Updated September 2020
Wildfire Glossary for Environmental Professionals, Adjusters and Restorers © 2020

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Author's Notes:

In 2009, I completed a non-scientific survey of environmental professionals, restorers and adjusters who attended my fire and smoke damage restoration class, where I found all three groups are using different interpretations of definitions to describe fire damaged and wildfire smoke, soot, char and ash contaminated buildings. Because of this, I spent the spring and summer of 2010 compiling information from government and fire agencies, the restoration and insurance industry, environmental professionals, and laboratories.

In 2011, Version #6 "*Wildfire Glossary of Environmental, Insurance and Restoration Terms*" it was published and distributed worldwide. https://www.uphelp.org/sites/default/files/blog/wildfire_glossary_-_patrick_moffet-2_0.pdf In it I wrote: "Over the past 20 years as an environmental professional and master restorer; teacher and lecturer on managing fire and wildfire damaged properties, the past 4 years have been the most challenging. The challenge comes in educating insurance adjusters, building owners, restoration contractors, attorneys and arbitrators about what it takes to assess a typical wildfire smoke and soot contaminated building to removing chemical residues."

In comparison to almost 10 years ago, today's science that identifies the presence of soot, char ash and other wildfire particulate in buildings has slightly but not dramatically changed, where there still are difficulties to overcome in 1) completing site inspections; 2) completing adequate occupant interviews; 3) completing photo documentation; 4) creating a hypothesis for sampling; 5) requesting proper laboratory analysis methods; 6) the lab providing appropriately trained technicians to analyze samples; 7) the lab investing in advanced analysis equipment; 8) interpreting field inspection findings with laboratory data analysis; 9) what does all the data mean when determining the degree and level of impact to a building, contents, environment, and addressing occupant health concerns; and 10) writing a scope of work that addresses the concerns of the building owner, insurer, environmental professional and the restoration contractor who takes on the responsibility for completing the scope of work.

One difficulty; there are no standards for soot, char, and ash collection and how many samples represent statistically quantitative data. Another challenge is directing the lab to provide professionals with better scientific examination beyond minimally accepted TEM and PLM analysis. Today, TEM and PLM can be coupled with EDS/EDX, GC/MS/FID and FTIR analysis (at a higher cost), where the data is more reliable. We now can provide customers with better interpretation of data that helps environmental hygienists determine whether the building is or is not affected by smoke, soot, char and ash, and whether it should or should not be cleaned based on data and inspection analysis findings.

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Another challenge for the restoration industry; cleaning and restoration technicians are not sufficiently educated, trained, and certified in smoke, soot, ash, char, corrosion, and chemical residue cleanup. Untrained workers can increase property damage including damage to contents, furniture, antiques,

appliances, computers and works of art; improper use of deodorization techniques, chemicals and systems can cause occupants to experience adverse health effects.

In communities where wildfires impacted buildings, a number of community help groups and restoration contractors (restorers) employees are either volunteers or temporary workers, who are poorly trained, and they are not supervised by individuals who are experts in their field. Environmental professionals also have limited training in assessments, occupant interviews, hypothesis modeling, sampling, and interpretation of data. To address some of these issues: In 2018, the American Industrial Hygiene Association (AIHA) published the "*Technical Guide for Wildfire Impact Assessments for the OEHS Professional*." This guide is not a standard, but it is as close to becoming a standard by a worldwide association, which provides guidance on best-practice for environmental professionals to follow.

Starting in May 2020, the Institute of Inspection Cleaning and Restoration Certification (IICRC), which is an American National Standards Institute (ANSI) writing body, the IICRC will have formed a group of professionals from the scientific community, laboratory, environmental and restorers to write the standard "S760" the "*Standard for Professional Restoration of Structures and Items Damaged by Wildfire Smoke*." This standard will provide a specific set of practical principles, methods, and processes to evaluate and restore wildfire and smoke damaged porous and non-porous structural and personal items. This standard will also establish methods and processes to document, evaluate, clean, and restore and verify the cleanliness of structures and items damaged from the smoke of wildfires.

There are additional terms and definitions involving 1) health and safety when inspecting wildfire impact buildings and structures and exposing workers to potentially toxic chemicals; 2) environment professional terms when assessing and sampling; 3) laboratory terms involving analysis; 4) insurance terms; and 5) restorer's terms involving mitigation, cleaning and restoration.

After considerable research, the 2011 "*Wildfire Glossary of Environmental, Instance and Restoration Terms*," is now a 2020 update, and is now called the "*Wildfire Glossary for Environmental Professionals, Adjusters and Restorers*" © 2020. I believe the 2020 wildfire glossary is the most extensive glossary and reference guide in the industry. If you want to know more about me, or add future terms and definitions, refer to the last page in the glossary.

Final Note: Since this is a teaching glossary, source reference links are found throughout the glossary. Links were active at the time of writing. The author cannot be responsible for inactive links.

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(A)

Abatement – The action of minimizing or removing the presence of a hazardous material such as asbestos and lead paint. (See: Cleaning; Mitigation; Restoration)

Abatement, fire – (1) The action of minimizing the presence and danger of hazardous material such as lead and asbestos, bacteria, and mold, by reducing the amount, degree, and intensity. (2) The reduction in degree or intensity of pollutant emissions commonly found in fire damaged structures.

Ablated char – The removal of char from the surface of an object. https://www.scielo.br/scielo.php?script=sci_arttext&pid=S2175-91462018000100302

Ablation – The removal of a coating or finish through heat, chipping, or erosion, where the substrate loses its protective layer. Some finishes are designed to protect products from heat damage. Several characteristics of heat protection finishes including pressure, heat transfer rate, gas composition, mode of heat transfer, and gas enthalpy. For more information go to: https://www.asminternational.org/documents/10192/1849770/05437G_Sample.pdf/ebc7b4bc-7035-4ec5-b3ab-8eedd24d4722 and https://publications.polymtl.ca/1126/1/2013_EtienneBousser.pdf

Ablative char – The results of damage to a material's protective layer after exposure to heat, gases, and cooling.

Ablative coating – A coating that chars when exposed to open flame or extreme temperatures, as would occur during the failure of an engine casing or during aerodynamic heating. The ablative char surface serves as an insulating barrier, protecting adjacent components from the heat or open flame. For more information go to: https://www.epa.gov/sites/production/files/2018-08/documents/comar_26.11.19.13-1_md_8-6-18.pdf

Ablative material – A polymer or resin having low thermal conductivity which pyrolyzes (a pyrolysis process) that causes decomposition layer-by-layer when its surface is heated, leaving a heat-resisting layer of charred material, which eventually breaks down to expose virgin material such as raw wood. For more information go to: https://link.springer.com/article/10.1007/s10999-018-9432-7 and https://link.springer.com/article/10.1007/s10694-018-0787-y

Abnormal – Something that is not normal or not within acceptable tolerances.

