outdoor Air	ug/m3	o-Xylene	L	100.00	0.65			0.26	0.49	0.81	1.05	1.13
			U	100.00	1.07	0.41	0.60	0.81	1.06	1.21	1.97	2.04
Soil	mg/kg	Arsenic	L	23.55	6.05					5.16	9.91	10.03
			U	48.70	9.30				5.23	10.13	19.54	31.17
Soil	mg/kg	Barium	L	100.00	82.95	29.12	40.84	55.29	78.18	97.49	121.48	128.40
			U	100.00	105.50	53.97	62.17	79.26	99.76	128.96	164.29	
Soil	mg/kg	Cadmium	L	71.35	1.10				0.90	1.35	1.87	2.14
			U	91.82	1.61		0.64	0.93	1.42	2.13	3.42	
Soil	mg/kg	Chromium	L	100.00	21.08	6.01	7.18	10.31	15.93	26.89	35.70	46.49
			U	100.00	32.36	10.31	12.06	15.56	25.18	47.21	78.87	
Soil	mg/kg	Copper	L	100.00	22.04			11.76	19.57	27.91	36.09	40.84
			U	100.00	29.01	11.83	14.31	19.38	27.98	40.71	51.73	
Soil	mg/kg	Lead	L	93.83	23.61		8.81	10.60	14.35	24.49	38.32	51.63
			U	100.00	51.53	10.67	11.62	14.61	25.51	49.55	151.84	
Soil	mg/kg	Nickel	L	100.00	17.43	2.82	3.09	6.60	11.81	19.95	34.41	46.69
			U	100.00	39.71	6.66	7.44	10.92	18.23	46.83	143.01	
Soil	mg/kg	Selenium	L	0.00	7.42							
			U	0.00	8.14							

WEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Soil	mg/kg	Vanadium	L	100.00	28.60	11.65	15.50	21.48	25.92	33.77	39.41	42.01
			U	100.00	37.02	20.52	22.29	26.03	34.12	41.99	59.74	
Soil	mg/kg	Zinc	L	100.00	97.40		43.09	66.11	85.85	120.74	188.97	231.62
			U	100.00	268.49	66.43	69.18	87.86	122.62	233.69	425.22	
Soil	mg/kg	Beryllium	L	83.76	0.47			0.33	0.42	0.53	0.61	0.71
			U	98.90	0.58	0.33	0.34	0.43	0.52	0.68	1.05	
Soil	mg/kg	Cobalt	L	100.00	7.45	2.89	3.23	4.59	6.28	9.26	11.31	13.00
			U	100.00	9.40	4.43	5.16	6.33	9.01	13.34	16.72	
Soil	mg/kg	Molybdenum	L	0.00	4.99							
			U	8.99	5.68						7.49	
Soil	mg/kg	Thallium	L	0.00	9.89							
			U	0.00	10.85							

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Indoor Air	logcnt/m3	Alternaria	A	185	65.0	0.79				0.83	1.42	1.64	1.72
Pollen/Spores		Alternaria	P	126	63.3	0.73				0.83	1.11	1.51	1.57
		Alternaria	T	59	65.9	0.83				0.83	1.38	1.67	1.77
		Amerospores	A	185	84.5	1.57			1.04	1.76	2.16	2.38	2.59
		Amerospores	P	126	84.7	1.59			0.95	1.82	2.22	2.42	2.69
		Amerospores	T	59	84.4	1.56			1.14	1.72	2.15	2.30	2.41
		Arthrinium	A	185	11.4	0.11						0.58	0.78
		Arthrinium	P	126	11.1	0.11						0.55	0.81
		Arthrinium	T	59	11.5	0.11						0.15	0.65
		Ascospores	A	185	71.8	0.92				0.92	1.37	1.65	1.95
		Ascospores	P	126	68.1	0.88				0.88	1.38	1.63	1.84
		Ascospores	T	59	73.8	0.93				0.93	1.36	1.67	1.87
		Aspergillus/Penicillium-like	A	185	31.4	0.59					1.33	2.01	2.37
		Aspergillus/Penicillium-like	P	126	33.3	0.63					1.46	1.97	2.37
		Aspergillus/Penicillium-like	T	59	30.3	0.57					1.16	2.01	2.27
		Aureobasidium	A	185	0.0	0.00							
		Aureobasidium	P	126	0.0	0.00							
		Aureobasidium	T	59	0.0	0.00							
		Basidiospores	A	185	63.8	0.81				0.84	1.27	1.74	2.03
		Basidiospores	P	126	72.3	0.86				0.84	1.18	1.77	2.00
		Basidiospores	T	59	59.2	0.79				0.74	1.30	1.67	2.11
		Bipolaris/Dreschlera	A	185	44.7	0.47					0.83	1.20	1.69
		Bipolaris/Dreschlera	P	126	48.3	0.48					0.84	1.12	1.33
		Bipolaris/Dreschlera	T	59	42.7	0.46					0.72	1.41	1.73
		Botrytis	A	185	0.5	0.00							
		Botrytis	P	126	1.6	0.01							
		Botrytis	T	59	0.0	0.00							
		Chaetomium	A	185	4.0	0.04							

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
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Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Chaetomium	P	126	5.9	0.05							0.82
		Chaetomium	T	59	3.0	0.03							
		Cladosporium	A	185	94.2	1.85		1.02	1.43	1.91	2.28	2.65	2.80
		Cladosporium	P	126	89.7	1.76			1.44	1.84	2.24	2.55	2.75
		Cladosporium	T	59	96.6	1.90	0.29	0.99	1.41	1.93	2.28	2.68	2.80
		Curvularia	A	185	19.5	0.21						1.01	1.11
		Curvularia	P	126	19.5	0.17						0.83	0.85
		Curvularia	T	59	19.5	0.24						1.00	1.31
		Epicoccum	A	185	0.0	0.00							
		Epicoccum	P	126	0.0	0.00							
		Epicoccum	T	59	0.0	0.00							
		Fusarium	A	185	0.0	0.00							
		Fusarium	P	126	0.0	0.00							
		Fusarium	T	59	0.0	0.00							
		Memnoniella	A	185	0.0	0.00							
		Memnoniella	P	126	0.0	0.00							
		Memnoniella	T	59	0.0	0.00							
		Mycelial Fragments	A	185	98.6	1.26	0.10	0.24	0.65	1.24	1.54	1.70	1.78
		Mycelial Fragments	P	126	99.0	1.22	0.09	0.21	0.56	1.11	1.46	1.72	1.88
		Mycelial Fragments	T	59	98.4	1.28	0.10	0.26	0.72	1.24	1.56	1.69	1.74
		Nigrospora	A	185	12.2	0.11						0.58	0.76
		Nigrospora	P	126	11.0	0.10						0.35	0.73
		Nigrospora	T	59	12.8	0.12						0.61	0.77
		Oidium/Peronospora	A	185	3.7	0.03							
		Oidium/Peronospora	P	126	2.0	0.01							
		Oidium/Peronospora	T	59	4.7	0.04							
		Pithomyces/Ulocladium	A	185	22.3	0.21						0.84	1.02
		Pithomyces/Ulocladium	P	126	25.5	0.22					0.05	0.84	0.93

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Pithomyces/Ulocladium	T	59	20.6	0.20						0.77	1.10
		Pollen Count	A	185	98.6	0.92	0.04	0.09	0.24	0.49	0.75	1.11	1.40
		Pollen Count	P	126	99.0	0.90	0.04	0.09	0.25	0.51	0.76	1.08	1.28
		Pollen Count	T	59	98.4	0.94	0.03	0.08	0.23	0.49	0.74	1.17	1.89
		Rusts	A	185	31.2	0.31					0.56	1.07	1.39
		Rusts	P	126	31.5	0.31					0.61	0.98	1.16
		Rusts	T	59	31.1	0.32					0.49	1.08	1.45
		Smuts/Myxomycetes	A	185	64.9	0.83				0.88	1.21	1.66	1.94
		Smuts/Myxomycetes	P	126	58.1	0.74				0.72	1.32	1.62	1.87
		Smuts/Myxomycetes	T	59	68.7	0.88				1.00	1.18	1.66	1.97
		Stachybotrys	A	185	1.0	0.01							
		Stachybotrys	P	126	0.1	0.00							
		Stachybotrys	T	59	1.5	0.01							
		Stemphylium	A	185	1.1	0.01							
		Stemphylium	P	126	0.7	0.01							
		Stemphylium	T	59	1.3	0.01							
		Torula	A	185	2.6	0.02							
		Torula	P	126	4.2	0.03							
		Torula	T	59	1.8	0.01							
		Total Fungal Spores	A	185	98.6	2.46	1.52	1.84	2.19	2.52	2.69	3.10	3.31
		Total Fungal Spores	P	126	99.0	2.46	1.52	1.76	2.15	2.45	2.76	3.04	3.37
		Total Fungal Spores	T	59	98.4	2.46	1.51	1.91	2.18	2.56	2.66	3.05	3.29
		Unidentified Conidia	A	185	12.1	0.11						0.75	0.83
		Unidentified Conidia	P	126	5.2	0.05							0.11
		Unidentified Conidia	T	59	15.8	0.14						0.82	0.84
Indoor Air	ppb	Formaldehyde	A	199	100.0	13.29	5.15	5.84	8.24	12.01	17.20	21.70	23.93
Aldehydes		Formaldehyde	P	135	100.0	15.07	5.30	5.96	9.32	14.49	19.35	21.94	25.78
		Formaldehyde	T	64	100.0	12.31	4.33	5.51	7.55	11.62	15.64	20.70	22.35

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
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Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Acetaldehyde	A	199	98.6	6.59	3.98	4.20	4.95	6.17	7.38	10.13	11.13
		Acetaldehyde	P	135	100.0	7.02	4.01	4.17	5.32	6.22	7.80	11.56	12.31
		Acetaldehyde	T	64	97.8	6.35	3.65	4.17	4.86	6.09	7.17	9.43	10.40
		Propionaldehyde	A	199	54.8	0.27				0.21	0.42	0.68	0.78
		Propionaldehyde	P	135	47.0	0.23					0.39	0.55	0.67
		Propionaldehyde	T	64	59.1	0.29				0.22	0.42	0.71	1.20
		Crotonaldehyde	A	199	19.5	0.28				0.15	0.54	0.77	0.94
		Crotonaldehyde	P	135	20.4	0.29				0.18	0.56	0.86	1.02
		Crotonaldehyde	T	64	19.0	0.28				0.15	0.48	0.73	0.85
		n-Butyraldehyde	A	199	38.9	0.15					0.33	0.55	0.57
		n-Butyraldehyde	P	135	37.6	0.16					0.32	0.46	0.63
		n-Butyraldehyde	T	64	39.7	0.14					0.29	0.57	0.57
		Benzaldehyde	A	199	45.3	0.30					0.59	0.88	0.97
		Benzaldehyde	P	135	49.8	0.38				0.17	0.69	1.04	1.19
		Benzaldehyde	T	64	42.9	0.27					0.55	0.74	0.85
		iso-Valeraldehyde	A	199	9.8	0.07						0.24	0.63
		iso-Valeraldehyde	P	135	7.6	0.05							0.56
		iso-Valeraldehyde	T	64	11.0	0.07						0.24	0.62
		Valeraldehyde	A	199	32.7	0.11					0.24	0.35	0.39
		Valeraldehyde	P	135	35.2	0.13					0.24	0.36	0.51
		Valeraldehyde	T	64	31.4	0.10					0.24	0.34	0.37
		Hexanaldehyde	A	199	72.9	0.78			0.02	0.76	1.15	1.54	1.86
		Hexanaldehyde	P	135	72.6	0.80				0.67	1.33	1.54	1.91
		Hexanaldehyde	T	64	73.0	0.77			0.03	0.77	1.13	1.53	1.82
		2,5-Dimethylbenzaldehyde	A	199	1.5	0.00							
		2,5-Dimethylbenzaldehyde	P	135	2.6	0.01							
		2,5-Dimethylbenzaldehyde	T	64	1.0	0.00							
		o,p-Tolualdehyde	A	199	19.7	0.46						0.76	3.98

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
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Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		o,p-Tolualdehyde	P	135	24.6	0.91						3.58	5.27
		o,p-Tolualdehyde	T	64	17.0	0.21						0.40	0.73
		m-Tolualdehyde	A	199	13.9	0.50						1.38	5.10
		m-Tolualdehyde	P	135	18.4	0.38						0.99	1.99
		m-Tolualdehyde	T	64	11.5	0.57						1.81	5.02
Indoor Air	ug/m3	1,1,1-Trichloroethane	A	78	100.0	1.05	0.31	0.41	0.50	0.65	1.03	1.90	2.80
VOCs		1,1,1-Trichloroethane	P	55	100.0	0.79	0.26	0.40	0.50	0.71	0.92	1.22	1.47
		1,1,1-Trichloroethane	T	23	100.0	1.21	0.23	0.41	0.46	0.61	1.09	2.61	
		Benzene	A	73	63.7	1.75	0.09	0.34	0.62	1.13	1.86	2.97	4.13
		Benzene	P	51	66.6	1.26		0.27	0.66	0.93	1.67	2.49	3.00
		Benzene	T	22	62.0	2.05		0.31	0.62	1.17	1.93	3.23	4.62
		Carbon tetrachloride	A	87	100.0	1.76	0.49	0.52	0.69	0.86	1.78	2.93	6.07
		Carbon tetrachloride	P	61	100.0	1.35	0.49	0.53	0.72	1.18	1.73	2.30	2.64
		Carbon tetrachloride	T	26	100.0	2.00	0.47	0.50	0.68	0.76	1.87	4.34	7.99
		Chloroform	A	78	75.8	0.41		0.06	0.18	0.29	0.38	0.85	1.07
		Chloroform	P	54	81.7	0.30		0.14	0.18	0.25	0.35	0.42	0.44
		Chloroform	T	24	72.2	0.48			0.18	0.28	0.75	0.91	
		Ethylbenzene	A	79	100.0	1.85	0.46	0.55	0.78	1.17	1.65	2.18	2.25
		Ethylbenzene	P	56	100.0	1.44	0.44	0.55	0.62	0.99	1.54	1.78	2.23
		Ethylbenzene	T	23	100.0	2.10	0.23	0.54	0.76	1.26	1.86	2.20	2.24
		Tetrachloroethylene	A	93	100.0	1.40	0.24	0.33	0.55	1.13	1.82	3.11	3.16
		Tetrachloroethylene	P	65	100.0	1.20	0.25	0.28	0.41	1.08	1.64	2.35	2.43
		Tetrachloroethylene	T	28	100.0	1.53	0.15	0.33	0.61	1.15	2.07	3.14	3.16
		Toluene	A	73	89.7	6.32	0.40	1.24	3.78	5.62	8.48	9.83	12.25
		Toluene	P	51	93.7	6.12	1.50	2.68	3.76	5.32	7.64	10.01	13.92
		Toluene	T	22	87.3	6.44		0.79	3.68	6.27	8.68	9.78	10.31
		m,p-Xylene	A	79	100.0	5.17	1.12	1.46	2.02	3.09	5.09	6.98	7.07
		m,p-Xylene	P	56	100.0	3.43	1.02	1.31	1.76	2.80	4.29	5.36	7.16

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		m,p-Xylene	T	23	100.0	6.24	0.69	1.48	1.99	3.51	5.53	6.58	6.99
		o-Xylene	A	79	100.0	1.94	0.50	0.63	0.86	1.32	1.93	2.84	2.87
		o-Xylene	P	56	100.0	1.38	0.47	0.56	0.75	1.15	1.69	2.44	2.57
		o-Xylene	T	23	100.0	2.27	0.28	0.63	0.96	1.47	2.16	2.67	2.84
Dust 500 um	ug/g	Dermatophagoides pteronyssinus	A	187	5.7	0.22							
Biologicals		Dermatophagoides pteronyssinus	P	129	3.9	0.21							
		Dermatophagoides pteronyssinus	T	58	6.7	0.23							
		Dermatophagoides farinae	A	187	8.7	0.34							0.91
		Dermatophagoides farinae	P	129	6.7	0.22							0.20
		Dermatophagoides farinae	T	58	9.8	0.41							1.57
		Canis f1	A	187	56.2	1.93				0.43	1.41	3.40	3.89
		Canis f1	P	129	52.2	1.07				0.41	0.76	1.69	4.18
		Canis f1	T	58	58.4	2.39				0.45	1.56	3.52	3.85
		Felis d1	A	187	73.7	0.53				0.26	0.60	1.54	1.80
		Felis d1	P	129	74.5	0.46				0.24	0.50	1.03	1.58
		Felis d1	T	58	73.2	0.57				0.28	0.65	1.58	1.75
Dust 500 um	units/g	Blatella germanica	A	187	0.7	1.00							
Biologicals		Blatella germanica	P	129	0.6	1.00							
		Blatella germanica	T	58	0.8	1.00							

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Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Indoor Air	logcnt/m3	Alternaria	A	L	53.84	0.62				0.79	1.01	1.43	1.55
			A	U	76.08	0.97			0.56	1.03	1.59	1.72	1.81
			P	L	51.12	0.56				0.36	0.92	1.28	1.48
			P	U	75.52	0.89			0.09	0.93	1.48	1.57	1.63
			T	L	50.19	0.60				0.03	0.92	1.37	1.57
			T	U	81.53	1.07			0.82	1.10	1.65	1.78	
Indoor Air	logcnt/m3	Amerospores	A	L	75.91	1.35			0.61	1.49	2.01	2.23	2.34
			A	U	93.06	1.80		0.78	1.52	2.12	2.34	2.59	2.79
			P	L	75.14	1.32				1.45	2.00	2.31	2.39
			P	U	94.31	1.86		1.04	1.60	2.08	2.39	2.77	2.91
			T	L	73.93	1.31				1.43	1.91	2.16	2.22
			T	U	94.78	1.81		0.95	1.54	2.13	2.29	2.47	
Indoor Air	logcnt/m3	Arthrinium	A	L	5.49	0.05							0.56
			A	U	17.26	0.17						0.75	1.02
			P	L	3.70	0.04							
			P	U	18.49	0.18						0.77	1.18
			T	L	2.83	0.03							
			T	U	20.24	0.19						0.68	1.01
Indoor Air	logcnt/m3	Ascospores	A	L	61.32	0.77				0.83	1.24	1.47	1.62
			A	U	82.31	1.06			0.82	1.15	1.56	1.95	2.05
			P	L	57.00	0.72				0.82	1.26	1.52	1.60
			P	U	79.25	1.04			0.81	1.24	1.55	1.84	2.00
			T	L	60.04	0.75				0.37	1.09	1.40	1.54
			T	U	87.65	1.12			0.51	1.22	1.58	1.91	
Indoor Air	logcnt/m3	Aspergillus/Penicillium-like	A	L	20.11	0.36						1.64	1.83
			A	U	42.64	0.82					1.71	2.36	3.61
			P	L	21.09	0.37						1.64	1.85
			P	U	45.42	0.89					1.72	2.40	3.38

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
			T	L	16.85	0.31						1.34	1.72
			T	U	43.83	0.84					1.82	2.34	
Indoor Air	logcnt/m3	Aureobasidium	A	L	0.00	0.00							
			A	U	0.00	0.00							
			P	L	0.00	0.00							
			P	U	0.00	0.00							
			T	L	0.00	0.00							
			T	U	0.00	0.00							
Indoor Air	logcnt/m3	Basidiospores	A	L	51.75	0.64				0.29	1.07	1.44	1.59
			A	U	75.93	0.99			0.19	1.05	1.53	2.10	2.17
			P	L	61.46	0.70				0.82	1.05	1.27	1.49
			P	U	83.17	1.02			0.82	1.02	1.43	2.02	2.13
			T	L	42.52	0.56					1.04	1.42	1.54
			T	U	75.83	1.02			0.15	1.09	1.57	2.11	
Indoor Air	logcnt/m3	Bipolaris/Dreschlera	A	L	31.45	0.30					0.82	0.84	1.03
			A	U	57.93	0.63				0.82	1.01	1.71	1.82
			P	L	34.84	0.32					0.82	0.84	1.02
			P	U	61.69	0.63				0.82	1.03	1.35	1.61
			T	L	26.30	0.26					0.18	0.75	0.83
			T	U	59.15	0.67				0.59	0.94	1.77	
Indoor Air	logcnt/m3	Botrytis	A	L	0.00	0.00							
			A	U	1.66	0.01							
			P	L	0.00	0.00							
			P	U	4.59	0.02							
			T	L	0.00	0.00							
			T	U	0.00	0.00							
Indoor Air	logcnt/m3	Chaetomium	A	L	0.68	0.01							
			A	U	7.28	0.06							0.83

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
			P	L	1.03	0.01							
			P	U	10.67	0.10						0.82	0.88
			T	L	0.00	0.00							
			T	U	7.53	0.06							
Indoor Air	logcnt/m3	Cladosporium	A	L	88.94	1.68			1.29	1.78	2.13	2.35	2.55
			A	U	99.41	2.02	1.10	1.38	1.74	2.15	2.38		
			P	L	80.31	1.53				1.68	2.03	2.38	2.51
			P	U	99.16	1.99			1.69	1.99	2.49	2.72	
			T	L	92.45	1.72		0.27	1.22	1.78	2.13	2.28	2.37
			T	U	100.00	2.08	1.19	1.38	1.83	2.20	2.38		
Indoor Air	logcnt/m3	Curvularia	A	L	8.26	0.08							0.82
			A	U	30.72	0.35					0.83	1.21	1.40
			P	L	10.10	0.08						0.02	0.82
			P	U	28.82	0.25					0.49	0.85	1.08
			T	L	4.26	0.05							
			T	U	34.75	0.43					0.92	1.36	
Indoor Air	logcnt/m3	Epicoccum	A	L	0.00	0.00							
			A	U	0.00	0.00							
			P	L	0.00	0.00							
			P	U	0.00	0.00							
			T	L	0.00	0.00							
			T	U	0.00	0.00							
Indoor Air	logcnt/m3	Fusarium	A	L	0.00	0.00							
			A	U	0.00	0.00							
			P	L	0.00	0.00							
			P	U	0.00	0.00							
			T	L	0.00	0.00							
			T	U	0.00	0.00							

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Indoor Air	logcnt/m3	Memnoniella	A	L	0.00	0.00							
			A	U	0.00	0.00							
			P	L	0.00	0.00							
			P	U	0.00	0.00							
			T	L	0.00	0.00							
			T	U	0.00	0.00							
Indoor Air	logcnt/m3	Mycelial Fragments	A	L	96.32	1.15	0.03	0.13	0.45	1.05	1.39	1.58	1.66
			A	U	100.00	1.36			1.03	1.40	1.65	1.78	1.97
			P	L	97.02	1.11	0.04	0.13	0.40	0.84	1.29	1.54	1.65
			P	U	100.00	1.32			0.86	1.30	1.65	1.90	1.97
			T	L	95.04	1.15	0.00	0.11	0.43	0.94	1.38	1.56	1.60
			T	U	100.00	1.41			1.05	1.52	1.67	1.77	
Indoor Air	logcnt/m3	Nigrospora	A	L	5.06	0.04							0.02
			A	U	19.33	0.18						0.74	0.98
			P	L	4.62	0.04							
			P	U	17.46	0.15						0.71	0.91
			T	L	1.98	0.02							
			T	U	23.68	0.22						0.79	
Indoor Air	logcnt/m3	Oidium/Peronospora	A	L	0.00	0.00							
			A	U	8.55	0.07							
			P	L	0.00	0.00							
			P	U	4.83	0.03							
			T	L	0.00	0.00							
			T	U	11.57	0.10							
Indoor Air	logcnt/m3	Pithomyces/Ulocladium	A	L	10.34	0.09						0.06	0.82
			A	U	34.30	0.32					0.82	0.99	1.24
			P	L	11.47	0.10						0.17	0.82
			P	U	39.45	0.34					0.82	0.92	1.09

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
			T	L	6.95	0.07							0.54
			T	U	34.24	0.32					0.64	1.14	
Indoor Air	logcnt/m3	Pollen Count	A	L	96.32	0.86	0.01	0.06	0.20	0.44	0.67	0.82	1.03
			A	U	100.00	0.99						1.39	2.01
			P	L	97.02	0.85	0.02	0.07	0.21	0.44	0.68	0.82	0.95
			P	U	100.00	0.95					0.98	1.28	1.38
			T	L	95.04	0.84	0.00	0.05	0.18	0.41	0.65	0.78	0.83
			T	U	100.00	1.03					0.86	1.94	
Indoor Air	logcnt/m3	Rusts	A	L	20.56	0.20						0.72	0.95
			A	U	41.85	0.43					0.79	1.36	1.53
			P	L	18.83	0.17						0.70	0.84
			P	U	44.09	0.44					0.79	1.16	1.29
			T	L	16.88	0.16						0.61	0.79
			T	U	45.25	0.47					0.98	1.47	1.57
Indoor Air	logcnt/m3	Smuts/Myxomycetes	A	L	51.79	0.63				0.55	1.07	1.38	1.50
			A	U	78.07	1.02			0.58	1.07	1.41	1.94	2.12
			P	L	43.78	0.53					1.02	1.40	1.46
			P	U	72.45	0.96				1.06	1.44	1.88	2.01
			T	L	53.06	0.66				0.59	1.06	1.23	1.39
			T	U	84.30	1.10			0.74	1.09	1.41	2.00	
Indoor Air	logcnt/m3	Stachybotrys	A	L	0.00	0.00							
			A	U	2.37	0.02							
			P	L	0.00	0.00							
			P	U	0.17	0.00							
			T	L	0.00	0.00							
			T	U	3.68	0.03							
Indoor Air	logcnt/m3	Stemphylium	A	L	0.00	0.00							
			A	U	2.83	0.02							

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
			P	L	0.00	0.00							
			P	U	2.26	0.02							
			T	L	0.00	0.00							
			T	U	3.83	0.03							
Indoor Air	logcnt/m3	Torula	A	L	0.00	0.00							
			A	U	5.36	0.04							
			P	L	0.00	0.00							
			P	U	9.51	0.08							
			T	L	0.00	0.00							
			T	U	4.99	0.04							
Indoor Air	logcnt/m3	Total Fungal Spores	A	L	96.32	2.33	0.45	1.72	2.05	2.35	2.62	2.77	2.96
			A	U	100.00	2.59	1.93	2.13	2.36	2.62	2.81	3.32	3.78
			P	L	97.02	2.31	0.78	1.52	1.96	2.30	2.61	2.80	3.01
			P	U	100.00	2.60	1.98	2.13	2.30	2.61	2.95	3.59	3.63
			T	L	95.04	2.31	0.02	1.49	2.05	2.35	2.59	2.69	2.77
			T	U	100.00	2.61	2.05	2.17	2.46	2.64	2.75	3.32	
Indoor Air	logcnt/m3	Unidentified Conidia	A	L	4.52	0.04							
			A	U	19.61	0.17						0.83	0.99
			P	L	0.00	0.00							
			P	U	10.93	0.11						0.35	1.04
			T	L	4.08	0.04							
			T	U	27.57	0.24					0.44	0.84	
Indoor Air	ppb	Formaldehyde	A	L	100.00	11.70	2.39	5.16	6.97	10.42	14.71	18.73	21.03
			A	U	100.00	14.89	6.40	7.44	10.51	13.68	20.55	23.44	28.07
			P	L	100.00	13.17	4.54	5.30	7.56	11.63	17.19	20.64	21.57
			P	U	100.00	16.97	7.69	9.02	12.11	16.57	21.34	25.07	30.96
			T	L	100.00	10.39		4.03	6.48	9.88	12.34	15.85	17.15
			T	U	100.00	14.24	6.79	7.49	10.36	13.09	20.16	22.95	

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Indoor Air	ppb	Acetaldehyde	A	L	95.66	6.10	2.84	3.98	4.66	5.53	6.85	8.08	9.72
			A	U	100.00	7.08	4.52	4.83	5.47	6.70	8.16	11.12	12.86
			P	L	100.00	6.36	3.46	4.02	4.96	5.68	6.97	8.63	10.97
			P	U	100.00	7.67	4.38	4.94	5.67	7.00	9.45	12.28	14.19
			T	L	93.27	5.77		3.53	4.19	5.35	6.47	7.52	8.15
			T	U	100.00	6.94	4.71	4.88	5.47	6.79	8.05	10.50	
Indoor Air	ppb	Propionaldehyde	A	L	41.58	0.17					0.33	0.47	0.56
			A	U	68.04	0.37				0.35	0.54		
			P	L	31.98	0.14						0.46	0.51
			P	U	62.05	0.32					0.51	0.66	1.07
			T	L	44.51	0.17						0.44	0.52
			T	U	73.68	0.41					0.65	1.21	1.22
Indoor Air	ppb	Crotonaldehyde	A	L	8.02	0.19					0.22	0.61	0.67
			A	U	30.93	0.38				0.26	0.74	0.93	
			P	L	9.94	0.19					0.26	0.62	0.72
			P	U	30.82	0.39				0.29	0.73	1.03	
			T	L	4.20	0.16					0.19	0.46	0.61
			T	U	33.75	0.40				0.24	0.68	0.92	
Indoor Air	ppb	n-Butyraldehyde	A	L	24.11	0.08						0.34	0.39
			A	U	53.78	0.22				0.15	0.39	0.57	0.66
			P	L	22.84	0.08						0.36	0.42
			P	U	52.40	0.24					0.40	0.66	
			T	L	22.58	0.06						0.24	0.35
			T	U	56.76	0.22				0.16	0.52	0.57	0.57
Indoor Air	ppb	Benzaldehyde	A	L	32.20	0.20					0.34	0.60	0.75
			A	U	58.48	0.41				0.35	0.76	0.97	1.23
			P	L	34.85	0.22					0.33	0.76	0.88
			P	U	64.83	0.53				0.40	0.95	1.22	

