

Appendix 11

Glossary of Terms

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Abatement – The act of reducing contamination levels.

Above-Ceiling – Three-dimensional space generally above the drop ceiling inside the Building.

Above Gash Sector – All floors from Floor 24 up to and including Floor 39; has approximately 350 broken windows/spandrel glass.

Additive – Toxic effects are considered additive when their combined effect is equal to the sum of their individual effects.

Aerosolized - The term *aerosolized* refers to the particles dispersed or suspended in air. The term is synonymous with the term resuspended.

Appropriate Level – Appropriate Levels were established for each contaminant from the WTC Event by an extensive review of scientific literature, and samples taken from the Background Buildings and from the Building. For each contaminant the Appropriate Level at the 95-95% upper tolerance limit was established (the “Maximum Appropriate Level”) and an Appropriate Level at the average was established (the “Average Appropriate Level”) as a remediation clearance standard. See Dr. Phillip Goad’s “Determination of Appropriate Levels for Surfaces in the Building” report.

Asbestos – The name given to a group of naturally occurring minerals used in certain products, such as building materials and vehicle brakes, to resist heat and corrosion. Asbestos includes chrysotile, amosite, crocidolite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos, and any of these materials that have been chemically treated and/or altered.

ATSDR – Agency for Toxic Substances and Disease Registry

ATSDR Minimal Risk Level (MRL) — [Agency for Toxic Substances and Disease Registry (ATSDR)] Chronic Minimal Risk Level is defined as an estimate of daily human exposure to a substance that is likely to be without an appreciable risk of noncancer adverse health effects (“to any element of the human population”) for exposures lasting one year or longer, up to an entire lifetime. This is not a level above which toxicity is likely to occur, nor does it represent a toxicity threshold. Regarding the MRL, the ATSDR also notes, “The MRL is *not* intended , nor should it be indiscriminately used, as a clean-up or remediation level, or as a predictor of adverse health effects it might be unnecessarily stringent for application to some exposure situations (i.e., higher air concentrations might afford a similar degree of protection in some exposure scenarios); ;thus its relevance in any specific environmental situation is intended to be determined by an experienced public health or medical official.” (Emphasis in original). It is also assumed that the exposure will be for 24 hours per day, 365 days per year, i.e., adjustments would have to be made to extrapolate the chronic MRL to exposures of lower duration or frequency.

Average Background Building Levels – Averages of analytes tested within the Background Buildings used as a basis for comparison.

Background Buildings – Office buildings that were sampled to assist in deriving Appropriate Levels for the Building. Background Buildings include buildings from New York, NY; Washington, DC; Florham, NJ; Philadelphia, PA; and Pittsburgh, PA. See RJ Lee Group “Background Levels in Buildings” report

Background Building Levels – Background Building Levels are the average (Average Background Building Level) and the maximum (Maximum Background Building Level) readings for each contaminant sampled in the Background Buildings.

Baseline, Baseline Sampling – The term baseline sampling and thereafter the term ‘baseline’ refers to samples that were collected prior to the beginning of the remediation tests.

Below-Ceiling – Three-dimensional space generally below the drop ceiling inside the Building.

Below Gash Sector – All floors from Basement Level B up to and including Floor 7. This includes the crushed plaza area and has approximately 300 broken windows/spandrel glass.

Bioaerosols – Aerosols containing particles, large molecules or volatile compounds that are living, contain living organisms or were produced by living organisms.

Bioavailability – The level of absorption into the bloodstream. A substance with high bioavailability is efficiently absorbed by the body.

Building – Specifically refers to the property located at 130 Liberty Street, New York, NY, 10006.

Bulk Sample – A representative mass of material collected at a known location.

California Reference Exposure Level (REL) – [California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Chronic Inhalation Reference Exposure Level]—California Chronic Inhalation Reference Exposure Levels are levels below which no adverse health effects are anticipated in the general human population. 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. A 24 hours per day, seven days per week exposure is assumed.

Carcinogenicity – The ability of a substance to cause cancer.