Abrasion mode (particles) – A size range of particles, typically larger than about 3 micrometers in diameter, primarily generated by abrasion of solids.

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Abrasive – (1) A hard substance used for grinding, air blasting and polishing. Common abrasives used in restoration include sand, pumice, ground corn cobs, nut hulls, baking soda, dry ice, and glass beads. (2) A material used to scour, scrub or polish. Abrasive particles are used in such products as cleansers, pumice stone, scouring pads and hand cleaners.

Abrasive blasting – The use of compressed air with an abrasive medium (e.g., dry ice, baking soda) to remove surface discoloration, accretions, char, and fire residue.

Absolute humidity – (1) The mass of water vapor in a given volume of air. It represents the density of water vapor in the air. (2) Total water vapor in unit or mass or the mass of water vapor/volume of air. (Western Regional Climate Center) (3) A type of humidity that considers the mass of water vapor present per unit volume of space. Also considered as the density of the water vapor. It is usually expressed in grams per cubic meter. (Weather.com) Education Note: Absolute humidity is the mass of water vapor per unit volume of air in the atmosphere. The mass of water at any given temperature is limited by the vapor pressure and it changes as air-pressures change. Absolute humidity is usually expressed as the weight of water in a given volume of air or grams of water per kilogram of air.

Absolute temperature – A temperature measured in Kelvins (K) or Rankines (R). Temperature measured relative to absolute zero. (NFPA 921, 2008, 3.3.1)

Absorb – To retain or hold a substance in a porous or semi-porous material such as water, a chemical or smoke odor.

Absorbed moisture – (1) Moisture that has been taken in or assimilated by a porous or semi-porous material, such as concrete, drywall, wood, masonry, and carpets. (2) Water held on surfaces of a material by physical and chemical forces and having physical properties substantially different from those of absorbed water or chemically combined water at the same temperature and pressure.

Absorbency – Moisture content difference between a dry and a saturated material. Absorbency is a weight measurement of the material's ability to retain a liquid or moisture.

Absorbent – (1) Any material that has an affinity for certain substances and attracts these substances from a liquid or gas state in which it is in contact. (2) A material that draws liquid or gaseous substances into itself, usually from surfaces or from the air. Education Note: Absorbents are used in carpet cleaning, spotting, concrete cleaning, and spill control. In limited cases, absorbents are used in dehumidification, such as lithium, or calcium chloride, which causes them to change, physically or chemically, as they absorb water or other liquids.

Absorption (chemical) – (1) A class of processes by which one material is taken up by another. (2) The process whereby a porous material extracts one or more substances from an atmosphere, a mixture of gases, or a mixture of liquids. (Gatley, "*Understanding Psychrometrics*") (3) The process that draws fluid or gas into a porous material, such as a sponge soaking up water. NAIMA (4) The temporary holding of water and moisture vapor in semi-porous and porous building materials and

finishes such as carpet and pad, drywall and insulation, subfloors, and underlayment. (5) In concrete, the process by which a liquid is drawn into the pores of a porous solid body; also, the increase in mass of a porous solid body resulting from the penetration of a liquid into its permeable pores. Education Note: Absorption is a process whereby a material extracts one or more substances in air or as a mixture of gases or liquids, accompanied by the material's temporary physical and/or chemical change into another material. Absorption rate describes the temporary holding of moisture in porous and semi-porous building materials (carpets, sub-floor padding, and sheetrock) for a period of time. (See: Adsorption verses Absorption) For more information go to: https://en.wikipedia.org/wiki/Absorption_(chemistry)

Absorption (medical) – The taking-in of chemicals and byproducts through the skin or by ingestion and inhalation. For more information go to: https://www.nap.edu/read/9767/chapter/6 and https://www.ccohs.ca/oshanswers/chemicals/how_chem.html

Absorption barrier (buildings) – Any material designed to hold-back moisture or diffuses moisture, while a water-resistive barrier holds back water.

Absorption barrier (medical) – Any of the exchange sites of the body that permit uptake of various substances at different rates (e.g. skin, lung tissue, and gastrointestinal-tract wall).

Absorption v. adsorption (discussion) – A sponge absorbs moisture in high humid air and gives it back as the air dries, where in PPE and respirators, the activated carbon filter in a gas mask adsorbs gaseous odors allowing the wearer to breathe fresh air. The activated carbon filter will not give back the odor to the wearer unless the activation carbon is depleted or loaded with vapors.

A/C – Abbreviation for air conditioner; air conditioning.

ACBM – Asbestos-containing building material.

Accelerant (fire forensics) **–** (1) Any substance, nearly always a liquid, that was placed at a fire scene to facilitate the spread of a fierce and fast blaze. (2) Flammable fuel (often liquid) used by some arsonists to increase or intensify a fire. (NFPA) (3) A fuel or oxidizer, often an ignitable liquid, used to initiate a fire or increase the rate of growth or spread of fire. (NFPA 921 3.3.2) Education Note: The most common accelerants found are petrol, kerosene, turpentine, and diesel which are all mixtures of hydrocarbons derived from petroleum. Other accelerants found include ethanol or methylated spirits (combination of methyl and ethyl alcohol), and acetone.

Accelerant testing analysis (environmental sampling) – An accelerant sample where analysis is performed in a laboratory using one or more of the following tests; Attenuated Total Reflectance-Fourier Transform Infrared Spectrometry (ATR-FTIR), Gas Chromatography/Mass Spectrometry (GC/MS), High-Performance Liquid Chromatography (HPLC) and Chemometric techniques. These analysis methods can be used on fabrics to identify accelerants. https://medic.upm.edu.my/upload/dokumen/2020042010154816_MJMHS_0530.pdf (See: Toxic Smoke Analysis using FTIR)

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Accelerated drying (Acceleration drying) (water damage remediation) - The process of drying wet buildings as quickly and as fast as possible. Education Note: Drying acceleration is the increase speed at which evaporation occurs. Heat combined with air movement causes evaporation to occur more rapidly.

Accessory building – A building that is smaller in scale and intended for the use of the principal building on a property. Accessory buildings include detached garages, sheds, carports, pergolas, gazebos, arbors, greenhouses, and playhouses

Acclimate – The ability of a person, material or even an organism to become accustom to a new climate or environment due to a change in environmental conditions.

Acclimation – (1) The physiological adjustment of a person, material, or even an organism, to adjust to a new, unusual, or modified environment. (2) The act of allowing wood moisture content to become at equilibrium with the environment in which it will perform.

Accumulation mode – A size range of airborne particles, from about 0.1 to 3 micrometers, formed largely by accumulation of gases and particles upon smaller particles. In air, particles are amazingly effective in scattering light. For more information go to: http://www.euro.who.int/__data/assets/pdf_file/0019/123085/AQG2ndEd_7_3Particulate-matter.pdf?ua=1

Acclimation temperature (biological energetics) – The ambient temperature that an organism has become accustomed to by a period of constant exposure to this condition over time.