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
			T	L	27.24	0.16					0.29	0.55	0.60
			T	U	58.49	0.37				0.34	0.70	0.87	0.92
Indoor Air	ppb	iso-Valeraldehyde	A	L	2.37	0.01							
			A	U	17.23	0.12						0.64	0.72
			P	L	0.48	0.00							
			P	U	14.67	0.10						0.64	0.74
			T	L	2.84	0.02							
			T	U	19.20	0.13						0.63	0.71
Indoor Air	ppb	Valeraldehyde	A	L	20.99	0.07						0.27	0.33
			A	U	44.45	0.15					0.29	0.38	0.47
			P	L	21.34	0.07						0.26	0.35
			P	U	49.10	0.18					0.34	0.47	0.89
			T	L	18.13	0.05						0.27	0.28
			T	U	44.58	0.14					0.28	0.38	0.40
Indoor Air	ppb	Hexanaldehyde	A	L	62.74	0.62				0.49	0.98	1.41	1.50
			A	U	82.98	0.94			0.48	0.98	1.43	1.85	
			P	L	62.47	0.60					0.99	1.43	1.51
			P	U	82.77	1.00				1.02	1.44	1.88	3.26
			T	L	59.70	0.59					0.93	1.20	1.40
			T	U	86.29	0.95				1.01	1.49	1.85	
Indoor Air	ppb	2,5-Dimethylbenzaldehyde	A	L	0.00	0.00							
			A	U	3.18	0.01							
			P	L	0.00	0.00							
			P	U	5.56	0.02							0.16
			T	L	0.00	0.00							
			T	U	2.88	0.00							
Indoor Air	ppb	o,p-Tolualdehyde	A	L	11.75	0.25						0.30	0.81
			A	U	27.61	0.67					0.30	3.59	5.04

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
			P	L	13.80	0.43						0.41	2.92
			P	U	35.34	1.40					2.34	5.28	8.40
			T	L	7.35	0.02							0.30
			T	U	26.64	0.40					0.24	0.75	
Indoor Air	ppb	m-Tolualdehyde	A	L	5.48	0.08							0.11
			A	U	22.35	0.93						5.21	5.59
			P	L	7.70	0.10							0.60
			P	U	29.07	0.65					0.38	1.98	6.11
			T	L	0.00	0.00							
			T	U	23.61	1.23						5.27	
Indoor Air	ug/m3	1,1,1-Trichloroethane	A	L	100.00	0.59		0.34	0.44	0.50	0.75	1.04	1.15
			A	U	100.00	1.51	0.46	0.50	0.65	0.88	1.34		
			P	L	100.00	0.61			0.40	0.59	0.74	0.88	1.01
			P	U	100.00	0.97	0.49	0.55	0.70	0.84	1.22		
			T	L	100.00	0.47			0.40	0.47	0.60	0.88	1.01
			T	U	100.00	1.95	0.53	0.56	0.63	1.00	2.62		
Indoor Air	ug/m3	Benzene	A	L	46.62	0.92		0.04	0.31	0.71	1.27	1.64	2.18
			A	U	80.79	2.59	0.62	0.66	0.89	1.54	2.88		
			P	L	44.65	0.80				0.67	0.94	1.54	1.61
			P	U	88.52	1.72	0.75	0.80	0.92	1.60	2.50	3.06	3.13
			T	L	40.08	0.80			0.26	0.62	1.17	1.28	1.68
			T	U	83.86	3.30	0.64	0.65	1.18	1.87	3.06	7.00	
Indoor Air	ug/m3	Carbon tetrachloride	A	L	100.00	0.93	0.27	0.49	0.53	0.75	1.26	1.76	2.26
			A	U	100.00	2.59	0.66	0.69	0.77	1.62	2.34	7.69	
			P	L	100.00	1.03	0.21	0.39	0.59	0.80	1.18	1.67	1.85
			P	U	100.00	1.67	0.70	0.77	1.16	1.62	2.27	2.88	
			T	L	100.00	0.74			0.50	0.69	0.76	1.68	2.01
			T	U	100.00	3.27	0.70	0.72	0.76	1.70	4.37		

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Indoor Air	ug/m3	Chloroform	A	L	55.56	0.23			0.07	0.20	0.31	0.38	0.44
			A	U	96.08	0.60	0.18	0.19	0.25	0.35	0.84		
			P	L	61.76	0.23			0.15	0.22	0.25	0.34	0.38
			P	U	100.00	0.37	0.18	0.21	0.25	0.32	0.42	0.45	
			T	L	45.38	0.21				0.18	0.28	0.39	0.74
			T	U	99.10	0.76	0.19	0.21	0.29	0.42	0.89		
Indoor Air	ug/m3	Ethylbenzene	A	L	100.00	0.81	0.19	0.43	0.56	0.88	1.26	1.63	1.75
			A	U	100.00	2.89	0.73	0.89	1.15	1.56	2.16	2.26	
			P	L	100.00	0.77		0.19	0.56	0.89	1.11	1.49	1.64
			P	U	100.00	2.11	0.62	0.80	0.95	1.45	1.75	2.28	2.60
			T	L	100.00	0.54			0.52	0.80	1.23	1.47	1.56
			T	U	100.00	3.66	0.92	1.13	1.39	2.11	2.20	2.45	
Indoor Air	ug/m3	Tetrachloroethylene	A	L	100.00	0.97	0.13	0.23	0.36	0.81	1.32	1.70	1.85
			A	U	100.00	1.83	0.50	0.75	1.02	1.63	3.11	3.16	
			P	L	100.00	0.88	0.17	0.25	0.29	0.64	1.21	1.54	1.78
			P	U	100.00	1.52	0.41	0.68	1.01	1.51	2.31	2.47	
			T	L	100.00	0.96			0.37	0.78	1.25	1.60	1.75
			T	U	100.00	2.09	0.61	0.84	1.08	2.06	3.14	3.30	3.60
Indoor Air	ug/m3	Toluene	A	L	79.51	4.80			2.57	3.93	6.03	8.06	8.48
			A	U	99.91	7.84	3.57	4.56	5.48	8.27	9.69	12.30	16.45
			P	L	86.12	4.41	1.05	1.34	2.86	4.41	5.34	7.00	7.65
			P	U	100.00	7.84	3.45	3.75	5.22	7.12	10.37		
			T	L	72.29	4.53			0.73	3.69	5.65	7.84	7.92
			T	U	100.00	8.35	4.49	4.57	7.71	8.77	9.79	10.42	12.33
Indoor Air	ug/m3	m,p-Xylene	A	L	100.00	2.00	0.36	0.97	1.48	2.36	3.49	4.89	5.25
			A	U	100.00	8.35	2.02	2.39	2.99	4.50	6.96	7.08	
			P	L	100.00	2.60		0.27	1.45	2.39	2.93	4.21	4.57
			P	U	100.00	4.25	1.75	2.08	2.79	3.94	5.26	7.36	7.76

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
			T	L	100.00	1.33			1.43	2.01	3.42	4.52	4.54
			T	U	100.00	11.15	2.22	2.55	4.23	5.74	6.58	7.46	
Indoor Air	ug/m3	o-Xylene	A	L	100.00	0.97	0.19	0.46	0.63	1.06	1.45	1.91	2.07
			A	U	100.00	2.90		1.05	1.28	1.77	2.84	2.87	
			P	L	100.00	1.06		0.15	0.58	0.92	1.24	1.66	1.86
			P	U	100.00	1.70	0.74	0.86	1.13	1.59	2.40	2.68	2.77
			T	L	100.00	0.80			0.61	0.99	1.41	1.76	1.80
			T	U	100.00	3.75	1.04	1.08	1.65	2.31	2.67	3.02	
Dust 500 um	ug/g	Dermatophagoides pteronyssinus	A	L	1.28	0.19							
			A	U	10.08	0.25							0.41
			P	L	0.27	0.20							
			P	U	7.46	0.21							0.27
			T	L	0.69	0.18							
			T	U	12.67	0.27							
Dust 500 um	ug/g	Dermatophagoides farinae	A	L	1.34	0.18							
			A	U	16.05	0.51						1.59	2.30
			P	L	1.19	0.20							
			P	U	12.24	0.24							0.36
			T	L	0.00	0.15							
			T	U	20.43	0.66						1.90	2.47
Dust 500 um	ug/g	Canis f1	A	L	41.65	0.38					0.66	1.49	1.78
			A	U	70.66	3.47				0.72	2.41	3.89	6.49
			P	L	37.59	0.61					0.56	0.85	1.01
			P	U	66.73	1.54				0.55	0.93	4.23	6.58
			T	L	40.35	0.01					0.67	1.52	1.68
			T	U	76.35	4.77				1.41	3.37	3.88	
Dust 500 um	ug/g	Felis d1	A	L	61.59	0.35				0.17	0.36	0.67	0.97
			A	U	85.81	0.70			0.17	0.36	1.31	1.82	2.03

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
APPROX. 95% CONFIDENCE LIMITS

Medium/ Location	Units	Analyte	Loc	Limit	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
			P	L	62.32	0.35				0.16	0.35	0.68	0.97
			P	U	86.75	0.58			0.15	0.33	0.72	1.57	2.04
			T	L	56.98	0.32				0.14	0.33	0.61	0.71
			T	U	89.50	0.81			0.22	0.41	1.54	1.80	
Dust 500 um	units/g	Blatella germanica	A	L	0.00	1.00							
			A	U	1.83	1.00							
			P	L	0.00	1.00							
			P	U	1.82	1.00							
			T	L	0.00	1.00							
			T	U	2.40	1.00							

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
ESTIMATED MEAN DIFFERENCES

Medium/ Location	Analyte	Units	No. Obs	Est. Pop. Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
Indoor Air	Alternaria	logcnt/m3	185	195769	0.7253	0.8327	-0.107	0.1213	-0.89	0.380
Pollen/Spores	Amerospores	logcnt/m3	185	195769	1.5919	1.5591	0.0328	0.1371	0.24	0.812
	Arthrinium	logcnt/m3	185	195769	0.1083	0.1092	-9E-4	0.0575	-0.02	0.988
	Ascospores	logcnt/m3	185	195769	0.8825	0.9348	-0.052	0.0971	-0.54	0.592
	Aspergillus/Penicillium-like	logcnt/m3	185	195769	0.6299	0.5742	0.0557	0.1395	0.40	0.691
	Aureobasidium	logcnt/m3	185	195769	0	0	0	0		
	Basidiospores	logcnt/m3	185	195769	0.8637	0.7867	0.077	0.1162	0.66	0.510
	Bipolaris/Dreschlera	logcnt/m3	185	195769	0.4775	0.4648	0.0127	0.093	0.14	0.892
	Botrytis	logcnt/m3	185	195769	0.0084	0	0.0084	0.0083	1.02	0.312
	Chaetomium	logcnt/m3	185	195769	0.0539	0.025	0.0289	0.0312	0.93	0.359
	Cladosporium	logcnt/m3	185	195769	1.76	1.8994	-0.139	0.1042	-1.34	0.187
	Curvularia	logcnt/m3	185	195769	0.1668	0.24	-0.073	0.0959	-0.76	0.449
	Epicoccum	logcnt/m3	185	195769	0	0	0	0		
	Fusarium	logcnt/m3	185	195769	0	0	0	0		
	Memnoniella	logcnt/m3	185	195769	0	0	0	0		
	Mycelial Fragments	logcnt/m3	185	195769	1.215	1.2825	-0.067	0.0674	-1.00	0.321
	Nigrospora	logcnt/m3	185	195769	0.0966	0.1169	-0.02	0.0589	-0.34	0.732
	Oidium/Peronospora	logcnt/m3	185	195769	0.0132	0.0395	-0.026	0.0273	-0.96	0.340
	Pithomyces/Ulocladium	logcnt/m3	185	195769	0.2211	0.1964	0.0247	0.0587	0.42	0.675
	Pollen Count	logcnt/m3	185	195769	0.9005	0.9367	-0.036	0.0428	-0.85	0.400
	Rusts	logcnt/m3	185	195769	0.3074	0.3171	-0.01	0.0943	-0.10	0.919
	Smuts/Myxomycetes	logcnt/m3	185	195769	0.7445	0.8767	-0.132	0.1019	-1.30	0.200
	Stachybotrys	logcnt/m3	185	195769	0.0005	0.0139	-0.013	0.0101	-1.33	0.189
	Stemphylium	logcnt/m3	185	195769	0.0063	0.0107	-0.004	0.0124	-0.35	0.726
	Torula	logcnt/m3	185	195769	0.0344	0.0149	0.0195	0.0269	0.73	0.471
	Total Fungal Spores	logcnt/m3	185	195769	2.4564	2.4593	-0.003	0.0834	-0.03	0.973
	Unidentified Conidia	logcnt/m3	185	195769	0.0527	0.1374	-0.085	0.0631	-1.34	0.184

WEIGHTED SUMMARY STATISTICS FOR INDOOR DATA
ESTIMATED MEAN DIFFERENCES

Medium/ Location	Analyte	Units	No. Obs	Est. Pop. Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
Indoor Air	Formaldehyde	ppb	199	195769	15.074	12.313	2.7616	1.0877	2.54	0.014
Aldehydes	Acetaldehyde	ppb	199	195769	7.0162	6.3548	0.6614	0.3812	1.73	0.088
	Propionaldehyde	ppb	199	195769	0.2297	0.2921	-0.062	0.057	-1.10	0.278
	Crotonaldehyde	ppb	199	195769	0.2908	0.2798	0.0109	0.0653	0.17	0.868
	n-Butyraldehyde	ppb	199	195769	0.1606	0.1428	0.0178	0.0423	0.42	0.676
	Benzaldehyde	ppb	199	195769	0.3772	0.2651	0.1121	0.0696	1.61	0.112
	iso-Valeraldehyde	ppb	199	195769	0.0515	0.0741	-0.023	0.014	-1.61	0.113
	Valeraldehyde	ppb	199	195769	0.1281	0.0978	0.0303	0.0303	1.00	0.322
	Hexanaldehyde	ppb	199	195769	0.8006	0.7718	0.0288	0.1012	0.28	0.777
	2,5-Dimethylbenzaldehyde	ppb	199	195769	0.0092	0.0003	0.0089	0.0053	1.70	0.095
	o,p-Tolualdehyde	ppb	199	195769	0.9149	0.2094	0.7055	0.2719	2.59	0.012
	m-Tolualdehyde	ppb	199	195769	0.3757	0.5741	-0.198	0.3713	-0.53	0.595
VOCs	1,1,1-Trichloroethane	ug/m3	78	194792	0.786	1.2083	-0.422	0.3821	-1.11	0.280
	Benzene	ug/m3	73	179743	1.2588	2.0523	-0.793	0.6233	-1.27	0.216
	Carbon tetrachloride	ug/m3	87	179633	1.3516	2.0041	-0.653	0.6305	-1.03	0.310
	Chloroform	ug/m3	78	195769	0.3006	0.4838	-0.183	0.1308	-1.40	0.174
	Ethylbenzene	ug/m3	79	195769	1.4394	2.1012	-0.662	0.8187	-0.81	0.427
	Tetrachloroethylene	ug/m3	93	195769	1.1966	1.5253	-0.329	0.2401	-1.37	0.182
	Toluene	ug/m3	73	180175	6.1228	6.4382	-0.315	1.0792	-0.29	0.773
	m,p-Xylene	ug/m3	79	195769	3.4269	6.2384	-2.812	2.4273	-1.16	0.258
	o-Xylene	ug/m3	79	195769	1.3816	2.2743	-0.893	0.7296	-1.22	0.233
Dust 500 um	Dermatophagoides pteronyssinus	ug/g	187	195769	0.2063	0.227	-0.021	0.0192	-1.08	0.284
Biologicals	Dermatophagoides farinae	ug/g	187	195769	0.2194	0.4073	-0.188	0.1269	-1.48	0.144
	Canis f1	ug/g	187	195769	1.0739	2.3932	-1.319	1.2048	-1.10	0.278
	Felis d1	ug/g	187	195769	0.4626	0.5651	-0.103	0.1261	-0.81	0.419
	Blatella germanica	units/g	187	195769	1	1.0008	-8E-4	0.0008	-0.99	0.325

UNWEIGHTED SUMMARY STATISTICS FOR OUTDOOR DATA
ESTIMATES

Medium/ Location	Units	Analyte	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Outdoor Air	logCFU/m3	Cladosporium spp.	10	100.0	2.57		1.14	1.81	2.30	2.99		
Biologicals		Penicillium spp.	10	60.0	0.97				1.00	1.54		
		Aspergillus spp.	10	0.0	0.00							
		Other	10	70.0	1.14				1.32	1.63		
		Unknown	10	80.0	1.45			0.43	1.54	2.09		
Dust Mat	mg/kg	Arsenic	15	26.7	5.22					5.09	5.82	
Metals		Barium	15	100.0	156.15		64.70	86.90	124.00	151.63	178.00	
		Cadmium	15	100.0	2.54		0.87	1.47	2.19	2.78	4.24	
		Chromium	15	100.0	31.86		13.90	21.63	25.05	41.93	49.05	
		Copper	15	100.0	402.53		25.65	36.75	60.10	83.98	143.50	
		Lead	15	100.0	83.65		27.35	42.75	59.45	84.28	148.00	
		Nickel	15	100.0	42.23		11.04	21.45	29.25	44.20	82.20	
		Selenium	15	0.0	7.50							
		Vanadium	15	100.0	24.85		15.85	20.30	20.80	26.65	36.50	
		Zinc	15	100.0	904.93		313.50	471.00	661.50	864.00	1170.0	
		Beryllium	15	86.7	0.35			0.28	0.35	0.39	0.44	
		Cobalt	15	100.0	7.54		4.30	5.47	6.79	8.30	11.15	
		Molybdenum	15	13.3	6.06						5.49	
		Thallium	15	0.0	10.00							

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Indoor Air	logCFU/m3	Cladosporium spp.	A	37	91.7	1.68		0.12	1.17	1.61	2.30	2.89	3.19
Biologicals		Cladosporium spp.	P	27	96.2	1.76	0.06	0.30	1.10	1.79	2.36	2.89	3.12
		Cladosporium spp.	T	10	80.0	1.46			0.64	1.41	1.70		
		Penicillium spp.	A	36	52.8	0.72				0.27	1.26	1.84	2.08
		Penicillium spp.	P	26	50.0	0.72				0.00	1.33	1.80	1.87
		Penicillium spp.	T	10	60.0	0.71				0.40	1.02		
		Aspergillus spp.	A	36	25.0	0.16					0.00	0.56	1.01
		Aspergillus spp.	P	26	23.1	0.15						0.56	0.92
		Aspergillus spp.	T	10	30.0	0.19					0.19		
		Other	A	36	80.6	0.75			0.21	0.83	1.17	1.46	1.51
		Other	P	26	76.9	0.75			0.03	0.87	1.17	1.47	1.54
		Other	T	10	90.0	0.75		0.00	0.34	0.67	1.03		
		Unknown	A	36	88.9	1.02			0.66	1.06	1.45	1.78	1.91
		Unknown	P	26	88.5	1.04			0.38	1.06	1.55	1.83	1.93
		Unknown	T	10	90.0	0.97		0.00	0.67	1.06	1.30		
Dust Conc	ug/g	Diazinon	A	71	57.6	0.358	0.003	0.003	0.003	0.035	0.135	0.321	0.679
Pesticides		Diazinon	P	36	47.9	0.126		0.003	0.003	0.003	0.135	0.273	0.508
		Diazinon	T	35	63.1	0.490	0.003	0.003	0.003	0.037	0.121	0.391	0.634
		Malathion	A	76	4.5	0.007	0.003	0.003	0.003	0.003	0.003	0.003	0.004
		Malathion	P	39	7.3	0.010		0.003	0.003	0.003	0.003	0.003	0.056
		Malathion	T	37	2.9	0.005	0.003	0.003	0.003	0.003	0.003	0.003	0.003
		Chlorpyrifos	A	30	97.0	0.607	0.011	0.036	0.103	0.308	0.712	1.445	1.906
		Chlorpyrifos	P	15	91.7	0.636		0.020	0.073	0.119	0.712	1.742	
		Chlorpyrifos	T	15	100.0	0.591			0.120	0.365	0.697	1.339	1.384
		4,4'-DDE	A	74	54.0	0.017	0.000	0.000	0.000	0.008	0.017	0.041	0.052
		4,4'-DDE	P	38	48.1	0.010	0.000	0.000	0.000	0.000	0.014	0.038	0.043
		4,4'-DDE	T	36	57.5	0.022	0.000	0.000	0.000	0.008	0.021	0.044	0.057
		Dieldrin	A	75	24.3	0.028						0.084	0.154

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Dieldrin	P	37	13.2	0.014						0.017	0.070
		Dieldrin	T	38	30.3	0.035					0.042	0.125	0.164
		cis-Permethrin	A	77	98.6	0.643	0.055	0.070	0.105	0.256	0.463	1.189	1.870
		cis-Permethrin	P	39	100.0	0.329	0.053	0.071	0.126	0.279	0.362	0.634	0.766
		cis-Permethrin	T	38	97.8	0.817	0.048	0.065	0.099	0.226	0.536	1.426	3.911
		trans-Permethrin	A	63	100.0	0.691	0.112	0.155	0.234	0.320	0.711	1.055	2.329
		trans-Permethrin	P	36	100.0	0.498		0.105	0.242	0.381	0.668	0.976	1.038
		trans-Permethrin	T	27	100.0	0.829	0.144	0.183	0.224	0.300	0.774	1.705	2.865
		Lindane	A	74	2.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
		Lindane	P	38	5.8	0.002		0.001	0.001	0.001	0.001	0.001	0.004
		Lindane	T	36	0.0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
		Pendimethalin	A	44	15.6	0.078	0.004	0.004	0.004	0.005	0.005	0.174	0.390
		Pendimethalin	P	19	7.1	0.034			0.004	0.005	0.005	0.005	0.163
		Pendimethalin	T	25	19.2	0.097		0.004	0.004	0.005	0.005	0.178	0.356
		Propoxur	A	38	69.3	0.129	0.001	0.001	0.005	0.014	0.064	0.378	0.633
		Propoxur	P	19	77.1	0.128	0.001	0.001	0.005	0.014	0.055	0.253	
		Propoxur	T	19	64.5	0.129		0.001	0.004	0.013	0.090		
		o-Phenylphenol	A	77	100.0	0.155	0.021	0.031	0.043	0.063	0.129	0.201	0.486
		o-Phenylphenol	P	39	100.0	0.086	0.010	0.024	0.035	0.060	0.076	0.138	0.249
		o-Phenylphenol	T	38	100.0	0.193	0.027	0.033	0.044	0.065	0.172	0.210	0.505
		Propetamphos	A	69	12.7	0.009	0.001	0.001	0.001	0.001	0.001	0.054	0.066
		Propetamphos	P	36	16.1	0.012		0.001	0.001	0.001	0.001	0.054	0.078
		Propetamphos	T	33	10.6	0.008	0.001	0.001	0.001	0.001	0.001	0.038	0.058
		Resmethrin	A	76	2.9	0.098							
		Resmethrin	P	38	6.6	0.221							1.938
		Resmethrin	T	38	0.9	0.032							
		Piperonyl Butoxide	A	63	93.3	0.629	0.001	0.068	0.156	0.369	0.581	0.981	2.195
		Piperonyl Butoxide	P	34	90.8	0.343	0.001	0.004	0.076	0.265	0.398	0.669	

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Piperonyl Butoxide	T	29	94.8	0.801	0.001	0.088	0.171	0.390	0.616	0.972	3.230
		Bifenthrin	A	71	28.7	0.134					0.015	0.385	0.627
		Bifenthrin	P	38	29.2	0.157					0.013	0.136	0.311
		Bifenthrin	T	33	28.5	0.119					0.014	0.521	0.684
		Cyhalothrin	A	77	25.5	0.081	0.000	0.001	0.001	0.001	0.005	0.120	0.216
		Cyhalothrin	P	39	18.0	0.098		0.001	0.001	0.001	0.001	0.070	0.142
		Cyhalothrin	T	38	29.7	0.071	0.000	0.000	0.001	0.001	0.025	0.154	0.217
		Cyfluthrin	A	74	9.5	0.297							2.586
		Cyfluthrin	P	38	14.7	0.301						1.280	1.797
		Cyfluthrin	T	36	6.5	0.295							1.335
		Cypermethrin	A	75	12.4	0.178						0.690	1.401
		Cypermethrin	P	39	20.9	0.208						0.750	1.248
		Cypermethrin	T	36	7.3	0.161							1.418
		Esfenvalerate	A	66	87.2	4.488			2.426	3.830	6.075	9.394	11.398
		Esfenvalerate	P	32	95.1	4.678	0.006	0.412	2.549	4.019	5.835	9.558	10.423
		Esfenvalerate	T	34	83.1	4.392			2.392	3.034	6.083	8.493	12.310
		Delta/Tralo-methrin	A	77	35.5	0.292	0.009	0.009	0.010	0.010	0.101	0.908	1.564
		Delta/Tralo-methrin	P	39	28.9	0.442		0.010	0.010	0.010	0.081	1.094	3.057
		Delta/Tralo-methrin	T	38	39.2	0.209	0.009	0.009	0.010	0.010	0.103	0.787	1.561
Dust Loading	ng/cm2	Diazinon	A	53	58.5	0.027	0.000	0.000	0.000	0.002	0.013	0.041	0.112
Pesticides		Diazinon	P	26	45.9	0.024	0.000	0.000	0.001	0.001	0.006	0.033	0.175
		Diazinon	T	27	65.2	0.028	0.000	0.000	0.000	0.003	0.015	0.036	0.076
		Malathion	A	56	3.5	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.003
		Malathion	P	29	2.6	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.003
		Malathion	T	27	4.0	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.002
		Chlorpyrifos	A	26	96.5	0.088	0.000	0.003	0.013	0.033	0.128	0.253	
		Chlorpyrifos	P	12	89.3	0.091			0.019	0.028	0.131		
		Chlorpyrifos	T	14	100.0	0.086			0.010	0.045	0.127		

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		4,4'-DDE	A	54	52.7	0.002	0.000	0.000	0.000	0.000	0.002	0.007	0.009
		4,4'-DDE	P	28	40.6	0.002		0.000	0.000	0.000	0.002	0.008	0.009
		4,4'-DDE	T	26	59.9	0.003	0.000	0.000	0.000	0.000	0.002	0.005	0.012
		Dieldrin	A	57	25.4	0.004					0.000	0.007	0.026
		Dieldrin	P	29	17.0	0.002						0.006	0.014
		Dieldrin	T	28	30.0	0.004					0.002	0.009	0.036
		cis-Permethrin	A	57	98.1	0.095	0.002	0.004	0.011	0.019	0.062	0.256	0.461
		cis-Permethrin	P	29	100.0	0.067	0.003	0.004	0.013	0.026	0.059	0.183	0.263
		cis-Permethrin	T	28	97.1	0.111	0.001	0.004	0.011	0.017	0.054	0.356	0.567
		trans-Permethrin	A	47	100.0	0.133	0.004	0.014	0.023	0.037	0.104	0.411	0.630
		trans-Permethrin	P	27	100.0	0.116	0.004	0.007	0.018	0.047	0.102	0.284	0.483
		trans-Permethrin	T	20	100.0	0.146		0.011	0.023	0.033	0.087	0.355	0.742
		Lindane	A	55	1.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Lindane	P	29	3.6	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001
		Lindane	T	26	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Pendimethalin	A	34	13.8	0.002	0.000	0.000	0.001	0.001	0.001	0.004	0.011
		Pendimethalin	P	14	2.6	0.001		0.000	0.001	0.001	0.001	0.002	0.002
		Pendimethalin	T	20	18.0	0.003		0.000	0.001	0.001	0.001	0.005	
		Propoxur	A	27	65.6	0.024	0.000	0.000	0.000	0.002	0.014	0.082	0.087
		Propoxur	P	15	80.5	0.025		0.000	0.001	0.003	0.013	0.045	
		Propoxur	T	12	53.9	0.023		0.000	0.000	0.001	0.014		
		o-Phenylphenol	A	57	100.0	0.015	0.001	0.001	0.004	0.007	0.011	0.029	0.087
		o-Phenylphenol	P	29	100.0	0.014	0.001	0.001	0.004	0.008	0.014	0.026	0.036
		o-Phenylphenol	T	28	100.0	0.015	0.001	0.001	0.003	0.006	0.009	0.031	0.095
		Propetamphos	A	50	8.5	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.003
		Propetamphos	P	26	16.2	0.002		0.000	0.000	0.000	0.000	0.003	0.008
		Propetamphos	T	24	3.8	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001
		Resmethrin	A	56	4.0	0.014							

