

SUPPLEMENTAL SOMERVILLE REPORT



Somerville High School

March 17, 2008

Discussion of the Texas A&M Data for Somerville
Schools

CTEH

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On December 5, 2007, researchers from the Texas A&M School of Rural Public Health collected eight surface wipe samples from the attics and/or floors of several Somerville School facilities: The investigations were performed at the request of the Somerville Independent School District (SISD).

The surface wipe samples were sent to an independent laboratory and analyzed for dioxins, PAHs, arsenic, copper and chromium. The results were reported on February 22, 2008 in a report titled, "Indoor Attic and Floor Dust Sampling and Collection Report for Somerville Independent School District." The report was made available to the general public on March 7, 2008.

This supplemental CTEH report presents a detailed evaluation of the Texas A&M findings and those obtained in previous investigations of the Somerville schools. The testing results are compared with health-based guidelines developed at the World Trade Center (WTC) following the events of 9/11, and with Somerville-specific health guidelines developed by CTEH using the WTC methodology. The findings are also compared with background concentrations reported by CTEH and in other published studies.

This report is designed to assist with interpretation of the results of the environmental testing performed at the Somerville school facilities. Based on the analysis described herein, CTEH has arrived at the following conclusions:

Conclusions

- The A&M results are consistent with those previously obtained by CTEH, and demonstrate that accessible area surface dusts in Somerville schools have PAH, dioxin, arsenic, copper and chromium levels that are far below health-based guidelines developed in accordance with the public health objectives established by the State of Texas.
- All samples obtained by Texas A&M, even the wipes from the attics, are below the health-based residential guidelines established for indoor living spaces by the World Trade Center Chemicals of Potential Concern (COPC) Committee.
- Given the sensitivity of laboratory testing, PAHs, dioxins, arsenic, chromium and copper will be detected in virtually any soil or dust sample collected in Texas or in other places in the United States.
- The dioxin levels in the wipes from Somerville attics are below the background living space values obtained in Manhattan from residential properties not impacted by the events of 9/11.
- As expected, given the age of the Somerville School facilities, wipe sample results from attics with years of accumulated dusts are higher than regularly cleaned accessible areas where the students and staff frequent. However, the actual bulk concentrations of arsenic and chromium in the attic dust are no different than what are found normally in the soil of Texas yards. Likewise, copper, arsenic and chromium attic dust concentrations are no different than those found in carpet dusts in background Texas homes.
- There is no evidence that attic dusts are migrating into the interior spaces of the schools. To the contrary, the results from accessible areas sampled by Texas A&M and CTEH are within expected levels for indoor settings.
- Interior dust sampling results are also consistent with prior CTEH investigations that demonstrated surface soils in the schools' eating and playground areas do not have elevated concentrations of chemicals.
- The Somerville schools pose no public health hazard to students or staff.
- No remediation or cleaning is necessary for these facilities.

Supplemental Somerville Report

DISCUSSION OF THE TEXAS A&M DATA FOR SOMERVILLE SCHOOLS

INTRODUCTION

On December 5, 2007, researchers from the Texas A&M School of Rural Public Health collected eight surface wipe samples from the attics and/or floors of following Somerville School facilities:

- Behavioral Management Center (floor and attic)
- Elementary School Gymnasium (floor and attic)
- Elementary School Cafeteria (floor and attic)
- Elementary School (floor)
- Junior High School (floor)

The locations tested were in the general vicinity of areas sampled in prior investigations by Paul Rosenfeld, Ph.D., acting on behalf of attorneys representing various individuals living in Somerville, and CTEH, acting on behalf of BNSF Railway and Koppers Inc. The surface wipe samples were sent to an independent laboratory and analyzed for dioxins, PAHs, arsenic, copper and chromium. The results were reported on February 22, 2008 in a report titled, "Indoor Attic and Floor Dust Sampling and Collection Report for Somerville Independent School District." The report was made available to the general public on March 7, 2008.

This supplemental report discusses the data collected by Texas A&M from Somerville Schools and compares the findings to health based guidelines and published background levels.

SUMMARY OF TEXAS A&M SURFACE DATA

The Table 1 presents a tabular summary of the findings of the Texas A&M researchers and CTEH sampling performed in November, 2007 for **accessible** areas of the Somerville Schools. Table 2 presents a summary of the Texas A&M **attic** sampling. In the tables, any result preceded by a "<" indicates that the chemical was not detected at the specific detection limit indicated by the number that follows the "less than" sign. The Texas A&M results tabulated below are in some instances different from those presented in Table 3 of the Texas A&M report for the following reasons:

1. The Toxic Equivalency Factors (TEFs) used by Texas A&M are the 2005 World Health Organization (WHO) values, while CTEH utilized the TEFs applied to dioxin values in the

State of Texas Risk Reduction Program, i.e., 2005 EPA TEFs (equivalent to the 1998 WHO values) (TRRP, 1999). In addition, CTEH used a value of $\frac{1}{2}$ the detection limit for any congener (i.e., individual type of dioxin/furan) that was not detected in the sample when calculating the overall dioxin TCDD TEQ, whereas Texas A&M used a value of zero. This will result in higher calculated TEQ levels in the CTEH calculations as compared to those presented in the Texas A&M report. Unless noted otherwise, mention of dioxins in this report refers to TCDD TEQs.¹

2. The Texas A&M report provides PAH results as total PAHs (“TPH” in Table 3) and “Total B2 PAHs.” However, in keeping with the standard practice for evaluating potential risk from carcinogenic (i.e., B2) PAH exposure, CTEH used the reported PAH values for each sample to calculate a “benzo(a)pyrene equivalent” (BaP equivalent). Any reference to “PAH” in this report refers to the BaP equivalent value for that sample.
3. CTEH recalculated each sample result provided in the Texas A&M report using the sample size surface area (in m²) provided in Table 1 of their report and the actual sample chemical result as reported in the laboratory reports attached to the study. In some instances, minor rounding differences are apparent in the reported individual sample findings.

Appendix A of this report contains an excerpt from CTEH’s previous Somerville report dated February 26, 2008 which describes the meaning of Toxic Equivalency Factors (TEF) and how they are used in evaluation of dioxins and PAHs. It also presents some of the many sources that exist for PAHs, dioxins and arsenic in Texas and the United States.

¹ For a more complete description of the approach taken to dioxin concentration reporting, see page 5 of the February 26, 2008 CTEH report, “Environmental Testing in Somerville, TX,” available for review at www.cteh.com.