Accredited laboratory – A laboratory that has been evaluated and given approval to perform a specified measurement or task, usually for a specific parameter and a specified period of time. https://www.aihaaccreditedlabs.org/#:~:text=AIHA%20Laboratory%20Accreditation%20Programs%2C%20LLC%20is%20a%20third%2Dparty%2C,environmental%20microbiology%2C%20and%20unique%20scopes

Accuracy of moisture measurements – The degree to which electronic moisture sensoring and monitoring equipment can calculate the accuracy of moisture content reading of wet building materials and humidified atmospheres.

ACD – Air cleaning device.

ACH – Air changes per hour. A common unit of measure of ventilation rate for a space, or air leakage rate for a building, defined as the volumetric flow rate divided by the volume of the space considered.

ACGIH – The American Conference of Governmental Industrial Hygienists, Inc. ACGIH is an organization open to all practitioners in industrial hygiene, occupational health, environmental health, or safety. Industrial hygiene deals with the protection of the health of those involved in

industry. This classifies it as a form of preventative medicine. Education Note: ACGIH publishes over 400 titles in occupational and environmental health and safety and publishes Threshold Limit Values (TLVs) for over 700 chemical substances and physical agents as well as 50 Biological Exposure Indices for select chemicals. (See: TLV) For more information about ACGIH go to: http://www.acgih.org

Acid cleaner – A chemical compound capable of breaking down smoke and char residue followed by rinsing and drying. On some tile surfaces having grout or aluminum window frames, phosphoric acid cleaners may be the appropriate chemical to bring back the finish to a clean condition.

Acid deposition / Acid deposits – (1) Acids commonly found in smoke film, soot and ash that settle on surfaces. Acids can be responsible for corrosion of the underlying substrate. Organic acids include hydrocarbons VOCs and PAHs, and organic acids including sulfur and nitrous oxides, benzene, 2-furaldehyde, and ketones and aldehydes can be responsible for property damage. (2) Wet and/or dry deposition of acidic materials to water or land surfaces. Some chemicals found in acidic deposition include nitrate, sulfate, and ammonium.

Acid, phosphoric – Phosphoric acid is commonly used to remove smoke film and soot from hard surfaces. Phosphoric acid cleaners can be applied on fiberglass tub and shower enclosures, light fixtures and crystal (with immediate rinsing), ceramic tile, grout, aluminum windows and door frames, including but not limited to clay and concrete blocks, brick, stone and mortar.

Acid precipitation – Acids in air that precipitate onto surfaces. (1) After a wildfire, acid precipitation results from high humidity or rain having high concentrations of acids produced by the interaction of water with oxygenated compounds of sulfur and nitrogen which are the by-products of wildfire combustion. Acid precipitation includes the by-products of char, soot, and ash fallout onto surfaces. (2) After a building fire, acid precipitation results from high humidity in the building, where there are high concentrations of acids produced by the interaction of water with oxygenated compounds of sulfur and nitrogen which are the by-products of heat, smolder and combusted materials. (3) In fire damaged buildings and wildfires acid precipitation includes the by-products of ash fallout onto surfaces.

Acid smoke – (1) Fire residues that have low to high levels of acidity often causing corrosion of metals and color change in textiles and pigments. (2) Fire residues characterized by acidity that is capable of damaging, corroding and discoloring materials and finishes, textiles, and pigments. (3) Fire residues characterized by high levels of acidity, often including corrosion of metals or color change in textiles and pigments.

Acid smoke residue, cause of – Smoke and soot residue components that are affected by moisture and humidity.

Acrid smoke smell – When breathing smoke an acrid smoke smell is a sharp, harsh, unpleasant smell like the smell of wet cigarette or cigar ashes. Smoke smells consist of VOCs. (See: VOC)

Acid smoke residue, cause of – Smoke and soot residue components that are affected by moisture and humidity.

Acid, strong – An acid with a pH of 2.5 or less.

Acid, sulfuric (H_2SO_4) – A heavy, corrosive, oily liquid that is colorless when pure, but it is usually yellowish or brownish, produced by the combined action of sulfur dioxide, oxygen (from the air), steam, and nitric fumes. Education Note: Sulfuric acid attacks and dissolves some metal and most metal finishes, and other intractable substances. It sets free most acids from their salts, and it is used in the manufacture of hydrochloric and nitric acids, bleaching powders, etc. It is used for bleaching paper, wood, and clothing. Sulfuric acid is also powerful dehydrating agent, having a strong affinity for water. Sulfuric acid is also used in etching iron, in removing iron scale from forgings, and in petroleum refining.

Acids in fire damaged buildings – Almost all fires result in some type of soot generation depending on fuel, time of burn and available oxygen. Soot can contain acidic deposits called chlorides created from the burning of carpet and plastics, urethane and paint, and other finishing materials. Education Note: Chlorides create hydrochloric acid [HCl], which is often responsible for staining, corrosion and intermittent or permanent damage to appliances and electronics. The successful removal of acids at the fire damaged building depends on the building's environmental conditions, temperature and humidity, materials affected, cleaning and deodorization supplies, training of technicians/conservators. https://chicora.org/fire.html and https://www.fpl.fs.fed.us/documnts/pdf2012/fpl_2012_kukay001.pdf and https://www.randrmagonline.com/articles/88781-following-fire-damage-restoration-fundamentals-to-save-an-elementary-school and https://www.propertycasualty360.com/2018/08/08/playing-with-fire-avoiding-toxic-exposures-in-structure-fires/?slreturn=20200807185701

Acid rain – The deposition of acid chemicals in the atmosphere that becomes a mixture of rain, snow, fog, or precipitation mist falling on land surfaces. The pH of rain is considered acid when it is below 5.6.

ACM – Asbestos containing material. (See: Asbestos containing material)

Acrid – Something that produces a strong unpleasant odor or taste. (1) A sense of taste where the substance is reported to be bitter, caustic, sharp or stinging. (2) A sense of smell where the substance is reported to be pungent. (3) An irritation to the eyes, nose, or throat where exposure is reported as stinging, unpleasant, caustic. (4) An impaired state of health where the acrimonious condition results in adverse health effects.

Acrid smoke smell – When breathing smoke an acrid smoke smell is a sharp, harsh, unpleasant smell similar to the smell of wet cigarette or cigar ashes. Acrid smoke smells consist of VOCs.

ACS – Air conveyance system; Abnormal chemical sensitivity.