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Resmethrin	P	28	9.1	0.039							0.169
		Resmethrin	T	28	1.3	0.001							
		Piperonyl Butoxide	A	48	94.1	0.101	0.000	0.003	0.015	0.038	0.070	0.276	0.376
		Piperonyl Butoxide	P	26	87.9	0.053	0.000	0.000	0.004	0.024	0.056	0.096	0.201
		Piperonyl Butoxide	T	22	97.7	0.130	0.002	0.004	0.017	0.036	0.121	0.352	0.450
		Bifenthrin	A	53	33.0	0.017					0.003	0.039	0.099
		Bifenthrin	P	28	32.6	0.009					0.002	0.007	0.045
		Bifenthrin	T	25	33.3	0.022					0.003	0.048	0.146
		Cyhalothrin	A	57	20.9	0.008	0.000	0.000	0.000	0.000	0.000	0.006	0.031
		Cyhalothrin	P	29	11.8	0.007	0.000	0.000	0.000	0.000	0.000	0.002	0.033
		Cyhalothrin	T	28	26.0	0.009	0.000	0.000	0.000	0.000	0.001	0.006	0.023
		Cyfluthrin	A	54	8.1	0.022							0.223
		Cyfluthrin	P	28	16.0	0.039						0.204	
		Cyfluthrin	T	26	3.5	0.012							
		Cypermethrin	A	55	12.6	0.027						0.091	0.193
		Cypermethrin	P	29	16.7	0.029						0.088	0.157
		Cypermethrin	T	26	10.2	0.025						0.011	
		Esfenvalerate	A	49	90.9	0.970		0.011	0.113	0.341	0.595	2.172	3.978
		Esfenvalerate	P	24	93.2	0.897		0.013	0.155	0.512	0.750	2.192	2.963
		Esfenvalerate	T	25	89.7	1.006			0.095	0.304	0.449	1.081	3.882
		Delta/Tralo-methrin	A	57	28.3	0.040	0.000	0.000	0.001	0.001	0.005	0.101	0.149
		Delta/Tralo-methrin	P	29	18.7	0.065	0.000	0.000	0.001	0.002	0.003	0.090	
		Delta/Tralo-methrin	T	28	33.6	0.026	0.000	0.000	0.001	0.001	0.006	0.072	0.121
Dust Conc	ug/g	Benzo[a]pyrene	A	69	58.6	0.115				0.054	0.125	0.260	0.306
PAHs		Benzo[a]pyrene	P	35	75.5	0.141			0.003	0.072	0.100	0.216	0.485
		Benzo[a]pyrene	T	34	49.3	0.100				0.001	0.128	0.249	0.290
		Benzo[a]anthracene	A	71	79.1	0.166			0.017	0.053	0.086	0.177	0.329
		Benzo[a]anthracene	P	37	94.3	0.242		0.011	0.033	0.064	0.141	0.292	0.592

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Benzo[a]anthracene	T	34	70.0	0.121				0.039	0.068	0.115	0.166
		Acenaphthylene	A	53	51.7	0.020				0.002	0.026	0.066	
		Acenaphthylene	P	29	39.3	0.012			0.000	0.000	0.015	0.028	0.049
		Acenaphthylene	T	24	59.4	0.025				0.005	0.031	0.103	
		Anthracene	A	69	73.5	0.040	0.000	0.000	0.001	0.007	0.015	0.031	0.182
		Anthracene	P	36	72.8	0.040	0.000	0.000	0.001	0.008	0.015	0.044	0.199
		Anthracene	T	33	74.0	0.040		0.000	0.001	0.007	0.014	0.027	0.035
		Chrysene	A	75	92.9	0.305	0.000	0.021	0.090	0.149	0.261	0.526	0.678
		Chrysene	P	39	97.1	0.404	0.010	0.045	0.113	0.152	0.243	0.713	1.012
		Chrysene	T	36	90.5	0.247	0.000	0.009	0.060	0.130	0.257	0.362	0.553
		Benzo[k]fluoranthene	A	74	80.0	0.170			0.016	0.057	0.101	0.157	0.378
		Benzo[k]fluoranthene	P	38	90.1	0.239	0.000	0.002	0.034	0.062	0.113	0.176	0.624
		Benzo[k]fluoranthene	T	36	74.2	0.131			0.000	0.053	0.094	0.136	0.199
		Fluoranthene	A	76	100.0	0.414	0.042	0.065	0.106	0.184	0.292	0.546	0.965
		Fluoranthene	P	39	100.0	0.559	0.028	0.068	0.112	0.197	0.311	0.707	1.360
		Fluoranthene	T	37	100.0	0.332	0.041	0.063	0.099	0.160	0.270	0.527	0.815
		Phenanthrene	A	76	100.0	0.375	0.047	0.064	0.116	0.173	0.277	0.429	0.574
		Phenanthrene	P	39	100.0	0.407	0.027	0.078	0.105	0.172	0.269	0.399	0.717
		Phenanthrene	T	37	100.0	0.357	0.050	0.063	0.117	0.174	0.276	0.431	0.564
		Pyrene	A	76	100.0	0.528	0.065	0.098	0.133	0.201	0.391	0.764	1.000
		Pyrene	P	39	100.0	0.614	0.043	0.105	0.132	0.215	0.379	0.661	1.457
		Pyrene	T	37	100.0	0.480	0.064	0.096	0.134	0.198	0.401	0.773	0.976
		Indeno[1,2,3-cd]pyrene	A	74	68.2	0.308	0.003	0.003	0.003	0.049	0.102	0.212	0.357
		Indeno[1,2,3-cd]pyrene	P	38	84.6	0.439	0.003	0.003	0.032	0.052	0.118	0.285	1.178
		Indeno[1,2,3-cd]pyrene	T	36	58.9	0.233	0.003	0.003	0.003	0.026	0.098	0.192	0.261
		Naphthalene	A	69	100.0	0.018	0.005	0.009	0.012	0.014	0.020	0.036	0.044
		Naphthalene	P	36	100.0	0.017	0.005	0.006	0.010	0.013	0.018	0.038	0.038
		Naphthalene	T	33	100.0	0.019	0.008	0.009	0.012	0.014	0.020	0.024	0.043

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Fluorene	A	73	100.0	0.047	0.012	0.014	0.019	0.030	0.040	0.052	0.063
		Fluorene	P	38	100.0	0.043	0.012	0.014	0.019	0.027	0.035	0.046	0.067
		Fluorene	T	35	100.0	0.049	0.012	0.012	0.019	0.031	0.042	0.053	0.062
		Acenaphthene	A	66	27.2	0.016					0.001	0.011	0.014
		Acenaphthene	P	33	23.7	0.019					0.001	0.005	0.053
		Acenaphthene	T	33	29.1	0.015					0.001	0.012	0.014
		Dibenz[a,h]anthracene	A	69	41.4	0.050	0.002	0.002	0.002	0.003	0.026	0.060	0.081
		Dibenz[a,h]anthracene	P	35	57.9	0.081		0.002	0.002	0.014	0.041	0.077	0.305
		Dibenz[a,h]anthracene	T	34	32.9	0.034	0.002	0.002	0.002	0.002	0.017	0.033	0.055
		Benzo[g,h,i]perylene	A	75	94.0	0.218	0.002	0.049	0.081	0.111	0.178	0.316	0.390
		Benzo[g,h,i]perylene	P	38	94.6	0.281	0.003	0.059	0.094	0.123	0.197	0.417	0.822
		Benzo[g,h,i]perylene	T	37	93.6	0.182		0.048	0.075	0.103	0.175	0.280	0.341
		Perylene/Benzo[b]fluoranthene	A	71	91.4	0.453		0.033	0.179	0.294	0.480	0.855	1.078
		Perylene/Benzo[b]fluoranthene	P	36	93.2	0.646		0.024	0.179	0.241	0.488	1.093	1.852
		Perylene/Benzo[b]fluoranthene	T	35	90.5	0.351		0.014	0.134	0.311	0.440	0.694	0.916
Dust Loading	ng/cm2	Benzo[a]pyrene	A	51	63.4	0.018				0.008	0.018	0.058	0.064
PAHs		Benzo[a]pyrene	P	26	85.5	0.026		0.000	0.003	0.012	0.034	0.059	0.065
		Benzo[a]pyrene	T	25	51.1	0.013				0.001	0.014	0.020	0.044
		Benzo[a]anthracene	A	53	82.6	0.022			0.001	0.005	0.014	0.023	0.062
		Benzo[a]anthracene	P	28	94.0	0.034		0.000	0.003	0.008	0.020	0.063	0.104
		Benzo[a]anthracene	T	25	75.8	0.015			0.000	0.005	0.010	0.015	0.018
		Acenaphthylene	A	40	58.0	0.003			0.000	0.001	0.005	0.012	0.013
		Acenaphthylene	P	22	36.1	0.002			0.000	0.000	0.003	0.007	0.011
		Acenaphthylene	T	18	71.7	0.004			0.000	0.001	0.005		
		Anthracene	A	52	72.5	0.004	0.000	0.000	0.000	0.001	0.003	0.004	0.006
		Anthracene	P	26	72.4	0.006	0.000	0.000	0.000	0.001	0.003	0.005	0.015
		Anthracene	T	26	72.6	0.004	0.000	0.000	0.000	0.001	0.002	0.004	0.004
		Chrysene	A	55	96.7	0.047	0.001	0.002	0.006	0.019	0.040	0.106	0.199

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Chrysene	P	29	97.7	0.074	0.001	0.002	0.010	0.028	0.055	0.203	0.267
		Chrysene	T	26	96.2	0.032	0.000	0.001	0.005	0.014	0.030	0.045	0.086
		Benzo[k]fluoranthene	A	54	80.4	0.023			0.001	0.006	0.015	0.030	0.054
		Benzo[k]fluoranthene	P	28	89.9	0.036	0.000	0.000	0.002	0.012	0.024	0.054	0.111
		Benzo[k]fluoranthene	T	26	75.0	0.016			0.000	0.004	0.010	0.019	0.024
		Fluoranthene	A	56	100.0	0.062	0.001	0.003	0.008	0.018	0.046	0.151	0.239
		Fluoranthene	P	29	100.0	0.094	0.001	0.003	0.007	0.035	0.066	0.251	0.323
		Fluoranthene	T	27	100.0	0.045	0.001	0.002	0.007	0.015	0.037	0.088	0.148
		Phenanthrene	A	56	100.0	0.052	0.001	0.003	0.008	0.024	0.039	0.114	0.153
		Phenanthrene	P	29	100.0	0.067	0.001	0.002	0.007	0.024	0.069	0.139	0.182
		Phenanthrene	T	27	100.0	0.044	0.001	0.003	0.010	0.023	0.030	0.073	0.120
		Pyrene	A	56	100.0	0.076	0.002	0.004	0.010	0.022	0.052	0.204	0.319
		Pyrene	P	29	100.0	0.098	0.001	0.004	0.011	0.036	0.076	0.238	0.321
		Pyrene	T	27	100.0	0.063	0.002	0.003	0.008	0.020	0.044	0.128	0.223
		Indeno[1,2,3-cd]pyrene	A	56	62.6	0.043	0.000	0.000	0.000	0.003	0.016	0.057	0.097
		Indeno[1,2,3-cd]pyrene	P	29	83.0	0.066	0.000	0.000	0.002	0.010	0.024	0.092	0.195
		Indeno[1,2,3-cd]pyrene	T	27	51.2	0.029	0.000	0.000	0.000	0.002	0.010	0.022	0.040
		Naphthalene	A	52	100.0	0.003	0.000	0.000	0.001	0.002	0.003	0.006	0.008
		Naphthalene	P	27	100.0	0.004	0.000	0.000	0.001	0.002	0.004	0.007	0.009
		Naphthalene	T	25	100.0	0.002	0.000	0.000	0.001	0.002	0.003	0.004	0.007
		Fluorene	A	53	100.0	0.007	0.000	0.001	0.002	0.004	0.006	0.012	0.025
		Fluorene	P	28	100.0	0.008	0.000	0.001	0.002	0.004	0.009	0.013	0.020
		Fluorene	T	25	100.0	0.007		0.001	0.002	0.004	0.005	0.007	0.023
		Acenaphthene	A	49	31.4	0.002					0.000	0.001	0.002
		Acenaphthene	P	25	22.9	0.003					0.000	0.001	0.008
		Acenaphthene	T	24	36.4	0.002					0.000	0.001	0.002
		Dibenz[a,h]anthracene	A	49	36.1	0.007	0.000	0.000	0.000	0.000	0.002	0.009	0.027
		Dibenz[a,h]anthracene	P	25	59.8	0.013	0.000	0.000	0.000	0.001	0.009	0.029	0.043

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Dibenz[a,h]anthracene	T	24	24.0	0.004	0.000	0.000	0.000	0.000	0.001	0.005	0.006
		Benzo[g,h,i]perylene	A	56	96.3	0.034	0.001	0.001	0.005	0.015	0.026	0.095	0.134
		Benzo[g,h,i]perylene	P	29	96.7	0.051	0.001	0.002	0.007	0.019	0.053	0.137	0.163
		Benzo[g,h,i]perylene	T	27	96.1	0.025	0.000	0.001	0.005	0.014	0.020	0.041	0.065
		Perylene/Benzo[b]fluoranthene	A	54	94.9	0.080		0.002	0.015	0.033	0.072	0.185	0.384
		Perylene/Benzo[b]fluoranthene	P	28	91.1	0.122		0.001	0.017	0.043	0.097	0.384	0.414
		Perylene/Benzo[b]fluoranthene	T	26	97.0	0.057	0.001	0.003	0.011	0.029	0.063	0.100	0.161
Dust Conc	ug/g	Arsenic	A	78	100.0	11.57	5.39	6.39	9.21	11.60	13.43	15.54	17.27
Metals		Arsenic	P	40	100.0	12.74	5.13	6.52	9.49	12.77	14.96	17.32	18.61
		Arsenic	T	38	100.0	10.91	4.97	5.96	8.95	11.01	12.45	14.82	15.33
		Cadmium	A	78	100.0	5.00	1.49	1.99	2.54	3.55	4.77	8.78	13.33
		Cadmium	P	40	100.0	4.81	1.33	1.90	2.23	3.21	4.12	6.60	8.13
		Cadmium	T	38	100.0	5.11	1.41	2.18	2.63	3.93	5.30	11.29	13.38
		Chromium	A	78	100.0	36.58	15.37	20.32	24.84	33.10	45.10	56.44	72.79
		Chromium	P	40	100.0	35.78	13.73	18.06	24.71	34.44	42.45	51.72	54.06
		Chromium	T	38	100.0	37.02	15.51	21.13	24.82	30.89	46.52	56.85	73.96
		Copper	A	78	100.0	148.81	38.79	42.35	47.90	60.22	85.35	111.71	287.73
		Copper	P	40	100.0	95.11	29.05	37.11	46.95	73.15	85.36	111.37	193.91
		Copper	T	38	100.0	178.70	41.44	43.32	47.94	57.38	80.28	110.16	209.41
		Lead	A	78	100.0	85.43	22.06	25.75	42.68	61.61	92.59	147.07	189.51
		Lead	P	40	100.0	67.41	17.03	22.45	38.67	57.45	76.86	122.90	151.64
		Lead	T	38	100.0	95.45	23.50	28.00	44.72	66.76	97.21	147.28	200.62
		Manganese	A	78	100.0	306.47	182.56	215.31	252.44	316.40	347.38	390.17	416.76
		Manganese	P	40	100.0	314.48	179.33	228.87	277.17	320.90	338.30	372.95	395.26
		Manganese	T	38	100.0	302.02	178.48	212.36	248.25	301.01	349.67	398.60	
		Nickel	A	78	100.0	41.27	12.77	16.10	20.09	32.24	53.83	64.28	83.18
		Nickel	P	40	100.0	36.88	11.21	12.35	17.97	32.00	47.13	58.80	63.14
		Nickel	T	38	100.0	43.71	14.84	16.14	20.44	32.92	55.98	67.73	85.82

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Selenium	A	78	54.1	5.10				1.56	10.88	13.34	13.50
		Selenium	P	40	49.5	4.27				0.56	10.87	12.60	13.28
		Selenium	T	38	56.6	5.55				1.82	10.88	13.37	13.59
		Vanadium	A	78	100.0	43.10	22.92	28.85	34.67	39.97	53.81	60.05	65.04
		Vanadium	P	40	100.0	44.26	24.35	31.72	36.04	42.75	52.03	57.05	63.39
		Vanadium	T	38	100.0	42.46	22.29	24.50	34.18	37.87	53.82	60.06	65.46
		Zinc	A	78	100.0	1203.8	408.30	593.38	752.07	980.40	1349.5	1883.1	2019.3
		Zinc	P	40	100.0	1044.7	376.67	591.28	714.13	937.83	1283.0	1554.7	1925.4
		Zinc	T	38	100.0	1292.3	424.70	595.39	749.75	1026.5	1365.7	1891.1	2126.9
		Aluminum	A	78	100.0	47396	36151	37966	42154	47500	52579	57204	60115
		Aluminum	P	40	100.0	44576	26962	32213	39049	43708	50573	53184	59029
		Aluminum	T	38	100.0	48966	36890	40100	43955	47970	53430	57994	60719
		Cobalt	A	78	64.3	6.18				1.70	10.54	12.70	13.98
		Cobalt	P	40	71.8	4.69			0.01	1.67	9.04	13.74	14.25
		Cobalt	T	38	60.1	7.01				1.77	10.87	12.41	12.83
		Cesium	A	78	100.0	2.01	1.30	1.34	1.48	1.85	2.29	2.96	3.24
		Cesium	P	40	100.0	2.01	1.14	1.30	1.56	1.93	2.30	2.81	2.99
		Cesium	T	38	100.0	2.01	1.32	1.35	1.47	1.77	2.23	2.99	
		Iron	A	78	100.0	23592	15113	16993	19359	22300	27463	30779	37333
		Iron	P	40	100.0	23402	14571	17033	19281	23642	26887	28425	30789
		Iron	T	38	100.0	23698	14519	16741	19600	21723	27165	30893	35203
		Magnesium	A	78	100.0	9333.7	5938.2	6413.4	7141.8	8700.6	11046	13108	14282
		Magnesium	P	40	100.0	8733.0	6116.9	6344.7	7016.0	8288.1	9200.7	11798	13401
		Magnesium	T	38	100.0	9668.1	5513.4	6318.9	7233.8	8793.7	11492	13523	14643
		Palladium	A	78	34.5	5.83					14.35	16.68	19.01
		Palladium	P	40	26.5	4.61					13.05	16.86	18.77
		Palladium	T	38	38.9	6.52					14.48	16.32	18.53
		Strontium	A	78	100.0	155.50	100.21	105.98	117.91	139.43	190.23	225.07	234.58

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Strontium	P	40	100.0	156.95	98.56	105.05	120.23	138.20	190.18	214.30	257.36
		Strontium	T	38	100.0	154.70	91.44	104.59	116.47	144.79	189.14	225.07	233.58
		Titanium	A	78	99.6	2404.6	1474.2	1534.8	1990.6	2270.9	2752.3	3337.9	3675.0
		Titanium	P	40	98.8	2183.7	1385.1	1526.4	1761.7	2181.5	2563.3	2810.9	3007.2
		Titanium	T	38	100.0	2527.5	1471.7	1564.6	2030.9	2320.1	2830.4	3561.1	
Dust Loading	ng/cm2	Arsenic	A	58	100.0	1.84	0.15	0.28	0.57	1.30	1.96	3.56	5.53
Metals		Arsenic	P	30	100.0	2.30	0.16	0.43	0.86	1.56	2.73	5.17	5.51
		Arsenic	T	28	100.0	1.58	0.12	0.25	0.45	1.14	1.80	2.38	3.40
		Cadmium	A	58	100.0	0.70	0.03	0.10	0.19	0.40	0.88	1.43	2.51
		Cadmium	P	30	100.0	0.74		0.08	0.23	0.40	0.67	1.93	2.40
		Cadmium	T	28	100.0	0.68	0.03	0.08	0.18	0.36	0.92	1.42	1.70
		Chromium	A	58	100.0	5.85	0.46	0.66	2.13	3.47	6.04	10.49	17.80
		Chromium	P	30	100.0	7.18	0.46	1.04	2.68	3.95	7.08	14.25	23.64
		Chromium	T	28	100.0	5.08	0.41	0.54	1.82	3.16	4.72	7.16	12.62
		Copper	A	58	100.0	24.72	0.89	1.17	3.73	7.08	11.29	31.97	133.31
		Copper	P	30	100.0	22.50	0.81	3.07	4.54	7.09	15.95	59.51	
		Copper	T	28	100.0	26.01	0.79	1.16	3.35	6.99	9.48	23.79	82.68
		Lead	A	58	100.0	14.71	0.63	1.25	3.48	6.60	12.31	40.45	58.38
		Lead	P	30	100.0	14.75		2.07	3.34	5.81	11.74	56.34	57.86
		Lead	T	28	100.0	14.69	0.46	0.89	3.57	7.14	12.56	37.69	57.53
		Manganese	A	58	100.0	48.36	4.31	6.21	17.26	37.77	59.51	78.98	137.85
		Manganese	P	30	100.0	59.32	3.61	7.44	19.50	46.88	64.79	110.11	159.01
		Manganese	T	28	100.0	42.02	4.14	4.84	12.26	34.14	47.89	66.40	92.74
		Nickel	A	58	100.0	6.73	0.44	0.81	1.84	3.41	5.89	13.69	24.19
		Nickel	P	30	100.0	8.03	0.42	0.96	1.86	4.07	6.50	19.53	38.37
		Nickel	T	28	100.0	5.98	0.32	0.77	1.69	3.32	5.67	9.52	17.70
		Selenium	A	58	50.6	0.84				0.08	1.05	2.11	2.58
		Selenium	P	30	55.8	0.96				0.10	1.83	2.58	

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Selenium	T	28	47.5	0.77				0.04	0.63	1.93	2.25
		Vanadium	A	58	100.0	6.99	0.49	0.97	2.49	4.57	6.88	11.74	17.45
		Vanadium	P	30	100.0	8.41	0.60	1.03	3.07	6.49	8.62	15.40	19.57
		Vanadium	T	28	100.0	6.17	0.41	0.70	1.53	4.01	6.29	10.88	13.73
		Zinc	A	58	100.0	201.42	13.78	18.07	64.13	107.21	189.43	480.03	820.41
		Zinc	P	30	100.0	224.26	11.87	21.95	65.09	107.92	215.44	490.93	654.76
		Zinc	T	28	100.0	188.18	13.68	17.56	37.90	102.77	163.13	361.53	812.82
		Aluminum	A	58	100.0	7159.3	655.80	1077.8	2944.2	5634.8	8287.4	12403	19131
		Aluminum	P	30	100.0	7492.7	614.71	1048.3	3047.6	6422.0	9090.5	14706	18528
		Aluminum	T	28	100.0	6966.1	571.18	1030.1	2535.5	5375.3	8133.8	10373	15659
		Cobalt	A	58	59.1	0.99				0.10	1.41	2.38	4.33
		Cobalt	P	30	77.0	1.03			0.02	0.13	1.61	3.03	
		Cobalt	T	28	48.8	0.97					0.49	1.99	3.94
		Cesium	A	58	100.0	0.29	0.04	0.05	0.13	0.24	0.38	0.52	0.69
		Cesium	P	30	100.0	0.33	0.03	0.05	0.15	0.26	0.39	0.60	0.90
		Cesium	T	28	100.0	0.27	0.02	0.05	0.09	0.22	0.32	0.44	0.54
		Iron	A	58	100.0	3542.4	285.90	638.77	1439.0	2856.4	4122.8	6615.1	10321
		Iron	P	30	100.0	4047.7	297.30	551.56	1761.1	3477.1	4380.6	9037.1	9939.5
		Iron	T	28	100.0	3249.5	246.76	491.37	988.08	2414.1	3731.0	4797.1	7021.4
		Magnesium	A	58	100.0	1348.5	97.95	183.65	529.24	982.82	1527.2	2302.7	4253.7
		Magnesium	P	30	100.0	1475.2	106.96	206.19	645.32	1256.7	1465.6	2437.2	4416.4
		Magnesium	T	28	100.0	1275.1	78.99	162.01	483.18	920.66	1528.6	1821.5	2910.6
		Palladium	A	58	33.0	0.94					0.68	2.70	4.03
		Palladium	P	30	27.8	1.03					0.25	3.99	
		Palladium	T	28	36.0	0.88					0.75	2.38	3.24
		Strontium	A	58	100.0	25.27	1.75	2.70	8.88	19.39	30.50	52.08	81.87
		Strontium	P	30	100.0	30.31	1.75	3.05	9.30	19.71	35.22	81.03	
		Strontium	T	28	100.0	22.35	1.42	2.39	7.84	15.43	28.60	41.17	54.16

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATES

Medium/ Location	Units	Analyte	Loc	n	Pct. Meas.	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
		Titanium	A	58	100.0	347.27	31.56	45.60	144.94	317.73	438.55	626.02	877.01
		Titanium	P	30	100.0	368.52	26.41	53.24	149.94	313.83	444.94	736.23	906.80
		Titanium	T	28	100.0	334.96	26.70	43.17	112.02	253.82	403.82	551.63	786.76

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATED MEAN DIFFERENCES

Medium/ Location	Analyte	Units	No. Obs	Est. Pop. Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
Indoor Air	Cladosporium spp.	logCFU/m3	37	37	1.7644	1.4635	0.3009	0.2801	1.07	0.304
Biologicals	Penicillium spp.	logCFU/m3	36	36	0.7158	0.7132	0.0025	0.2493	0.01	0.992
	Aspergillus spp.	logCFU/m3	36	36	0.1479	0.1859	-0.038	0.1009	-0.38	0.714
	Other	logCFU/m3	36	36	0.7545	0.7528	0.0017	0.1802	0.01	0.993
	Unknown	logCFU/m3	36	36	1.037	0.9738	0.0633	0.2036	0.31	0.761
Dust Conc	Diazinon	ug/g	71	1063	0.126	0.4903	-0.364	0.3754	-0.97	0.338
Pesticides	Malathion	ug/g	76	1128	0.0099	0.0055	0.0044	0.0035	1.27	0.212
	Chlorpyrifos	ug/g	30	431	0.6359	0.5909	0.045	0.3212	0.14	0.890
	4,4'-DDE	ug/g	74	1099	0.0102	0.0217	-0.011	0.0078	-1.48	0.147
	Dieldrin	ug/g	75	1135	0.0145	0.0348	-0.02	0.011	-1.86	0.071
	cis-Permethrin	ug/g	77	1152	0.3292	0.8174	-0.488	0.2909	-1.68	0.102
	trans-Permethrin	ug/g	63	887	0.4981	0.8289	-0.331	0.2562	-1.29	0.205
	Lindane	ug/g	74	1104	0.0019	0.0011	0.0008	0.0006	1.42	0.163
	Pendimethalin	ug/g	44	705	0.0339	0.0974	-0.063	0.0399	-1.59	0.123
	Propoxur	ug/g	38	629	0.1277	0.1292	-0.002	0.103	-0.02	0.988
	o-Phenylphenol	ug/g	77	1152	0.0864	0.1926	-0.106	0.0761	-1.40	0.171
	Propetamphos	ug/g	69	1045	0.0119	0.0078	0.0041	0.0044	0.94	0.355
	Resmethrin	ug/g	76	1134	0.2208	0.0321	0.1887	0.1627	1.16	0.253
	Piperonyl Butoxide	ug/g	63	927	0.3431	0.8013	-0.458	0.2499	-1.83	0.075
	Bifenthrin	ug/g	71	1047	0.1574	0.1193	0.0382	0.1324	0.29	0.775
	Cyhalothrin	ug/g	77	1152	0.0982	0.0712	0.027	0.0747	0.36	0.720
	Cyfluthrin	ug/g	74	1106	0.3006	0.2951	0.0055	0.2417	0.02	0.982
	Cypermethrin	ug/g	75	1107	0.2078	0.1607	0.047	0.0902	0.52	0.605
	Esfenvalerate	ug/g	66	973	4.6781	4.3922	0.2859	0.7296	0.39	0.697
	Delta/Tralo-methrin	ug/g	77	1152	0.4418	0.2086	0.2333	0.2221	1.05	0.300
Dust Loading	Diazinon	ng/cm2	53	810	0.0244	0.0281	-0.004	0.0145	-0.25	0.802
Pesticides	Malathion	ng/cm2	56	828	0.0008	0.0007	0.0002	0.0002	0.92	0.363
	Chlorpyrifos	ng/cm2	26	375	0.091	0.0862	0.0048	0.0513	0.09	0.926