TABLE 1. ACCESSIBLE AREA WIPE SAMPLE RESULTS IN SOMERVILLE SCHOOLS

Sample Number	Sampling Location	Dioxin TEQ (ng/m ²)	PAH (µg/m ²)	Arsenic (µg/m ²)	Chromium (µg/m ²)	Copper (µg/m ²)
Texas A&M Results						
SV001-F	Behavior Management Center-Floor wipe near front entrance	0.0024	0.047	<1.1	14.9	9.7
SV004-F	Elementary School Gym-Floor wipe, front left hand stage	0.013	0.30	<3.77	61.4	45.2
SV005-F	Elementary School Cafeteria-Floor wipe, exit doorway	0.0024	0.035	<0.90	15.6	8.4
SV007-F	Elementary School-Floor wipe, Main hallway/entrance	0.0031	0.38	<1.1	19.2	14.9
SV008-F	Junior High School Main hallway, floor wipe, front entrance	0.0014	0.13	<0.90	18.8	11.1
CTEH Results						
Wipe011	Somerville High School Gym (Bathroom floor, Storage room floor, Storage room shelf)	0.14	0.021	<13.4	<22	<12
Wipe012	Somerville High School (Rm 119 clothing lab table, Rm 119 storage shelf, Bathroom floor)	0.15	0.019	<13.4	<22	30
Wipe013	Yegua BMC (Bathroom floor directly below attic access used by Dr. Rosenfeld, Top of file cabinet in teacher's area, Floor in file storage area)	0.13	0.04	<13.4	<24	<13
Wipe014	Somerville Elementary School Cafeteria (Kitchen floor area below Rosenfeld attic access area, Storage room floor under attic access area, cafeteria floor)	0.11	0.025	<13.4	<22	300
Wipe015	Somerville Elementary School Gymnasium (Storage room behind stage: 3 desk tops)	0.17	0.06	<13.4	<22	64
Wipe016	Somerville Elementary School Gymnasium (Stage: table top, floor, desk adjacent to "attic" storage area sampled by Dr. Rosenfeld)	0.11	0.12	<13.4	<22	39
Wipe017	Somerville Elementary School (Classroom 109: window sill, 2 shelf tops)	0.17	0.022	<13.4	<22	46
Wipe018	Somerville Elementary School (Classroom 109: 5 table tops)	0.10	0.017	<8.0	<13	35

TABLE 2. ATTIC WIPE SAMPLE RESULTS IN SOMERVILLE SCHOOLS

Sample Number	Sampling Location	Dioxin TEQ (ng/m ²)	PAH (µg/m ²)	Arsenic (µg/m ²)	Chromium (µg/m ²)	Copper (µg/m ²)
SV002-A	Behavior Management Center- Attic dust sample, air dust surface	0.079	0.50	32.3	202.4	494.1
SV003-A	Elementary School Gym- Attic dust sample, behind stage	0.34	16.8	37.7	337	2,734
SV006-A	Elementary School Cafeteria- Attic (Food storage center) Dust sample, floor near air duct	0.015	0.37	19.4	367.1	1,604

COMPARISON WITH HEALTH BASED GUIDELINES

COPC Methodology

As discussed in the February 26, 2008 CTEH report, neither the USEPA nor the Texas Commission on Environmental Quality (TCEQ) have standards for evaluating the results of dioxin, PAH, arsenic, copper or chromium testing of surfaces. Accordingly, the methodology developed by the Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Task Force Working Group (COPC Committee)² was used in this evaluation. This methodology was used following 9/11 to assess risks from potential exposure to chemicals deposited on the surfaces of residential units impacted by the collapse of the WTC towers (COPC, 2003).

The COPC Committee ultimately developed health-based screening levels and benchmark levels for assessing affected residential properties in Manhattan. These levels were developed using public health goals established for New York City. However, there are some differences in public health goals established by the COPC Committee and those required in the State of Texas. Accordingly, the COPC methodology was used by CTEH to derive “COPC Method Benchmark Levels” for Somerville that are consistent with the public health goals established in the Texas Risk Reduction Program (TRRP). This required two modifications of the COPC screening/benchmark levels for Manhattan in order to be consistent with Texas goals. First, the COPC methodology targeted cancer risks of 1 in 10,000, whereas the Texas Risk Reduction Program requires the use

² The COPC Committee is a multi-agency group that established both health-based “screening levels” and health-based “benchmarks” for assessing the risks for chemicals deposited on surfaces in residential units following collapse of the WTC towers (COPC, 2003).

of a lower cancer risk target for individual chemicals of 1 in 100,000.³ Second, the COPC used a draft revised slope factor for dioxins of $1,000,000 \text{ (mg/kg/day)}^{-1}$, which had been recently proposed at that time (EPA, 2000). However, the draft revised slope factor has not been adopted, so the current slope factor of $150,000 \text{ (mg/kg/day)}^{-1}$ was used for the Somerville assessment. No modification of the COPC Health-Based Criteria for metals (arsenic, chromium, copper) was required since the methodology used by the COPC Committee for these metals was similar to the public health policy outlined in the Texas Risk Reduction Program (TRRP). Thus, the Somerville-specific COPC Method Benchmarks used by CTEH for arsenic, chromium and copper are identical to the COPC Health-Based Criteria developed for Manhattan. It is important to note that these health-based criteria apply only to “accessible” surfaces, defined by the COPC as areas in which exposures of residents or the general public readily occur. These types of surfaces include floors, table tops, desk tops, etc. For the Texas A&M study, all of the “accessible” samples were obtained from the facility floors where students and staff frequented. CTEH obtained accessible samples from floors, table tops, book shelves, and window sills.

According to the COPC methodology, health-based guidelines for areas defined as “infrequently accessed,” such as window sill troughs, on top of vent ducts, and on top or beneath large appliances, allow for 10 times higher acceptable chemical concentrations since individuals are infrequently exposed to these areas. There were no “infrequently accessed” areas sampled by Texas A&M.

Finally, the COPC methodology defines “inaccessible” areas as locations where dust may accumulate but which rarely cause exposure to residents or the general public. All attic dust samples collected in the Somerville schools would be defined as “inaccessible” according to COPC criteria. No health-based criteria were established by the COPC Committee for inaccessible areas, as these areas are not contacted by individuals and, results from these areas were not used to make exposure, risk or cleanup decisions following 9/11.

