

Appendix 6

***Contaminated Building Components, Potentially Exposed Populations, and
Routes of Exposure***

1. *The Building has been pervasively contaminated by WTC Dust and WTC Hazardous Substances*

The significance of specific contaminant reservoirs identified in the Building is discussed below. Further details regarding potentially exposed populations and routes of exposure are provided in subsequent sections.

Interior Surfaces (Below Ceiling)

The below ceiling interior space comprises the bulk of the office space within the Building and may be occupied by all evaluated populations including office workers, building maintenance staff, maintenance/construction contractors, and visitors, including daycare center children. Workers or visitors present in the office space may inhale WTC Hazardous Substances found in vapor form or associated with particulates. Dermal absorption and incidental ingestion of WTC Hazardous Substances may also occur during contact with items within the office space. For example, office workers may come into contact with file cabinets, desks, and other office furniture during routine office work. Building maintenance staff and maintenance/construction contractors may routinely contact walls and office equipment during maintenance activities. Visitors may also be exposed to the WTC Hazardous Substances present on the furniture, walls, floor, and other surfaces in the interior space. In addition, both semi-volatile and nonvolatile WTC Hazardous Substances may contaminate food that is present within the office space.

Interior Surfaces (Above Ceiling)

The above ceiling interior space is the space formed between the drop ceiling and base of the floor above and often serves as the plenum. Building maintenance staff and maintenance/construction contractors may access this space directly, in order to replace lighting fixtures, repair the HVAC system, or perform similar activities. During such activities, WTC Hazardous Substances may also be re-entrained and transported to the office spaces. Air movement within the plenum may also allow the WTC Hazardous Substances to be released into the office space through gaps in the ceiling such as light fixture slots.

Spaces Between Interior Walls

The interior wall cavity is the space formed between two sheets of drywall above and below ceilings. During renovation activities, the drywall may be penetrated and the interior wall cavities exposed by maintenance/construction contractors where WTC Hazardous Substances found in vapor form or associated with particulates may be inhaled. Contact with the interior wall cavities to enlarge office space, update electrical lines located within the interior walls, or repair plumbing pipes may expose these populations to dermal absorption and incidental ingestion through hand to mouth contact.

Renovation activities may also expose WTC Hazardous Substances to the office space and enhance migration through air movement caused by the activity. In the absence of renovation activities, WTC Hazardous Substances within the interior wall cavities may migrate to the office space through the plenum or louvers. To allow return air to pass through, the drywall above the ceiling often ends just above the ceiling tile for some interior wall cavities (Figure 1). WTC Hazardous Substances within the interior wall cavities may therefore be transported to the plenum and released into the office space through gaps in the ceiling such as light fixture slots.



Figure 1. Interior “above ceiling” wall cavity. Reprinted from RJ Lee Group, TP-06 Contamination Report, 2003.

Louvers, located throughout the Building, connect the interior wall cavities to the office space and present a pathway through which the WTC Hazardous Substances may migrate directly into an office space (Figure 2).



Figure 2. Walls with Louvers are Potential Pathways of Exposure to WTC Hazardous Substances. Reprinted from RJ Lee Group, TP-06 Contamination Report, 2003.

Furniture

The Building is filled with furniture typical of a large commercial office building with multiple business operations. These include tables, desks, bookshelves, cabinets, credenzas, many types of chairs, sofas, partitions, and file cabinets. Persons who work in the Building and visitors who enter the Building will likely contact the furniture. Normal contact with and everyday use of furniture in the Building could thus expose Building occupants through dermal absorption, incidental ingestion through hand-to-mouth contact, and through inhalation of airborne contaminants.

Curtain Wall and Curtain Wall Insulation

A curtain wall is an architectural feature designed to protect a building from the weather, conceal the perimeter columns, and provide visual perspectives of depth and height to a building. The curtain wall cavity is insulated, contained within the column covers, and is separated from the interior office space by drywall. Maintenance/construction contractors may access the curtain wall cavities and insulation where WTC Hazardous Substances found in vapor form or associated with particulates

may be inhaled. Contact with the curtain wall cavity and insulation surfaces while conducting renovations may expose this population to dermal absorption and incidental ingestion through hand-to-mouth contact.