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATED MEAN DIFFERENCES

Medium/ Location	Analyte	Units	No. Obs	Est. Pop. Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
	4,4'-DDE	ng/cm2	54	799	0.002	0.0027	-71E-5	0.0012	-0.58	0.566
	Dieldrin	ng/cm2	57	852	0.0024	0.0045	-0.002	0.0023	-0.90	0.377
	cis-Permethrin	ng/cm2	57	852	0.0666	0.1113	-0.045	0.0417	-1.07	0.292
	trans-Permethrin	ng/cm2	47	656	0.1158	0.1458	-0.03	0.0609	-0.49	0.626
	Lindane	ng/cm2	55	816	0.0007	0.0001	0.0006	0.0005	1.05	0.302
	Pendimethalin	ng/cm2	34	567	0.0015	0.0028	-0.001	0.0016	-0.83	0.413
	Propoxur	ng/cm2	27	454	0.0248	0.0231	0.0017	0.0205	0.09	0.933
	o-Phenylphenol	ng/cm2	57	852	0.0145	0.0154	-92E-5	0.0059	-0.16	0.877
	Propetamphos	ng/cm2	50	765	0.0024	0.0019	0.0005	0.0009	0.50	0.619
	Resmethrin	ng/cm2	56	834	0.0389	0.0006	0.0382	0.0285	1.34	0.190
	Piperonyl Butoxide	ng/cm2	48	707	0.0533	0.1299	-0.077	0.0471	-1.63	0.115
	Bifenthrin	ng/cm2	53	785	0.0091	0.022	-0.013	0.0095	-1.35	0.187
	Cyhalothrin	ng/cm2	57	852	0.0073	0.0087	-0.001	0.0024	-0.63	0.534
	Cyfluthrin	ng/cm2	54	806	0.0394	0.0123	0.027	0.0263	1.03	0.312
	Cypermethrin	ng/cm2	55	807	0.0294	0.0249	0.0046	0.0126	0.36	0.720
	Esfenvalerate	ng/cm2	49	722	0.8969	1.0058	-0.109	0.4863	-0.22	0.824
	Delta/Tralo-methrin	ng/cm2	57	852	0.065	0.0257	0.0393	0.0507	0.78	0.444
Dust Conc	Benzo[a]pyrene	ug/g	69	1016	0.141	0.1001	0.0409	0.0358	1.14	0.260
PAHs	Benzo[a]anthracene	ug/g	71	1074	0.2421	0.1209	0.1211	0.0793	1.53	0.135
	Acenaphthylene	ug/g	53	755	0.0116	0.0251	-0.013	0.0108	-1.25	0.219
	Anthracene	ug/g	69	1032	0.0404	0.0401	0.0004	0.0179	0.02	0.984
	Chrysene	ug/g	75	1126	0.4042	0.247	0.1572	0.1092	1.44	0.158
	Benzo[k]fluoranthene	ug/g	74	1123	0.239	0.1311	0.1079	0.0849	1.27	0.211
	Fluoranthene	ug/g	76	1146	0.5595	0.3323	0.2271	0.1857	1.22	0.229
	Phenanthrene	ug/g	76	1146	0.4073	0.3575	0.0498	0.1301	0.38	0.704
	Pyrene	ug/g	76	1146	0.6139	0.4799	0.134	0.235	0.57	0.572
	Indeno[1,2,3-cd]pyrene	ug/g	74	1108	0.4391	0.2333	0.2059	0.175	1.18	0.247
	Naphthalene	ug/g	69	1041	0.0171	0.0192	-0.002	0.0034	-0.63	0.530

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATED MEAN DIFFERENCES

Medium/ Location	Analyte	Units	No. Obs	Est. Pop. Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
	Fluorene	ug/g	73	1088	0.0434	0.0493	-0.006	0.0069	-0.85	0.398
	Acenaphthene	ug/g	66	1022	0.019	0.0146	0.0043	0.0079	0.55	0.585
	Dibenz[a,h]anthracene	ug/g	69	1040	0.081	0.0342	0.0468	0.0316	1.48	0.146
	Benzo[g,h,i]perylene	ug/g	75	1141	0.2815	0.1823	0.0992	0.0731	1.36	0.183
	Perylene/Benzo[b]fluoranthene	ug/g	71	1099	0.6456	0.3512	0.2944	0.2102	1.40	0.170
Dust Loading	Benzo[a]pyrene	ng/cm2	51	752	0.026	0.0132	0.0128	0.0047	2.72	0.011
PAHs	Benzo[a]anthracene	ng/cm2	53	800	0.0342	0.0153	0.0189	0.0085	2.22	0.034
	Acenaphthylene	ng/cm2	40	562	0.0024	0.0036	-0.001	0.0019	-0.63	0.534
	Anthracene	ng/cm2	52	790	0.0057	0.0036	0.0021	0.0014	1.50	0.144
	Chrysene	ng/cm2	55	826	0.0739	0.032	0.0419	0.0199	2.11	0.043
	Benzo[k]fluoranthene	ng/cm2	54	823	0.0362	0.0159	0.0204	0.0093	2.20	0.036
	Fluoranthene	ng/cm2	56	846	0.0939	0.0447	0.0492	0.0249	1.98	0.057
	Phenanthrene	ng/cm2	56	846	0.0667	0.0441	0.0226	0.0145	1.56	0.130
	Pyrene	ng/cm2	56	846	0.0979	0.0632	0.0346	0.0276	1.26	0.219
	Indeno[1,2,3-cd]pyrene	ng/cm2	56	846	0.0661	0.0294	0.0368	0.0187	1.97	0.058
	Naphthalene	ng/cm2	52	798	0.004	0.0024	0.0015	0.0014	1.12	0.272
	Fluorene	ng/cm2	53	788	0.0083	0.0068	0.0015	0.0017	0.87	0.392
	Acenaphthene	ng/cm2	49	755	0.0027	0.002	0.0008	0.0007	1.08	0.289
	Dibenz[a,h]anthracene	ng/cm2	49	740	0.0131	0.0042	0.009	0.004	2.25	0.032
	Benzo[g,h,i]perylene	ng/cm2	56	846	0.0513	0.0248	0.0265	0.0121	2.20	0.035
	Perylene/Benzo[b]fluoranthene	ng/cm2	54	824	0.1224	0.0574	0.065	0.038	1.71	0.097
Dust Conc	Arsenic	ug/g	78	1152	12.736	10.913	1.8226	1.0022	1.82	0.077
Metals	Cadmium	ug/g	78	1152	4.8103	5.1082	-0.298	1.4127	-0.21	0.834
	Chromium	ug/g	78	1152	35.782	37.025	-1.243	2.2953	-0.54	0.591
	Copper	ug/g	78	1152	95.112	178.7	-83.59	96.324	-0.87	0.391
	Lead	ug/g	78	1152	67.414	95.455	-28.04	18.997	-1.48	0.148
	Manganese	ug/g	78	1152	314.48	302.02	12.46	14.702	0.85	0.402
	Nickel	ug/g	78	1152	36.884	43.707	-6.823	4.5922	-1.49	0.146

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATED MEAN DIFFERENCES

Medium/ Location	Analyte	Units	No. Obs	Est. Pop. Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
	Selenium	ug/g	78	1152	4.2743	5.5543	-1.28	1.6719	-0.77	0.449
	Vanadium	ug/g	78	1152	44.265	42.458	1.8066	2.5734	0.70	0.487
	Zinc	ug/g	78	1152	1044.7	1292.3	-247.6	187.27	-1.32	0.194
	Aluminum	ug/g	78	1152	44576	48966	-4390	1866.3	-2.35	0.024
	Cobalt	ug/g	78	1152	4.6885	7.0066	-2.318	2.6656	-0.87	0.390
	Cesium	ug/g	78	1152	2.0085	2.0133	-0.005	0.1426	-0.03	0.974
	Iron	ug/g	78	1152	23402	23698	-296.8	1488.3	-0.20	0.843
	Magnesium	ug/g	78	1152	8733	9668.1	-935	566.75	-1.65	0.107
	Palladium	ug/g	78	1152	4.6079	6.5158	-1.908	2.3295	-0.82	0.418
	Strontium	ug/g	78	1152	156.95	154.7	2.2484	8.4126	0.27	0.791
	Titanium	ug/g	78	1152	2183.7	2527.5	-343.8	151.99	-2.26	0.029
Dust Loading	Arsenic	ng/cm2	58	864	2.2981	1.577	0.7211	0.3539	2.04	0.050
Metals	Cadmium	ng/cm2	58	864	0.7396	0.6818	0.0578	0.1747	0.33	0.743
	Chromium	ng/cm2	58	864	7.1788	5.0811	2.0977	1.5119	1.39	0.175
	Copper	ng/cm2	58	864	22.502	26.008	-3.505	15.64	-0.22	0.824
	Lead	ng/cm2	58	864	14.753	14.686	0.067	4.4995	0.01	0.988
	Manganese	ng/cm2	58	864	59.315	42.017	17.298	11.119	1.56	0.130
	Nickel	ng/cm2	58	864	8.0339	5.9803	2.0536	2.113	0.97	0.338
	Selenium	ng/cm2	58	864	0.9567	0.7676	0.1891	0.4513	0.42	0.678
	Vanadium	ng/cm2	58	864	8.4135	6.1658	2.2477	1.7451	1.29	0.207
	Zinc	ng/cm2	58	864	224.26	188.18	36.076	70.808	0.51	0.614
	Aluminum	ng/cm2	58	864	7492.7	6966.1	526.63	1344.2	0.39	0.698
	Cobalt	ng/cm2	58	864	1.028	0.9722	0.0558	0.5616	0.10	0.921
	Cesium	ng/cm2	58	864	0.3337	0.2693	0.0644	0.0469	1.37	0.179
	Iron	ng/cm2	58	864	4047.7	3249.5	798.17	719.15	1.11	0.275
	Magnesium	ng/cm2	58	864	1475.2	1275.1	200.11	279.97	0.71	0.480
	Palladium	ng/cm2	58	864	1.0338	0.8828	0.151	0.6686	0.23	0.823

SUMMARY STATISTICS FOR INDOOR DATA WEIGHTED TO SAMPLE SCHOOLS
ESTIMATED MEAN DIFFERENCES

Medium/ Location	Analyte	Units	No. Obs	Est. Pop. Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
	Strontium	ng/cm2	58	864	30.309	22.355	7.9542	6.0664	1.31	0.199
	Titanium	ng/cm2	58	864	368.52	334.96	33.56	62.721	0.54	0.596

APPENDIX F

Estimated Distributions of Summary Measures from Continuous Monitors

Appendix F summarizes the summary measures derived from the real-time monitors. It consists of the following sections:

Part 1: Indoor CO_2 data

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary CO_2 summary measures – for all classrooms and for portables and traditionals
- Approximate 95% confidence intervals for these parameters (where appropriate)
- Tests (approximate t tests) of differences in the means of the summary measures for portable and traditional classrooms

Part 2: Indoor temperature data

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary temperature summary measures – for all classrooms and for portables and traditionals
- Approximate 95% confidence intervals for these parameters (where appropriate)
- Tests (approximate t tests) of differences in the means of the summary measures for portable and traditional classrooms

Part 3: Indoor relative humidity data

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary relative humidity summary measures – for all classrooms and for portables and traditionals
- Approximate 95% confidence intervals for these parameters (where appropriate)
- Tests (approximate t tests) of differences in the means of the summary measures for portable and traditional classrooms

Part 4: Outdoor CO_2 data

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary CO_2 summary measures
- Approximate 95% confidence intervals for these parameters (where appropriate)

Part 5: Outdoor temperature data

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary temperature summary measures
- Approximate 95% confidence intervals for these parameters (where appropriate)

Part 6: Outdoor relative humidity data

- *Unweighted* estimates of distributional parameters (mean and selected percentiles), for various summary relative humidity summary measures
- Approximate 95% confidence intervals for these parameters (where appropriate)

Part 7: Indoor particle count data

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary particle count summary measures – for all classrooms and for portables and traditionals
- Approximate 95% confidence intervals for these parameters (where appropriate)
- Tests (approximate t tests) of differences in the means of the summary measures for portable and traditional classrooms

Part 8: Outdoor particle count data

- Weighted estimates of distributional parameters (mean and selected percentiles), for various summary particle count summary measures
- Approximate 95% confidence intervals for these parameters

Part 9: HVAC status data: *Unweighted* estimates of means, standard errors, and confidence intervals for various summary measures characterizing the amount of time HVAC units were run. These data are highly suspect.

Note: Hourly estimates are not population weighted.

Note: Inestimable percentiles and confidence intervals are denoted with “N”.

SUMMARY OF INDOOR CO2 DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
% time CO2 conc>1000 ppm	All	136	195769	42.8	N	N	9.4	39.7	71.8	86.2	95.9
	Port	92	69447	42.1	N	N	12.5	41.4	65.6	82.4	86.6
	Trad	44	126322	43.2	N	N	9.0	39.5	70.9	86.2	96.0
% time CO2 conc>2000 ppm	All	136	195769	9.8	N	N	N	N	3.8	36.0	51.4
	Port	92	69447	9.2	N	N	N	N	16.5	35.4	40.5
	Trad	44	126322	10.1	N	N	N	N	0.5	35.6	N
Avg CO2 conc (ppm)	All	136	195769	1070.3	515.5	545.9	739.9	959.8	1239.8	1688.9	2030.7
	Port	92	69447	1063.5	510.2	547.2	739.6	947.4	1377.6	1655.9	1827.3
	Trad	44	126322	1074.1	517.0	545.8	735.6	959.9	1213.8	1708.6	N
Max 5-min avg CO2 conc (ppm)	All	136	195769	1770.7	688.9	863.2	1127.5	1574.2	2070.5	2924.5	3131.1
	Port	92	69447	1898.9	688.1	807.1	1127.3	1727.3	2343.7	3070.7	3845.4
	Trad	44	126322	1700.3	643.1	865.4	1120.7	1542.7	1967.7	2777.3	2943.6
Max hourly avg CO2 conc (ppm)	All	136	195769	1489.1	627.4	742.0	930.5	1344.0	1756.6	2646.2	2718.5
	Port	92	69447	1555.6	627.8	707.1	1016.2	1305.8	2145.2	2593.0	2744.1
	Trad	44	126322	1452.5	598.5	779.2	926.0	1333.0	1730.5	2645.8	2711.3
Avg CO2 conc (ppm) 8-9AM	All	87	1057	931.8	440.8	483.9	573.6	749.4	1031.9	1619.9	N
	Port	60	440	848.3	339.1	396.1	532.1	718.2	1000.2	1427.9	1577.0
	Trad	27	618	991.2	471.0	485.9	618.8	761.8	1056.3	N	N
Avg CO2 conc (ppm) 9-10AM	All	127	1427	1165.8	449.8	537.2	738.0	1040.0	1272.1	2278.1	2636.5
	Port	87	559	1233.7	440.6	450.2	685.9	1044.6	1508.2	2247.3	2699.5
	Trad	40	869	1122.1	456.5	521.2	743.3	943.4	1116.2	2244.8	N
Avg CO2 conc (ppm) 10-11AM	All	133	1502	1218.7	531.9	563.2	740.6	1098.4	1450.0	2287.2	2392.6
	Port	91	605	1171.7	497.6	554.6	717.9	1063.8	1483.2	1957.5	2288.9
	Trad	42	897	1250.5	537.4	566.2	751.9	1182.0	1425.9	2325.0	2400.1
Avg CO2 conc (ppm) 11AM-noon	All	132	1500	1243.1	477.1	551.7	732.7	1012.5	1588.2	2502.6	2528.7
	Port	90	603	1237.3	491.4	554.0	724.1	1006.3	1454.6	2164.0	2601.1

SUMMARY OF INDOOR CO2 DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Trad	42	897	1247.0	465.0	528.8	722.4	976.6	1632.1	2478.1	2515.9
Avg CO2 conc (ppm) noon-1PM	All	130	1499	1061.3	443.3	471.5	573.8	815.4	1350.1	2087.8	2588.2
	Port	87	592	1040.8	446.4	493.5	558.0	816.6	1283.5	1850.1	2440.1
	Trad	43	908	1074.6	414.7	469.0	568.2	757.7	1339.4	2341.4	N
Avg CO2 conc (ppm) 1-2PM	All	106	1172	991.5	433.0	468.2	633.3	740.0	1116.3	2043.3	2242.3
	Port	69	462	960.7	420.1	438.1	622.8	759.6	1083.3	1826.5	2035.0
	Trad	37	711	1011.6	435.6	473.7	625.6	695.6	1159.5	N	N

SUMMARY OF INDOOR CO2 DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
% time CO2 conc>1000 ppm	All	Lower	33.0	N	N	2.7	27.4	55.0	71.8	79.7
	All	Upper	52.6	N	5.7	27.8	62.7	80.2	96.0	96.0
	Port	Lower	33.9	N	N	N	27.9	56.9	69.5	79.6
	Port	Upper	50.2	N	N	30.6	59.0	77.8	86.6	N
	Trad	Lower	30.1	N	N	N	N	49.4	65.6	71.8
	Trad	Upper	56.3	N	N	32.0	64.8	84.7	96.0	96.0
% time CO2 conc>2000 ppm	All	Lower	1.7	N	N	N	N	N	12.1	24.6
	All	Upper	17.8	N	N	N	0.3	25.0	N	N
	Port	Lower	4.9	N	N	N	N	N	19.7	22.4
	Port	Upper	13.5	N	N	N	N	22.4	41.1	N
	Trad	Lower	-2.2	N	N	N	N	N	0.4	1.6
	Trad	Upper	22.3	N	N	N	0.1	34.9	N	N
Avg CO2 conc (ppm)	All	Lower	921.9	475.9	520.3	694.6	833.2	1048.7	1339.5	1493.6
	All	Upper	1218.7	610.3	712.9	859.3	1099.9	1504.7	N	N
	Port	Lower	941.8	475.3	510.1	637.3	882.1	1098.2	1437.0	1570.8
	Port	Upper	1185.3	632.0	701.8	891.7	1132.7	1603.5	N	N
	Trad	Lower	867.0	N	N	701.8	778.3	995.4	1190.6	1353.9
	Trad	Upper	1281.1	707.5	736.2	902.8	1152.3	1662.3	N	N
Max 5-min avg CO2 conc (ppm)	All	Lower	1570.4	594.6	706.6	1012.2	1412.3	1900.3	2431.8	2850.1
	All	Upper	1971.1	933.9	1071.3	1410.1	1947.6	2740.6	3022.2	3686.9
	Port	Lower	1617.1	610.2	684.9	932.7	1415.4	2052.1	2476.3	2892.2
	Port	Upper	2180.6	926.1	1078.6	1484.0	2067.5	2980.2	3856.5	N
	Trad	Lower	1445.1	N	632.4	956.9	1383.6	1601.2	1956.1	2157.3
	Trad	Upper	1955.4	1039.4	1116.3	1462.7	1927.0	2633.3	2955.2	N
Max hourly avg CO2 conc (ppm)	All	Lower	1313.2	548.5	631.3	847.5	1164.7	1480.7	2123.0	2399.4
	All	Upper	1664.9	785.8	892.8	1147.7	1578.0	2351.4	2716.8	2916.6

SUMMARY OF INDOOR CO2 DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Port	Lower	1345.5	545.5	627.4	790.0	1174.9	1650.0	2157.5	2434.8
	Port	Upper	1765.6	751.4	870.3	1172.8	1685.7	2454.5	2808.6	N
	Trad	Lower	1210.7	N	595.1	828.1	1096.3	1412.1	1729.5	1801.6
	Trad	Upper	1694.4	903.8	927.0	1241.8	1721.5	2600.6	2720.1	N

SUMMARY OF INDOOR CO2 DATA
ESTIMATED MEAN DIFFERENCES

Variable Description	No. Obs	Est. Pop Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
% time CO2 conc>1000 ppm	136	195769	42.091	43.19	-1.099	6.5278	-0.17	0.867
% time CO2 conc>2000 ppm	136	195769	9.209	10.065	-0.856	6.4805	-0.13	0.895
Avg CO2 conc (ppm)	136	195769	1063.5	1074.1	-10.51	109.2	-0.10	0.924
Max 5-min avg CO2 conc (ppm)	136	195769	1898.9	1700.3	198.59	177.47	1.12	0.269
Max hourly avg CO2 conc (ppm)	136	195769	1555.6	1452.5	103.04	154.75	0.67	0.509

SUMMARY OF INDOOR TEMPERATURE DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
% time TEMP<17 deg C	All	148	195769	4.3	N	N	N	N	3.1	10.1	28.3
	Port	102	69447	6.3	N	N	N	N	4.7	23.3	36.0
	Trad	46	126322	3.2	N	N	N	N	1.3	9.7	16.3
% time TEMP<20 deg C	All	148	195769	20.5	N	N	1.5	10.7	25.9	58.2	80.5
	Port	102	69447	27.0	N	0.7	5.5	16.8	37.9	77.0	95.9
	Trad	46	126322	17.0	N	N	1.3	5.6	19.2	49.7	69.6
% time TEMP>23 deg C	All	148	195769	27.2	N	N	1.1	15.6	46.0	67.4	81.7
	Port	102	69447	27.0	N	N	2.4	19.8	43.2	59.2	70.4
	Trad	46	126322	27.3	N	N	0.0	14.6	46.2	68.5	84.2
% time TEMP>26 deg C	All	148	195769	4.4	N	N	N	N	N	9.3	28.5
	Port	102	69447	2.5	N	N	N	N	N	4.1	11.2
	Trad	46	126322	5.4	N	N	N	N	N	16.9	27.7
% time TEMP>29 deg C	All	148	195769	2.3	N	N	N	N	N	N	9.6
	Port	102	69447	0.8	N	N	N	N	N	N	N
	Trad	46	126322	3.1	N	N	N	N	N	1.0	10.2
Avg temperature	All	148	195769	21.8	18.2	18.9	20.6	21.9	22.7	23.7	24.0
	Port	102	69447	21.4	18.0	18.5	20.5	21.5	22.6	23.3	23.5
	Trad	46	126322	22.0	18.2	19.8	20.7	21.9	22.7	23.9	24.0
Max 5-min avg TEMP (deg C)	All	148	195769	24.7	20.5	21.4	22.9	24.5	25.2	28.6	30.8
	Port	102	69447	24.6	20.0	20.9	23.2	24.5	25.7	27.5	28.6
	Trad	46	126322	24.7	20.5	21.5	22.8	23.9	25.0	28.9	30.7
Min 5-min avg TEMP (deg C)	All	148	195769	17.6	12.7	15.0	16.1	18.0	19.4	20.4	21.1
	Port	102	69447	17.1	12.3	12.8	15.8	17.6	19.1	19.8	20.7
	Trad	46	126322	17.9	15.0	15.1	16.1	18.0	19.4	20.4	21.7
Max hourly avg TEMP (deg C)	All	148	195769	23.3	19.7	20.6	21.9	23.1	24.3	26.2	26.7
	Port	102	69447	23.2	18.9	20.2	22.0	23.2	24.5	25.5	26.3

SUMMARY OF INDOOR TEMPERATURE DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Trad	46	126322	23.3	19.7	20.6	21.7	22.9	24.3	25.9	26.7
Min hourly avg TEMP (deg C)	All	148	195769	19.8	15.5	17.3	18.6	20.1	21.5	22.4	22.5
	Port	102	69447	19.2	15.2	16.3	18.1	19.4	20.8	21.6	22.3
	Trad	46	126322	20.1	14.1	17.3	18.9	20.3	21.8	22.5	23.0
Avg TEMP (deg C) 8-9AM	All	93	1093	20.4	16.1	16.5	18.8	20.4	21.8	22.9	23.5
	Port	66	475	19.2	14.1	15.6	17.5	19.5	20.9	22.2	22.9
	Trad	27	618	21.4	17.2	18.4	19.4	21.5	22.4	23.0	25.5
Avg TEMP (deg C) 9-10AM	All	139	1540	21.1	16.4	18.1	20.4	21.4	22.5	23.1	24.2
	Port	97	626	20.6	16.3	17.3	19.3	21.0	22.0	23.0	23.6
	Trad	42	914	21.5	13.1	18.7	20.7	22.0	22.5	23.1	24.8
Avg TEMP (deg C) 10-11AM	All	145	1615	21.7	17.6	18.7	20.5	21.9	22.7	24.2	25.0
	Port	101	673	21.2	17.9	18.4	19.5	21.7	22.5	23.6	24.5
	Trad	44	942	22.0	14.0	19.2	20.8	22.0	22.7	24.2	25.4
Avg TEMP (deg C) 11AM-noon	All	144	1613	22.0	16.9	19.1	20.8	22.2	23.1	24.2	25.0
	Port	100	671	22.0	18.8	19.2	20.7	22.2	23.1	24.1	24.9
	Trad	44	942	21.9	14.0	18.6	20.8	22.3	23.0	24.2	24.8
Avg TEMP (deg C) noon-1PM	All	142	1612	21.8	17.6	19.1	20.8	22.2	23.2	23.8	24.6
	Port	97	659	21.8	17.5	18.7	20.5	22.2	23.2	23.8	24.5
	Trad	45	953	21.8	15.9	19.7	20.9	22.3	23.1	24.0	24.3
Avg TEMP (deg C) 1-2PM	All	115	1268	21.9	17.3	18.7	20.7	22.4	23.2	24.5	24.6
	Port	76	512	22.2	15.9	18.6	21.2	22.3	23.3	24.5	25.2
	Trad	39	756	21.8	15.4	18.5	20.5	22.5	23.0	24.3	24.5

SUMMARY OF INDOOR TEMPERATURE DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
% time TEMP<17 deg C	All	Lower	1.3	N	N	N	N	N	4.0	7.7
	All	Upper	7.3	N	N	N	0.4	9.5	30.6	34.5
	Port	Lower	2.7	N	N	N	N	N	7.6	16.8
	Port	Upper	9.9	N	N	N	N	9.7	35.7	37.0
	Trad	Lower	0.3	N	N	N	N	N	1.0	2.7
	Trad	Upper	6.2	N	N	N	0.3	9.4	23.5	29.2
% time TEMP<20 deg C	All	Lower	13.9	N	N	1.2	5.3	16.1	38.6	51.1
	All	Upper	27.2	0.5	1.3	5.3	16.2	44.8	80.1	N
	Port	Lower	18.7	N	N	4.5	10.8	19.9	43.0	63.1
	Port	Upper	35.3	3.8	5.2	14.5	24.5	55.3	N	N
	Trad	Lower	9.4	N	N	N	N	10.5	20.5	34.9
	Trad	Upper	24.6	N	N	4.4	13.5	38.1	73.5	N
% time TEMP>23 deg C	All	Lower	20.2	N	N	N	5.1	38.9	52.3	58.5
	All	Upper	34.2	N	N	7.9	37.8	56.6	82.3	N
	Port	Lower	19.8	N	N	N	12.2	38.1	45.2	53.8
	Port	Upper	34.2	N	N	14.0	39.2	54.5	73.1	N
	Trad	Lower	16.9	N	N	N	N	28.7	46.1	54.0
	Trad	Upper	37.8	N	N	N	41.8	64.8	N	N
% time TEMP>26 deg C	All	Lower	0.6	N	N	N	N	N	N	2.0
	All	Upper	8.2	N	N	N	N	2.0	28.5	N
	Port	Lower	-0.3	N	N	N	N	N	1.5	2.0
	Port	Upper	5.3	N	N	N	N	1.9	22.7	41.5
	Trad	Lower	-0.3	N	N	N	N	N	N	N
	Trad	Upper	11.1	N	N	N	N	8.0	N	N
% time TEMP>29 deg C	All	Lower	-0.6	N	N	N	N	N	N	N
	All	Upper	5.2	N	N	N	N	N	9.9	N

