

2 APPROPRIATE LEVELS FOR REMEDIATION OF WTC HAZARDOUS SUBSTANCES

2.1 Appropriate Surface Concentrations for Remediation of WTC Hazardous Substances

The Bank's environmental and other consultants conducted a comprehensive study in order to determine appropriate levels for remediation clearance standards for WTC Hazardous Substances found in the Building. The study is provided in Volume III: Appropriate Levels for WTC Hazardous Substances. The appropriate levels are summarized in Table 2-1 below.

Table 2-1
Arithmetic Mean and Maximum Appropriate Level Surface Concentrations
for Remediation of WTC Hazardous Substances

WTC Hazardous Substances	Arithmetic Mean Appropriate Level Surface Concentration	Maximum Appropriate Surface Level Concentration
Asbestos (s/cm ²)	156	801
Beryllium (µg/ft ²)	0.036	0.34
Cadmium (µg/ft ²)	0.15	0.94
Lead (µg/ft ²)	1.82	9.46
Mercury (µg/ft ²)	0.011	0.067
PCB (µg/100 cm ²)	0.001	0.01
2,3,7,8-TCDD Equivalents (pcg/100 cm ²)	0.25	1.83
PNA (µg/100 cm ²)	0.035	0.29

All of the surfaces inside and outside the Building must be cleaned to the clearance standards described in Table 2-1 before the Building can be reoccupied. The level of cleaning will need to be determined by testing after any cleaning is performed. For each area or Building component, the average appropriate surface level determined by sampling should be at or below the arithmetic mean appropriate level surface concentration and all sample values should be below the maximum appropriate level surface concentration. If an area or Building component cannot be cleaned to these levels or if such cleaning is not economically feasible, the area or Building system must be removed and replaced.

2.2 Process for Establishing Appropriate Levels for Remediation of WTC Hazardous Substances

The process began with the presumption that the appropriate remediation standard for reoccupancy of the Building is to return the Building to its pre-WTC Event condition. In regards to surface concentrations of WTC Hazardous Substances, this standard means that levels on the various Building surfaces should not exceed those that existed prior to the WTC Event.

Because there was no environmental profile of the Building determined prior to the WTC Event, the Bank's consultants estimated the surface levels of WTC Hazardous Substances as a remediation standard using three sources of information. The three sources considered are as follows:

- Sampling of surfaces from comparable buildings not impacted by the WTC Event and surveyed for this report
- Sampling data from the Building pursuant to protocol TP-01
- Published surface concentration data

Evaluation of the Building data pursuant to protocol TP-01 is referred to as "cold spot analysis." In order to establish an upper bound on the appropriate levels of eight WTC Hazardous Substances that may have existed prior to the WTC Event, or a lower bound on the post-WTC Event contamination level, a k-means cluster analysis (using the software program SAS) was performed on the TP01 data (all pre-cleaning data) by Dr. Robert Gibbons, Professor of Biostatistics and Director of the Center for Health Statistics at the University of Illinois at Chicago. The cluster analysis identified the locations that had the lowest end of the concentration distribution of: (i) asbestos alone, and (ii) metals, PCBs, 2,3,7,8-TCDD equivalents (TEQs), and PNAs.

Using the results of analyses of surface samples from these locations, the mean and maximum surface concentrations were determined, along with the upper 95% confidence limit for the upper 95th percentile (95% UCL) of the distribution. The 95% UCL was estimated using methods described in Gibbons and Coleman, *Statistical Methods for Detection and Quantification of Environmental Contamination*, Wiley, 2001). The 95% UCL represents with 95% confidence the concentration that is **higher** than 95% of the samples within the designated "cold spot" areas. It is an upper bound estimate of the potential "background" concentrations of the Building. After consideration of the data from all three sources, the "cold spot" data was used in deriving the applicable arithmetic mean and maximum appropriate surface concentrations. This methodology was used for all the selected WTC Hazardous Substances except PCBs where the level of detection was used as the appropriate level, as no PCBs were detected in the cold spot analysis.