The COPC Method Benchmark Levels developed for accessible areas in Somerville, as compared to the levels established by the COPC for Manhattan, are shown in Table 3. Throughout this report, the criteria developed by the COPC Committee for Manhattan residential properties are referred to as “**COPC Health-Based Criteria**,” whereas those developed by CTEH using the COPC methodology and applying it to Somerville are referred to as “**COPC Method Benchmarks**.”

³ The Texas Risk Reduction Program does allow an overall site risk from exposure to all chemicals present on site to be equal to 1 in 10,000.

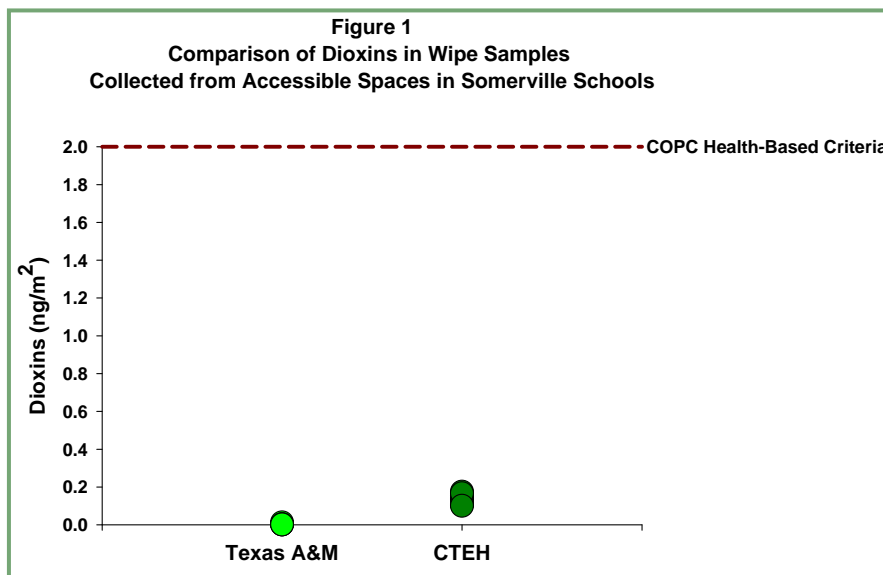
TABLE 3. COPC HEALTH-BASED CRITERIA AND COPC METHOD BENCHMARKS

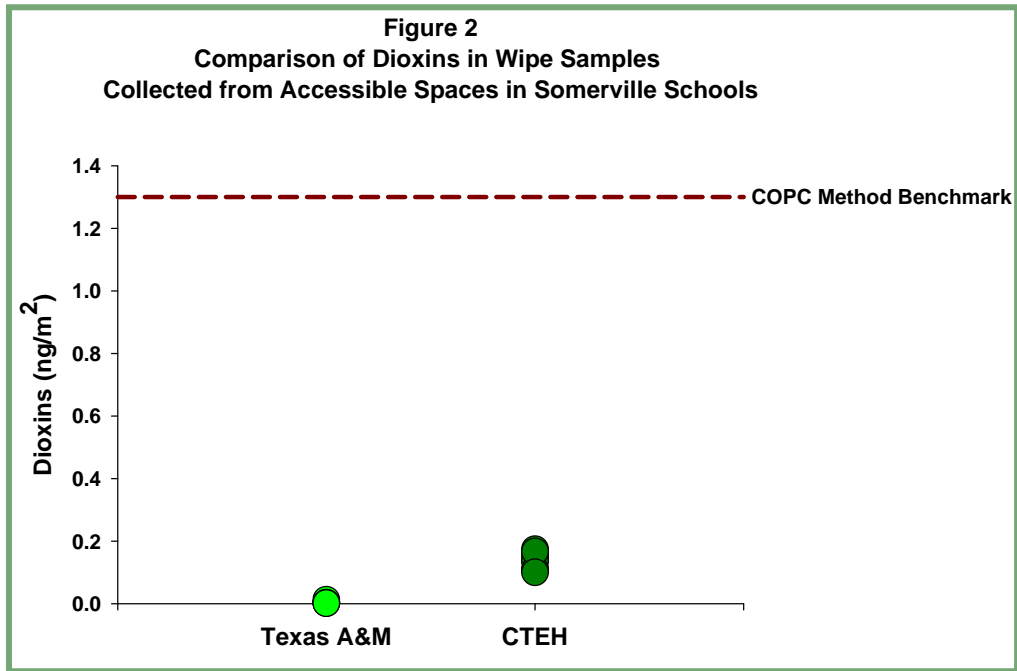
Chemical	COPC Health-Based Criteria	Somerville COPC Method Benchmarks
Dioxins (ng/m ²)	2	1.3
PAHs (µg/m ²)	150	15
Arsenic (µg/m ²)	387	387
Chromium (µg/m ²)	4,704	4,704
Copper (µg/m ²)	62,716	62,716

Accessible Area Sample Results Compared to COPC Health-Based Criteria and the CTEH COPC Method Benchmarks

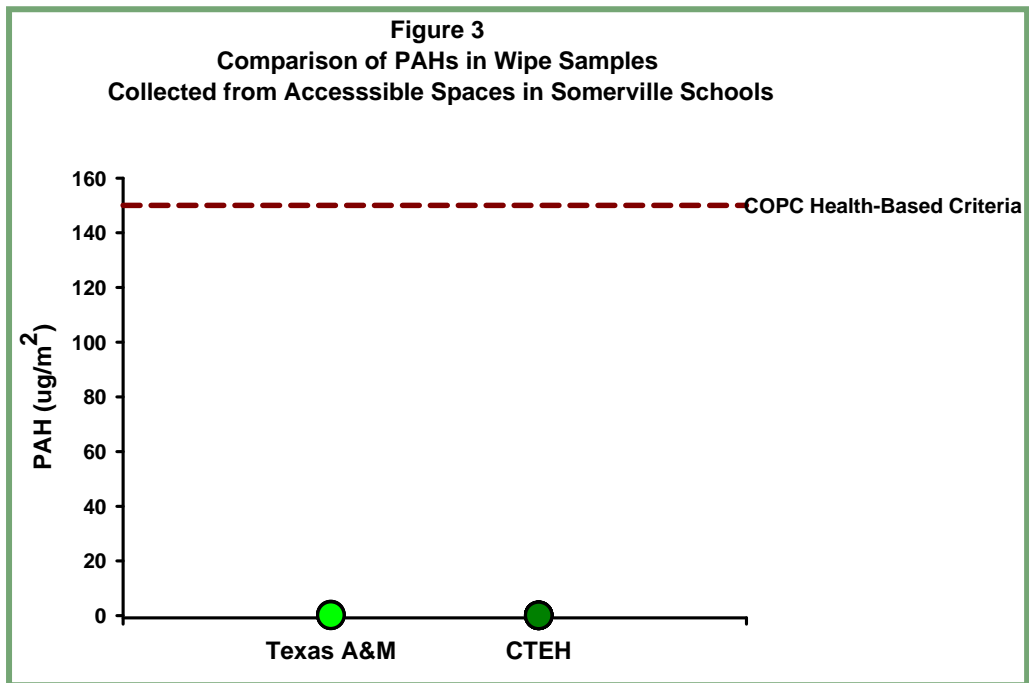
As can be seen by comparing the Texas A&M and CTEH sampling results from accessible areas in the Somerville schools presented in Table 1 with the health-based criteria presented in Table 3, all sample results are far below the COPC Committee Health-Based Criteria and the Somerville-specific COPC Method Benchmarks developed by CTEH. These results are presented graphically in Figures 1 – 6. There is no graph for arsenic, as no accessible area sample taken by either Texas A&M or CTEH had detectable levels of this metal.