Cascade Impactor – An instrument that separates particles based on (aerodynamic) particle diameter.

CDC- Centers for Disease Control and Prevention

Cell System – A conduit system built into the floors of the Building to route electrical and communication cables and wires to various locations within the Building.

Cement Dust – The dust created by any action whereby concrete is pulverized.

Chrysotile Asbestos – A member of the serpentine group; the most common type of asbestos found in building products. Also known as "white asbestos", chrysotile makes up approximately 95% of all asbestos contained in buildings in the United States.

Class A Office Building – Buildings that have excellent location and access, attract high quality tenants, and are managed professionally. Building materials are high quality and rents are competitive with other new buildings.

Clearance – Consent for reoccupancy based on reduction of WTC Hazardous Substances to levels below predetermined health-based screening levels.

Confidence Interval, 95% - Confidence interval is the numerical interval in which the true mean of a distribution lies, within a certain probability. e.g., there is a 95% confidence that the true mean lies between 2 and 2.5, i.e., the confidence interval is 2.25 +/- 0.25.

http://www.stats.gla.ac.uk/steps/glossary/confidence_intervals.html.

COPC – Chemicals of potential concern.

Curtain Wall – The outside skin of the Building supported by the Building structure comprised of extruded aluminum column covers and an aluminum and glass window wall.

Curtain Wall Cavities – The open spaces within the extrusions and between parts of the curtain wall assembly.

Curtain Wall Insulation – Insulation located between the perimeter induction units and the sheet metal panel behind the glass spandrel panel of the curtain wall.

Dioxins/Furans – A group of organic compounds with certain chemical and toxicological similarities. Several hundred of these compounds exist and are members of three closely related families: the chlorinated dibenzo-p-dioxins (PCDDs), chlorinated dibenzofurans (PCDFs) and certain polychlorinated biphenyls (PCBs). Dioxins are formed as a result of combustion processes and from burning fuels (like wood, coal or oil). The term dioxin will be used as a simplified reference to dioxins/furans.

Dyspnea – Difficulty breathing

EPA – Environmental Protection Agency

EPA Reference Concentration (RfC) — the U.S. Environmental Protection Agency (EPA) Chronic Reference Concentration is intended to protect against noncancer health effects for exposures of 7 years or longer, up to an entire lifetime. It is defined as follows:

An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious noncancer effects during a lifetime.

As with the MRL, the RfC is also based on assumed continuous (i.e., 24/7, 365 days per year) exposure.

f/cm³ – Fibers per cubic centimeter. May also be reported as f/cc.

Gash – Structurally damaged area on the north side of the Building between Floors 8 and 23, north of Column Line 6 resulting from the collapse of the South Tower, WTC-2. It has approximately 800 broken windows/spandrel glass.

Headers – Rectangular ducts/conduits embedded in concrete floors that connect the under floor Cell System to wiring closets in the Building core.

HEPA Filter – High Efficiency Particulate Air filter. A filter that is 99.97% effective at removing particles 0.3 microns (0.3×10^{-6} meter) and greater in size from air.

HEPA Vacuum – A vacuum with a filter that traps particles ≥ 0.3 microns in diameter.

HUD – US Department of Housing and Development

HVAC Systems – Heating, ventilation, air conditioning system. A system that is used to provide heating, cooling and ventilation within an office building.

IARC – International Agency for Research on Cancer

Interior Wall Cavity (IWC) - The hollow space between the panels that form the faces of the interior drywalls of the Building.

In vitro – An experiment performed outside a living organism.

In vivo – An experiment performed with a living organism.

Lead – A metal commonly added to paints and solder. Lead exposure has been associated with behavioral problems, learning disabilities, seizures, and death.

Legionella pneumophila – The bacterium associated with Legionnaire's disease.

Mercury – Naturally occurring toxic element, commonly used in fluorescent light tubes. Exposure to mercury has been linked to neurological dysfunction, kidney failure, impaired pulmonary function, and renal toxicity.

Metals – Included as metals in this study are: barium, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel and zinc.

Microgram (μg) – A unit of mass equivalent to 1×10^{-6} grams.