Construction activities that disturb the curtain walls and their insulation may also cause the release of WTC Hazardous Substances from the curtain wall cavities to the office space. Under normal operating conditions, WTC Hazardous Substances may migrate from the curtain wall cavities to an office space if cracks and creases develop along the drywall. Migration may occur if pressure differences (e.g., due to stack effects and wind pressure) cause infiltration of outdoor air into the curtain wall cavities, forcing air containing the WTC Hazardous Substances through the cracks and creases and into the office space. Stack pressure is caused by the temperature and humidity gradients between the inside of the Building versus the outside of the Building. Wind pressure is caused when wind impinges on a building and exerts a static pressure on a building's exterior surface. Wind pressure exerted on a building depends on wind direction and speed, building surface orientation, and surrounding conditions.

Fireproofing

Fireproofing is a coating of insulation applied to structural steel and the underside of the supported concrete floors for protection of the structural steel and floor support during a fire and may be found in the curtain wall cavities and above ceiling spaces (Figure 3). Maintenance/construction contractors may contact the fireproofing and cause WTC Hazardous Substances found in vapor form or associated with particulates to be released and may be inhaled. Contact with the fireproofing during renovation may expose this population to dermal absorption and incidental ingestion through hand-to-mouth contact.



Figure 3. Fireproofing on column steel, structural beams and floor support. Reprinted from RJ Lee Group, TP-04 Contamination Report, 2003.

Removal of the fireproofing may also cause the release and migration of the WTC Hazardous Substances into the office space. Under normal operating conditions, WTC Hazardous Substances in fireproofing may be released to the plenum and circulate throughout the office space or may be distributed throughout the curtain wall cavity and be released through cracks and seams in the drywall that separates the curtain wall cavity from the interior office space.

Structural Steel

Structural steel has been sprayed with a fireproofing coating to insulate the steel during fires. During construction activities, structural steel could be exposed and be made available for direct contact by maintenance/construction contractors. WTC Hazardous Substances from the exposed steel may also migrate to the office space during demolition activities. Migration of WTC Hazardous Substances may also occur under normal operation conditions. Results from the structural steel testing indicated that WTC Hazardous Substances had penetrated through the fireproofing to the steel beam surfaces (RJ Lee Group, CR25, 2003). Although the structural steel is coated with the fireproofing, there is at least the potential that WTC Hazardous Substances could migrate back through the fireproofing and be released into the curtain wall cavity or above ceiling spaces where it would enter the office space.

Perimeter Induction Units

The perimeter induction units are components of the HVAC system that deliver conditioned air to the interior work spaces of the Building. The units are located along the building perimeter, beneath the windows and adjacent to the curtain walls (Figure 4). Because of the nature of the HVAC system, there is a high probability that WTC Hazardous Substances contaminating the perimeter induction units would be blown into the interior spaces used by workers and visitors to the Building by the flow of conditioned air through the system. The perimeter induction units are relatively inaccessible and, therefore, difficult to clean. If not properly remediated, the units are likely to act as reservoirs of WTC Hazardous Substances that would re-contaminate previously cleaned interior spaces when the HVAC is in operation.

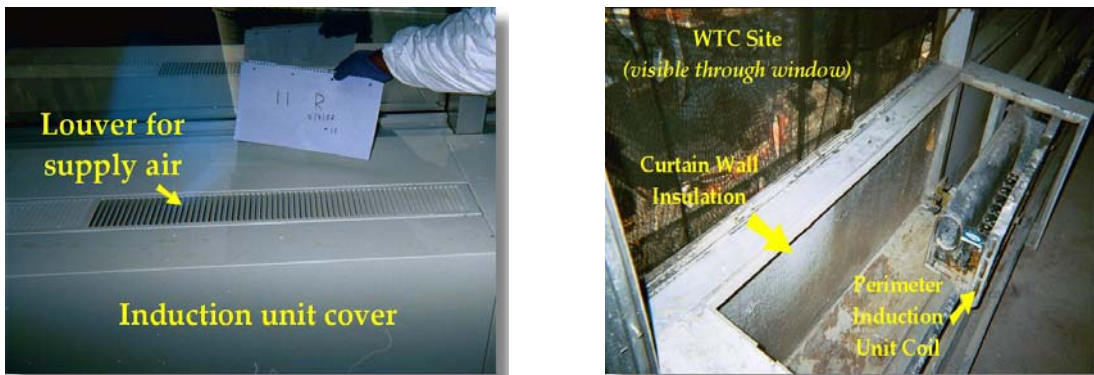


Figure 4. Perimeter induction of HVAC systems. Reprinted from RJ Lee Group, TP-11 Contamination Report, 2003.