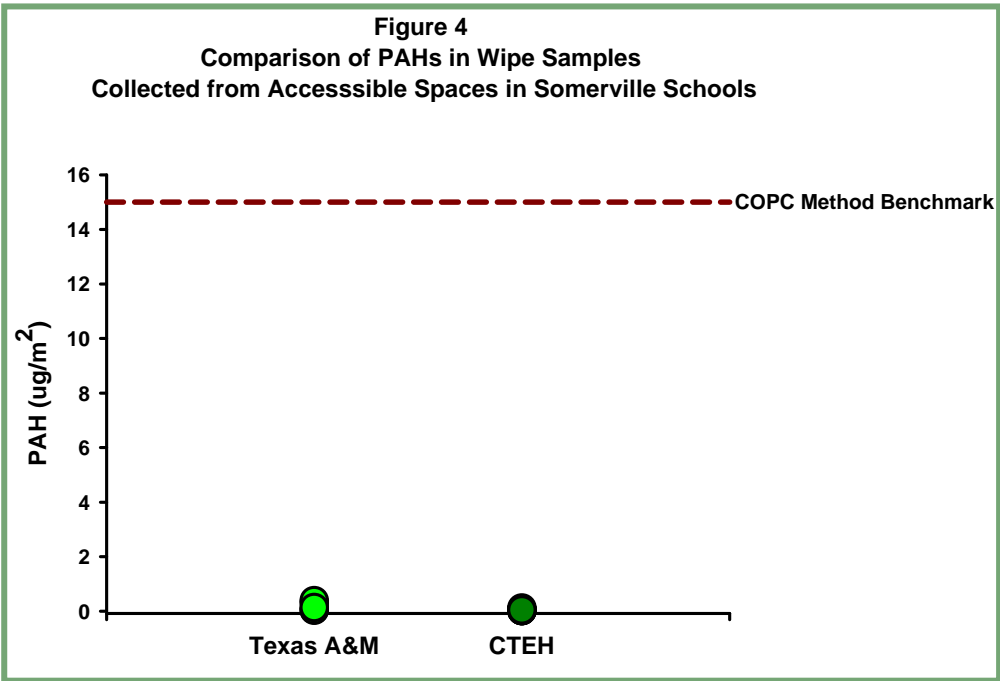
As shown in Figures 1 and 2, even the highest accessible area dioxin result obtained in the Somerville schools is well below both the COPC Health-Based Criteria developed for the WTC, and the more stringent Somerville-specific COPC Method Benchmark developed by CTEH.



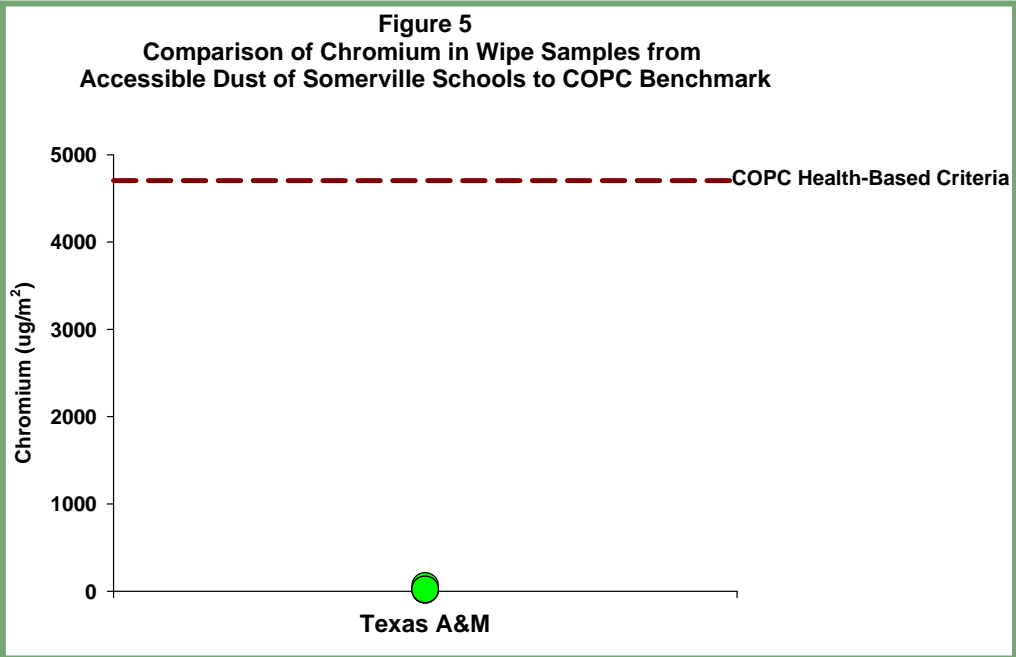


As shown in Figures 3 and 4, even the highest accessible area PAH result obtained in the Somerville schools is well below both the COPC Health-Based Criteria developed for the WTC, and the more stringent Somerville-specific COPC Method Benchmark developed by CTEH.