SUMMARY OF INDOOR TEMPERATURE DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Port	Lower	-0.2	N	N	N	N	N	N	N
	Port	Upper	1.8	N	N	N	N	N	N	17.8
	Trad	Lower	-1.4	N	N	N	N	N	N	N
	Trad	Upper	7.7	N	N	N	N	0.2	N	N
Avg temperature	All	Lower	21.2	14.2	17.5	20.2	21.3	22.5	22.8	23.0
	All	Upper	22.3	20.0	20.4	21.3	22.5	23.0	24.0	N
	Port	Lower	20.8	15.5	17.7	19.0	21.1	22.0	22.7	23.0
	Port	Upper	21.9	18.9	20.3	21.3	22.1	23.0	23.8	N
	Trad	Lower	21.2	13.8	16.7	20.1	21.2	22.5	22.7	22.8
	Trad	Upper	22.8	20.4	20.6	21.7	22.6	23.7	N	N
Max 5-min avg TEMP (deg C)	All	Lower	23.8	18.1	20.5	22.6	23.6	24.8	25.8	27.2
	All	Upper	25.6	22.5	22.8	23.7	24.9	26.9	30.8	N
	Port	Lower	23.8	17.2	19.6	21.9	24.0	25.1	26.1	27.1
	Port	Upper	25.3	22.0	22.8	24.1	25.1	26.8	28.6	N
	Trad	Lower	23.5	18.6	20.5	22.4	23.0	24.7	24.9	25.5
	Trad	Upper	26.0	22.7	22.9	23.7	24.8	28.1	N	N
Min 5-min avg TEMP (deg C)	All	Lower	16.9	8.6	12.7	15.4	17.4	18.7	19.7	20.0
	All	Upper	18.3	15.2	15.8	17.6	18.9	19.8	21.1	N
	Port	Lower	16.4	9.2	12.0	13.9	16.7	18.2	19.3	19.6
	Port	Upper	17.8	13.3	15.4	16.7	18.4	19.5	20.7	20.9
	Trad	Lower	17.0	10.0	15.0	15.4	17.6	18.6	19.5	19.9
	Trad	Upper	18.8	15.7	16.2	17.9	19.4	20.1	N	N
Max hourly avg TEMP (deg C)	All	Lower	22.6	18.4	19.7	20.9	22.3	23.7	24.7	25.1
	All	Upper	24.0	20.8	21.5	22.3	23.6	24.9	26.7	N
	Port	Lower	22.6	17.0	18.9	20.6	22.8	23.7	24.7	24.9
	Port	Upper	23.8	20.7	21.8	22.9	23.7	24.8	N	N

SUMMARY OF INDOOR TEMPERATURE DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Trad	Lower	22.3	19.2	19.5	20.8	22.2	23.2	24.3	24.6
	Trad	Upper	24.4	21.0	21.8	22.6	23.9	25.6	N	N
Min hourly avg TEMP (deg C)	All	Lower	19.2	11.8	15.5	17.9	19.6	20.6	21.7	22.2
	All	Upper	20.4	17.8	18.3	19.7	20.7	22.2	22.5	N
	Port	Lower	18.7	13.7	15.2	17.5	18.5	20.3	20.9	21.5
	Port	Upper	19.8	17.4	18.0	18.6	20.4	21.4	22.4	22.5
	Trad	Lower	19.4	10.0	13.0	18.3	19.8	20.5	21.7	22.1
	Trad	Upper	20.9	18.5	18.9	20.1	21.5	22.3	N	N

SUMMARY OF INDOOR TEMPERATURE DATA
ESTIMATED MEAN DIFFERENCES

Variable Description	No. Obs	Est. Pop Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
% time TEMP<17 deg C	148	195769	6.2652	3.2404	3.0248	1.1009	2.75	0.008
% time TEMP<20 deg C	148	195769	26.982	16.966	10.016	4.4751	2.24	0.029
% time TEMP>23 deg C	148	195769	26.992	27.345	-0.352	6.6652	-0.05	0.958
% time TEMP>26 deg C	148	195769	2.5405	5.4052	-2.865	3.1641	-0.91	0.369
% time TEMP>29 deg C	148	195769	0.7637	3.1425	-2.379	2.3286	-1.02	0.312
Avg temperature	148	195769	21.353	22.004	-0.651	0.4369	-1.49	0.142
Max 5-min avg TEMP (deg C)	148	195769	24.556	24.73	-0.174	0.6933	-0.25	0.802
Min 5-min avg TEMP (deg C)	148	195769	17.11	17.918	-0.808	0.4556	-1.77	0.082
Max hourly avg TEMP (deg C)	148	195769	23.186	23.347	-0.162	0.5717	-0.28	0.779
Min hourly avg TEMP (deg C)	148	195769	19.245	20.137	-0.893	0.4093	-2.18	0.034

SUMMARY OF INDOOR RELATIVE HUMIDITY DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
% time Rel Humidity<30%	All	148	195769	11.3	N	N	N	N	0.8	30.8	N
	Port	102	69447	11.0	N	N	N	N	N	27.4	N
	Trad	46	126322	11.4	N	N	N	N	0.9	30.8	N
% time Rel Humidity>50%	All	148	195769	45.3	N	N	0.3	29.3	94.8	N	N
	Port	102	69447	44.7	N	N	0.3	39.8	90.3	N	N
	Trad	46	126322	45.6	N	N	0.3	20.3	95.0	N	N
% time Rel Humidity>60%	All	148	195769	14.1	N	N	N	0.5	13.5	63.1	69.5
	Port	102	69447	16.9	N	N	N	0.3	13.0	71.2	91.5
	Trad	46	126322	12.6	N	N	N	0.9	14.0	39.9	57.5
Avg relative humidity (%)	All	148	195769	46.2	16.0	31.7	36.0	48.6	55.6	61.8	62.8
	Port	102	69447	46.8	16.3	32.0	39.3	48.6	55.3	62.9	63.6
	Trad	46	126322	45.9	15.4	31.6	35.4	46.7	55.4	59.7	61.4
Max 5-min avg rel. humidity	All	148	195769	58.1	24.9	39.3	47.7	59.4	69.4	76.0	82.1
	Port	102	69447	57.5	23.5	41.6	47.1	58.6	66.5	74.3	78.1
	Trad	46	126322	58.4	25.2	36.5	47.7	61.4	69.7	75.8	82.2
Min 5-min avg rel. humidity	All	148	195769	38.9	11.6	23.5	30.1	40.4	47.7	53.6	55.1
	Port	102	69447	39.4	10.6	23.2	31.6	41.8	47.7	53.7	56.2
	Trad	46	126322	38.7	11.2	22.0	29.9	40.0	47.5	53.0	53.7
Max hourly avg rel. humidity	All	148	195769	50.3	21.9	34.0	40.0	52.6	59.3	66.8	69.8
	Port	102	69447	50.8	20.9	34.8	41.9	52.6	59.9	67.4	69.7
	Trad	46	126322	50.0	20.9	33.9	39.0	50.7	59.0	66.6	68.6
Min hourly avg rel. humidity	All	148	195769	41.7	12.4	26.5	32.6	43.8	51.9	55.2	57.7
	Port	102	69447	42.4	12.6	26.3	34.8	44.1	51.2	58.7	61.3
	Trad	46	126322	41.3	11.8	27.8	30.9	43.0	52.0	54.7	55.3
Avg relative humidity 8-9AM	All	93	1093	50.7	15.7	34.9	42.3	52.1	60.1	69.5	70.1
	Port	66	475	51.3	23.0	36.0	43.7	51.1	62.8	66.9	69.8

SUMMARY OF INDOOR RELATIVE HUMIDITY DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Trad	27	618	50.2	13.7	29.9	39.2	52.4	59.1	N	N
Avg relative humidity 9-10AM	All	139	1540	49.0	17.1	31.4	40.4	50.5	58.8	65.1	66.3
	Port	97	626	49.7	30.6	36.5	43.4	50.0	58.4	65.4	66.6
	Trad	42	914	48.5	15.1	25.7	37.2	50.8	58.3	63.0	65.6
Avg relative humidity 10-11AM	All	145	1615	48.4	18.3	31.6	40.2	49.5	58.3	66.0	66.5
	Port	101	673	47.8	17.8	32.0	41.3	48.8	54.6	64.1	65.3
	Trad	44	942	48.9	17.6	29.6	36.9	51.8	58.4	65.2	66.5
Avg relative humidity 11AM-noon	All	144	1613	47.5	20.9	32.8	38.9	48.9	56.9	61.0	63.6
	Port	100	671	47.1	19.6	32.5	39.1	48.0	54.5	62.5	64.8
	Trad	44	942	47.9	18.2	32.8	38.3	52.1	58.7	60.9	61.1
Avg relative humidity noon-1PM	All	142	1612	46.5	21.9	31.2	37.2	48.8	55.9	58.7	62.1
	Port	97	659	45.8	18.8	31.0	38.8	46.1	53.8	60.5	64.0
	Trad	45	953	46.9	23.2	30.8	36.6	50.4	56.8	58.4	59.5
Avg relative humidity 1-2PM	All	115	1268	46.6	16.6	29.6	36.5	47.8	58.0	62.4	62.9
	Port	76	512	45.2	N	26.5	35.6	46.7	57.3	60.0	63.7
	Trad	39	756	47.5	24.3	29.9	37.2	48.1	58.8	N	N

SUMMARY OF INDOOR RELATIVE HUMIDITY DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
% time Rel Humidity<30%	All	Lower	2.8	N	N	N	N	N	3.6	18.5
	All	Upper	19.8	N	N	N	N	19.5	N	N
	Port	Lower	0.4	N	N	N	N	N	3.1	10.8
	Port	Upper	21.5	N	N	N	N	24.1	N	N
	Trad	Lower	2.3	N	N	N	N	N	0.8	12.2
	Trad	Upper	20.5	N	N	N	N	19.0	N	N
% time Rel Humidity>50%	All	Lower	31.2	N	N	N	2.1	74.4	N	N
	All	Upper	59.3	N	N	4.9	85.6	N	N	N
	Port	Lower	30.1	N	N	N	N	56.8	N	N
	Port	Upper	59.3	N	N	N	85.9	N	N	N
	Trad	Lower	28.7	N	N	N	0.5	72.1	90.9	96.0
	Trad	Upper	62.5	N	0.3	5.2	87.7	N	N	N
% time Rel Humidity>60%	All	Lower	5.5	N	N	N	N	1.6	13.3	34.1
	All	Upper	22.7	N	N	N	3.1	43.8	67.6	88.0
	Port	Lower	5.2	N	N	N	N	1.2	10.8	38.5
	Port	Upper	28.6	N	N	N	2.1	67.0	92.3	N
	Trad	Lower	3.6	N	N	N	N	1.1	9.1	15.2
	Trad	Upper	21.5	N	N	0.0	8.0	35.9	60.5	67.3
Avg relative humidity (%)	All	Lower	41.8	14.2	15.6	32.9	42.3	52.0	55.5	59.1
	All	Upper	50.6	33.8	35.9	44.9	53.5	60.9	63.0	63.8
	Port	Lower	41.7	N	16.0	34.1	43.6	50.5	54.9	58.4
	Port	Upper	51.9	36.3	38.7	44.3	53.1	61.9	63.7	N
	Trad	Lower	41.0	N	14.8	33.4	39.3	52.0	54.8	55.7
	Trad	Upper	50.8	34.4	35.8	45.6	54.7	59.6	61.8	N
Max 5-min avg rel. humidity	All	Lower	52.9	22.1	23.8	43.6	53.7	62.7	69.5	71.5
	All	Upper	63.2	43.8	46.2	54.9	63.9	73.8	82.3	83.4

SUMMARY OF INDOOR RELATIVE HUMIDITY DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Port	Lower	51.9	N	22.5	42.6	53.6	62.1	68.1	71.1
	Port	Upper	63.0	44.3	46.7	55.6	63.5	72.3	78.3	N
	Trad	Lower	52.4	N	23.5	41.0	51.7	62.4	69.5	70.5
	Trad	Upper	64.3	45.4	47.3	56.2	66.3	74.2	N	N
Min 5-min avg rel. humidity	All	Lower	34.9	9.6	11.2	24.7	35.6	45.5	48.5	51.3
	All	Upper	43.0	26.6	29.7	36.9	45.9	53.1	55.0	55.9
	Port	Lower	34.6	N	9.8	25.1	36.2	44.1	47.7	51.2
	Port	Upper	44.1	26.5	30.0	38.3	46.2	52.8	56.2	N
	Trad	Lower	34.1	N	10.3	23.6	33.2	45.1	46.6	49.0
	Trad	Upper	43.4	29.1	30.2	39.1	46.3	52.8	53.8	N
Max hourly avg rel. humidity	All	Lower	45.7	17.1	21.6	38.4	45.6	55.4	59.2	N
	All	Upper	54.9	38.4	39.7	47.3	58.3	66.1	70.0	70.2
	Port	Lower	45.5	N	19.2	38.9	45.7	54.5	59.9	63.4
	Port	Upper	56.0	39.5	41.4	49.2	56.2	66.4	69.7	N
	Trad	Lower	45.0	N	18.9	36.6	43.5	55.4	58.8	59.7
	Trad	Upper	55.1	38.3	39.7	48.3	58.6	66.1	69.1	69.8
Min hourly avg rel. humidity	All	Lower	37.5	10.2	12.2	29.0	37.6	47.8	52.1	53.8
	All	Upper	45.8	29.7	31.4	40.7	49.5	54.7	57.9	60.9
	Port	Lower	37.4	N	11.8	27.9	38.9	47.2	51.3	54.9
	Port	Upper	47.4	30.0	33.5	41.7	48.4	56.3	61.9	N
	Trad	Lower	36.5	N	11.0	28.3	35.7	46.3	51.6	52.1
	Trad	Upper	46.0	30.0	31.3	41.5	51.1	54.6	55.4	N

SUMMARY OF INDOOR RELATIVE HUMIDITY DATA
ESTIMATED MEAN DIFFERENCES

Variable Description	No. Obs	Est. Pop Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
% time Rel Humidity<30%	148	195769	10.97	11.449	-0.478	4.7079	-0.10	0.919
% time Rel Humidity>50%	148	195769	44.674	45.605	-0.931	8.2767	-0.11	0.911
% time Rel Humidity>60%	148	195769	16.884	12.587	4.2975	5.3975	0.80	0.429
Avg relative humidity (%)	148	195769	46.779	45.894	0.8846	2.3886	0.37	0.713
Max 5-min avg rel. humidity	148	195769	57.47	58.394	-0.924	2.799	-0.33	0.743
Min 5-min avg rel. humidity	148	195769	39.367	38.706	0.6607	2.4701	0.27	0.790
Max hourly avg rel. humidity	148	195769	50.752	50.041	0.7111	2.3738	0.30	0.766
Min hourly avg rel. humidity	148	195769	42.416	41.254	1.1621	2.5024	0.46	0.644

SUMMARY OF OUTDOOR CO2 DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER SCHOOLS

Variable Description	n	Est. No. Schools	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Avg CO2 conc (ppm)	49	6506	426.5	N	344.2	399.6	424.0	449.5	483.7	510.5
Max 5-min avg CO2 conc (ppm)	49	6506	521.1	398.8	414.5	464.1	504.7	562.2	628.2	655.3
Max hourly avg CO2 conc (ppm)	49	6506	456.3	N	367.9	417.7	459.1	493.6	508.4	529.5
Avg CO2 conc (ppm) 8-9AM	9	9	508.6	N	N	454.1	493.5	530.7	N	N
Avg CO2 conc (ppm) 9-10AM	39	39	462.8	373.4	400.4	424.3	460.8	495.7	523.9	529.6
Avg CO2 conc (ppm) 10-11AM	47	47	441.7	357.7	379.7	410.2	436.5	474.8	509.3	521.5
Avg CO2 conc (ppm) 11AM-noon	48	48	428.7	346.7	350.2	393.2	422.4	463.8	496.7	520.4
Avg CO2 conc (ppm) noon-1PM	47	47	420.8	340.9	350.1	390.7	414.8	443.7	496.7	506.5
Avg CO2 conc (ppm) 1-2PM	44	44	415.3	335.1	345.3	384.0	410.3	436.8	486.1	496.5

SUMMARY OF OUTDOOR CO2 DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Avg CO2 conc (ppm)	Lower	409.5	N	N	355.5	415.5	434.0	453.7	478.8
	Upper	443.5	390.4	399.7	419.9	445.3	481.7	N	N
Max 5-min avg CO2 conc (ppm)	Lower	492.1	N	395.5	426.7	477.9	533.7	564.5	596.2
	Upper	550.1	439.8	462.8	485.5	554.8	619.1	661.1	N
Max hourly avg CO2 conc (ppm)	Lower	436.5	N	N	387.4	437.3	463.5	494.4	502.4
	Upper	476.1	405.8	417.5	453.6	480.0	506.4	N	N

SUMMARY OF OUTDOOR TEMPERATURE DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER SCHOOLS

Variable Description	n	Est. No. Schools	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Avg temperature	52	6506	18.2	8.6	9.9	11.1	14.7	23.5	28.9	30.2
Max 5-min avg TEMP (deg C)	52	6506	22.6	10.1	14.0	15.5	20.5	28.1	33.2	35.4
Min 5-min avg TEMP (deg C)	52	6506	12.7	0.2	1.2	7.5	12.8	18.3	21.5	22.5
Max hourly avg TEMP (deg C)	52	6506	21.2	9.2	13.6	15.0	18.3	26.4	31.9	34.4
Min hourly avg TEMP (deg C)	52	6506	14.6	2.8	4.4	7.8	13.6	21.1	25.6	26.8
Avg TEMP (deg C) 8-9AM	11	11	11.2	N	0.4	4.7	7.2	16.4	21.8	N
Avg TEMP (deg C) 9-10AM	42	42	14.3	3.9	6.0	8.5	12.8	18.4	24.8	25.9
Avg TEMP (deg C) 10-11AM	50	50	16.9	8.0	8.4	10.9	14.9	21.6	27.4	28.7
Avg TEMP (deg C) 11AM-noon	51	51	18.6	9.5	11.7	12.5	16.6	23.3	29.6	30.9
Avg TEMP (deg C) noon-1PM	50	50	19.8	10.1	12.5	13.8	17.8	24.8	30.3	32.4
Avg TEMP (deg C) 1-2PM	47	47	20.0	9.7	12.7	14.5	16.5	24.7	31.2	33.6

SUMMARY OF OUTDOOR TEMPERATURE DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Avg temperature	Lower	15.4	N	8.4	10.0	12.9	20.3	23.4	24.1
	Upper	21.0	10.5	11.1	13.7	22.7	28.5	N	N
Max 5-min avg TEMP (deg C)	Lower	20.0	N	9.4	15.3	17.4	24.9	27.6	31.0
	Upper	25.3	15.1	15.5	17.4	26.3	31.6	N	N
Min 5-min avg TEMP (deg C)	Lower	9.9	N	-0.6	2.1	8.4	15.7	18.2	19.7
	Upper	15.5	5.1	7.5	11.0	17.1	20.8	N	N
Max hourly avg TEMP (deg C)	Lower	18.5	N	8.9	14.4	15.3	22.4	25.9	29.5
	Upper	23.9	14.2	14.8	16.1	25.0	30.6	N	N
Min hourly avg TEMP (deg C)	Lower	11.7	N	1.3	4.6	10.5	17.2	21.1	21.8
	Upper	17.6	6.4	7.9	12.1	18.7	24.6	N	N

SUMMARY OF OUTDOOR RELATIVE HUMIDITY DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER SCHOOLS

Variable Description	n	Est. No. Schools	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Avg relative humidity (%)	28	28	47.9	12.9	18.1	33.0	48.6	60.9	65.5	72.3
Max 5-min avg rel. humidity	29	29	68.2	28.7	38.3	49.4	70.5	85.4	90.4	93.1
Min 5-min avg rel. humidity	29	29	36.8	6.1	9.7	24.0	36.5	45.4	61.6	64.8
Max hourly avg rel. humidity	29	29	61.7	22.3	26.6	44.8	62.2	82.0	87.5	88.9
Min hourly avg rel. humidity	29	29	39.5	7.7	12.6	25.9	40.2	48.3	64.1	68.0
Avg relative humidity 8-9AM	5	5	66.8	N	N	36.2	65.2	83.3	N	N
Avg relative humidity 9-10AM	24	24	62.9	25.7	27.9	48.1	65.2	83.0	86.0	86.7
Avg relative humidity 10-11AM	28	28	53.4	18.6	24.0	39.3	51.8	67.7	77.5	82.8
Avg relative humidity 11AM-noon	28	28	46.2	10.0	18.7	35.2	44.9	58.8	66.1	74.7
Avg relative humidity noon-1PM	27	27	44.1	10.8	15.5	28.7	44.6	55.1	67.1	70.0
Avg relative humidity 1-2PM	25	25	40.6	8.4	11.8	26.8	44.2	50.7	63.4	66.7

SUMMARY OF OUTDOOR RELATIVE HUMIDITY DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
Avg relative humidity (%)	Lower	41.1	N	N	20.3	40.5	54.0	60.3	62.5
	Upper	54.7	29.8	35.4	47.3	57.8	64.6	N	N
Max 5-min avg rel. humidity	Lower	60.8	N	N	41.0	56.4	73.3	84.5	87.9
	Upper	75.5	45.6	51.4	69.1	76.7	90.2	N	N
Min 5-min avg rel. humidity	Lower	30.0	N	N	13.6	25.2	39.0	44.4	49.0
	Upper	43.6	18.6	24.2	32.8	43.6	60.0	N	N
Max hourly avg rel. humidity	Lower	53.7	N	N	27.8	52.7	65.8	78.8	85.6
	Upper	69.7	39.5	46.9	60.6	70.6	87.0	N	N
Min hourly avg rel. humidity	Lower	32.6	N	N	16.8	28.2	42.9	47.7	50.0
	Upper	46.4	22.1	26.2	35.8	46.4	61.9	N	N

SUMMARY OF PARTICLE COUNT DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
0.5-2.5um particles/min	All	169	195769	43863	6599.7	8037.9	12710	19552	35439	72721	233869
	Port	113	69447	52683	6085.9	7315.1	10170	25108	39227	201547	270444
	Trad	56	126322	39015	6705.7	8181.3	13204	17616	34698	62181	119291
2.5-5.0um particles/min	All	169	195769	2157.8	460.4	639.5	1026.8	1545.0	2691.7	4224.4	6147.2
	Port	113	69447	2072.9	378.5	483.6	1018.6	1804.4	2763.9	3867.7	4221.8
	Trad	56	126322	2204.4	464.3	646.8	968.1	1461.4	2475.8	4596.6	N.
5-10um particles/min	All	169	195769	607.5	123.2	154.6	233.7	444.6	733.9	1105.5	1784.3
	Port	113	69447	589.7	99.5	124.0	283.2	567.2	822.8	957.4	1162.9
	Trad	56	126322	617.3	130.6	171.6	197.7	424.1	721.1	1421.0	N.
>10um particles/min	All	169	195769	87.8	1.4	3.8	15.7	45.2	102.4	211.7	318.5
	Port	113	69447	59.4	0.8	1.9	12.9	33.9	55.1	128.7	250.7
	Trad	56	126322	103.4	1.8	6.1	17.3	55.7	122.4	218.3	N.
<=10um particles/min	All	169	195769	46629	7448.6	9130.6	14643	22988	43972	75885	236032
	Port	113	69447	55345	6923.7	7964.3	11740	27203	42647	204124	274934
	Trad	56	126322	41837	8416.1	9443.5	14901	20774	43255	66938	121456
0.5-2.5um particles/min 8-9AM	All	55	629	47132	2602.4	3852.6	11537	27547	49179	86524	240453
	Port	39	290	61695	N.	2770.3	10290	32446	61292	195216	241792
	Trad	16	339	34694	N.	3985.2	11362	19354	29737	66590	70962
0.5-2.5um particles/min 9-10AM	All	152	1683	55083	4600.4	7328.8	13458	27881	43797	102872	250246
	Port	100	649	67902	4059.6	6642.9	12034	28754	65335	201236	297035
	Trad	52	1034	47037	4792.3	8311.4	14029	26253	38725	75364	168597
0.5-2.5um particles/min 10-11AM	All	167	1806	53535	5076.4	7277.9	13078	21882	40044	100276	332127
	Port	113	738	64043	5738.1	6881.2	11019	25582	52660	205923	326593
	Trad	54	1068	46273	4887.8	8264.1	13316	17915	34484	96946	334979
0.5-2.5um particles/min 11-noon	All	168	1870	54857	6415.8	8280.0	13145	21207	36785	110677	321721
	Port	112	711	67417	5241.3	7589.4	12486	23492	45144	245771	333641
	Trad	56	1159	47152	6054.7	8071.6	13345	18082	32091	79022	192051
0.5-2.5um particles/min noon-1PM	All	165	1838	55791	5398.4	7179.0	12802	20618	46399	146023	314653

SUMMARY OF PARTICLE COUNT DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Port	109	674	67823	4990.8	6590.0	12987	22634	44003	280755	337805
	Trad	56	1164	48829	5013.2	7631.0	12786	19665	46554	103529	192381
0.5-2.5um particles/min 1-2PM	All	150	1681	58577	5815.7	7563.9	10719	23142	45037	148000	292211
	Port	100	621	66307	4715.2	5954.6	12951	24176	42678	270705	297022
	Trad	50	1060	54049	6541.7	8639.6	10161	20800	45521	129650	217855
2.5-5um particles/min 8-9AM	All	55	629	1931.3	208.4	355.2	602.7	1273.9	2232.9	5042.8	5643.1
	Port	39	290	2205.2	349.7	376.9	584.7	1844.6	2354.6	4909.2	6843.9
	Trad	16	339	1697.5	N.	215.9	523.8	931.1	1978.9	3664.6	N.
2.5-5um particles/min 9-10AM	All	152	1683	2500.3	420.3	495.3	850.6	1543.3	2636.6	5810.2	8329.1
	Port	100	649	2467.1	336.9	407.7	945.9	1717.3	3330.7	5028.8	6223.0
	Trad	52	1034	2521.2	470.6	536.1	817.8	1539.0	2409.6	6037.1	8347.7
2.5-5um particles/min 10-11AM	All	167	1806	2493.3	321.5	424.0	863.4	1671.3	2958.2	4727.6	6913.4
	Port	113	738	2569.8	271.5	432.6	795.1	1829.0	3311.4	4700.2	6508.2
	Trad	54	1068	2440.4	274.7	348.3	865.8	1519.0	2568.8	4451.0	7072.3
2.5-5um particles/min 11-noon	All	168	1870	2068.6	333.1	443.1	710.3	1617.8	2784.8	4808.8	5238.4
	Port	112	711	2166.3	190.8	387.0	808.5	1957.9	2852.7	4624.3	5043.0
	Trad	56	1159	2008.7	346.8	444.0	695.3	1567.6	2529.3	4858.1	5460.1
2.5-5um particles/min noon-1PM	All	165	1838	1955.2	328.6	516.1	767.6	1512.4	2698.9	4103.4	4603.1
	Port	109	674	2100.6	237.3	343.8	783.0	1753.4	2703.5	4488.7	5234.7
	Trad	56	1164	1871.0	355.2	560.8	722.8	1406.4	2687.2	3766.4	4191.1
2.5-5um particles/min 1-2PM	All	150	1681	2155.8	275.5	444.0	729.9	1396.8	2368.0	3771.0	4514.0
	Port	100	621	1853.9	148.0	198.8	655.6	1451.7	2658.9	4030.0	4664.8
	Trad	50	1060	2332.7	443.4	567.4	733.2	1339.0	2085.1	3543.9	4183.0
5-10um particles/min 8-9AM	All	55	629	563.2	58.6	60.9	109.2	316.9	647.0	1550.2	1990.6
	Port	39	290	658.9	67.3	102.1	122.6	491.9	707.7	1503.7	1969.9
	Trad	16	339	481.5	N.	58.7	62.5	262.9	605.8	1099.6	N.
5-10um particles/min 9-10AM	All	152	1683	732.4	101.8	139.3	231.4	434.6	795.4	1865.6	2655.9
	Port	100	649	706.5	69.7	102.1	266.5	498.4	1037.4	1599.1	1962.0