Cell System and Risers

The cell system is a series of conduits built into the floors to route communication cables and electrical wires from a central utility closet riser to various locations on the floors. Passageways for wiring are present within each floor and are connected between floors through risers (Figure 5). Computer/IT specialists, building maintenance staff, and maintenance/construction contractors may access these cell system and risers and inhale semi-volatile or nonvolatile WTC Hazardous Substances. Contact with the cell system and risers could also occur while handling communication cables (office workers), rewiring the Building's system (building maintenance staff), or renovating the cell system and risers (maintenance/construction contractors). These activities may also

cause migration of the WTC Hazardous Substances to the office space since many of the access ports are located within this area.

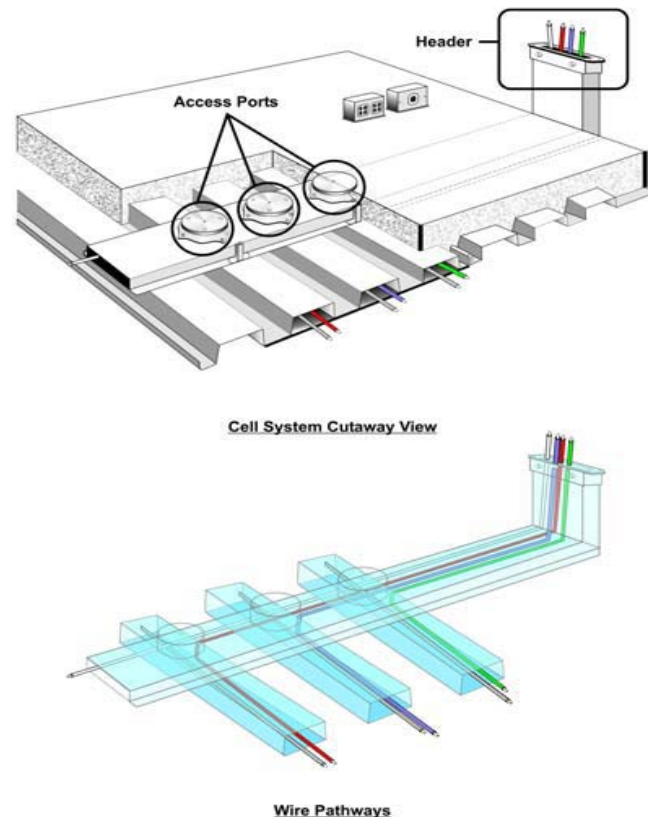


Figure 5. Cross section of cell section showing access ports and headers. Reprinted from RJ Lee Group, TP-09 Contamination Report.

Elevators and Elevator Shafts

Thirty elevator shafts service the Building through the central core of the structure. The low-rise (lobby, 7th-19th floors) and the mid-rise (19th-29th floors) parts of the Building are serviced by eight elevators each. The high-rise (29th-39th floors) part of the Building is serviced by seven elevators. The remaining elevators are for special use including handicapped access and freight transport. It is likely that all visitors and employees will use the elevators and contact surfaces within the elevators. Maintenance crews will likely contact surfaces within and on the outside of the elevators during routine

maintenance and repair (Figure 6). The normal operation of the elevators will likely cause the agitation and redistribution of WTC Dust and WTC Hazardous Substances within individual elevators and elevator shafts, allowing transport between floors in the Building.



Figure 6. View of elevator shaft. Reprinted from RJ Lee Group, TP-12 Contamination Report, 2003.

IT Equipment

The Building contains thousands of pieces of IT Equipment that include computers, telephones, printers, fax machines, and less common equipment such as battery chargers. These components are located on every floor and in almost every occupied space in the Building. Contact with these types of equipment is necessary for many employees and maintenance staff and is likely even for visitors to the Building. The interior spaces of IT Equipment may also serve as reservoirs of WTC Hazardous Substances and result in future recontamination.