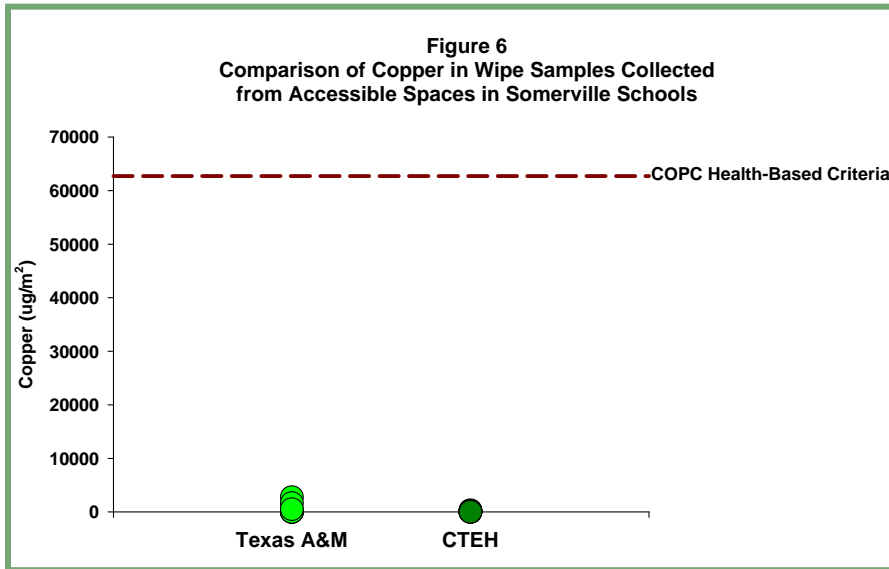




As shown in Figure 5, the highest accessible area sample chromium result obtained by Texas A&M (61.4 $\mu\text{g}/\text{m}^2$; Table 1) is over 75 times below the 4,704 $\mu\text{g}/\text{m}^2$ health-based levels developed by the COPC and CTEH. CTEH sample results are not included in Figure 5, as no detectable chromium was observed in any sample.



Copper levels in wipe samples collected in Somerville Schools were also found to be well below the COPC Benchmark for living space dust (Figure 6). In fact, the highest level of copper in an accessible area sample ($300 \mu\text{g}/\text{m}^2$; Table 1) and was over 200 times below health-based levels developed by the COPC and CTEH.



Attic (Inaccessible) Dust Comparisons

As previously discussed, the COPC methodology defines “inaccessible” areas as locations where dust may accumulate but which rarely cause exposure to residents or the general public. All attic dust samples collected in the Somerville schools would be defined as “inaccessible” according to COPC criteria. No health-based criteria were established by the COPC for inaccessible areas, as these areas are not contacted by individuals and, results from these areas were not used by the COPC Committee to make exposure, risk or cleanup decisions following 9/11.

For a number of reasons, sampling of bulk attic dust cannot be used to determine whether a community or an individual living in a community is being over-exposed to chemicals. The Agency for Toxic Substances and Disease Registry (ATSDR), an agency of the federal government that addresses chemical exposure issues for the general public noted the following about attic dust.

“Therefore, possible patterns of attic surface dust levels may provide information on relative air dioxin deposition in the past. It cannot be used to estimate the resident’s exposure to dioxin (past or present), or to make health risk calculations, or predict potential health effects” (ATSDR, 2001).

The primary reason for this limitation is that unless an attic is entered by an individual or is disturbed during remodeling or other similar types of activities, individuals living in the home do not come into contact with the dust and are not, therefore, exposed to any chemicals found in it. The health-based guidelines for house dusts referenced above are all based on the assumption that an individual regularly (daily) contacts the surfaces, resulting in dermal (skin) and ingestion (eating) exposures. In contrast, for attic dust there is no such exposure pathway since exposure to attic dust is irregular, if it occurs at all. If there is a pathway from the attic to living space, resulting in contaminant migration from the attic, sampling of living spaces would detect the increased levels of chemicals.

In addition, it has been shown that concentrations of contaminants in attic dust are generally higher than those in surface dust in main living spaces and outdoors (Hansen, 1996; ATSDR, 2006). For instance, Hansen (1996) found that the contamination of apartment dust by dioxin was 1000 times lower than the level of contamination found in the attic. Attic dust is protected from human foot traffic and environmental weathering, which normally act to breakdown, dilute, or remove contaminants from the environment. Contaminant concentrations in attic dust may remain virtually unchanged for years. The differences between attic dust and indoor living space dust has also been demonstrated in Somerville. For example, a comparison of bulk dust dioxin concentrations reveals that the average concentration in school attic dust (156 ppt) is 11 times higher than the average concentration from interior carpet dust from the schools (14 ppt).

To address the reality that locations with infrequent human contact have a lower exposure potential than accessible areas, the COPC established cleanup criteria for **infrequently accessed** areas that were 10 times higher than for accessible areas. Thus, each of the health-based criteria discussed in this report (Table 3) should be multiplied by 10 if they are to be used for infrequently accessed areas, such as the tops of window sills or appliances. As previously stated, attics are defined as “inaccessible areas” according to COPC criteria.

Furthermore, it is important to remember that the results of wipe samples are determined by two factors; the amount of dust accumulated on the surface, and the concentration of chemicals in the dust. Therefore, attics from decades-old buildings such as the Somerville schools would be expected to have higher surface wipe sample results as compared to regularly cleaned areas if for no other reason than attics have years of accumulated dusts. Stated differently, the fact that wipe sample results from attics are higher than the results from areas that are regularly cleaned does not necessarily mean that the attics are “contaminated.” For example, as discussed below, the higher surface wipe results for arsenic, copper, and chromium in the school attics as compared to the accessible areas, are not because there are elevated concentrations of these metals in the dusts. Rather, there is simply more dust in the attic than found in the regularly cleaned areas of the schools.

With these principles in mind (i.e., available health-based levels are not applicable to attic samples), the following can still be said about the attic dust wipes obtained by Texas A&M from Somerville schools:

1. None of the attic samples exceed any of the Health-Based Criteria for **accessible** or **infrequently accessed** areas developed by the COPC Committee for evaluation of residential properties.
2. None of the attic samples exceed any of the COPC Method Benchmarks for **infrequently accessed** areas developed by CTEH for application to Somerville.
3. With a single exception, none of the attic samples exceed any of the COPC Method Benchmarks for **accessible** areas developed by CTEH for application to Somerville. The single exception, is the PAH level of 16.8 $\mu\text{g}/\text{m}^2$ found in the elementary school gymnasium attic that only slightly exceeded CTEH's 15 $\mu\text{g}/\text{m}^2$ criterion for spaces regularly contacted by people.