SUMMARY OF PARTICLE COUNT DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Trad	52	1034	748.7	110.4	150.8	225.0	387.5	718.9	2101.9	2596.7
5-10um particles/min 10-11AM	All	167	1806	709.5	55.9	129.4	233.1	417.0	886.7	1292.1	2064.7
	Port	113	738	736.2	59.9	122.5	223.1	535.4	983.9	1500.2	2263.0
	Trad	54	1068	691.1	41.7	113.1	241.9	398.2	802.7	1167.8	1960.3
5-10um particles/min 11-noon	All	168	1870	568.8	91.1	107.3	190.5	408.8	784.2	1267.2	1416.3
	Port	112	711	612.1	23.5	96.9	210.2	581.5	832.9	1091.8	1375.9
	Trad	56	1159	542.3	59.7	107.9	159.7	370.2	696.5	1262.7	1415.9
5-10um particles/min noon-1PM	All	165	1838	530.5	72.4	113.4	228.8	440.0	831.7	957.4	1231.9
	Port	109	674	564.6	40.5	71.8	228.3	476.4	848.3	1145.5	1366.6
	Trad	56	1164	510.8	80.9	155.9	220.3	418.7	819.1	938.3	969.9
5-10um particles/min 1-2PM	All	150	1681	600.5	44.9	81.9	208.5	346.4	620.7	1079.6	1476.7
	Port	100	621	515.5	21.1	44.6	130.5	360.8	747.9	1363.2	1508.0
	Trad	50	1060	650.3	64.5	140.5	223.1	338.4	528.8	1003.0	1114.0
>10um particles/min 8-9AM	All	55	629	50.6	N.	N.	0.3	9.4	56.8	154.9	235.3
	Port	39	290	69.8	N.	N.	0.1	10.2	57.1	194.8	370.4
	Trad	16	339	34.3	N.	N.	0.4	8.2	16.7	82.0	N.
>10um particles/min 9-10AM	All	152	1683	86.6	N.	0.6	3.9	25.7	115.2	205.7	342.1
	Port	100	649	67.2	N.	0.0	3.5	16.9	69.8	191.2	284.1
	Trad	52	1034	98.8	0.1	0.9	3.1	41.3	126.5	191.9	379.4
>10um particles/min 10-11AM	All	167	1806	75.7	0.1	1.6	10.8	30.3	91.3	222.0	287.3
	Port	113	738	71.3	N.	0.8	10.3	29.5	66.7	184.9	347.0
	Trad	54	1068	78.7	0.3	2.8	10.8	30.2	97.9	227.1	279.1
>10um particles/min 11-noon	All	168	1870	75.2	0.7	4.5	11.5	37.3	99.9	227.5	276.7
	Port	112	711	66.2	0.1	1.7	9.7	29.4	74.4	194.8	250.9
	Trad	56	1159	80.8	2.4	5.1	13.5	41.2	114.4	239.6	280.8
>10um particles/min noon-1PM	All	165	1838	76.8	1.5	4.8	17.9	50.1	122.3	208.9	258.4
	Port	109	674	65.2	0.8	2.4	12.5	28.2	74.2	183.2	282.1
	Trad	56	1164	83.6	4.1	11.5	18.5	55.1	135.4	209.1	257.2

SUMMARY OF PARTICLE COUNT DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
>10um particles/min 1-2PM	All	150	1681	108.4	1.3	2.5	13.6	46.1	115.8	159.6	224.4
	Port	100	621	58.5	0.8	1.8	5.3	39.1	91.6	140.0	173.4
	Trad	50	1060	137.7	2.3	9.4	14.3	52.8	126.0	165.7	293.1
<=10um particles/min 8-9AM	All	55	629	49626	3162.9	4609.2	12749	27735	53363	93671	242767
	Port	39	290	64559	N.	3327.4	12627	38558	65302	197758	244247
	Trad	16	339	36873	N.	4955.2	12324	22135	34162	70463	77454
<=10um particles/min 9-10AM	All	152	1683	58316	5694.4	8823.4	14226	30670	53923	106318	253278
	Port	100	649	71076	5363.9	7444.9	13048	31958	67096	204657	298906
	Trad	52	1034	50307	5812.0	9602.8	17082	27488	48558	80801	173708
<=10um particles/min 10-11AM	All	167	1806	56738	6048.0	8467.9	14095	25252	45278	111705	333516
	Port	113	738	67349	5928.4	8107.8	13122	27858	55042	211084	328782
	Trad	54	1068	49405	5954.1	9197.6	14330	19335	39408	100695	335961
<=10um particles/min 11-noon	All	168	1870	57494	6981.2	9285.3	15236	23129	39946	112508	324103
	Port	112	711	70195	5454.9	9006.7	15194	26444	49422	249131	337660
	Trad	56	1159	49703	7240.7	9121.5	15023	20891	37153	80856	193703
<=10um particles/min noon-1PM	All	165	1838	58277	6175.6	8350.3	14031	23094	49394	147893	317152
	Port	109	674	70488	5983.6	7306.0	15017	24931	50573	283663	339962
	Trad	56	1164	51211	5776.0	8739.1	13665	21244	41721	103984	194691
<=10um particles/min 1-2PM	All	150	1681	61334	6654.4	8356.8	12394	25377	47148	149041	293390
	Port	100	621	68676	4875.1	7087.8	13774	28077	45043	274319	299306
	Trad	50	1060	57032	7697.7	10064	11622	23459	47421	132052	218844

SUMMARY OF PARTICLE COUNT DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
0.5-2.5um particles/min	All	Lower	25990	4215.9	6651.3	9243.3	16163	27994	41903	58504
	All	Upper	61737	8520.2	10537	16575	27597	49780	233860	313665
	Port	Lower	24379	N	5552.1	8620.6	15321	28086	40331	58940
	Port	Upper	80986	7974.4	9186.8	17466	28691	78754	269391	N
	Trad	Lower	23242	4419.4	6337.8	9227.3	15333	23238	34742	48757
	Trad	Upper	54788	10985	13046	16581	28208	52628	119935	N
2.5-5.0um particles/min	All	Lower	1581.7	280.6	465.5	737.1	1231.4	2136.4	3067.9	3670.6
	All	Upper	2733.9	726.3	906.8	1235.9	1996.4	3532.1	N	N
	Port	Lower	1763.4	276.7	390.2	635.3	1381.9	2509.5	3280.9	3684.7
	Port	Upper	2382.5	630.1	958.2	1383.9	2449.9	3506.3	N	N
	Trad	Lower	1363.5	N	N	659.8	1046.3	1792.5	2582.1	3210.5
	Trad	Upper	3045.3	837.3	981.0	1287.3	2193.8	4124.1	N	N
5-10um particles/min	All	Lower	437.0	106.1	123.3	183.2	338.0	624.2	838.7	961.6
	All	Upper	777.9	182.8	223.8	342.4	576.2	912.5	N	N
	Port	Lower	498.6	56.9	100.8	186.9	423.8	698.8	882.9	940.5
	Port	Upper	680.7	150.2	268.0	425.0	695.8	903.8	N	N
	Trad	Lower	365.8	N	N	181.5	273.8	499.8	725.8	878.3
	Trad	Upper	868.7	183.8	213.3	335.7	558.1	1121.6	N	N
>10um particles/min	All	Lower	45.8	0.5	1.5	13.1	35.4	62.2	126.9	176.1
	All	Upper	129.7	5.2	12.4	27.4	59.3	148.9	N	N
	Port	Lower	43.9	N	0.7	6.1	25.5	49.8	93.7	126.5
	Port	Upper	74.9	2.8	7.2	17.8	45.1	94.3	N	N
	Trad	Lower	39.0	N	N	12.6	31.0	77.5	126.6	156.5
	Trad	Upper	167.8	14.1	17.3	43.2	95.8	204.4	N	N
<=10um particles/min	All	Lower	28676	4863.4	7934.9	10518	17844	31855	46413	63012
	All	Upper	64581	9796.1	12188	18258	31564	55345	236127	315603
	Port	Lower	27054	N	6780.8	9939.5	18337	32694	46013	61394
	Port	Upper	83637	9189.8	10463	19348	33780	82370	274558	N

SUMMARY OF PARTICLE COUNT DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Room Type	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
	Trad	Lower	25895	5499.9	8088.3	10428	17298	26355	43371	53167
	Trad	Upper	57778	12695	14517	18893	31725	58181	122207	N

SUMMARY OF PARTICLE COUNT DATA
ESTIMATED MEAN DIFFERENCES

Variable Description	No. Obs	Est. Pop Size	Mean (port)	Mean (trad)	Diff	Std. Error of Diff	t statistic	p value
0.5-2.5um particles/min	169	195769	52683	39015	13668	12016	1.14	0.260
2.5-5.0um particles/min	169	195769	2072.9	2204.4	-131.5	416.54	-0.32	0.753
5-10um particles/min	169	195769	589.66	617.29	-27.63	126.82	-0.22	0.828
>10um particles/min	169	195769	59.385	103.38	-43.99	33.85	-1.30	0.199
<=10um particles/min	169	195769	55345	41837	13509	12026	1.12	0.266

SUMMARY OF OUTDOOR PARTICLE COUNT DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER SCHOOLS

Variable Description	n	Est. No. Schools	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
0.5-2.5um particles/min	50	6506	79439	4304.2	5495.3	11737	37539	75689	221709	364679
2.5-5.0um particles/min	50	6506	1470.8	146.3	266.3	568.3	948.8	1769.3	2559.8	4722.8
5-10um particles/min	50	6506	182.0	16.0	29.7	57.4	97.2	237.6	434.7	556.8
>10um particles/min	50	6506	53.9	2.7	3.8	13.0	26.4	83.8	134.2	165.0
<=10um particles/min	50	6506	81092	4800.9	6270.2	12503	38482	84103	224083	366973
0.5-2.5um particles/min 8-9AM	7	7	135516	N.	N.	16859	33462	109715	N.	N.
0.5-2.5um particles/min 9-10AM	33	33	94529	4528.6	7732.0	15540	45976	133357	158788	350584
0.5-2.5um particles/min 10-11AM	49	49	107546	4997.7	7093.3	14845	44901	133784	255573	456560
0.5-2.5um particles/min 11-noon	50	50	96054	3112.8	4295.9	13276	39037	89424	287890	441726
0.5-2.5um particles/min noon-1PM	49	49	91387	2396.7	3990.4	9562.3	32093	86093	307318	428413
0.5-2.5um particles/min 1-2PM	47	47	88436	2023.7	4309.7	7258.4	29899	71426	299667	395694
2.5-5um particles/min 8-9AM	7	7	3374.7	N.	N.	320.2	1004.1	3091.7	N.	N.
2.5-5um particles/min 9-10AM	33	33	3303.2	247.9	351.2	711.2	1014.9	1841.2	3716.8	7604.7
2.5-5um particles/min 10-11AM	49	49	1641.4	225.2	309.1	560.8	1139.0	1706.1	3803.4	4738.1
2.5-5um particles/min 11-noon	50	50	1164.2	138.0	227.9	374.6	1008.4	1596.7	2188.6	2848.1
2.5-5um particles/min noon-1PM	49	49	1219.8	133.0	212.0	388.6	875.4	1567.1	2228.4	2362.6
2.5-5um particles/min 1-2PM	47	47	1072.2	87.4	122.4	383.3	966.4	1569.7	1935.3	2150.3
5-10um particles/min 8-9AM	7	7	223.6	N.	N.	67.6	101.6	206.3	N.	N.
5-10um particles/min 9-10AM	33	33	267.7	28.1	33.9	51.5	119.5	317.1	588.5	857.8
5-10um particles/min 10-11AM	49	49	199.4	24.2	35.6	51.7	74.3	195.3	403.6	619.3
5-10um particles/min 11-noon	50	50	157.1	13.0	22.7	40.3	74.0	186.9	412.0	506.4
5-10um particles/min noon-1PM	49	49	169.4	13.5	18.7	39.4	68.8	204.4	511.6	606.6
5-10um particles/min 1-2PM	47	47	164.7	9.7	14.4	31.5	69.4	208.2	524.0	580.5
>10um particles/min 8-9AM	7	7	70.2	N.	N.	14.2	25.5	40.9	N.	N.
>10um particles/min 9-10AM	33	33	64.1	4.4	6.7	12.9	27.0	99.1	147.0	150.8
>10um particles/min 10-11AM	49	49	53.9	1.6	2.9	8.8	17.7	65.8	134.0	194.6
>10um particles/min 11-noon	50	50	44.5	1.1	2.3	7.1	18.4	65.2	140.6	148.8
>10um particles/min noon-1PM	49	49	53.4	1.9	2.2	5.0	19.5	69.8	192.9	220.3

SUMMARY OF OUTDOOR PARTICLE COUNT DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER SCHOOLS

Variable Description	n	Est. No. Schools	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
>10um particles/min 1-2PM	47	47	48.7	0.8	1.9	4.3	16.8	60.2	163.7	173.4
<=10um particles/min 8-9AM	7	7	139114	N.	N.	18326	34200	112621	N.	N.
<=10um particles/min 9-10AM	33	33	98100	5199.1	8778.4	16663	47254	135357	160516	372322
<=10um particles/min 10-11AM	49	49	109387	5630.6	7609.7	16068	46255	135500	266869	459272
<=10um particles/min 11-noon	50	50	97375	3384.8	5076.8	13691	40260	90312	289579	445193
<=10um particles/min noon-1PM	49	49	92776	2653.8	4528.3	10597	33523	86748	309669	430584
<=10um particles/min 1-2PM	47	47	89673	2214.6	4582.4	7755.5	31708	72454	301477	397426

SUMMARY OF OUTDOOR PARTICLE COUNT DATA
APPROXIMATE 95% CONFIDENCE LIMITS

Variable Description	Conf. Limit	Mean	5th Pctl	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl	95th Pctl
0.5-2.5um particles/min	Lower	47019	N	3887.8	6282.1	17132	45048	91154	115390
	Upper	111860	10041	11790	27852	57958	113644	N	N
2.5-5.0um particles/min	Lower	930.3	N	83.8	401.5	763.3	1173.2	1807.0	1994.5
	Upper	2011.2	475.9	557.7	836.1	1522.8	2215.4	4864.0	N
5-10um particles/min	Lower	115.5	N	13.7	37.9	65.5	126.9	240.8	274.1
	Upper	248.6	46.4	56.5	80.1	192.9	358.2	N	N
>10um particles/min	Lower	34.0	N	1.8	5.5	14.9	33.1	84.7	106.8
	Upper	73.8	7.7	12.1	20.7	64.1	116.3	N	N
<=10um particles/min	Lower	48396	N	4110.8	7181.9	18267	46048	92220	116521
	Upper	113788	11635	12503	30524	59349	115764	N	N

SUMMARY OF HVAC STATUS DATA
PARAMETER ESTIMATES CHARACTERIZING DISTRIBUTIONS OVER CLASSROOMS

Variable Description	Room Type	n	Est. No. Classrms	Mean	Std. Error of Mean	Lower 95% Conf Limit	Upper 95% Conf Limit
% time HVAC on	All	60	641	22.6	6.2	10.2	35.0
	Port	45	314	14.6	4.2	6.2	22.9
	Trad	15	327	30.4	10.4	9.5	51.3
% time HVAC on 8-9AM	All	32	407	0.0	0.0	0.0	0.0
	Port	23	182	0.0	0.0	0.0	0.0
	Trad	9	225	0.0	0.0	0.0	0.0
% time HVAC on 9-10AM	All	44	525	4.6	3.3	-1.9	11.1
	Port	32	232	1.6	1.6	-1.6	4.8
	Trad	12	293	7.0	5.1	-3.3	17.3
% time HVAC on 10-11AM	All	45	534	13.9	7.4	-0.9	28.8
	Port	33	241	4.0	2.7	-1.4	9.4
	Trad	12	293	22.1	12.4	-2.7	46.9
% time HVAC on 11AM-noon	All	54	611	23.2	8.3	6.7	39.8
	Port	40	286	14.6	7.1	0.4	28.7
	Trad	14	325	30.9	13.3	4.2	57.6
% time HVAC on noon-1PM	All	57	605	31.6	8.6	14.5	48.7
	Port	43	290	23.9	7.2	9.5	38.3
	Trad	14	315	38.7	14.0	10.8	66.6
% time HVAC on 1-2PM	All	55	594	39.5	10.1	19.3	59.7
	Port	41	279	27.6	8.4	10.9	44.4
	Trad	14	315	50.0	15.7	18.6	81.4

APPENDIX G

Model Results for Factors Affecting Classroom Environmental Quality

Appendix G presents results for models that relate an IEQ variable, Y, to classroom type (portable/traditional indicator) and to other variates. Define the following:

- R = classroom type indicator (= 1 if portable, = 0 otherwise),
- Z = an outdoor measure corresponding to Y. For example, if Y is the logarithm of the classroom formaldehyde levels, then Z would be the logarithm of the outdoor formaldehyde levels at the schools.
- X and X2 =other potential independent variables. These can be continuous variates or can be discrete variates that are coded as a set of dummy (0,1) variables. The models are structured and denoted as follows:

Structure	Model A Terms			Additional Terms In Model B	Additional Terms In Model C
1	R			X	X2
2	R	Z		X	X2
3	R*	Z*	ZR	X	X2

* Since Structure 3 is used to determine if the effect of Z differs for portables and traditionals (i.e., to determine if the ZR term is significant), separate tests for R and Z within Structure 3 are not possible.

The models are identified by letter and structure; for instance, the model containing R, Z, and a single X would be referred to as Model B2. For cases in which there is not an outdoor measurement analogous to Y, only structure 1 is used.

Appendix G consists of five parts:

Part 1: An index to the X variables (not all Xs go with all Ys)

Part 2: An index to the X variables and their levels

Part 3: P-values for the Wald F tests associated with the A and B models.

Part 4: P-values for the Wald F tests associated with the C models.

Part 5: Identification of Preferred Models (p=0.05 is used for judging statistical significance).

- The left portion of the table identifies the preferred A model for each Y, using the following logic. If the ZR term is significant, then Model A3 is preferred over A1 or A2. If not, but the Z term is significant, then Model A2 is the preferred model. If neither Z nor ZR is significant, then Model A1 is preferred. The table identifies, for the preferred A model, which of the effects are significant (*), are not significant (ns), are not testable (NT), or are not applicable (NA) (because they are not in the given model).
- The middle portion of the table identifies the preferred B model for each Y and X combination, using the same logic as above. If the X variate is not significant, then one of the A models is preferred over the B models. The table identifies, for the preferred model, which of the effects are significant (*), are not significant (ns), are not testable (NT), or are not applicable (NA) (because they are not in the given model).
- The right portion of table identifies the preferred C model for each Y, X, and X2 combination, using the same logic as above. One of the A or B models is preferred over

the C models except when both X and X2 are statistically significant. Only C models in which X is the classroom age have been attempted at this point. The table identifies, for the preferred model, which of the effects are significant (*), are not significant (ns), are not testable (NT), or are not applicable (NA) (because they are not in the given model).

- The final column identifies the overall preferred model. If both classroom age (CLAGE) and the X2 variable are statistically significant, then the C model is chosen. On the other hand, if only the X variable is statistically significant, then the B model would be chosen. If neither X nor CLAGE are significant then the A Model is chosen if it has any significant effects. If not, no preferred model is chosen.

Index to Independent Variables

Variable Name	No. of Levels	Description	Source Variable(s)
ACTVOUT	2	New construction/repairs affecting IAQ	AG1_01,02
AE11_03	2	Bookcase -- pressed wood	AE11_03
AG8_01	2	Parking lot/roadway within 50 ft.	AG8_01
AHUAXS	3	Ease of access to AHU interior	BG1
AI2	2	Windows open today	AI2
BORDWALL	2	Fiber/particle board or plywood walls	AD1_02,07
CAIROK	2	Classroom air (teacher)	TQ2c
CARPET	2	Carpet/rugs on floor	AC2_02,07
CEILMOLD	2	Mold areas on ceiling	AB6
CHEMPROD	2	Chemical products	AE17_11
CLAGE	0	Classroom Age	CA3,CA1
CWATSTAN	2	Water stains on ceiling	AB5
DRNFAIL	3	Drain test failure	BD13_1,2,10
DUSTMAT	2	Walk-off dust mats	AG6,AC3
FLTRGAP	4	Size of gap around filter	BG6
FLTRLDG	4	Dirt loading on filter	BG5
FRESHNER	2	Air freshener	AE6_05
FWATSTAN	2	Water stains on floor	AC7
GENINST	2	General instruction classroom	AA13
HVACMODE	3	HVAC mode	BB2
LCO2CONC	0	Log Avg Indr Air CO2 Conc	Q-Trak
MOISTA	2	Max wall, ceiling, floor moisture (%)	BB5a-f
MOLDAREA	2	Mold areas	AF11
MUSTODOR	2	Musty odor at times (teacher)	TQ5a
OAPERS	0	Outdoor air flow/person	BB4_C,AA11
RBC4	4	Air handling unit location	BC4
REGION	2	Geographic region	Sample Frame
RELHUM	0	Avg Indoor Rel Humidity	Q-Trak
RFQ16B	3	Freq of vacuuming/sweeping/dusting	RFQ16b
SCHTYP	3	School type	Sample Frame
TAIRPERS	0	Supply air flow (cfm/person)	BB4_D&_E,AA11
TAKWALL	2	Tackboard walls	AD1_01
TEMP	0	Avg Indoor Temp	Q-Trak
TOTSAIR	0	Supply air flow (cfm)	BB4_D&_E
TURNOFF	2	Turn off heat/AC due to noise (teacher)	TQ4

Index to Independent Variables

Variable Name	No. of Levels	Description	Source Variable(s)
URBAN	2	Urban School	Sampling Fram
USETOL	4	Awareness/use of EPA IAQ Tools	FQ19a,b
WATRLEAK	4	Leak or flood in room (teacher)	TQ6a

Variable Name	Source Variable(s)	Description	Level No.	Category
ACTVOUT	AG1_01,02	New construction/repairs affecting IAQ	1	Yes
			2	No
AE11_03	AE11_03	Bookcase -- pressed wood	1	Yes
			2	No
AG8_01	AG8_01	Parking lot/roadway within 50 ft.	1	Yes
			2	No
AHUAXS	BG1	Ease of access to AHU interior	1	Good
			2	Fair
			3	Poor/None
AI2	AI2	Windows open today	1	Yes
			2	No
BORDWALL	AD1_02,07	Fiber/particle board or plywood walls	1	Yes
			2	No
CAIROK	TQ2c	Classroom air (teacher)	1	Yes
			2	No
CARPET	AC2_02,07	Carpet/rugs on floor	1	Yes
			2	No
CEILMOLD	AB6	Mold areas on ceiling	1	Some
			2	None
CHEMPROD	AE17_11	Chemical products	1	Some
			2	None
CLAGE	CA3,CA1	Classroom Age	0	continuous
CWATSTAN	AB5	Water stains on ceiling	1	Yes
			2	No
DRNFAIL	BD13_1,2,10	Drain test failure	1	Yes
			2	No
			3	NA
DUSTMAT	AG6,AC3	Walk-off dust mats	1	yes
			2	no
FLTRGAP	BG6	Size of gap around filter	1	>=1/2in.
			2	<1/2in.
			3	None
			4	DK/NA
FLTRLDG	BG5	Dirt loading on filter	1	Heavy
			2	Medium
			3	Light

Variable Name	Source Variable(s)	Description	Level No.	Category
			4	DK/NA
FRESHNER	AE6_05	Air freshener	1	Some
			2	None
FWATSTAN	AC7	Water stains on floor	1	Yes
			2	No
GENINST	AA13	General instruction classroom	1	Yes
			2	No
HVACMOD E	BB2	HVAC mode	1	Heating
			2	Cooling
			3	Fan_only
LCO2CONC	Q-Trak	Log Avg Indr Air CO2 Conc	0	continuous
MOISTA	BB5a-f	Max wall, ceiling, floor moisture (%)	1	Max=0
			2	Max>0
MOLDAREA	AF11	Mold areas	1	Some
			2	None
MUSTODOR	TQ5a	Musty odor at times (teacher)	1	Yes
			2	No
OAPERS	BB4_C,AA11	Outdoor air flow/person	0	continuous
RBC4	BC4	Air handling unit location	1	Wall
			2	Window
			3	Rooftop
			4	Other/NA
REGION	Sample Frame	Geographic region	1	North
			1	North
			2	South
			2	South
RELHUM	Q-Trak	Avg Indoor Rel Humidity	0	continuous
RFQ16B	RFQ16b	Freq of vacuuming/sweeping/dusting	1	5/wk
			2	3-4/wk
			3	Other
SCHTYP	Sample Frame	School type	1	Elem
			1	Elem
			2	Middle
			2	Middle
			3	High

Variable Name	Source Variable(s)	Description	Level No.	Category
			3	High
TAIRPERS	BB4_D&_E,AA11	Supply air flow (cfm/person)	0	continuous
TAKWALL	AD1_01	Tackboard walls	1	Yes
			2	No
TEMP	Q-Trak	Avg Indoor Temp	0	continuous
TOTSAIR	BB4_D&_E	Supply air flow (cfm)	0	continuous
TURNOFF	TQ4	Turn off heat/AC due to noise (teacher)	1	Yes
			2	No
URBAN	Sampling Fram	Urban School	1	yes
			2	no
USETOL	FQ19a,b	Awareness/use of EPA IAQ Tools	1	Aware/yes
			2	Aware/no
			3	Aware/DK
			4	Unaware
WATRLEAK	TQ6a	Leak or flood in room (teacher)	1	Current
			2	Previous
			3	Never
			4	Unknown

P Values for Wald F Tests: A and B Models

Dependent Variable	Model A1 R	Model A2 R	Model A2 Z	Model A3 Z*R	X	Model B1 R	Model B1 X	Model B2 R	Model B2 Z	Model B2 X	Model B3 X	Model B3 Z*R
log10 Pollen Count	0.459	0.556	0.045	0.774	ai2	0.352	0.053	0.387	0.033	0.029	0.051	0.679
					cairok	0.431	0.135	0.504	0.034	0.098	0.097	0.890
					carpet	0.398	0.527	0.564	0.041	0.915	0.937	0.775
					clage	0.718	0.549	0.861	0.122	0.726	0.695	0.853
					fltrgap	0.236	0.323	0.359	0.045	0.344	0.340	0.802
					lco2conc	0.898	0.595	0.927	0.108	0.668	0.627	0.602
					region	0.466	0.639	0.555	0.043	0.909	0.915	0.775
					rfq16b	0.476	0.093	0.600	0.043	0.139	0.171	0.725
					schtyp	0.447	0.171	0.544	0.046	0.836	0.846	0.781
					turnoff	0.440	0.423	0.571	0.036	0.236	0.236	0.587
					urban	0.457	0.736	0.552	0.044	0.617	0.626	0.782
log10 Total Fungal Spores	0.916	0.849	0.000	0.930	carpet	0.819	0.644	0.904	0.000	0.836	0.841	0.935
					ceilmold	0.894	0.993	0.838	0.000	0.693	0.703	0.921
					clage	0.765	1.000	0.589	0.002	0.794	0.794	0.969
					cwatstan	0.786	0.583	0.938	0.000	0.698	0.702	0.927
					drnfail	0.405	0.132	0.704	0.000	0.187	0.193	0.947
					fwatstan	0.992	0.490	0.728	0.000	0.103	0.180	0.985
					lco2conc	0.718	0.584	0.660	0.000	0.721	0.692	0.638
					moista	0.875	0.732	0.773	0.000	0.513	0.509	0.920
					moldarea	0.876	0.978	0.891	0.000	0.791	0.791	0.922
					mustodor	0.973	0.285	0.862	0.000	0.728	0.720	0.893
					region	0.939	0.543	0.853	0.000	0.803	0.804	0.933
					watrleak	0.380	0.219	0.338	0.002	0.781	0.744	0.781
log Formaldehyde	0.017	0.026	0.112	0.809	ae11_03	0.099	0.074	0.181	0.036	0.053	0.052	0.870
					bordwall	0.041	0.210	0.070	0.146	0.145	0.149	0.972
					clage	0.003	0.023	0.009	0.840	0.043	0.053	0.598
					freshner	0.028	0.025	0.038	0.120	0.034	0.034	0.723
					geninst	0.009	0.044	0.018	0.158	0.258	0.254	0.815

P Values for Wald F Tests: A and B Models

Dependent Variable	Model A1 R	Model A2 R	Model A2 Z	Model A3 Z*R	X	Model B1 R	Model B1 X	Model B2 R	Model B2 Z	Model B2 X	Model B3 X	Model B3 Z*R
					lco2conc	0.059	0.042	0.045	0.004	0.029	0.029	0.744
					relhum	0.196	0.000	0.233	0.929	0.000	0.000	0.806
					schtyp	0.020	0.681	0.032	0.185	0.887	0.877	0.735
					takwall	0.004	0.071	0.010	0.171	0.095	0.102	0.924
					temp	0.074	0.181	0.056	0.008	0.207	0.205	0.640
log Acetaldehyde	0.136	0.197	0.005	0.944	ae11_03	0.188	0.098	0.289	0.002	0.046	0.041	0.654
					bordwall	0.419	0.029	0.575	0.002	0.008	0.008	0.925
					clage	0.481	0.934	0.486	0.007	0.914	0.891	0.396
					freshner	0.210	0.120	0.325	0.003	0.018	0.017	0.745
					geninst	0.033	0.001	0.063	0.004	0.001	0.001	0.892
					lco2conc	0.294	0.800	0.310	0.004	0.827	0.849	0.236
					relhum	0.323	0.022	0.406	0.001	0.003	0.003	0.155
					schtyp	0.193	0.013	0.238	0.012	0.089	0.089	0.933
					takwall	0.065	0.087	0.074	0.005	0.005	0.005	0.990
					temp	0.298	0.769	0.371	0.003	0.723	0.670	0.144
log o,p-Tolualdehyde	0.105	0.124	0.052	0.001	ae11_03	0.236	0.229	0.268	0.112	0.274	0.286	0.001
					bordwall	0.240	0.192	0.291	0.016	0.176	0.174	0.000
					clage	0.194	0.551	0.168	0.000	0.603	0.615	0.000
					freshner	0.192	0.073	0.185	0.087	0.093	0.119	0.259
					geninst	0.047	0.000	0.057	0.084	0.000	0.000	0.001
					lco2conc	0.391	0.146	0.365	0.880	0.150	0.118	0.006
					relhum	0.384	0.190	0.393	0.960	0.226	0.227	0.031
					schtyp	0.120	0.000	0.147	0.207	0.001	0.001	0.001
					takwall	0.040	0.125	0.046	0.009	0.134	0.143	0.002
					temp	0.386	0.696	0.394	0.940	0.738	0.747	0.022
log Benzene	0.458	0.267	0.194	0.765	actvout	0.488	0.281	0.233	0.263	0.093	0.100	0.671
					ag8_01	0.264	0.460	0.214	0.246	0.818	0.824	0.821
					carpet	0.438	0.745	0.251	0.215	0.923	0.927	0.765