Mechanical Equipment

The Building is equipped with large-scale heating, ventilation, and air conditioning (HVAC) systems with air handling machinery located on the 5th and 40th floors. Also located on these floors are other pieces of equipment including compressors, generators, pumps, filtration units, control panels, chillers, fans, and ducts. This equipment is used to distribute water and conditioned air throughout the Building. There is the potential for contamination to be carried via air from contaminated air handling units to all areas of the building that those units serve. This may pose a risk of

inhalation to employees and visitors exposed to air circulated through the Building. In addition, routine maintenance and repair to these systems may expose workers to contamination via dermal contact, incidental hand-to-mouth ingestion, and inhalation.

2. *Future Building Occupants Could Be Exposed to WTC Dust, WTC Hazardous Substances, and Mold in Numerous Ways*

2.1. *Potentially Exposed Populations*

If the Building were to be re-occupied, people of all ages and health conditions would be expected to enter, either as workers or visitors. Examples include the following:

Office Workers

Office workers are expected to be present in the Building during normal business hours and spend the bulk of their time in the office space (i.e., interior space below the ceiling). In addition, office workers involved in computer or information technology (IT) functions could routinely access the cell system and risers for communication cables to be used in the office space.

Building Maintenance Staff

Depending on the nature of their work on any given day, building maintenance staff may be in direct contact with the interior space (office space and above-ceiling) and cell system and risers. Examples of exposure include moving furniture (office space), accessing wiring (cell system and risers), and adjusting lighting fixtures (above-ceiling interior space).

Maintenance/Construction Contractors

For non-routine maintenance/construction activities, contractors may be hired to conduct specific maintenance or construction activities. Population size and duration of the activities within the Building would depend on the nature and scope of work. For example, contractors may be in direct contact with any of the Building components considered in the evaluation during renovation work that could be involved in office build-out or construction activities. In addition, maintenance/construction contractors may be

exposed while rewiring the electrical system (interior wall cavities) or conducting work in the plenum (above ceiling interior space and fireproofing).

Visitors, including Children at Daycare

During the course of a year, visitors may enter the Building for a variety of reasons (e.g., conduct business transactions, attend meetings, etc.). Children may also visit the Building. The number of visitors and the length of their visits are highly variable, and contact with building components would likely be limited primarily to the office space (i.e., interior spaces below the ceiling).

Small children could possibly experience higher levels of exposure and a greater risk of adverse health effects than adults in the Building. In the past, Building space has been used for daycare services. It is possible that Building space could be allocated for daycare use in the future if the Building were reoccupied.

Within each of the groups listed above, there may be particularly “sensitive” individuals that may be affected by the WTC Hazardous Substances differently and/or exhibit an alternative or enhanced response to the exposure. Sensitive individuals may include people with inherited disorders (i.e., inhibited detoxification or clearance of toxic substances), immunodeficiencies, and/or nutritional deficiencies. Individuals may also be more sensitive due to certain behaviors, such as smoking (hand-to-mouth contact while smoking outdoors after being exposed indoors) or greater hand-to-mouth contact leading to incidental ingestion of dust. Two examples of potentially sensitive individuals are asthmatics and pregnant women, as discussed below:

Asthmatics

Asthmatics react more severely to respirable substances (ALA, 2003), such as irritants found in the WTC Dust. In a recent study published in the Journal of Allergy and Immunology, children with asthma who lived within five miles of the World Trade Center had more severe illness after the WTC Event, seeing the doctor more often and taking more medication the year after the WTC Event than the year before (Szema et al., 2004). According to the Centers for Disease Control and Prevention (CDC), the self-reported lifetime asthma prevalence rate in the state of New York is 11.5% (CDC 2002).

Pregnant women

Pregnant women are expected to represent a portion of the office worker and visitor population. A fetus is sensitive to the exposures of a pregnant woman, particularly for WTC Hazardous Substances that could cause birth defects, such as mercury and lead (ATSDR, 1999b,c). According to the ATSDR, mercury's harmful effects may be passed from mother to the fetus (ATSDR, 1999c).

Others

Other types of potentially sensitive populations that may routinely enter the building include the elderly, diabetics, and those with cardiovascular disease (EPA 2000).