Action level (Al) – A term used by OSHA and NIOSH to express the level of toxicant (toxic substance) that requires medical surveillance, which is usually one half of the PEL. https://www.osha.gov/SLTC/hazardoustoxicsubstances/ and https://www.osha.gov/sites/default/files/2019-03/health_hazards_workbook.pdf

Action level, concentration of – (1) The concentration of a substance in air, soil, water or other defined medium at which specified emergency counter-measures, such as the seizure and destruction of contaminated materials, evacuation of the local population or closing down the sources of pollution, are to be taken. (2) The concentration of a pollutant in air, soil, water, or other defined medium at which a preventive action (not necessarily of an emergency nature) is to be taken. As an example, is the action level for exposure to lead in lead-based paint, where the action level means employee exposure, without regard to the use of respirators, to an airborne concentration of lead is 30 micrograms per cubic meter of air (30 ug/m^3) averaged over an 8-hour period. https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1025AppB

Activated carbon – (1) A highly adsorbent form of carbon used to remove odors and toxic substances from liquid or gaseous emissions. (2) A carbonaceous material capable of capturing airborne odor molecules. Activated carbon is found in special HVAC filters that trap fire and nuisance odors from entering the building or air scrubbers that trap malodors from entraining into indoor air. (2) Carbon-based charcoal that has an increased adsorptive capacity of retaining chemical fumes, vapors, hydrocarbons, and some toxins from a contaminated environment. (3) A highly adsorbent form of carbon, which is used to remove odors and toxic substances from liquid gaseous emissions. Education Note #1: In water and fire damage restoration involving odor control, activated carbon filters are highly absorbent form of carbon used to capture volatile organic compounds (VOCs). In mold remediation activated carbon filters capture microbial-VOCs (MVOCs) commonly found in some moldy building environments. Education Note #2: In smoke odor contaminated structures, granular carbon that was first treated with high temperatures is used to remove odors and toxic substances from gases and aerosolized liquids, through adsorption and filtration. (See: Potassium permanganate.) For more information go to: https://generalcarbon.com/facts-about-activated-carbon/activated-carbon-faq/

ACV – Actual cash value. Based on computation, the method of knowing what an insurer will pay an insured, after a loss, for a specific insured item. ACV is calculated by subtracting depreciation from replacement cost and is part of the claim's recovery process.

Activated carbon filters – Specially sized and compacted filters used in ventilation systems, air scrubbers and negative air machines to capture gaseous particles from the air.

Activated carbon filter with chemical activation – A carbon filter having an odor control substance impregnated into it. As gaseous odors from the air is captured, the filter releases a more pleasant odor in air. The pleasant odor is a masking agent since it does not have paring capabilities. The more pleasant smell is usually for occupied spaces than ensures there is an air exchange occurring to remove noxious odors, such as sewer gas, fire, and mold odors.

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Activated carbon for IAQ – A processed carbon which makes it extremely porous and has a large surface area available for adsorption. Activated https://nexgenairandheat.com/guide-to-indoor-air-quality-air-filtration carbon is commonly used in air filters to clean the air of odors, such as smoke odors and VOCs. https://nexgenairandheat.com/guide-to-indoor-air-quality-air-filtration

Activated charcoal – Carbon, which is steam heated to increase its surface area. It is used as an absorbent for purifying gases. Education Note: Solvent vapors cling to its surface. It is used as a collection material in some respirator cartridges and sampling tubes.

Active sampling (environmental testing) – The collection of airborne contaminates through the assistance of forced air movement. Passive or quiescence sampling is the opposite of active sampling.

Actual cash value (ACV) – (1) An object's current market value (current replacement value minus depreciation). (2) The replacement cost of property minus depreciation. (HUD) (3) In property and auto physical damage insurance, one of several possible methods of establishing the value of insured property to determine the amount the insurer will pay in the event of loss. ACV is typically calculated one of three ways: a) the cost to repair or replace the damaged property, minus depreciation; b) the damaged property's "fair market value"; or c) using the "broad evidence rule," which calls for considering all relevant evidence of the value of the damaged property. (IRMI)

Actual cooling capacity – The amount of energy absorbed by water applied for fire control.

Acute effect - An adverse effect on a human or animal body, which has severe symptoms developing rapidly and coming quickly to a crisis. Education Note: Examples include dizziness, nausea, skin rashes, inflammation, tearing of eyes, unconsciousness, and even death.

Acute exposure - A single exposure to a toxic substance which results in biological harm or death. Acute exposures are usually characterized as lasting no longer than a day.

Acute health concerns - (1) In terms of completing remediation work at a jobsite, a worker experiencing a sudden exposure to a significant high dose of a dangerous substance. (2) A worker having exposure to high concentrations of a substance or contaminate for a short duration.

Acute health effects – A circumstance in which a chemical or substance results in the rapid development of severe symptoms in people.

Acute toxicity (AT) – (1) Toxicity resulting from an acute exposure. The adverse effects closely spaced in time between the absorbed dose and the toxic material. (2) A substance so poisonous as to cause severe biological harm to target organisms, cells, or organ, which may result in death soon after a single exposure or dose. (3) The ability of a substance to cause severe biological harm or death soon after a single exposure or dose. (4) Any poisonous effect resulting from a single short-term exposure to a toxic substance. (5) Any poisonous effect produced within a short period of time following an exposure, usually 24 to 96 hours. (6) Adverse effects that result from a single dose or

single exposure of a chemical; any poisonous effect produced within a short period of time, usually less than 96 hours. This term normally is used to describe effects in experimental animals. https://www.ilo.org/legacy/english/protection/safework/ghs/ghsfinal/ghsc05.pdf

ACV (insurance) **–** Actual cash value.

Adaptation – (1) The ability of a substance or environment to change or modify, based on temporary or a permanent change. (2) Changes in an organism's physiological structure or function or habits that allow it to survive in new surroundings.

Adaptive sampling strategy – A sampling strategy that allows modification of sampling design and analysis to adapt to changing objectives or to changing circumstances. https://archive.epa.gov/emap/archive-emap/web/html/mglossary.html

Additional living expense (ALE) – (1) In residential insurance policies, that portion of the insurance contract which allows for the insured to temporarily relocate, because of damage, disaster, or health consequence, caused by the dwelling from its damage. (2) A form of extra expense paid to a policyholder by their insurance policy for temporary shelter due to damage by a covered peril that makes the home temporarily uninhabitable (Insurance Institute). Education Note: When a covered property loss makes the residential premises unfit to live in, the insurance policy typically covers the necessary increase in living expense incurred by the insured so that the insured can maintain their normal standard of living.

Adequate ventilation – (1) The appropriate amount of ventilation in a room or building based on building size, occupancy, and use. (2) The appropriate amount of supply and exhaust ventilated air during water damage and microbial remediation activities.

Adequately wet (water damage) – Building materials and contents that are wet, requiring them to be professionally dried.

Adhered particulate (HVAC cleaning) – Any material not intended or designed to be present in an HVAC system, and which must be dislodged to be removed.