In summary, all surface dust results from wipe sampling performed by Texas A&M and CTEH were substantially below applicable health based guidelines.

COMPARISONS WITH OTHER SOURCES OF INFORMATION

World Trade Center Studies

In Texas A&M's report of Somerville school testing, the researchers compared the results from Somerville with those published only a month following 9/11 by Chatfield and Kominsky (2001). This "small scale monitoring survey of two residential buildings" was commissioned only six days after the collapse of the WTC Towers. The findings were used to address the "great concern" of the 50,000 residents of lower Manhattan surrounding Ground Zero. While the findings did provide some information regarding residential surfaces in Manhattan following 9/11, there are other sources of information regarding WTC levels that can be used for comparison purposes.

In May 2002, EPA launched a voluntary program to either clean and test or just test any home in Lower Manhattan for asbestos in the air. Ultimately, over 4,100 homes participated in the program. The Agency also collected wipe samples in a subset of the households that were cleaned and tested or tested only through the program, referred to as the "Residential Dust Cleanup Program." Wipe samples, collected by wiping a piece of soft filter paper over a representative hard surface such as a floor, were analyzed for dioxin and 23 elements, including arsenic, chromium, and copper, and evaluated against health-based screening levels. Up to 1,544 samples were taken in approximately 263 homes that were cleaned and tested or tested only. The data include pre- and post-cleaning wipe samples from 222 homes; some data also

exist for 41 additional apartments.⁴ Table 4 presents a tabular summary of the results of the pre- and post-cleaning testing performed during the test and clean program.

In the summer of 2002, EPA also collected wipe samples from residential locations in Manhattan that were not impacted by the events of 9/11. A total of 1,158 samples were ultimately collected, including 114 for dioxin and 113 for PAH analysis. These results serve as an indication of “background” levels in residential apartments and buildings in Manhattan, including dioxins and PAHs.⁵ Table 5 presents a summary of the WTC Test and Clean Program data and the WTC Background data and compares these with surface wipe results from Somerville schools.

In making these comparisons, it is important to note that the WTC data are not from attics and will not truly be representative of expected chemical levels in areas such as attics with decades of dust accumulation.

TABLE 4. SUMMARY OF WTC TEST AND CLEAN PROGRAM SAMPLE RESULTS

Analyte	Sample Type	No. Samples	Detects	Min	Max	Average	Geometric Mean
Arsenic ($\mu\text{g}/\text{m}^2$)	Post Cleaning	704	6	10	51	10.2	10.1
Arsenic ($\mu\text{g}/\text{m}^2$)	Pre Cleaning	840	28	10	268	11.7	10.6
Chromium ($\mu\text{g}/\text{m}^2$)	Post Cleaning	704	316	10	587	23.0	16.3
Chromium ($\mu\text{g}/\text{m}^2$)	Pre Cleaning	840	539	10	1,900	49.4	25.8
Copper ($\mu\text{g}/\text{m}^2$)	Post Cleaning	704	704	36.6	2730	230.0	182.2
Copper ($\mu\text{g}/\text{m}^2$)	Pre Cleaning	840	840	36	14,500	420.5	270.3
Dioxins (ng/m^2)	Post Cleaning	690	690	0.267	2.29	0.6	0.6
Dioxins ($\mu\text{g}/\text{m}^2$)	Pre Cleaning	848	848	0.265	75.3	0.8	0.6

⁴ More detailed information regarding this program, including data summaries and actual test results can be found at <http://www.epa.gov/wtc/dustcleanup/index.html>.

⁵ More detailed information regarding the World Trade Center Background Study can be found at http://www.epa.gov/wtc/background_study.htm.

TABLE 5. RANGE OF SURFACE WIPE LEVELS IN WTC STUDIES AS COMPARED TO SOMERVILLE SCHOOLS

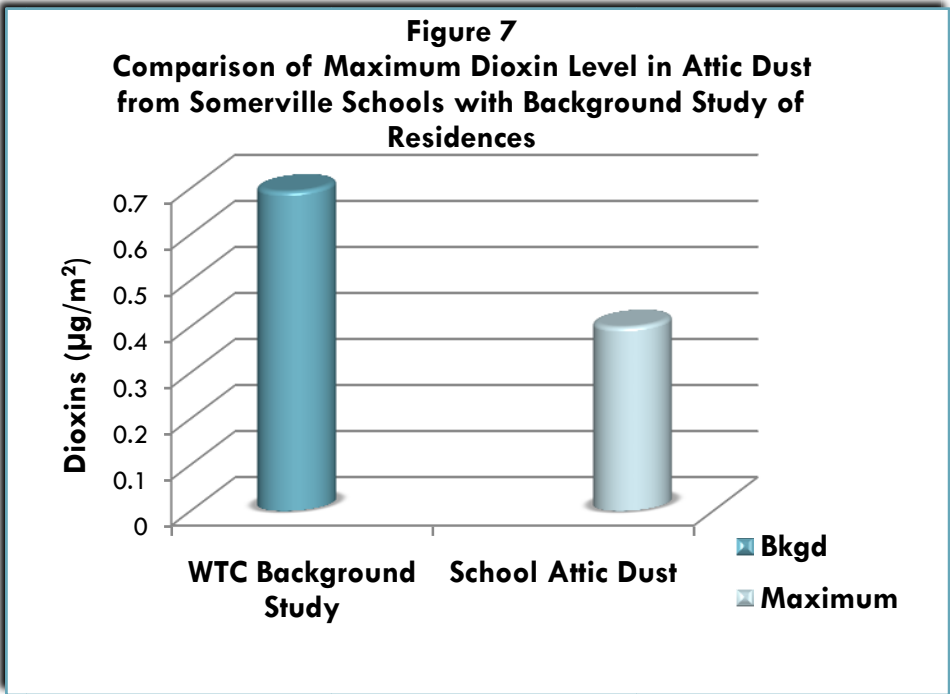
Data Source	Arsenic ($\mu\text{g}/\text{m}^2$)	Chromium ($\mu\text{g}/\text{m}^2$)	Copper ($\mu\text{g}/\text{m}^2$)	Dioxins (ng/m^2)	PAHs ($\mu\text{g}/\text{m}^2$)
WTC Background	NA	NA	NA	0.48 – 1.66	<290
WTC Cleaning Program					
Pre-Cleaning	10 – 268	10 – 1,900	36 – 14,500	0.27 – 75.3	NA
Post-Cleaning	10 – 51	10 – 587	37 – 2,730	0.29 – 2.27	NA
Somerville Schools					
Living Space**	0.45 – 6.7	6.7 – 61.4	6.0 – 297	0.0014 – 0.17	0.034 – 0.38
Attics	19.4 – 37.7	202 – 367	494 – 2,734	0.015 – 0.34	0.37 – 16.8

* - NA – not available. No samples taken for this compound.