Microvac – Hand-held device used to create small negative pressures at a flow rate typically between 0 and 5 liters per minute. Usually used in conjunction with a cassette and filter to collect particulate samples.

Mineral Wool – An inorganic fibrous substance that is produced by steam blasting or spinning molten substances; commonly used in insulation and as a filtering medium.

MMVF – Man-made vitreous fibers such as rock wool or glass fibers.

NTP – National Toxicology Program

Morphology – A description of the physical shape of an object or particle. Refers to a general class of shape and surface texture (e.g., the morphology is elongated and smooth).

ng – Nanogram: One billionth of a gram.

NIOSH – National Institute for Occupational Safety and Health

Occupied Space – Office space, closets, maintenance rooms, etc. It is defined as the area below the false ceiling and outside of mechanical chases in the Building, whether occupied by personnel or not.

OSHA –Occupational Safety and Health Administration

Opposite Gash Sector – Portion of Floors 8 through 23 (all areas on these floors south of Column Line 6). This area has approximately 30 broken windows/ spandrel glass.

PAH – Polycyclic Aromatic Hydrocarbon: Organic compounds resulting from incomplete combustion of building materials.

Particulate Matter (PM) – Material suspended in the air in the form of minute solid particles or liquid droplets, especially when considered as an atmospheric pollutant.

PCBs – *Polychlorinated Biphenyls*. Organic species that consist of any of the 209 individual chlorinated biphenyl compounds.

PCDD – Acronym for organic species referred to as Polychlorinated dibenzo-p-dioxins (also see dioxins/furans).

PCDF - Acronym for organic species referred to as Polychlorinated dibenzofurans (also see dioxins/furans).

pg – picogram, one trillionth of a gram

pg/100 cm² – picograms per 100 square centimeters

Perimeter Induction Unit (PIU) – HVAC units that deliver air through jets that cause room air to be aspirated through heating and/or cooling coils and mixed with the supplied air.

Permissible Exposure Limit (PEL) – Maximum level of contamination as determined by OSHA that a worker may be exposed to over a 30-minute period.

OR

Permissible Exposure Limit (OSHA PEL) — U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) permissible exposure limit for various substances. OSHA sets permissible exposure limits (PELs) to protect workers against the health effects of exposure to hazardous substances. PELs are regulatory limits on the amount or concentration of a substance in the air. They may also contain a skin designation. PELs are enforceable. OSHA PELs are

based on an 8-hour time weighted average (TWA) exposure. The current Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) for mercury vapor is 0.1 milligram per cubic meter (mg/m³) of air as a ceiling limit. A worker's exposure to mercury vapor shall at no time exceed this ceiling level.

PIU (see Perimeter Induction Unit)

PNA's – Polynuclear Aromatic Compounds - Organic compounds resulting from incomplete combustion of building materials.

ppb – Parts per billion.

ppm – Parts per million.

Raceways – A metal or plastic conduit used to house electrical and communications cable.

Recommended Exposure Limits (NIOSH REL) — U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits for various substances. The NIOSH recommended exposure limits (RELs) are time-weighted average (TWA) concentrations for up to a 10-hour workday during a 40-hour workweek. A short-term exposure limit (STEL) is designated by "ST" preceding the value; unless noted otherwise, the STEL is a 15-minute TWA exposure that should not be exceeded at any time during a workday. A ceiling REL is designated by "C" preceding the value; unless noted otherwise, the ceiling value should not be exceeded at any time. Any substance that NIOSH considers to be a potential occupational carcinogen is designated by the notation "Ca".

Recontamination – Contamination of building components that had been previously cleaned.

Re-entrainment – Particle resuspension by airflow movement.

Remediation –The process of correcting a deficiency. Refers to cleaning a contaminated area to meet predetermined health-based or environmental standards.

Respirable Dust – Particles that can be deposited in the alveoli of the lungs: Defined as < 0.25 µM to 2.5 µM

Risers – Vertical main runs of ductwork, piping, conduit or wiring usually found in the Building core. May also refer to floor level openings within the Cell System designed to allow wire to feed through.