Adhered substance (ducting; HVAC) – A material, such as mastic, that is not removable by direct contact vacuuming. https://www.ductandvent.com/about/faq/commonairductclean/ and https://quizlet.com/77350690/nadca-flash-cards/

Adhesion – The tendency of dissimilar particles or surfaces to cling to one another. https://www.biolinscientific.com/blog/what-is-adhesion (See: Cohesion)

Adiabatic – (1) A thermodynamic process during which energy (heat) is neither added to nor removed from the system. The process is plotted on a psychometric chart showing constant enthalpy between state points. The energy content of the mass of the air and humidity mixture remains constant: Btu/Lb (Cal/KG). A change in humidity results in a change in temperature such that the

total energy is constant. Static dehumidification by use of a desiccant (such as may be used in (packaging) is an adiabatic process in which moisture is removed from air while the temperature is proportionately increased (Concepts and Designs, Inc.). (2) A thermodynamic process with no gain or loss of heat. Education Note: A condition in which there is no change in the measurement of temperature, but there can be a change involving the expansion or contraction of a material without the loss or gain of heat, the change of entropy. https://byjus.com/physics/adiabatic-process/

Adjusted dry-bulb temperature – The average of the air temperature (Ta) and the mean radiant temperature (Tr) at a given location. Education Note: The adjusted dry bulb (db) temperature (Tadb) is approximately equivalent to operative temperature (to) at air motions less than 80 fpm (0.4 m/s) when Tr is less than 120°F (50°C). https://www.engineeringtoolbox.com/dry-wet-bulb-dew-point-air-d_682.html

Adjuster (insurance) – (1) A professional knowledgeable person who has been trained in the art of "estimating" losses. In property damages, a property adjuster is not a contractor. (2) A representative of an insurance company who has specific training and knowledge about claims and who negotiates with the insured to settle the claim equitably. (3) An individual who valuates insurance losses for one of the parties to the claim. (4) An insurance person that understands policy interpretations and coverage and serves as a coordinating link between the insured and insurance company, and often contractors involved in cleanup, deodorizing, and restoration services. (5) A person or organization licensed to evaluate the amount of damage to property and negotiates insurance losses. Education Note: Besides the insured (policyholder), the adjuster deals with emergency repair and restoration contractors, and acts as a middleman between all parties and the insurer (insurance company).

Adjuster, CAT (insurance) – A catastrophe (CAT) adjuster is an investigator, who is hired by an insurance company to assess property damage resulting from a disaster. The CAT adjuster can work directly for an insurance company or is hired independently as a private consultant.

Adjuster, company – An employee of an insurance company who negotiates and settles claims against the insured.

Adjuster, contents (insurance) **–** A specialist adjuster whose job it is involves the assessment of contents impacted by a loss or contents that are in the way of mitigating building property damage. The contents adjuster may assign or work with existing content cleaning companies, packout companies and storage moving companies to remove contents to a safe place, have them cleaned and restored, or assess contents that are considered total loss.

Adjuster, company – An employee of an insurance company who negotiates and settles claims against the insured.

Adjuster, general (insurance) – A skilled individual having years of experience in most all aspects of claims investigation, assessment, processing, and settlement. Most general adjusters are also known as "large loss" adjusters, where their communication skills, working with various materially

interested parties (MIPs), providing problem analysis and negotiation, which leads to the settlement of a claim.

Adjuster, independent (insurance) – (1) An independent state licensed adjuster who is an individual that does not work for a particular insurance company, but rather, they are hired to work for several insurance companies on an as-need basis to investigate and document claims. (2) A licensed independent adjuster that works on a contract basis and charges a fee to adjust the insurance company's claim.

Adjuster, public (insurance) – (1) An individual who is licensed by their state to represent the interests of the insurer at the time of an insurance claim. (2) A person licensed by the state who, for compensation, is contracted and then acts on behalf the insured, negotiating for or effecting the settlement of a claim involving loss or damage.

Adjuster, role of – The objectives of any claim settlement expert (adjuster) is to verify the loss occurred, and there is coverage within the policy. Based on investigation of damage, the adjuster, acting on behalf of the insurer, is to pay the claim promptly and fairly. In some cases, based on coverage, the adjuster is to provide personal assistance to the insured, including when additional living expense is required. Investigation by the adjuster is necessary to prevent fraud and to reduce exaggerated claims.

Adjuster scope – An estimate prepared by an insurance adjuster (estimator) addressing specific damages covered by an insurance policy.

Adjuster, staff (insurance) – (1) A field adjuster who is hired by one insurance company to investigate claims and represent the interests of the insurer and insured based on policy coverage and property damage. (2) A desk adjuster who is assigned claims, where they gather pertinent information about the claim by the insured or contractors assigned to investigate property damage.

Adjusting (insurance) – The process of investigating and settling losses with or by an insurance carrier. This service is usually conducted by a claim's adjustor. Sometimes adjustors are employees of the insurance company and sometimes they are independent. https://www.nolo.com/legal-encyclopedia/insurance-adjusters-who-they-are-how-they-handle-injury-claim.html

Adjustment (insurance) – The means necessary to attain settlement in claims paid by an insurance company or other party.

Administrative controls – Measures aimed at reducing risks, such as the setting time tables and scheduling of workers to minimize exposures. (IICRC S520, 2015)

Adsorbed smoke – Fine and coarse particles, vapors and gases that are influenced by vapor pressure that become forced into the pores and cracks of a material such as plaster and drywall.

Adsorbed smoke from a protein fire – Smoke in a building from a cooking process or from burnt

food. Education Note: While smoke and soot cleaning will help remove surface contamination, surface cleaning will not remove smoke and odor molecules adsorbed into a material. The heat transference process that caused adsorbed smoke to bond with a material in the first place should be reversed-engineered by thermally desorbing compounds out of a material with a dry fog or thermal fog. In completing this process successfully for a kitchen and pantry, turn-off all gas supplies that can back flash from gas appliances; all contents and appliances must be removed; old vinyl wall paper should be removed; ceiling fixtures and wall outlet plates removed; ventilation registers cleaned and then sealed; cabinets may need to be detached; ceiling walls and flooring cleaned (degreased) and deodorized; dry fogging or thermal fogging the room is next; keep the room closed (sealed) with the fog encased; then, a reevaluation of any remaining lingering odor is completed later in the day or next morning to identify its source.

Adsorbed water – (1) Water held on surfaces of a material by electrochemical forces and having physical properties substantially different from those of absorbed water or chemically combined water at the same temperature and pressure. (2) Water which is held in place by surface tension or electrochemical forces. Education Note: At low relative humidity, moisture consists mainly of adsorbed water. At higher relative humidity, liquid water becomes more and more important to adsorbed water depending on the pore size of absorbent materials. In wood-based materials such as wood framing, almost all water is: Adsorbed at humidity's below 98% RH; released when ambient relative temperature is higher and/or humidity is lower than surface temperature and surface moisture content level.

Adsorption – (1) The assimilation of gas, vapor, or dissolved materials by the surface of a solid or liquid. (2) The condensation of thin layers of molecules of gases, liquids, or dissolved substances on the surfaces of solids. Usually, there is no chemical or physical change in the material used as the adsorbent. (3) Process in which fluid molecules are concentrated on a surface by chemical or physical forces or both. (4) Surface adherence of a material in extracting one or more substances present in an atmosphere or mixture of gases and liquids, unaccompanied by physical or chemical change. Education Note: For example, silica gel is an adsorbent. The binding to the surface is usually weak and reversible. Just about anything including the fluid that dissolves or suspends the material of interest is bound, but compounds with color and those that have taste or odor tend to bind more strongly.