** - Includes CTEH and Texas A&M results

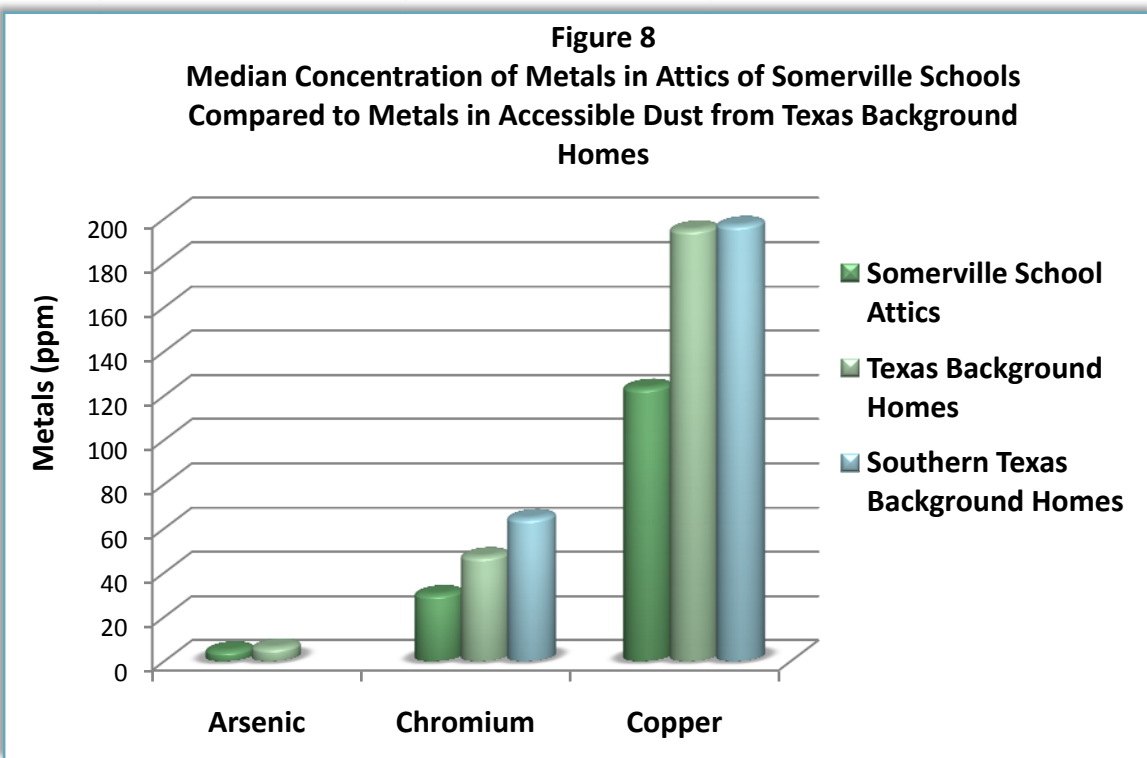
A comparison of the WTC data summarized in Tables 4 and 5 with the Somerville wipe sampling data presented in Tables 1 and 2 supports the following conclusions:

1. Sample results for accessible areas in Somerville schools have results for dioxins, arsenic, copper, and chromium that are similar to both pre- and post-cleaning World Trade Center sample results.
2. While average levels of arsenic, copper, and chromium in Somerville school attics (“inaccessible” areas) are higher than average levels from accessible areas sampled in the WTC Test and Clean program, the range of values detected in the Somerville school attics and the WTC testing is similar.
3. The highest dioxin surface level from accessible areas detected by CTEH and Texas A&M ($0.17 \text{ ng}/\text{m}^2$) is 4 times lower than background level of dioxins found in the WTC background study ($0.693 \mu\text{g}/\text{m}^2$).
4. Even the highest attic dust sample from Somerville schools is less than one-half of the WTC background level for dioxin (Figure 7).



Bulk Dust Testing Comparisons

Dr. Paul Rosenfeld collected bulk dust samples from attics and inaccessible places in Somerville Schools. The median concentration of arsenic (4.7 ppm) and chromium (30.2 ppm) from his testing is below or similar to the median concentration of these metals typically found in Texas soils (5.9 ppm and 30 ppm, respectively) (TNRCC, 2000). Therefore the concentration of these chemicals in the dust of the school attics is no higher than what might be brought into the school on a student's shoes from walking on Texas soil. Furthermore, the median concentrations of arsenic (4.7 ppm), chromium (30.2 ppm) and copper (123.5 ppm) in bulk dust from Somerville school attics are below the median concentrations of arsenic (6.3 ppm), chromium (47.3 ppm) and copper (195 ppm) measured by CTEH in the bulk living space carpet dust of background Texas homes and in background homes in southern Texas as reported in the scientific literature (Figure 8) (Mukerjee et al., 1997). **Thus, the higher wipe sample results for these metals in the Somerville school attics are not due to elevated chemical concentrations in the dust itself, but due to the fact that the attics have decades of accumulated dust.**



DO SOMERVILLE SCHOOLS REQUIRE CLEANING OR REMEDIATION?

There has been some discussion that since the attics of Somerville schools have higher levels of the measured chemicals than found in the accessible areas, the attics may pose a risk to students and teachers, and should be remediated. However, for the following reasons, cleaning or remediation of the attics in the schools is not necessary to protect the health of those who use these facilities.

1. All of the surface wipe samples taken from the attics in the Somerville schools have chemical levels that are below the health-based cleaning criteria developed by the EPA and other agencies for **residential living (“accessible”) spaces**. They are even further below cleaning levels set for **infrequently accessed** areas.
2. The bulk concentrations of arsenic and chromium in the school attics are not different than what are found normally in the soil of Texas yards. Likewise, copper, arsenic and chromium concentrations are no different than found in carpet dusts in Texas homes.
3. The dioxin levels in the wipes from Somerville attics are below the background living space values obtained in Manhattan from residential properties not impacted by the events of 9/11.
4. There is no evidence that attic dusts are migrating into the interior spaces of the schools. To the contrary, the results from accessible areas sampled by Texas A&M and CTEH are within expected levels for indoor settings.
5. Interior dust sampling results are also consistent with prior CTEH investigations that demonstrated that surface soils in the schools’ eating and playground areas do not have elevated concentrations of chemicals.