Risk Assessment – The evaluation of scientific information on the hazardous properties of environmental agents (hazard characterization), the dose-response relationship (dose-response assessment), and the extent of human exposure to those agents (exposure assessment). The product of the risk assessment is a statement regarding the probability that populations or individuals so exposed will be harmed and to what degree (risk characterization).

Rust - Iron oxide resulting from corrosion of the steel when exposed to air and moisture.

s/cm² – Structures per square centimeter

Sector – One of five, three-dimensional areas of the Building identified as: below gash, gash, opposite gash, above gash, and top.

Silica – Silicon dioxide, which may either be “glassy” or crystalline. Silica is a natural constituent of the earth's crust and is a basic component of sand and granite. As used in building products, silica is a component of cements, plaster, ceiling tile, and numerous other construction materials.

Spray-On Fireproofing – Material applied to a structural steel to insulate it from the heat of fire. The spray-on fireproofing sampled in the Building is lightweight and comprised of vermiculite, gypsum, cellulose and fiberglass.

Standard Deviation – A measure of variability (dispersion) of observations or measurements.

Standard Error – A statistical measure of variability that is equal to the standard deviation of the population divided by the square root of the sample size.

Structural Steel – Steel components making up the superstructure of the Building that support the concrete floors, walls and other building elements.

Structures – Individual fibers or bundles or matrices of asbestos particles.

Structures/cm² – Structures per square centimeter.

Surgical Tear Out – The removal of Building components in a controlled manner.

Synergistic - Toxic effects are considered synergistic when their combined effect is greater than the sum of their individual effects.

Threshold Limit Values (ACGIH TLV) — American Conference of Governmental Industrial Hygienists (ACGIH) time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.

Time Weighted Average (TWA) – Average level of contamination that a worker may be exposed to over an eight-hour shift.

Top Sector – Floors 40 and 41 which includes mechanical floors with intake louvers and closet fans and has no broken windows/spandrel glass.

Toxicity Equivalent (TEQ) – Standard toxicity estimation for concentrations of the compounds classified as dioxins and furans. The total toxicity equivalent of a compound is defined as the summation of the individual toxicities of the component parts (B through N) identified in the compound:

$$n(\text{TEQ}) = \sum n(\text{TEQ})_B + n(\text{TEQ})_C + \dots + n(\text{TEQ})_N$$

μg – Microgram, one millionth of a gram

$\mu\text{g}/\text{ft}^2$ – Micrograms per square foot

95-95% Upper Tolerance Limit (UTL) - The limit below which 95% of all values are expected to occur, calculated for a stated confidence of 95%. The 95-95% UTL suggests that one is 95% confident that 95% of additional samples would be below this value.

Vertical Shafts – Elevators and escalators including all operating mechanisms such as hoist machines, sheaves, brake assemblies, and wire rope cabling.

Wind Pressure - Pressure caused when wind impinges on a Building.

Wipe – Sample media where a wet cloth is used to collect particulate.

WTC – World Trade Center – consisting of several office buildings (including the World Trade Center Towers) and a large shopping concourse formerly located in downtown Manhattan, New York, New York, which was destroyed on September 11, 2001.

WTC Dust – Refers to a unique composition pattern or “signature” that permits identification of WTC Dust. The signature is based on the presence, concentrations and morphology of multiple components (e.g., metals, morphological features, organic compounds).

WTC Dust Signature – Refers to the unique “fingerprint” of the WTC Dust in comparison to Background Buildings unaffected by the WTC Event and samples from the World Trade Center pre-WTC Event.

WTC Event – Refers to the attacks on and subsequent collapse of the WTC towers, including fires at Ground Zero, fires in the Building, demolition activities, and any other related activities that resulted in contamination of the Building from September 11, 2001 and thereafter.

WTC Hazardous Substances – Refers to the hazardous constituents found in WTC Dust, such as asbestos, mercury, PCBs, PNAs, DROs, and dioxins/furans

WTC RCCS – World Trade Center Residential Confirmation Cleaning Study