Adverse health effect – Changes in body function or cell structure that might lead to disease or health problems.

Aerodynamic diameter – The behavior of airborne particles based on their spherical or irregular shape. Aerodynamic diameter is also known as particle size.

Aerodynamic(s) – The study of how air and other gases flow, including the thermal dynamic forces created by heat and pressure that act on an object as it moves in air.

Aeolian contamination – Matter in the form of a contaminate which is transported and broadcast

through dynamic air movement. Education Note: In water damage restoration, mold, and fire remediation, aeolian contamination is aerosols (particles, vapors, mists, and gases) that become airborne. When possible, non-hazardous airborne contamination is to be vented outdoors or captured through filtering.

Aerate – To expose to air and to flush out. Education Note: In water damage restoration and smoke odor removal, an example would be a wet building that needs aeration of humidified air through air movement and ventilation; smoke odor removed by air movement and ventilation.

Aeration (restorative building drying) – Dryer air that is introduced into surface moisture to help evaporation to occur more rapidly.

Aeration (water damage restoration) – The process by which dryer air is artificially introduced into wet building materials and contents, allowing some building materials and contents to dry faster.

Aerial fuels (wildfire) – All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.

Aerial ignition (wildfire) – The ignition of fuels by dropping incendiary devices or materials from aircraft.

Aerodynamic diameter (AD) – (1) The behavior of airborne particles based on their spherical or irregular shape. Aerodynamic diameter is also known as particle size. (2) The cross-sectional width of a pollutant, which is suspended in air, based on the unit density of perfect sphere of that particle with the same settling velocity. The diameter of a unit density sphere having the same terminal settling velocity as the particle in question. Operationally, the size of a particle as measured by an inertial device. Education Note: The diameter of a unit-density sphere having the same terminal settling velocity is used to predict where in the respiratory tract such particles will deposit.

Aerodynamic (equivalent) diameter – The diameter of a pollutant suspended in air considering its shape, roughness, and aerodynamic drag.

Aerodynamic forces – The forces exerted on particles to remain suspended in air, either by the movement of air or gases, and/or the change in temperature and pressure.

Aerodynamic particle sizer – A spectrometer that measures differentiating particles by aerodynamic diameter and a laser velocimeter in detecting particle size.

Aerodynamic particles – (1) The diameter of a spherical particle having a relative density equal to unity which has the same settling velocity in air as the particle in question. (2) The particles in air that stay suspended based on their diameter and dimension or their shape, size, and weight.

Aerodynamic(s) – The study of how air and other gases flow, including the thermal dynamic forces created by heat and pressure that act on an object as it moves in air.

Aerosol – (1) A suspended liquid or solid particle in a gas (e.g., air). Education Note: An aerosol is a fine aerial suspension of particles sufficiently small in size to confer some degree of stability from sedimentation, such as fog or smoke. (2) Suspended fine solid particles and/or liquid droplets that can be found in smoke, air pollution, and smog. Aerosols are defined as a suspension of particles and droplets having a size range between 0.001 to 100 microns in a surrounding gas phase.

Aerosol classes and subgroups – The type and group aerosols are classified. Fumes – consist of solid particles ranging in size from 0.001 to 1.0 micron in size. Some typical fumes are those produced by the dispersion of carbon black, rosin, petroleum solids and tobacco smoke solids in air. In wildfires the most familiar form of fume is smoke. Smoke is formed from the incomplete combustion of fuels. Its particles are generally smaller than 10 microns in size: 1) Dusts – Airborne solid particles that are larger than those in a fume. They range between 1 to 100 microns (and even larger) in size. Dust is formed by the release of a material such as soil and sand, fertilizers, coal and cement, pollen and fly ash. Because of their large particle size, dust tends to be unstable in air and they tend to settle out of air more rapidly than fumes, which do not settle out at all but cling with solid particles that fall out of air. 2) Mists – Dispersions in a gas of liquid particles that are generally less than 10 microns in size. The most common type of mist is formed by water droplets suspended in air. 3) Combusted materials – Fossil fuels such as vegetative growth and its byproducts including but not limited to PAHs, CFCs, and VOCs.

Aerosol photometer – A real-time direct-reading particulate monitor capable of measuring aerosols in air (e.g., PM_{10}, $PM_{2.5}$, $PM_{1.0}$, and respirable size fractions), including liquid particles (mist, fog, fume) that are sufficiently small in size to remain suspended in air for a significant period of time.

Aerosolized – A liquid or solid particle that because of an external force, has been caused to become suspended in a gas (e.g., air). (IICRC S540, 2017)

Aerosols – (1) Solid or liquid airborne particles. 2) Any non-refillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state. Aerosol includes aerosol dispensers.

Aerosols from complete combustion – Airborne aerosols that are formed in a complete combustion environment: 1) From mineral matter (ash components) which lead to components such as KCl, K_2SO_4, CaO, Al_2O_3, SiO_2; 2) A result of contaminants (e.g. Cl and heavy metals present in urban waste wood) which can lead to additional emissions of heavy metals including hydrogen chloride (HC1) and polychlorinated dibenzodioxin and dibenzofuran (PCDD/F).

Aerosols from incomplete combustion – (1) A wide-variety of chemicals, vapors and particles from halogenated aromatic hydrocarbons, dioxins, water vapor, CO_2, CH_4, N_2O, and CFCs. Education Note: Particles from incomplete combustion such as soot and organic particles are present in wildfire smoke and soot. Inorganic particles resulting from ash constituents from native

vegetation mainly found as salts like KC_l, K_2SO_4, $CaCO_3$ and CaO. In addition, volatile organic compounds such as polycyclic aromatic hydrocarbons (PAH) can be adsorbed on the surface of soot particle. (2) Airborne biomass that results from incomplete combustion such as soot, polycyclic aromatic hydrocarbons (PAH), unburnt carbon, and of unburnt biomass fragments. In simple combustion systems and/or under unfavorable combustion conditions, the mass fraction of unburnt particles can reach more than 90% of the total particle mass.
https://www.osti.gov/etdeweb/servlets/purl/20371223

Aerosols, secondary – Aerosol formed by the interaction of two or more gas molecules and/or primary aerosols.

AFD – Air filtration device. (1) AFDs are air-moving machines that filter particulates and/or gasses from indoor air. (2) Depending on the mode of use, an AFD that filters (usually HEPA) and recirculates air is referred to as an air scrubber. One that filters air and creates a pressure differential is referred to as a negative air machine. (IICRC S540, 2017) Education Note: AFDs are rated at processing rate (per cubic feet of air per minute (cfm). AFDs can create negative, neutral, or positive air pressure. When they do not create negative or positive air pressure, AFDs are also known as air scrubbers. https://spinoff.nasa.gov/Spinoff2009/ch_2.html

Affected area – An area of a structure that has been impacted by primary or secondary damage. IICRC S500, 2015)

Affected public – The people who are not employed at a building but through visiting, they are affected by conditions and pollutants in the building.