PENTACHLOROPHENOL (PENTA) AS A SOURCE OF CHEMICALS IN SOMERVILLE ATTICS

There has also been some discussion that the presence of the most highly chlorinated dioxin, octa-chlorodibenzo dioxin (OCDD), in the dust collected from Somerville Schools might have come from the use of Penta at the tie treating plant, a preservative that was last used in relatively small quantities many years ago. However, for several reasons, the mere presence of OCDD cannot be used as evidence that the chemicals found in surface dust come from historic plant emissions. First, OCDD is present in emissions from many other common combustion processes including burning fuel to heat homes and burning wood in a fireplace (ATSDR, 1998). Also, hepta-chlorinated dioxins (HCDD) and OCDD are the most commonly found dioxin congeners in the environment (ATSDR, 1998). For example, the National Institute of Standards and Technology collected samples of urban air fine particulate matter (i.e., ambient air dust) in the Washington, D.C. area in 1976 – 1977 (NIST, 2007). The dust samples were analyzed for a large number of organic

chemicals, including dioxins. OCDD was by far the most abundant dioxin present in the urban dust sample, found at a concentration that was more than 18,000 times higher than the most toxic TCDD congener. Therefore, OCDD would be the dioxin most likely found in the highest concentration in soils and dusts in and around any school, regardless of where it is located. This is further illustrated by the fact the OCDD is the highest dioxin congener present in the dust of background Texas homes which could not have been impacted by emissions from the Somerville Tie Plant.

CONCLUSIONS

The Texas A&M data, together with that collected by other organizations, supports the following conclusions:

- The A&M results are consistent with those previously obtained by CTEH, and demonstrate that accessible area surface dusts in Somerville schools have PAH, dioxin, arsenic, copper and chromium levels that are far below health-based guidelines developed in accordance with the public health objectives established by the State of Texas.
- All samples obtained by Texas A&M, even the wipes from the attics, are below the health-based residential guidelines established for indoor living spaces by the World Trade Center Chemicals of Potential Concern (COPC) Committee.
- Given the sensitivity of laboratory testing, PAHs, dioxins, arsenic, chromium and copper will be detected in virtually any soil or dust sample collected in Texas or in other places in the United States.
- The dioxin levels in the wipes from Somerville attics are below the background living space values obtained in Manhattan from residential properties not impacted by the events of 9/11.
- As expected, given the age of the Somerville School facilities, wipe sample results from attics with years of accumulated dusts are higher than regularly cleaned accessible areas where the students and staff frequent. However, the actual bulk concentrations of arsenic and chromium in the attic dust are no different than what are found normally in the soil of Texas yards. Likewise, copper, arsenic and chromium attic dust concentrations are no different than those found in carpet dusts in background Texas homes.
- There is no evidence that attic dusts are migrating into the interior spaces of the schools. To the contrary, the results from accessible areas sampled by Texas A&M and CTEH are within expected levels for indoor settings.
- Interior dust sampling results are also consistent with prior CTEH investigations that demonstrated surface soils in the schools' eating and playground areas do not have elevated concentrations of chemicals.
- The Somerville schools pose no public health hazard to students or staff.
- No remediation or cleaning is necessary for these facilities.

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APPENDIX A
Excerpt from February 22, 2008 Environmental Assessment Report

Chemicals Tested

Arsenic

Arsenic is a naturally occurring element that is found in soil and many kinds of rock, especially minerals and ores that contain copper and lead. It is also part of a wood treatment chemical used in small quantities for a short period of time during the plant's history. Elemental arsenic is a steel grey solid material. In the environment, it combines with oxygen, chlorine, and sulfur to form what is called inorganic arsenic. When combined with carbon and hydrogen, it is referred to as organic arsenic. Most arsenic compounds are white or colorless powders that do not have a smell or special taste. Arsenic cannot be destroyed in the environment. Arsenic can be found in the air, water, and soil.

Dioxins

Chlorinated dibenzo-p-dioxins and dibenzofurans (also known as polychlorinated dioxins/furans or collectively as "dioxins") are a group of over 100 chemically related compounds. They exist as odorless, colorless solids or crystals. Dioxins can be formed during burning of coal, oil, natural gas, and medical, household, or municipal wastes. They can also be produced during the manufacture of other chemicals. They are found in the environment as mixtures with other components in air, water, and soil. Dioxins were selected for testing due to allegations that they were produced in elevated amounts from burning treated and untreated wood wastes in the tie-treating plant's boiler. Once present in soils, dioxins can persist for decades.

PAHs

Polycyclic aromatic hydrocarbons are a group of compounds that are formed during the incomplete burning of coal, oil, gas, wood and other organic substances. They also comprise a major proportion of the creosote used for wood treatment at the plant. PAHs exist as colorless, white, or pale yellow-green solids. There over 100 different PAHs. They are usually found as a mixture containing two or more of these compounds, such as soot. PAHs are found in asphalt used in road construction, coal, crude oil, and roofing tar. Some PAHs are used in medicines and to make dyes, plastics, and pesticides. They are found throughout the environment in the air, water, and soil. For non-smokers, the greatest source of PAH exposure is from the diet, while for smokers, the primary source of PAH exposure is cigarette smoke.

Toxic Equivalency Factors (TEF)

Not all of the chemicals in a chemical class have the same toxicity. Equivalency factors have been developed for dioxins, based on 2,3,7,8-TCDD (TCDD) and for PAHs, based on benzo[a]pyrene (BaP), to account for the individual differences in congener toxicity. The term for this is toxic equivalency factor (TEF). To calculate toxicity equivalence (TEQ) in a mixture of dioxins or PAHs, the concentration of each specific type of dioxin or PAH is multiplied by the TEF for that chemical.

These calculated values are then added to get the dioxin or BaP TEQ for that sample. For instance, in a mixture of dioxins; TCDD is considered the most toxic congener. Another dioxin, referred to as OCDD is considered to be about a ten thousand fold less toxic than TCDD. Therefore, the concentration of OCDD is multiplied by 0.0001 (1/10,000th) to take into account the lower potential for toxicity compared to TCDD when calculating the TEQ.

Unless noted otherwise, mention of dioxins in this report refers to TCDD-TEQ (USEPA, 2005a) and mention of PAHs refers to BaP equivalents (USEPA, 1993).