2.2. Routes of Exposure

An exposure pathway (route of exposure) is the physical course a chemical takes from its source to the exposed person. The behavior and movement of WTC Hazardous Substances within the Building will vary based on their individual physical-chemical properties. For example, the WTC Hazardous Substances discussed in the report are generally considered relatively non-volatile (e.g., asbestos, cadmium and lead) or semivolatile (mercury, PCBs, PAHs, and dioxin). All of these substances may adhere to WTC Dust and be transported within the Building as solids. In addition, the semivolatile substances may also be transported within the Building as vapors.

The tendency of a substance to volatilize is often characterized by relatively low boiling points and/or high vapor pressures. Asbestos, cadmium and lead all have very high boiling temperatures and are considered non-volatile under normal conditions in the Building. These WTC Hazardous Substances are likely to be detected only in the solid phase.

Mercury, PCBs, PAHs, and dioxin, while typically not considered "volatile", have vapor pressures that are sufficiently high such that a portion of each of these WTC Hazardous Substances would be expected in the vapor phase under normal building conditions. Once in vapor form, the semi-volatile WTC Hazardous Substances may migrate from one building component to another and redeposit onto surfaces or dust particles.

For non-volatiles, the physical characteristics of the dust will impact the transport properties of the WTC Hazardous Substances. Particle size analysis of the WTC Dust from the Building conducted in 2003 indicates the dust in the Building includes substantial amounts of fine particulates. For example, samples taken from five locations in the Building had up to 11% particulate matter with a diameter of less than 10 microns (μm). Such fine particulates will more likely be re-entrained, increasing the potential for transport within the Building and for particulate-bound WTC Hazardous Substances to be inhaled. In addition, free asbestos fibers (those fibers not bound to other materials in the dust) have been detected in the WTC Dust (RJ Lee Group, Report S5, 2004).

As discussed in greater detail in Section 2.3 of the report, the unique physical characteristics of WTC Dust increase its likelihood of re-entrainment from contaminated surfaces. Chatfield and Kominsky (2001) demonstrated under “passive” conditions, i.e., no ventilation or air condition systems were in operation, and no human activity ongoing during the monitoring, relatively high levels of airborne asbestos in apartments contaminated with WTC Dust. Dr. Richard Lee demonstrated in experimental studies in the Building that lead and asbestos fibers in the WTC Dust are released into the air with low velocity air pulses (RJ Lee Group, S3 Report, 2004). These characteristics increase the opportunity for inhalation exposure to asbestos.

A number of mathematical approaches have been used to model contaminant transport in buildings [e.g., Elayed *et al.* (1992); Federspiel *et al.* (2002); Chung (1997); and Pepper *et al.* (1992)]. However, these models do not account for migration from less accessible locations in the Building such as interior wall cavities, curtain wall cavities, cell system and risers, fireproofing, or structural steel that may be exposed during routine operation and renovation activities and therefore would not accurately estimate contaminant concentrations. In addition, Elayed *et al.* (1992) and Federspiel *et al.* (2002) model only vapor transport and do not account for particulate buoyancy. As a result of such modeling limitations, as well as limitations on available information regarding airflows through individual building components, movement of WTC Hazardous Substances in the Building is not quantified in this exposure assessment.

People working in or visiting the Building could be exposed to WTC Hazardous Substances in many different ways, through one or more of the following routes:

Ingestion

Oral exposure to the WTC Hazardous Substances may occur during incidental ingestion of WTC Hazardous Substances on dust as a result of hand-to-mouth contact; and during ingestion of foods that have come into contact with dust or vapors.

Inhalation

Depending on their volatility, WTC Hazardous Substances may be inhaled as vapors or in particulate form on WTC Dust.

Dermal Absorption

Direct skin contact with WTC Dusts or re-deposited volatilized WTC Hazardous Substances on building component surfaces may occur, resulting in contaminant transfer across the skin and into the blood.