Affected worker – Building employees to remediation workers that are affected because of an event or condition involving a contamination or fire smoke impaction.

Agency – Any federal, state, or county government organization participating with jurisdictional responsibilities.

Agent (chemistry) **–** An ingredient that causes activity or reactions to take place (e.g., a cleaning agent causes cleaning to occur). (See: Chemical agent)

Agent (insurance) **–** (1) The person insurers use to represent and sell an insurance policy. (2) The sworn or licensed person assigned by a government agency to act on the agency's behalf. (3) An insurance company representative licensed by the state who solicits negotiates or effects contracts of insurance and provides service to the policyholder on behalf of the insurer. (4) One who acts for or represents another person (e.g., an insurance agent acts on behalf of insured's and insurance companies in initiating and carrying out contractual obligations between the two parties).

Agent (oxidizing) – (1) An agent that removes color by adding oxygen to a dye structure rendering it colorless (e.g., benzyl peroxide, sodium perborate, hydrogen peroxide, sodium hypochlorite). (2) An oxidation agent, also called an oxidant, oxidizer, is a chemical compound that readily transfers

oxygen atoms that results to the conversion of metals, nonmetals, and organic matter to oxides.

Agent, captive (insurance) – An insurance agent who represents a single insurance carrier exclusively.

Agent, independent (insurance) – An individual, company or agency that often represents several insurers.

Agglomerate (soot) – (1) A group of individual, sub-micron-sized soot particles (which individually cannot be resolved using light microscopy techniques) that have clustered together to form a larger soot particle (subsequently greater than one micron in size and visible during an optical microscope examination). (2) Particles of carbon that is impregnated with tar forming the incomplete combustion of carbonaceous material.

Agglomeration – (1) A gathering into a ball or mass. (2) The gathering and collection of a material or particles into a group, cluster, pile, or mass.

Agglomeration (fire particulate) – (1) The process by which collisions from wind turbulence cause moist sticky smoke and soot particles to stick together to form larger particles. (2) Micro-fine (sub-micron) size soot particles that have clustered together to form particles larger than one micron in size. http://www.microlabgallery.com/FireParticlesFile.aspx and https://www.fs.fed.us/rm/pubs_other/rmrs_2012_samsonov_y001.pdf and http://patarnott.com/pdf/2006LabWoodSmokeChakrabarty.pdf and https://onlinelibrary.wiley.com/doi/10.1002/fam.2881

AHERA – The US Asbestos Hazard Emergency Response Act of 1986. Education Note: In 1986, the Asbestos Hazard Emergency Response Act (AHERA) was signed into law as Title II of the Toxic Substance Control Act. Additionally, the Asbestos School Hazard Abatement Reauthorization Act (ASHARA), passed in 1990, requires accreditation of personnel working on asbestos activities in schools, and public and commercial buildings. https://www.epa.gov/asbestos/asbestos-and-school-buildings

AHU – Air handling unit. (1) In building ventilation systems, the AHU is the mechanical space conditioning device comprising an enclosure, and a fan to move air throughout the building. (2) In restoration, the AHU processes air that is supplied to a work area or removes contaminated air. Education Note: An AHU might contain several types of filters, duct connection flanges, and/or heating, or cooling coils.

AIHA – The American Industrial Hygiene Association. AIHA organization and membership are dedicated to the anticipation, recognition, evaluation, and control of environmental factors arising in or from the workplace that may result in work-related injury or illness. For more information about AIHA go to: http://www.aiha.org

Air – (1) The volume of all clean-breathable air having an average of 20.95% (21%) oxygen and minimum of 19.5% oxygen to be safe for human health. Air is the blend of gasses that constitute the

atmosphere that we breathe. It is mainly composed of oxygen, nitrogen, and argon, which together contain the major gasses in a breathable atmosphere. (2) A simple mixture of gases (e.g., nitrogen, oxygen, water vapor, carbon dioxide) that surrounds the Earth; a space that is filled with air. (IICRC S500, 2015) Education Note: 1) Air is a mixture of gases constituting a compressed fluid tied to the planet by gravitational attraction. Air is 78% nitrogen, 20.95% oxygen, 1% argon and 0.1% a mixture of carbon dioxide, helium and hundreds of other gases originating from natural and manmade processes. 2) Air at normal sea-level pressure, dry air that consists of (percentage by volume)nitrogen 78%, oxygen 20.95%, argon 0.93%, carbon dioxide 0.033% (currently; thought to be increasing), neon 0.0018%, helium 0.0005%, methane 0.0002%, krypton 0.0001%, and smaller amounts of nitrous oxide, hydrogen, xenon, and ozone.

Air-barrier (building construction of outside walls) **–** (1) A solid material that blocks air flow, used to enclose structures to prevent the passage of moisture laden air into the interior of the wall where it could condense on cold surfaces. (2) Any solid material installed to control air leakage either into or out of the building envelope. Education Note #1: Air barrier is an element in an assembly designed and constructed to control air leakage between a conditioned space and an unconditioned space. An air barrier may be a single material or a combination of materials. An air-barrier may be placed on inside or outside wall surfaces of structure. Most often they are placed on outside surface where it also fulfills the code requirement for a weather barrier. Education Note #2: Depending on building construction, air barriers are beneath siding, facing the outside of the structure, where there have been instances where they trapped smoke odor. In another instance, scorching to the exterior siding found air-barrier sheeting melted. For more information about air barriers for moisture control go to: https://www.epa.gov/sites/production/files/2014-08/documents/moisture-control.pdf

Air barrier (containment) – (1) Mechanical and engineering controls that provides containment of airborne contaminates and pollutants. (2) A system of materials (e.g., 6-mil plastic or semi-porous drywall to plywood sheeting) that encloses a volume of air. (3) Any solid material installed to control air leakage either into or out of the building envelope. Education Note: Air barrier is an element in an assembly designed and constructed to control air leakage between a conditioned space and an unconditioned space. Air barriers are usually a temporary barrier for the control of particles, gases, moisture, bacteria, mold, and viruses. https://web.ornl.gov/sci/buildings/conf-archive/2007%20B10%20papers/014_Totten.pdf and https://www.phe.gov/s3/BioriskManagement/biocontainment/Pages/default.aspx

Air bladder (HVAC system duct cleaning) – A type of bladder which is a balloon-type of device designed to stop incoming or outgoing air from passing through.

Air blast – A blast of air. Air blasts (controlled blasts of air) can remove particles in air and from surfaces.

Air blast, continuous – A constant force of air that removes air and surface particulates.