P Values for Wald F Tests: A and B Models

Dependent Variable	Model A1 R	Model A2 R	Model A2 Z	Model A3 Z*R	X	Model B1 R	Model B1 X	Model B2 R	Model B2 Z	Model B2 X	Model B3 X	Model B3 Z*R
					chemprod	0.262	0.232	0.152	0.115	0.268	0.273	0.685
					clage	0.833	0.582	0.656	0.400	0.735	0.682	0.754
					freshner	0.425	0.390	0.207	0.079	0.199	0.154	0.603
					geninst	0.464	0.701	0.277	0.193	0.641	0.653	0.794
					lco2conc	0.492	0.457	0.241	0.231	0.460	0.436	0.569
					schtyp	0.438	0.595	0.250	0.225	0.468	0.481	0.779
					temp	0.327	0.713	0.210	0.206	0.654	0.683	0.793
log Chloroform	0.773	0.903	0.043	0.167	actvout	0.981	0.602	0.727	0.001	0.603	0.700	0.065
					ag8_01	0.586	0.594	0.763	0.044	0.459	0.468	0.208
					carpet	0.490	0.237	0.560	0.070	0.309	0.342	0.297
					chemprod	0.614	0.376	0.743	0.040	0.394	0.482	0.182
					clage	0.263	0.319	0.200	0.047	0.184	0.160	0.131
					freshner	0.751	0.134	0.851	0.049	0.133	0.139	0.192
					geninst	0.719	0.665	0.799	0.023	0.747	0.836	0.348
					lco2conc	0.301	0.138	0.541	0.000	0.032	0.017	0.027
					schtyp	0.858	0.090	0.832	0.000	0.048	0.062	0.495
					temp	0.952	0.584	0.831	0.000	0.914	0.768	0.059
log Tetrachloroethylene	0.311	0.117	0.002	0.953	actvout	0.402	0.641	0.196	0.003	0.594	0.610	0.550
					ag8_01	0.372	0.493	0.233	0.002	0.171	0.173	0.721
					carpet	0.739	0.034	0.382	0.000	0.005	0.006	0.444
					chemprod	0.321	0.505	0.087	0.003	0.551	0.547	0.909
					clage	0.801	0.309	0.380	0.005	0.716	0.800	0.315
					freshner	0.159	0.245	0.047	0.002	0.107	0.119	0.636
					geninst	0.468	0.004	0.192	0.002	0.008	0.007	0.685
					lco2conc	0.816	0.252	0.176	0.000	0.185	0.216	0.198
					schtyp	0.235	0.405	0.080	0.002	0.515	0.508	0.964
					temp	0.667	0.644	0.315	0.000	0.976	0.959	0.077
log Toluene	0.822	0.455	0.016	0.000	actvout	0.781	0.474	0.354	0.020	0.422	0.403	0.000

P Values for Wald F Tests: A and B Models

Dependent Variable	Model A1 R	Model A2 R	Model A2 Z	Model A3 Z*R	X	Model B1 R	Model B1 X	Model B2 R	Model B2 Z	Model B2 X	Model B3 X	Model B3 Z*R
					ag8_01	0.973	0.935	0.451	0.011	0.442	0.244	0.000
					carpet	0.617	0.067	0.615	0.021	0.152	0.197	0.000
					chemprod	0.510	0.228	0.784	0.011	0.375	0.155	0.000
					clage	0.393	0.040	0.403	0.022	0.906	0.476	0.000
					freshner	0.771	0.278	0.456	0.008	0.907	0.164	0.000
					geninst	0.698	0.340	0.589	0.016	0.414	0.280	0.000
					lco2conc	0.295	0.012	0.899	0.010	0.081	0.224	0.009
					schtyp	0.757	0.147	0.432	0.028	0.723	0.731	0.000
					temp	0.872	0.030	0.408	0.007	0.078	0.404	0.004
log m,p-Xylene	0.197	0.116	0.032	0.014	actvout	0.174	0.454	0.059	0.026	0.332	0.316	0.012
					ag8_01	0.211	0.432	0.136	0.009	0.144	0.121	0.004
					carpet	0.203	0.610	0.122	0.030	0.457	0.417	0.010
					chemprod	0.185	0.842	0.153	0.030	0.508	0.292	0.009
					clage	0.653	0.050	0.936	0.387	0.197	0.285	0.012
					freshner	0.186	0.964	0.106	0.017	0.794	0.554	0.022
					geninst	0.296	0.497	0.183	0.020	0.283	0.300	0.011
					lco2conc	0.848	0.002	0.600	0.183	0.002	0.003	0.322
					schtyp	0.188	0.368	0.123	0.153	0.623	0.530	0.016
					temp	0.328	0.903	0.226	0.084	0.901	0.943	0.133
log CO2	0.986	0.712	0.358	0.344	ag8_01	0.872	0.979	0.591	0.411	0.989	0.965	0.379
					ahuaxs	0.588	0.162	0.423	0.339	0.165	0.163	0.270
					cairok	0.949	0.007	0.733	0.428	0.007	0.008	0.488
					clage	0.022	0.010	0.003	0.332	0.003	0.000	0.001
					hvacmode	0.815	0.819	0.913	0.255	0.624	0.477	0.435
					oapers	0.000	0.227	0.000	0.169	0.113	0.151	0.729
					region	0.986	0.960	0.716	0.345	0.893	0.900	0.349
					schtyp	0.889	0.022	0.544	0.860	0.002	0.001	0.244
					tairpers	0.028	0.933	0.034	0.085	0.864	0.923	0.481

P Values for Wald F Tests: A and B Models

Dependent Variable	Model A1 R	Model A2 R	Model A2 Z	Model A3 Z*R	X	Model B1 R	Model B1 X	Model B2 R	Model B2 Z	Model B2 X	Model B3 X	Model B3 Z*R
					turnoff	0.706	0.138	0.657	0.236	0.046	0.045	0.269
					usetol	0.353	0.578	0.270	0.461	0.769	0.755	0.184
% time CO2>1000ppm	0.881	.	.	.	ag8_01	0.965	0.613	.	.	.	.	.
					ahuaxs	0.865	0.268	.	.	.	.	.
					cairok	0.893	0.001	.	.	.	.	.
					clage	0.005	0.001	.	.	.	.	.
					hvacmode	0.840	0.846	.	.	.	.	.
					oapers	0.001	0.515	.	.	.	.	.
					region	0.880	0.995	.	.	.	.	.
					schtyp	0.969	0.001	.	.	.	.	.
					tairpers	0.018	0.934	.	.	.	.	.
					turnoff	0.879	0.441	.	.	.	.	.
					usetol	0.596	0.802	.	.	.	.	.
particles/min <=2.5um	0.560	0.206	0.000	0.063	actvout	0.333	0.419	0.067	0.000	0.610	0.510	0.123
					ag8_01	0.655	0.097	0.332	0.000	0.569	0.459	0.036
					ahuaxs	0.750	0.704	0.389	0.000	0.469	0.342	0.015
					carpet	0.262	0.081	0.045	0.000	0.048	0.045	0.093
					clage	0.607	0.843	0.308	0.000	0.828	0.770	0.015
					dustmat	0.512	0.902	0.170	0.000	0.821	0.726	0.041
					fltrgap	0.509	0.133	0.314	0.000	0.218	0.224	0.110
					fltrldg	0.560	0.154	0.156	0.000	0.117	0.219	0.130
					lco2conc	0.559	0.096	0.057	0.000	0.716	0.745	0.448
					rfq16b	0.369	0.106	0.143	0.000	0.401	0.311	0.055
					schtyp	0.614	0.195	0.213	0.000	0.435	0.469	0.067
particles/min <=10um	0.560	0.252	0.000	0.068	actvout	0.348	0.484	0.105	0.000	0.693	0.597	0.135
					ag8_01	0.657	0.092	0.411	0.000	0.506	0.403	0.038
					ahuaxs	0.777	0.720	0.548	0.000	0.406	0.288	0.014
					carpet	0.259	0.091	0.055	0.000	0.057	0.054	0.100

P Values for Wald F Tests: A and B Models

Dependent Variable	Model A1 R	Model A2 R	Model A2 Z	Model A3 Z*R	X	Model B1 R	Model B1 X	Model B2 R	Model B2 Z	Model B2 X	Model B3 X	Model B3 Z*R
					clage	0.585	0.798	0.290	0.000	0.806	0.747	0.016
					dustmat	0.502	0.952	0.204	0.000	0.945	0.613	0.038
					fltrgap	0.482	0.203	0.294	0.000	0.293	0.297	0.116
					fltrldg	0.534	0.160	0.164	0.000	0.111	0.189	0.146
					lco2conc	0.541	0.125	0.090	0.000	0.506	0.528	0.475
					rfq16b	0.369	0.102	0.174	0.000	0.384	0.297	0.059
					schtyp	0.603	0.209	0.239	0.000	0.409	0.439	0.075
noise-register Hvac on	0.858	.	.	.	ahuaxs	0.723	0.356	.	.	.	.	.
					cairok	0.849	0.236	.	.	.	.	.
					clage	0.006	0.005	.	.	.	.	.
					lco2conc	0.619	0.216	.	.	.	.	.
					rbc4	0.829	0.080	.	.	.	.	.
					schtyp	0.696	0.604	.	.	.	.	.
					totsair	0.038	0.956	.	.	.	.	.
					turnoff	0.768	0.190	.	.	.	.	.
					urban	0.848	0.101	.	.	.	.	.
% time temp<20 deg C	0.024	.	.	.	ahuaxs	0.674	0.201	.	.	.	.	.
					cairok	0.102	0.343	.	.	.	.	.
					clage	0.145	0.444	.	.	.	.	.
					oapers	0.307	0.176	.	.	.	.	.
					region	0.032	0.092	.	.	.	.	.
					schtyp	0.034	0.633	.	.	.	.	.
					tairpers	0.060	0.297	.	.	.	.	.
					turnoff	0.183	0.920	.	.	.	.	.
					usetol	0.017	0.016	.	.	.	.	.
% time temp>23 deg C	0.947	.	.	.	ahuaxs	0.801	0.706	.	.	.	.	.
					cairok	0.940	0.726	.	.	.	.	.
					clage	0.846	0.288	.	.	.	.	.

P Values for Wald F Tests: A and B Models

Dependent Variable	Model A1 R	Model A2 R	Model A2 Z	Model A3 Z*R	X	Model B1 R	Model B1 X	Model B2 R	Model B2 Z	Model B2 X	Model B3 X	Model B3 Z*R
					oapers	0.929	0.482	.	.	.	.	.
					region	0.952	0.905	.	.	.	.	.
					schtyp	0.921	0.008	.	.	.	.	.
					tairpers	0.416	0.328	.	.	.	.	.
					turnoff	0.406	0.066	.	.	.	.	.
					usetol	0.633	0.000	.	.	.	.	.

P Values for Wald F Tests: C Models

Dependent Variable	X	X2	Model C1 R	Model C1 X	Model C1 X2	Model C2 R	Model C2 Z	Model C2 X	Model C2 X2	Model C3 X	Model C3 Z*R	Model C3 X2
log10 Pollen Count	clage	ai2	0.638	0.512	0.293	0.732	0.109	0.728	0.139	0.702	0.976	0.232
	clage	cairok	0.965	0.908	0.053	0.786	0.096	0.723	0.046	0.732	0.753	0.034
	clage	carpet	0.716	0.594	0.358	0.857	0.124	0.773	0.715	0.745	0.852	0.708
	clage	fltrgap	0.631	0.574	0.566	0.845	0.095	0.829	0.718	0.796	0.864	0.711
	clage	lco2conc	0.161	0.207	0.501	0.171	0.045	0.208	0.519	0.187	0.124	0.276
	clage	region	0.710	0.535	0.992	0.846	0.112	0.709	0.443	0.677	0.848	0.440
	clage	rfq16b	0.709	0.486	0.273	0.832	0.065	0.585	0.177	0.568	0.901	0.232
	clage	schtyp	0.743	0.620	0.652	0.812	0.125	0.677	0.848	0.637	0.842	0.832
	clage	turnoff	0.737	0.581	0.326	0.848	0.117	0.681	0.214	0.675	0.904	0.219
	clage	urban	0.727	0.556	0.429	0.873	0.122	0.741	0.521	0.712	0.847	0.506
log10 Total Fungal Spores	clage	carpet	0.769	0.725	0.208	0.604	0.001	0.524	0.157	0.525	0.957	0.155
	clage	ceilmold	0.774	1.000	0.031	0.580	0.003	0.793	0.066	0.794	0.953	0.077
	clage	cwatstan	0.829	0.996	0.820	0.617	0.003	0.791	0.906	0.791	0.936	0.888
	clage	drnfail	0.767	0.876	0.268	0.953	0.003	0.841	0.490	0.840	0.951	0.491
	clage	fwatstan	0.674	0.986	0.360	0.509	0.002	0.811	0.099	0.810	0.971	0.169
	clage	lco2conc	0.464	0.291	0.384	0.578	0.005	0.332	0.435	0.303	0.477	0.421
	clage	moista	0.835	0.986	0.432	0.583	0.005	0.795	0.763	0.795	0.959	0.761
	clage	moldarea	0.750	0.990	0.038	0.581	0.002	0.800	0.048	0.800	0.965	0.073
	clage	mustodor	0.832	0.974	0.565	0.624	0.002	0.798	0.963	0.800	0.840	0.936
	clage	region	0.726	0.959	0.441	0.584	0.006	0.792	0.944	0.792	0.969	0.944
	clage	watrleak	0.648	0.994	0.245	0.496	0.010	0.787	0.730	0.795	0.716	0.715
log Formaldehyde	clage	ae11_03	0.035	0.010	0.024	0.090	0.905	0.027	0.017	0.038	0.819	0.017
	clage	bordwall	0.010	0.019	0.238	0.025	0.677	0.027	0.088	0.033	0.512	0.086
	clage	freshner	0.003	0.009	0.059	0.006	0.791	0.015	0.062	0.018	0.471	0.052
	clage	geninst	0.003	0.046	0.110	0.006	0.733	0.055	0.111	0.067	0.635	0.113
	clage	lco2conc	0.213	0.661	0.048	0.422	0.199	0.927	0.022	0.743	0.401	0.015
	clage	relhum	0.263	0.356	0.001	0.222	0.191	0.119	0.001	0.127	1.000	0.001
	clage	schtyp	0.001	0.009	0.955	0.002	0.885	0.016	0.930	0.026	0.601	0.931

P Values for Wald F Tests: C Models

Dependent Variable	X	X2	Model C1 R	Model C1 X	Model C1 X2	Model C2 R	Model C2 Z	Model C2 X	Model C2 X2	Model C3 X	Model C3 Z*R	Model C3 X2
	clage	takwall	0.003	0.039	0.201	0.008	0.780	0.064	0.121	0.078	0.608	0.123
	clage	temp	0.031	0.089	0.273	0.025	0.591	0.117	0.359	0.148	0.824	0.355
log Acetaldehyde	clage	ae11_03	0.515	0.785	0.055	0.621	0.001	0.724	0.012	0.734	0.643	0.012
	clage	bordwall	0.735	0.918	0.029	0.837	0.001	0.868	0.003	0.886	0.393	0.003
	clage	freshner	0.492	1.000	0.381	0.489	0.006	0.945	0.148	0.964	0.573	0.163
	clage	geninst	0.272	0.773	0.001	0.302	0.006	0.749	0.001	0.717	0.284	0.001
	clage	lco2conc	0.565	0.939	0.411	0.705	0.013	0.794	0.372	0.581	0.107	0.291
	clage	relhum	0.511	0.901	0.225	0.751	0.004	0.714	0.019	0.431	0.092	0.011
	clage	schtyp	0.208	0.356	0.009	0.253	0.023	0.429	0.072	0.440	0.538	0.069
	clage	takwall	0.451	0.890	0.355	0.428	0.008	0.803	0.039	0.777	0.396	0.035
	clage	temp	0.404	0.745	0.908	0.492	0.007	0.922	0.817	0.835	0.091	0.719
log o,p-Tolualdehyde	clage	ae11_03	0.305	0.602	0.350	0.275	0.000	0.642	0.431	0.652	0.000	0.456
	clage	bordwall	0.316	0.591	0.092	0.298	0.000	0.663	0.083	0.680	0.000	0.078
	clage	freshner	0.195	0.607	0.512	0.161	0.000	0.635	0.715	0.634	0.031	0.822
	clage	geninst	0.127	0.503	0.000	0.109	0.000	0.554	0.000	0.567	0.000	0.000
	clage	lco2conc	0.143	0.726	0.121	0.124	0.032	0.574	0.088	0.574	.	0.088
	clage	relhum	0.311	0.718	0.475	0.308	0.000	0.804	0.581	0.804	.	0.581
	clage	schtyp	0.093	0.925	0.008	0.083	0.000	0.824	0.013	0.813	0.000	0.013
	clage	takwall	0.150	0.476	0.153	0.131	0.000	0.529	0.220	0.542	0.000	0.235
	clage	temp	0.243	0.835	0.550	0.243	0.000	0.912	0.592	0.912	.	0.592
log Benzene	clage	actvout	0.611	0.894	0.101	0.427	0.449	0.848	0.062	0.923	0.705	0.070
	clage	ag8_01	0.718	0.470	0.202	0.680	0.681	0.585	0.377	0.550	0.687	0.365
	clage	carpet	0.687	0.076	0.045	0.666	0.960	0.161	0.110	0.124	0.537	0.080
	clage	chemprod	0.578	0.496	0.120	0.315	0.096	0.685	0.094	0.567	0.424	0.062
	clage	freshner	0.945	0.289	0.329	0.871	0.248	0.334	0.323	0.329	0.845	0.300
	clage	geninst	0.828	0.595	0.889	0.627	0.395	0.766	0.786	0.709	0.760	0.793
	clage	lco2conc	0.905	0.198	0.126	0.841	0.648	0.351	0.294	0.340	0.793	0.287
	clage	schtyp	0.789	0.270	0.489	0.924	0.585	0.403	0.630	0.336	0.628	0.599

P Values for Wald F Tests: C Models

Dependent Variable	X	X2	Model C1 R	Model C1 X	Model C1 X2	Model C2 R	Model C2 Z	Model C2 X	Model C2 X2	Model C3 X	Model C3 Z*R	Model C3 X2
	clage	temp	0.565	0.755	0.301	0.447	0.557	0.925	0.272	0.825	0.398	0.156
log Chloroform	clage	actvout	0.263	0.179	0.063	0.341	0.000	0.062	0.073	0.040	0.028	0.111
	clage	ag8_01	0.243	0.300	0.622	0.191	0.043	0.146	0.388	0.125	0.154	0.379
	clage	carpet	0.336	0.661	0.275	0.245	0.028	0.307	0.568	0.259	0.191	0.785
	clage	chemprod	0.256	0.329	0.552	0.194	0.053	0.187	0.734	0.157	0.113	0.847
	clage	freshner	0.359	0.526	0.328	0.264	0.072	0.309	0.668	0.261	0.178	0.886
	clage	geninst	0.212	0.277	0.397	0.147	0.021	0.152	0.362	0.140	0.326	0.425
	clage	lco2conc	0.305	0.991	0.075	0.320	0.000	0.752	0.094	0.729	0.011	0.099
	clage	schtyp	0.671	0.462	0.067	0.962	0.000	0.978	0.034	0.882	0.470	0.062
	clage	temp	0.270	0.184	0.913	0.244	0.001	0.056	0.407	0.031	0.028	0.230
log Tetrachloroethylene	clage	actvout	0.615	0.565	0.024	0.023	0.000	0.615	0.001	0.512	0.133	0.001
	clage	ag8_01	0.640	0.177	0.079	0.506	0.006	0.669	0.044	0.817	0.094	0.041
	clage	carpet	0.881	0.563	0.275	0.175	0.000	0.245	0.001	0.128	0.031	0.000
	clage	chemprod	0.815	0.305	0.697	0.364	0.004	0.743	0.868	0.863	0.296	0.623
	clage	freshner	0.658	0.181	0.129	0.505	0.011	0.416	0.152	0.462	0.306	0.152
	clage	geninst	0.871	0.389	0.004	0.090	0.002	0.956	0.007	0.892	0.208	0.006
	clage	lco2conc	0.619	0.660	0.273	0.353	0.000	0.497	0.217	0.462	0.152	0.337
	clage	schtyp	0.929	0.742	0.587	0.528	0.009	0.902	0.917	0.945	0.311	0.922
	clage	temp	0.460	0.169	0.778	0.621	0.000	0.980	0.925	0.604	0.009	0.965
log Toluene	clage	actvout	0.564	0.075	0.114	0.007	0.008	0.207	0.000	0.043	0.000	0.000
	clage	ag8_01	0.482	0.039	0.972	0.205	0.005	0.569	0.153	0.175	0.000	0.050
	clage	carpet	0.394	0.184	0.943	0.363	0.015	0.597	0.342	0.233	0.000	0.079
	clage	chemprod	0.292	0.038	0.255	0.692	0.010	0.984	0.459	0.548	0.000	0.215
	clage	freshner	0.605	0.507	0.506	0.445	0.012	0.819	0.723	0.778	0.000	0.368
	clage	geninst	0.364	0.016	0.391	0.147	0.012	0.591	0.301	0.153	0.000	0.232
	clage	lco2conc	0.216	0.138	0.693	0.413	0.003	0.429	0.082	0.381	0.000	0.098
	clage	schtyp	0.274	0.121	0.923	0.581	0.025	0.795	0.525	0.696	0.000	0.633
	clage	temp	0.345	0.057	0.043	0.421	0.007	0.988	0.016	0.695	0.003	0.120

P Values for Wald F Tests: C Models

Dependent Variable	X	X2	Model C1 R	Model C1 X	Model C1 X2	Model C2 R	Model C2 Z	Model C2 X	Model C2 X2	Model C3 X	Model C3 Z*R	Model C3 X2
log m,p-Xylene	clage	actvout	0.972	0.099	0.070	0.339	0.047	0.553	0.024	0.820	0.009	0.017
	clage	ag8_01	0.739	0.027	0.489	0.724	0.033	0.294	0.140	0.459	0.001	0.094
	clage	carpet	0.589	0.061	0.385	0.813	0.674	0.241	0.606	0.445	0.048	0.893
	clage	chemprod	0.721	0.054	0.846	0.957	0.377	0.217	0.846	0.345	0.002	0.473
	clage	freshner	0.399	0.017	0.154	0.688	0.576	0.142	0.332	0.130	0.010	0.249
	clage	geninst	0.630	0.026	0.514	0.741	0.103	0.212	0.199	0.347	0.006	0.248
	clage	lco2conc	0.327	0.109	0.710	0.559	0.905	0.506	0.553	0.592	0.409	0.535
	clage	schtyp	0.449	0.053	0.701	0.701	0.190	0.120	0.548	0.198	0.007	0.572
	clage	temp	0.418	0.018	0.042	0.456	0.962	0.071	0.016	0.124	0.935	0.019
log CO2	clage	ag8_01	0.014	0.007	0.455	0.002	0.389	0.002	0.557	0.000	0.002	0.654
	clage	ahuaxs	0.004	0.010	0.320	0.001	0.709	0.004	0.355	0.000	0.000	0.235
	clage	cairok	0.164	0.076	0.004	0.132	0.393	0.061	0.001	0.010	0.003	0.002
	clage	hvacmode	0.015	0.011	0.917	0.001	0.506	0.005	0.916	0.000	0.001	0.588
	clage	oapers	0.000	0.001	0.105	0.000	0.666	0.004	0.034	0.000	0.002	0.132
	clage	region	0.022	0.011	0.555	0.004	0.346	0.004	0.962	0.000	0.001	0.929
	clage	schtyp	0.081	0.040	0.016	0.023	0.430	0.011	0.017	0.000	0.001	0.008
	clage	tairpers	0.004	0.002	0.508	0.008	0.609	0.025	0.599	0.000	0.000	0.464
	clage	turnoff	0.083	0.009	0.442	0.070	0.788	0.011	0.301	0.001	0.003	0.445
	clage	usetol	0.010	0.014	0.928	0.003	0.378	0.006	0.924	0.000	0.000	0.902
% time CO2>1000ppm	clage	ag8_01	0.004	0.002	0.953	.	.	.	.	.	.	.
	clage	ahuaxs	0.000	0.001	0.196	.	.	.	.	.	.	.
	clage	cairok	0.088	0.037	0.003	.	.	.	.	.	.	.
	clage	hvacmode	0.002	0.001	0.827	.	.	.	.	.	.	.
	clage	oapers	0.000	0.000	0.092	.	.	.	.	.	.	.
	clage	region	0.005	0.001	0.654	.	.	.	.	.	.	.
	clage	schtyp	0.037	0.019	0.000	.	.	.	.	.	.	.
	clage	tairpers	0.000	0.000	0.821	.	.	.	.	.	.	.
	clage	turnoff	0.015	0.008	0.875	.	.	.	.	.	.	.

P Values for Wald F Tests: C Models

Dependent Variable	X	X2	Model C1 R	Model C1 X	Model C1 X2	Model C2 R	Model C2 Z	Model C2 X	Model C2 X2	Model C3 X	Model C3 Z*R	Model C3 X2
	clage	usetol	0.001	0.007	0.867	.	.	.	.	.	.	.
particles/min <=2.5um	clage	actvout	0.567	0.902	0.501	0.216	0.000	0.760	0.842	0.822	0.026	0.960
	clage	ag8_01	0.772	0.880	0.645	0.311	0.000	0.622	0.433	0.592	0.020	0.461
	clage	ahuaxs	0.659	0.903	0.859	0.395	0.000	0.609	0.239	0.509	0.005	0.162
	clage	carpet	0.659	0.709	0.582	0.283	0.000	0.974	0.190	0.881	0.014	0.208
	clage	dustmat	0.601	0.846	0.985	0.288	0.000	0.821	0.793	0.787	0.006	0.523
	clage	fltrgap	0.659	0.278	0.134	0.417	0.000	0.995	0.268	0.885	0.002	0.168
	clage	fltrldg	0.782	0.576	0.015	0.273	0.000	0.760	0.098	0.706	0.032	0.176
	clage	lco2conc	0.589	0.887	0.312	0.117	0.000	0.597	0.413	0.655	0.118	0.237
	clage	rfq16b	0.365	0.726	0.301	0.206	0.000	0.708	0.025	0.648	0.010	0.004
	clage	schtyp	0.686	0.732	0.148	0.418	0.006	0.720	0.130	0.616	0.012	0.069
particles/min <=10um	clage	actvout	0.547	0.879	0.442	0.199	0.001	0.722	0.784	0.784	0.030	0.889
	clage	ag8_01	0.752	0.840	0.663	0.301	0.000	0.610	0.451	0.580	0.021	0.483
	clage	ahuaxs	0.607	0.907	0.833	0.368	0.000	0.574	0.221	0.472	0.005	0.146
	clage	carpet	0.634	0.703	0.655	0.274	0.000	0.914	0.297	0.816	0.015	0.356
	clage	dustmat	0.576	0.797	0.940	0.265	0.000	0.803	0.857	0.766	0.006	0.469
	clage	fltrgap	0.623	0.271	0.178	0.374	0.000	0.928	0.378	0.806	0.003	0.288
	clage	fltrldg	0.767	0.537	0.027	0.265	0.000	0.741	0.081	0.683	0.034	0.123
	clage	lco2conc	0.568	0.934	0.344	0.126	0.000	0.657	0.292	0.727	0.123	0.146
	clage	rfq16b	0.359	0.713	0.321	0.199	0.000	0.696	0.036	0.633	0.011	0.007
	clage	schtyp	0.609	0.782	0.151	0.358	0.014	0.832	0.124	0.727	0.014	0.074
noise-register Hvac on	clage	ahuaxs	0.005	0.003	0.600	.	.	.	.	.	.	.
	clage	cairok	0.003	0.002	0.162	.	.	.	.	.	.	.
	clage	lco2conc	0.021	0.146	0.875	.	.	.	.	.	.	.
	clage	rbc4	0.079	0.008	0.580	.	.	.	.	.	.	.
	clage	schtyp	0.009	0.041	0.923	.	.	.	.	.	.	.
	clage	totsair	0.002	0.003	0.713	.	.	.	.	.	.	.
	clage	turnoff	0.035	0.005	0.823	.	.	.	.	.	.	.