For example, typical office workers could be directly exposed to WTC Hazardous Substances present in the interior spaces, and computer/IT specialists could be directly exposed to WTC Hazardous Substances in cell system and risers. Typical office workers could also be indirectly exposed to WTC Hazardous Substances originally present in interior wall cavities, fireproofing, structural steel, and curtain wall cavities when they are carried to office areas by movement of air or dust¹. In some cases, a population may be exposed through both direct and indirect pathways to WTC Hazardous Substances present in a building component. For example, maintenance/construction contractors could be directly exposed to WTC Hazardous Substances in interior wall cavities during renovation activities, and indirectly exposed during activities in offices contaminated by the transport of the WTC Hazardous Substances from the interior wall cavities by movement of air or dust. Table 1 provides examples of contaminant migration within the Building.

¹ For the purposes of this discussion, “direct” exposures are classified as those that can occur without transport of WTC Hazardous Substances from one building component to another, while “indirect” exposures involve transport of WTC Hazardous Substances from one building component to another prior to exposure.

Table 1 - Contaminant Migration Pathways to Office Space

Building Components	Routine Operation	Renovation
Interior Wall Cavities	Air Flow via Plenum	Demolition of Building Component
	Air Flow through Louvers	Maintenance of Wiring/Plumbing in Building Component
	Leak through Outlets and Switches	Access Interior Wall Cavity to Remove Pests and/or /Mold
	Leak through Cracks	
Curtain Wall Cavities	Leak through Cracks	Demolition of Building Component
		Access Curtain Wall Cavity to Remove Mold
		Change Curtain Wall Insulation
Fireproofing	Air Flow via Plenum	Removal of Fireproofing
	Leak through Cracks	Respray Fireproofing on Structural Steel
Structural Steel	Air Flow to Plenum	Demolition of Building Component
	Leak through Cracks	Respray Fireproofing on Structural Steel
Cell System and Risers	Access ports	Rewiring in the Cell System and Risers
	Leak through port seals	Demolition of Building Component
BOLD text indicates pathways most likely to occur.		

Table 2 presents a summary Conceptual Exposure Model (CEM) for the Building that illustrates the relationship between sources of WTC Hazardous Substances, the exposed populations who might come into contact with WTC Hazardous Substances originating from the sources, and potential exposure pathways and routes through which the exposed populations may contact the WTC Hazardous Substances. Pathways were determined based upon a site visit, the review of Building photos and diagrams, and communications with Morse Zehnter Associates. In addition, building layout drawings were reviewed to provide an understanding of the Building's structure as it pertained to potential routes of WTC Hazardous Substances transport throughout the Building.

Table 2 - Conceptual Exposure Model Summary

Building Components	Office Workers	Building Maintenance Staff	Maintenance/ Construction Contractors	Visitors (Adults and Children)	Building Inspectors	Emergency Response*	Janitorial/ Cleaning Staff	Building Security
Interior Spaces								
-below ceiling (office space)	DE	DE	DE	DE	DE	DE	DE	DE
-above ceiling (plenum space)	IE	DE/IE	DE/IE	IE	DE/IE	DE/IE	IE	IE
Interior Wall Cavities	IE	IE	DE/IE	IE	DE/IE	DE/IE	IE	IE
Curtain Wall Cavities	IE	IE	DE/IE	IE	DE/IE	DE/IE	IE	IE
Fireproofing	IE	IE	DE/IE	IE	DE/IE	DE/IE	IE	IE
Structural Steel	IE	IE	DE/IE	IE	DE/IE	DE/IE	IE	IE
Cell System and Risers	DE/IE	DE/IE	DE/IE	IE	DE/IE	DE/IE	IE	IE

Notes:

DE: Potential for Direct Exposure (i.e., exposures can occur without transport of contaminants from one building component to another).

IE: Potential for Indirect Exposure (e.g., involves transport of contaminants from one building component to another).

* This category includes the potential for intrusive work such as might be conducted by the fire department. Such populations may be wearing personal protective equipment (PPE) that could mitigate exposures. Some other type of emergency response workers (e.g. police, medical support) would be less likely to conduct intrusive activities in the building and would thus be expected to have exposure pathways more similar to those of routine visitors to the building.

To illustrate these concepts in greater detail, a presentation of potential exposure pathways and routes for the specific population of office worker is provided for individual building components in Table 3 on the next page.