P Values for Wald F Tests: C Models

Dependent Variable	X	X2	Model C1 R	Model C1 X	Model C1 X2	Model C2 R	Model C2 Z	Model C2 X	Model C2 X2	Model C3 X	Model C3 Z*R	Model C3 X2
	clage	urban	0.005	0.003	0.847	.	.	.	.	.	.	.
% time temp<20 deg C	clage	ahuaxs	0.480	0.870	0.484	.	.	.	.	.	.	.
	clage	cairok	0.103	0.807	0.485	.	.	.	.	.	.	.
	clage	oapers	0.052	0.883	0.049	.	.	.	.	.	.	.
	clage	region	0.172	0.306	0.063	.	.	.	.	.	.	.
	clage	schtyp	0.098	0.623	0.313	.	.	.	.	.	.	.
	clage	tairpers	0.032	0.888	0.077	.	.	.	.	.	.	.
	clage	turnoff	0.122	0.855	0.994	.	.	.	.	.	.	.
	clage	usetol	0.060	0.530	0.012	.	.	.	.	.	.	.
% time temp>23 deg C	clage	ahuaxs	0.829	0.536	0.788	.	.	.	.	.	.	.
	clage	cairok	0.853	0.829	0.329	.	.	.	.	.	.	.
	clage	oapers	0.258	0.686	0.074	.	.	.	.	.	.	.
	clage	region	0.834	0.277	0.775	.	.	.	.	.	.	.
	clage	schtyp	0.934	0.818	0.249	.	.	.	.	.	.	.
	clage	tairpers	0.111	0.836	0.006	.	.	.	.	.	.	.
	clage	turnoff	0.332	0.312	0.141	.	.	.	.	.	.	.
	clage	usetol	0.632	0.408	0.004	.	.	.	.	.	.	.

Dependent Variable	Selected A Model	R	Z	Z*R	X or X2 Variable	Selected B Model	R	Z	Z*R	X	Selected C Model	R	Z	Z*R	X2	CLAGE	Preferred Model
log10 Pollen Count	A2	ns	*	NA	ai2	B2	ns	*	NA	*	C1	ns	NA	NA	ns	ns	B2
					cairok	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					carpet	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					clage	B1	ns	NA	NA	ns							A2
					fltrgap	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					lco2conc	B1	ns	NA	NA	ns	C2	ns	*	NA	ns	ns	A2
					region	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					rfq16b	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					schtyp	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					turnoff	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					urban	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
log10 Total Fungal Spores	A2	ns	*	NA	carpet	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					ceilmold	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					clage	B2	ns	*	NA	ns							A2
					cwatstan	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					drnfail	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					fwatstan	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					lco2conc	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					moista	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					moldarea	B2	ns	*	NA	ns	C2	ns	*	NA	*	ns	A2
					mustodor	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					region	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					watrleak	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
log Formaldehyde	A1	*	NA	NA	ae11_03	B2	ns	*	NA	ns	C1	*	NA	NA	*	*	C1
					bordwall	B1	*	NA	NA	ns	C1	*	NA	NA	ns	*	A1
					clage	B1	*	NA	NA	*							B1
					freshner	B1	*	NA	NA	*	C1	*	NA	NA	ns	*	B1
					geninst	B1	*	NA	NA	*	C1	*	NA	NA	ns	*	B1

Dependent Variable	Selected A Model	R	Z	Z*R	X or X2 Variable	Selected B Model	R	Z	Z*R	X	Selected C Model	R	Z	Z*R	X2	CLAGE	Preferred Model
					lco2conc	B2	*	*	NA	*	C1	ns	NA	NA	*	ns	B2
					relhum	B1	ns	NA	NA	*	C1	ns	NA	NA	*	ns	B1
					schtyp	B1	*	NA	NA	ns	C1	*	NA	NA	ns	*	A1
					takwall	B1	*	NA	NA	ns	C1	*	NA	NA	ns	*	A1
					temp	B2	ns	*	NA	ns	C1	*	NA	NA	ns	ns	A1
log Acetaldehyde	A2	ns	*	NA	ae11_03	B2	ns	*	NA	*	C2	ns	*	NA	*	ns	B2
					bordwall	B2	ns	*	NA	*	C2	ns	*	NA	*	ns	B2
					clage	B2	ns	*	NA	ns							A2
					freshner	B2	ns	*	NA	*	C2	ns	*	NA	ns	ns	B2
					geninst	B2	ns	*	NA	*	C2	ns	*	NA	*	ns	B2
					lco2conc	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					relhum	B2	ns	*	NA	*	C2	ns	*	NA	*	ns	B2
					schtyp	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					takwall	B2	ns	*	NA	*	C2	ns	*	NA	*	ns	B2
					temp	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
log o,p-Tolualdehyde	A3	NT	NT	*	ae11_03	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					bordwall	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					clage	B3	NT	NT	*	ns							A3
					freshner	B1	ns	NA	NA	ns	C3	NT	NT	*	ns	ns	A3
					geninst	B3	NT	NT	*	*	C3	NT	NT	*	*	ns	B3
					lco2conc	B3	NT	NT	*	ns	C2	ns	*	NA	ns	ns	A3
					relhum	B3	NT	NT	*	ns	C2	ns	*	NA	ns	ns	A3
					schtyp	B3	NT	NT	*	*	C3	NT	NT	*	*	ns	B3
					takwall	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					temp	B3	NT	NT	*	ns	C2	ns	*	NA	ns	ns	A3
log Benzene	A1	ns	NA	NA	actvout	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					ag8_01	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					carpet	B1	ns	NA	NA	ns	C1	ns	NA	NA	*	ns	none

Dependent Variable	Selected A Model	R	Z	Z*R	X or X2 Variable	Selected B Model	R	Z	Z*R	X	Selected C Model	R	Z	Z*R	X2	CLAGE	Preferred Model
					chemprod	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					clage	B1	ns	NA	NA	ns							none
					freshner	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					geninst	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					lco2conc	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					schtyp	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					temp	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
log Chloroform	A2	ns	*	NA	actvout	B2	ns	*	NA	ns	C3	NT	NT	*	ns	*	A2
					ag8_01	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					carpet	B1	ns	NA	NA	ns	C2	ns	*	NA	ns	ns	A2
					chemprod	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					clage	B2	ns	*	NA	ns							A2
					freshner	B2	ns	*	NA	ns	C1	ns	NA	NA	ns	ns	A2
					geninst	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					lco2conc	B3	NT	NT	*	*	C3	NT	NT	*	ns	ns	B3
					schtyp	B2	ns	*	NA	*	C2	ns	*	NA	*	ns	B2
					temp	B2	ns	*	NA	ns	C3	NT	NT	*	ns	*	A2
log Tetrachloroethylene	A2	ns	*	NA	actvout	B2	ns	*	NA	ns	C2	*	*	NA	*	ns	A2
					ag8_01	B2	ns	*	NA	ns	C2	ns	*	NA	*	ns	A2
					carpet	B2	ns	*	NA	*	C3	NT	NT	*	*	ns	B2
					chemprod	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					clage	B2	ns	*	NA	ns							A2
					freshner	B2	*	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					geninst	B2	ns	*	NA	*	C2	ns	*	NA	*	ns	B2
					lco2conc	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					schtyp	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					temp	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
log Toluene	A3	NT	NT	*	actvout	B3	NT	NT	*	ns	C3	NT	NT	*	*	*	C3

Identification Of Preferred Models

Dependent Variable	Selected A Model	R	Z	Z*R	X or X2 Variable	Selected B Model	R	Z	Z*R	X	Selected C Model	R	Z	Z*R	X2	CLAGE	Preferred Model
					ag8_01	B3	NT	NT	*	ns	C3	NT	NT	*	*	ns	A3
					carpet	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					chemprod	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					clage	B3	NT	NT	*	ns							A3
					freshner	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					geninst	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					lco2conc	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					schtyp	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					temp	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
log m,p-Xylene	A3	NT	NT	*	actvout	B3	NT	NT	*	ns	C3	NT	NT	*	*	ns	A3
					ag8_01	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					carpet	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					chemprod	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					clage	B3	NT	NT	*	ns							A3
					freshner	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					geninst	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					lco2conc	B1	ns	NA	NA	*	C1	ns	NA	NA	ns	ns	B1
					schtyp	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A3
					temp	B1	ns	NA	NA	ns	C1	ns	NA	NA	*	*	C1
log CO2	A1	ns	NA	NA	ag8_01	B1	ns	NA	NA	ns	C3	NT	NT	*	ns	*	none
					ahuaxs	B1	ns	NA	NA	ns	C3	NT	NT	*	ns	*	none
					cairok	B1	ns	NA	NA	*	C3	NT	NT	*	*	*	C3
					clage	B3	NT	NT	*	*							B3
					hvacmode	B1	ns	NA	NA	ns	C3	NT	NT	*	ns	*	none
					oapers	B1	*	NA	NA	ns	C3	NT	NT	*	ns	*	none
					region	B1	ns	NA	NA	ns	C3	NT	NT	*	ns	*	none
					schtyp	B1	ns	NA	NA	*	C3	NT	NT	*	*	*	C3
					tairpers	B1	*	NA	NA	ns	C3	NT	NT	*	ns	*	none

Dependent Variable	Selected A Model	R	Z	Z*R	X or X2 Variable	Selected B Model	R	Z	Z*R	X	Selected C Model	R	Z	Z*R	X2	CLAGE	Preferred Model
					turnoff	B1	ns	NA	NA	ns	C3	NT	NT	*	ns	*	none
					usetol	B1	ns	NA	NA	ns	C3	NT	NT	*	ns	*	none
% time CO2>1000ppm	A1	ns	NA	NA	ag8_01	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					ahuaxs	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					cairok	B1	ns	NA	NA	*	C1	ns	NA	NA	*	*	C1
					clage	B1	*	NA	NA	*							B1
					hvacmode	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					oapers	B1	*	NA	NA	ns	C1	*	NA	NA	ns	*	none
					region	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					schtyp	B1	ns	NA	NA	*	C1	*	NA	NA	*	*	C1
					tairpers	B1	*	NA	NA	ns	C1	*	NA	NA	ns	*	none
					turnoff	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					usetol	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
particles/min <=2.5um	A2	ns	*	NA	actvout	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
					ag8_01	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A2
					ahuaxs	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A2
					carpet	B2	*	*	NA	*	C3	NT	NT	*	ns	ns	B2
					clage	B3	NT	NT	*	ns							A2
					dustmat	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A2
					fltrgap	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
					fltrldg	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
					lco2conc	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					rfq16b	B2	ns	*	NA	ns	C3	NT	NT	*	*	ns	A2
					schtyp	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
particles/min <=10um	A2	ns	*	NA	actvout	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
					ag8_01	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A2
					ahuaxs	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A2
					carpet	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2

Dependent Variable	Selected A Model	R	Z	Z*R	X or X2 Variable	Selected B Model	R	Z	Z*R	X	Selected C Model	R	Z	Z*R	X2	CLAGE	Preferred Model
					clage	B3	NT	NT	*	ns							A2
					dustmat	B3	NT	NT	*	ns	C3	NT	NT	*	ns	ns	A2
					fltrgap	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
					fltrldg	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
					lco2conc	B2	ns	*	NA	ns	C2	ns	*	NA	ns	ns	A2
					rfq16b	B2	ns	*	NA	ns	C3	NT	NT	*	*	ns	A2
					schtyp	B2	ns	*	NA	ns	C3	NT	NT	*	ns	ns	A2
noise-register Hvac on	A1	ns	NA	NA	ahuaxs	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					cairok	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					clage	B1	*	NA	NA	*							B1
					lco2conc	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	ns	none
					rbc4	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	*	none
					schtyp	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					totsair	B1	*	NA	NA	ns	C1	*	NA	NA	ns	*	none
					turnoff	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
					urban	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	*	none
% time temp<20 deg C	A1	*	NA	NA	ahuaxs	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	A1
					cairok	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	A1
					clage	B1	ns	NA	NA	ns							A1
					oapers	B1	ns	NA	NA	ns	C1	ns	NA	NA	*	ns	A1
					region	B1	*	NA	NA	ns	C1	ns	NA	NA	ns	ns	A1
					schtyp	B1	*	NA	NA	ns	C1	ns	NA	NA	ns	ns	A1
					tairpers	B1	ns	NA	NA	ns	C1	*	NA	NA	ns	ns	A1
					turnoff	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	A1
					usetol	B1	*	NA	NA	*	C1	ns	NA	NA	*	ns	B1
% time temp>23 deg C	A1	ns	NA	NA	ahuaxs	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					cairok	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					clage	B1	ns	NA	NA	ns							none

Identification Of Preferred Models

Dependent Variable	Selected A Model	R	Z	Z*R	X or X2 Variable	Selected B Model	R	Z	Z*R	X	Selected C Model	R	Z	Z*R	X2	CLAGE	Preferred Model
					oapers	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					region	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					schtyp	B1	ns	NA	NA	*	C1	ns	NA	NA	ns	ns	B1
					tairpers	B1	ns	NA	NA	ns	C1	ns	NA	NA	*	ns	none
					turnoff	B1	ns	NA	NA	ns	C1	ns	NA	NA	ns	ns	none
					usetol	B1	ns	NA	NA	*	C1	ns	NA	NA	*	ns	B1

APPENDIX H

Detailed Results for Selected Models

The remainder of this appendix provides details on the models for selected Y and X variables and selected model types. For each model, the following are given:

Identification of Y
Identification of Model Type (e.g., A2 or C3)
The R-Square Value (% of variation accounted for by the model)
Estimated model parameters, their standard errors, and results of significance tests (t-tests). Note that the variable labeled OUTDRLEV is the counterpart of the response variable, Y – i.e., it is the Z variable. For instance, if Y = log(indoor concentration of some analyte), then OUTDRLEV = Z = log(outdoor concentration of the analyte).

Log10 Pollen Count - Model A2   R-Square = 14.1

Response variable Y820M100

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	0.6884	0.1020	6.7494	0.0000
CLASTYP				
1	-0.0252	0.0425	-0.5930	0.5555
2	0.0000	0.0000	.	.
OUTDRLEV	0.1835	0.0894	2.0531	0.0447

Log10 Pollen Count - Model B2   R-Square = 16.7

Response variable Y820M100

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	0.6828	0.1008	6.7709	0.0000
CLASTYP				
1	-0.0401	0.0460	-0.8712	0.3873
2	0.0000	0.0000	.	.
OUTDRLEV	0.2004	0.0917	2.1856	0.0330
WERE THERE ANY WINDOWS OPEN TODAY?				
1	-0.1855	0.0830	-2.2352	0.0293
2	0.0000	0.0000	.	.

Log10 Total Fungal Spores - Model A2   R-Square = 19.8

Response variable Y898M100

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.2369	0.3028	4.0844	0.0001
CLASTYP				
1	0.0157	0.0821	0.1914	0.8489
2	0.0000	0.0000	.	.
OUTDRLEV	0.3784	0.0871	4.3469	0.0001

Log Formaldehyde - Model C1   R-Square = 14.1

Response variable Y501M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.9513	0.1591	12.2629	0.0000
CLASTYP				
1	0.2877	0.1330	2.1630	0.0345
2	0.0000	0.0000	.	.
CLASSROOM AGE (YRS)	0.0078	0.0029	2.6618	0.0100
BOOKCASES/PRESSED WOOD				
1	0.3042	0.1314	2.3160	0.0240
2	0.0000	0.0000	.	.

Log Formaldehyde - Model A1   R-Square = 3.4

Response variable Y501M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	2.3861	0.0825	28.9397	0.0000
CLASTYP				
1	0.2063	0.0838	2.4617	0.0167
2	0.0000	0.0000	.	.

Log Formaldehyde - Model B1   R-Square = 9.1

Response variable Y501M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	2.0950	0.1601	13.0856	0.0000
CLASTYP				
1	0.3975	0.1307	3.0413	0.0035
2	0.0000	0.0000	.	.
CLASSROOM AGE (YRS)	0.0070	0.0030	2.3262	0.0234

Log Formaldehyde - Model B1 R-Square = 5.6

Response variable Y501M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	2.3585	0.0883	26.6960	0.0000
CLASTYP				
1	0.1849	0.0819	2.2566	0.0277
2	0.0000	0.0000	.	.
AIR FRESHENER				
1	0.2152	0.0938	2.2942	0.0253
2	0.0000	0.0000	.	.

Log Formaldehyde - Model B1 R-Square = 4.8

Response variable Y501M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	2.1256	0.1236	17.1905	0.0000
CLASTYP				
1	0.2248	0.0838	2.6813	0.0095
2	0.0000	0.0000	.	.
GENERAL INSTRUCTION CLASSROOM				
1	0.2700	0.1314	2.0543	0.0443
2	0.0000	0.0000	.	.

Log Formaldehyde - Model B2 R-Square = 22.2

Response variable Y501M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	0.3458	0.7968	0.4340	0.6658
CLASTYP				
1	0.1526	0.0745	2.0467	0.0451
2	0.0000	0.0000	.	.
OUTDRLEV	0.2378	0.0787	3.0230	0.0037
LCO2CONC	0.2704	0.1207	2.2408	0.0288

Log Formaldehyde - Model B1   R-Square = 32.2

Response variable Y501M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.6641	0.1645	10.1145	0.0000
CLASTYP				
1	0.1025	0.0784	1.3065	0.1964
2	0.0000	0.0000	.	.
Avg relative humidity	0.0188	0.0033	5.6877	0.0000

Log Acetaldehyde - Model A2   R-Square = 18.4

Response variable Y502M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.4377	0.1311	10.9665	0.0000
CLASTYP				
1	0.0734	0.0563	1.3046	0.1970
2	0.0000	0.0000	.	.
OUTDRLEV	0.2423	0.0824	2.9401	0.0047

Log Acetaldehyde - Model B2   R-Square = 23.5

Response variable Y502M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.3630	0.1307	10.4285	0.0000
CLASTYP				
1	0.0549	0.0513	1.0706	0.2887
2	0.0000	0.0000	.	.
OUTDRLEV	0.2412	0.0739	3.2652	0.0018
BOOKCASES/PRESSED WOOD				
1	0.1312	0.0644	2.0366	0.0461
2	0.0000	0.0000	.	.

Log o,p-Tolualdehyde - Model A3   R-Square = 4.2

Response variable Y515M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.6619	1.6469	1.0091	0.3170
CLASTYP				
1	-4.3137	1.0907	-3.9550	0.0002
2	0.0000	0.0000	.	.
OUTDRLEV	1.5254	0.4476	3.4081	0.0012
OUTDRLEV, CLASTYP				
1, 1	-1.2932	0.3518	-3.6759	0.0005
1, 2	0.0000	0.0000	.	.

Log o,p-Tolualdehyde - Model B3   R-Square = 10.8

Response variable Y515M200

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	-0.3577	2.0432	-0.1751	0.8616
CLASTYP				
1	-4.2376	1.1291	-3.7532	0.0004
2	0.0000	0.0000	.	.
OUTDRLEV	1.2285	0.5331	2.3043	0.0247
School type				
1	1.3777	0.3435	4.0104	0.0002
2	0.5024	0.3972	1.2647	0.2109
3	0.0000	0.0000	.	.
OUTDRLEV, CLASTYP				
1, 1	-1.2546	0.3506	-3.5783	0.0007
1, 2	0.0000	0.0000	.	.

Log Tetrachloroethylene - Model A2 R-Square = 32.5

Response variable Y118M300

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	0.2803	0.1708	1.6414	0.1123
CLASTYP				
1	-0.2324	0.1436	-1.6180	0.1173
2	0.0000	0.0000	.	.
OUTDRLEV	0.4534	0.1346	3.3681	0.0023

Log Tetrachloroethylene - Model B2 R-Square = 43.1

Response variable Y118M300

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	0.6364	0.1015	6.2676	0.0000
CLASTYP				
1	-0.1198	0.1348	-0.8888	0.3820
2	0.0000	0.0000	.	.
OUTDRLEV	0.4326	0.1066	4.0600	0.0004
CARPET/RUGS ON FLOOR				
1	-0.6029	0.1964	-3.0696	0.0048
2	0.0000	0.0000	.	.

log Benzene – Model C1 R-Square = 21.1

Response variable Y111M300

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	-1.1467	0.6733	-1.7030	0.1020
CLASTYP				
1	0.1304	0.3165	0.4119	0.6842
2	0.0000	0.0000	.	.
CLASSROOM AGE (YRS)	0.0184	0.0098	1.8727	0.0739
CARPET/RUGS ON FLOOR				
1	0.9872	0.4624	2.1350	0.0436
2	0.0000	0.0000	.	.

Log Toluene - Model A3 R-Square = 44.7

Response variable Y119M300

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.2451	0.2410	5.1664	0.0000
CLASTYP				
1	0.4300	0.1593	2.6986	0.0128
2	0.0000	0.0000	.	.
OUTDRLEV	0.6443	0.1993	3.2321	0.0037
OUTDRLEV, CLASTYP				
1, 1	-0.6725	0.1400	-4.8042	0.0001
1, 2	0.0000	0.0000	.	.

Log Toluene - Model B3 R-Square 55.8

Response variable Y119M300

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.5413	0.4442	3.4698	0.0021
CLASTYP				
1	0.2558	0.3049	0.8388	0.4102
2	0.0000	0.0000	.	.
OUTDRLEV	0.8066	0.2054	3.9259	0.0007
CLASSROOM AGE (YRS)	-0.0056	0.0078	-0.7246	0.4760
OUTDRLEV, CLASTYP				
1, 1	-0.8234	0.1432	-5.7519	0.0000
1, 2	0.0000	0.0000	.	.

Log Toluene - Model B3 R-Square = 45.5

Response variable Y119M300

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.2858	0.2426	5.2997	0.0000
CLASTYP				
1	0.4017	0.1573	2.5540	0.0177
2	0.0000	0.0000	.	.
OUTDRLEV	0.6307	0.2030	3.1072	0.0050
NEW CONSTRUCT/REPAIR AFFECTING IAQ				
1	-0.3982	0.4675	-0.8518	0.4031
2	0.0000	0.0000	.	.
OUTDRLEV, CLASTYP				
1, 1	-0.6598	0.1440	-4.5823	0.0001
1, 2	0.0000	0.0000	.	.

Log Toluene - Model C3 R-Square = 69.2

Response variable Y119M300

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	1.9562	0.2906	6.7313	0.0000
CLASTYP				
1	-0.0569	0.2407	-0.2365	0.8152
2	0.0000	0.0000	.	.
OUTDRLEV	0.9019	0.1926	4.6829	0.0001
CLASSROOM AGE (YRS)	-0.0135	0.0063	-2.1380	0.0434
OUTDRLEV, CLASTYP				
1, 1	-0.8759	0.1343	-6.5231	0.0000
1, 2	0.0000	0.0000	.	.
NEW CONSTRUCT/REPAIR AFFECTING IAQ				
1	-1.6493	0.3351	-4.9221	0.0001
2	0.0000	0.0000	.	.

Log CO2 - Model B3 R-Square = 36.8

Response variable LCO2CONC

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	14.2921	3.2844	4.3515	0.0001
CLASTYP				
1	-12.7754	3.7325	-3.4228	0.0013
2	0.0000	0.0000	.	.
OUTDRLEV	-1.2966	0.5433	-2.3866	0.0209
CLASSROOM AGE (YRS)	0.0123	0.0028	4.3914	0.0001
OUTDRLEV, CLASTYP				
1, 1	2.1682	0.6141	3.5307	0.0009
1, 2	0.0000	0.0000	.	.

Log CO2 - Model C3 R-Square = 47.2

Response variable LCO2CONC

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	13.2218	3.1591	4.1853	0.0001
CLASTYP				
1	-11.5508	3.8657	-2.9880	0.0044
2	0.0000	0.0000	.	.
OUTDRLEV	-1.0724	0.5225	-2.0526	0.0455
CLASSROOM AGE (YRS)	0.0091	0.0034	2.6893	0.0098
OUTDRLEV, CLASTYP				
1, 1	1.9479	0.6333	3.0758	0.0034
1, 2	0.0000	0.0000	.	.
Classroom Air Quality Okay				
1	-0.2733	0.0828	-3.2997	0.0018
2	0.0000	0.0000	.	.

Log CO2 - Model C3 R-Square = 43.9

Response variable LCO2CONC

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	14.0099	3.1664	4.4245	0.0001
CLASTYP				
1	-11.8120	3.4518	-3.4220	0.0013
2	0.0000	0.0000	.	.
OUTDRLEV	-1.1955	0.5224	-2.2885	0.0265
CLASSROOM AGE (YRS)	0.0094	0.0023	3.9944	0.0002
OUTDRLEV, CLASTYP				
1, 1	1.9984	0.5700	3.5058	0.0010
1, 2	0.0000	0.0000	.	.
School type				
1	-0.2621	0.1083	-2.4209	0.0192
2	-0.3276	0.0991	-3.3054	0.0018
3	0.0000	0.0000	.	.

%time CO2>1000ppm - Model B1   R-Square = 26.7

Response variable CO2GT1K

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	11.9604	9.4141	1.2705	0.2099
CLASTYP				
1	23.5214	8.0290	2.9296	0.0051
2	0.0000	0.0000	.	.
CLASSROOM AGE (YRS)	0.7819	0.2304	3.3943	0.0014

%time CO2>1000ppm - Model C1   R-Square = 40.9

Response variable CO2GT1K

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	39.8264	15.1740	2.6246	0.0115
CLASTYP				
1	18.0375	8.4216	2.1418	0.0372
2	0.0000	0.0000	.	.
CLASSROOM AGE (YRS)	0.5393	0.2228	2.4207	0.0192
School type				
1	-18.2029	9.4786	-1.9204	0.0606
2	-40.0137	9.4153	-4.2499	0.0001
3	0.0000	0.0000	.	.

Particles/min<=2.5um - Model B2   R-Square = 61.2

Response variable LPCNT1

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	4.3921	0.8504	5.1645	0.0000
CLASTYP				
1	0.2583	0.1263	2.0456	0.0452
2	0.0000	0.0000	.	.
OUTDRLEV	0.5613	0.0833	6.7393	0.0000
CARPET/RUGS ON FLOOR				
1	-0.4416	0.2190	-2.0166	0.0482
2	0.0000	0.0000	.	.

Noise near register, HVAC on - Model B1 R-Square = 10.7

Response variable RBB7IRY

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	53.5308	1.7363	30.8304	0.0000
CLASTYP				
1	4.3633	1.5179	2.8746	0.0056
2	0.0000	0.0000	.	.
CLASSROOM AGE (YRS)	0.1042	0.0357	2.9192	0.0050

% time temp<20 deg C - Model A1 R-Square = 3.7

Response variable TEMPLT20

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	16.6860	3.7549	4.4438	0.0000
CLASTYP				
1	10.2962	4.4453	2.3162	0.0244
2	0.0000	0.0000	.	.

% time temp<20 deg C - Model B1 R-Square = 23.7

Response variable TEMPLT20

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	13.7304	2.7210	5.0462	0.0000
CLASTYP				
1	11.7712	4.7656	2.4700	0.0167
2	0.0000	0.0000	.	.
Awareness/use of EPA IAQ Tools				
1	7.2745	8.9705	0.8109	0.4210
2	37.5797	14.2173	2.6432	0.0107
3	-7.9355	4.1987	-1.8900	0.0641
4	0.0000	0.0000	.	.

% time temp>23 deg C - Model B1   R-Square = 18.9

Response variable TEMPGT23

Independent Variables and Effects	Beta Coeff.	SE Beta	T-Test B=0	P-value T-Test B=0
Intercept	25.5064	5.2359	4.8714	0.0000
CLASTYP				
1	-3.4425	7.1608	-0.4807	0.6326
2	0.0000	0.0000	.	.
Awareness/use of EPA IAQ Tools				
1	10.0978	9.5750	1.0546	0.2963
2	-20.1346	4.9042	-4.1055	0.0001
3	26.6139	10.0112	2.6584	0.0103
4	0.0000	0.0000	.	.