Table 3 - Conceptual Exposure Model - Office Workers

Building Components	Office Workers
Interior Spaces	
-below ceiling	<p>Direct (exposure in work/office areas):</p> <ul style="list-style-type: none"> - dermal contact through touching surfaces within office space, incidental ingestion through hand to mouth contact - dermal contact, incidental ingestion, inhalation of chemicals on particulates re-entrained by physical disturbances, air movement - inhalation of chemicals volatilizing from surfaces or particulates - dermal contact, incidental ingestion of volatilized chemicals that re-deposit on surfaces within office space - ingestion of food contaminated by particulates and volatiles from surfaces within office space
-above ceiling	<p>Indirect (movement to work/office areas, where exposure occurs):</p> <ul style="list-style-type: none"> - inhalation of re-circulated particulates/vapors originating in plenum and moving to office areas, during periods of both physical disturbance involving the plenum (e.g., construction or maintenance activity of the HVAC) and no physical disturbance - dermal contact, incidental ingestion of chemicals on particulates from plenum deposited onto surfaces within office space - dermal contact, incidental ingestion of volatilized chemicals from the plenum deposited onto surfaces within office space - ingestion of food contaminated by particulates and volatiles from plenum
Interior Wall Cavities	<p>Indirect (movement to work/office areas, where exposure occurs):</p> <ul style="list-style-type: none"> - inhalation of particulates/vapor originating from the interior wall cavities and moving to office areas, during periods of both physical disturbance (e.g., construction or maintenance activity) and no physical disturbance - dermal contact, incidental ingestion of chemicals on particulates from interior wall cavities deposited onto surfaces within office space - dermal contact, incidental ingestion of volatilized chemicals from the interior wall cavities deposited onto surfaces within office space - ingestion of food contaminated by particulates and volatiles from interior wall cavities
Curtain Wall Cavities	<p>Indirect (movement to work/office areas, where exposure occurs):</p> <ul style="list-style-type: none"> - inhalation of particulates/vapor originating from the curtain wall cavities and moving to office areas, during periods of physical disturbance (e.g., construction or maintenance activity) - dermal contact, incidental ingestion of chemicals on particulates from curtain wall cavities deposited onto surfaces within office space - dermal contact, incidental ingestion of volatilized chemicals from the curtain wall cavities deposited onto surfaces within office space - ingestion of food contaminated by particulates and volatiles from curtain wall cavities
Fireproofing	<p>Indirect (movement to work/office areas, where exposure occurs):</p> <ul style="list-style-type: none"> - inhalation of particulates/vapor originating from the fireproofing and moving to office areas, during periods of both physical disturbance (e.g., construction or maintenance activity) and no physical disturbance - dermal contact, incidental ingestion of chemicals on particulates from the fireproofing deposited onto surfaces within office space - dermal contact, incidental ingestion of volatilized chemicals from the fireproofing deposited onto surfaces within office space - ingestion of food contaminated by particulates and volatiles from fireproofing
Structural Steel	<p>Indirect (movement to work/office areas, where exposure occurs):</p> <ul style="list-style-type: none"> - inhalation of particulates/vapor originating from the structural steel and moving to office areas, during periods of physical disturbance (e.g., construction or maintenance activity) - dermal contact, incidental ingestion of chemicals on particulates from structural steel deposited onto surfaces within office space - dermal contact, incidental ingestion of volatilized chemicals from the structural steel deposited onto surfaces within office space - ingestion of food contaminated by particulates and volatiles from structural steel

Table 3 - Conceptual Exposure Model - Office Workers (continued)

Cell System and Risers	<p>Direct (exposure to substances on wiring during activities):</p> <ul style="list-style-type: none">- inhalation of volatiles and particulates released from accessing the cell system- dermal contact through touching wires (e.g., by IT staff), incidental ingestion through hand to mouth contact <hr/> <p>Indirect (movement to work/office areas, where exposure occurs):</p> <ul style="list-style-type: none">- inhalation of particulates/vapor originating from the cell system and risers and moving to office areas, during periods of both physical disturbance (e.g., construction or maintenance activity) and no physical disturbance- dermal contact, incidental ingestion of chemicals on particulates from cell systems and risers deposited onto surfaces within office space- dermal contact, incidental ingestion of volatilized chemicals from cell systems and risers deposited onto surfaces within office space- ingestion of food contaminated by particulates and volatiles from the cell system and risers
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