Air blasting – (1) The process of using pressurized air and different size tips and nozzles, to force

and dislodge surface materials and contaminates. (2) The use of high-pressure air, often combined with an abrasive, to remove odor or adhered material from a surface. (3) High forced compressed air that distributes a blasting media such as dry ice, soda, water, pumice, shot, fibers, foam, and sand.

Air blasting CFM – The volume of air consumed when blasting based on CFM. Education Note: There are several variables that determine the CFM of compressed air for an air blasting process: nozzle orifice size for pressure systems, air jet orifice size for suction blast systems, air pressure from the compressor, interior diameter of the hose, and the media being blasted. When there are more than one hoses and blast nozzles, the CFM of air required for each nozzle will be multiplied by the total number of nozzles.

Air blasting, compressed air – The use of compressed air to create an air blast through a nozzle. Compressed air is measured in PSI. A 25 PSI machine with media is considered low pressure while a high-pressure machine with media is 180 PSI. Extra high-volume machines or blasting cabinets with media can produce 400 PSI.

Airborne coarse particles – The relatively large particles suspended in air produced by the mechanical breakup of even larger solid particles.

Airborne particulate matter (PM) – In wildfire contaminated air, the sum of solids and liquid particles being coarse, fine, and ultra-fine that are suspended in air which some may be hazardous. This complex mixture contains for instance smoke, soot, ash, and char, dust and pollen, other vegetative organic matter, and chemical agents that are part of incomplete combustion. Airborne particulate matter is emitted into air from combustion or because of wildfire storm turbulence.

Airborne particles – Any group of particles of one or multiple substances that are suspended in air.

Air change – (1) Unlike re-circulated air, this is the total air required to completely replace the air in a room or building. (2) The amount of air required to completely replace the air in a room or building; not to be confused with re-circulated air. (3) A measurement or method expressing the amount of air movement into or out of a room or building, by the volume of air and the exchange-rate per hour. Air changes are described as (AC/h or ACH).

Air change efficiency – A measure of how quickly the air in a given space (a room or building) is completely replaced.

Air changes per hour (ACH) – (1) The transfer of a given volume of air over one hour. (2) The movement of a given amount of air volume in a room or area over one hour. (3) The volume of air moved across a surface or in a room or building in one hour. Education Note: One air change per hour in a room, home or building means that all the air in each of those environments will be replaced in one hour.

Air change rate – The number of times the total air volume of a defined space is replaced per unit of time. Education Note: An air change rate is calculated by dividing the amount of air delivered per

hour by the total volume in cubic feet to give air changes per hour.

Air changes, leakage – The amount of air that is leaked into and out of a building or room in terms of the number of building cubic foot volume of air or room volume of air over a given time.

Air cleaning – (1) An IAQ control strategy designed to remove various airborne pollutants and/or gases from the air. (2) An indoor air quality control strategy to remove various airborne particulates and/or gases from the air. Education Note: The three types of air cleaning most commonly used includes: particulate filtration, electrostatic precipitation, and gas sorption.

Air cleaning device (ACD) – Mechanical and electronic air cleaning devises that capture and lower airborne allergens in the home.

Air cleaning equipment – A device within the air handling system or air stream designed to purify (filter) air before it is allowed to enter the building's air stream.

Air cleaning system – A single device or a combination of devices engineered as a "system" to reduce the concentration of airborne contamination in a building.

Air collector – A medium-temperature collector used predominantly in space heating, utilizing pumped air as the heat-transfer medium.

Air conditioning – (1) A mechanical system that heats and/or cools indoor environments. (2) The building's mechanical system designed to filter and control temperature and humidity. (3) Cooling and dehumidifying the air in an enclosed space by use of a refrigeration unit powered by electricity or natural gas. Education Note: Fans, blowers, and evaporative cooling systems ("swamp coolers") that are not connected to a refrigeration unit are excluded.

Air conditioning unit inspection after a fire – The inspection process completed by building engineers, HVAC professionals and/or a qualified ventilation cleaning technician to document the presence of soot and smoke in ducting and the mechanical system. Education Note #1: When the system is found contaminated, a thorough cleaning and deodorization process must be completed. In some cases, the mechanical system assembly must be taken apart and cleaned. In a few cases, taking apart the mechanical system and restoring it may not be cost effective, resulting in the replacement of the mechanical system. Education Note #2: When plastic flex ducting is impacted by heat or oily soot residue, ducting is expected to be replaced and not sealed with a soot sealer.

Air contaminant – Smoke, soot, fly ash, dust, cinders, gases, vapors, odors, toxic or radioactive substance, waste, particulate, solid, liquid or gaseous matter, or any other material in the outdoor atmosphere, excluding uncombined water.

Air contamination – (1) Any airborne substance that can affect human health or the environment. (2) In fire damage restoration, smoke, soot, ash and char, and other gaseous or toxic materials that are in outdoor and indoor air. Air contamination can affect the health of workers and building occupants.

Air conveyance – The process by which the building's HVAC systems deliver fresh air to a space.

Air conveyance systems (ACS) – The mechanical air handling part of the building's ventilation system.

Air cooled – An HVAC system that uses a fan to discharge heat from the condenser coil to the outdoors.

Air-cooled system – A type of air conditioning system that uses Freon as a refrigerant and air as a condensing medium. Typically, the air-cooled condenser is located outside, and refrigerant lines are piped to it from the indoor unit.

Air curtain (waterways) – A method of containing oil spills. Air bubbling through a perforated pipe causes an upward water flow that slows the spread of oil. Education Note: An air curtain can also be used to stop fish from entering polluted water. In a wildland fire, air curtains can capture debris and fire retardants.

Air curtain (fire mitigation) – A curtain, usually consisting of 6-mil F/R polyethylene sheeting that is installed floor to ceiling, which separates a fire impacted area from non-impacted areas, rooms, apartments, offices, etc. In some instances, the air curtain is placed under positive or negative air pressure. In other situations, there is two sheets of air curtains, where the center portion is pressurized with clean fresh air having no odor.

Air diffuser – An air distribution outlet or grille that directs airflow into desired patterns.

Air diffusion – The movement of individual molecules through a material. Education Note: The movement occurs because of concentration gradients (and to a much lesser degree) thermal gradients, independent of airflow. A mode of water vapor transport in building enclosures that is much slower than airflow.

Air distribution – Air in a building that is mechanically created by a ventilation system.

Air distribution system – The mechanical means of moving and processing air throughout a building.

Air drying – (1) Using the building's ambient air to dry damp surfaces naturally (passive/static) or (active) with forced air movement. (2) Using specialized equipment to dry indoor air or air around a material or object. (3) Removal of moisture from materials (usually structural wood) using natural circulation rather than kiln drying. Education Note: Moving indoor wet air without dehumidification can cause secondary damage to building materials and contents. Thus, air drying is often a combination of equipment and processes necessary to dry wet building materials.

Air dried – (1) Lumber that is dried by exposure to air in a yard or shed without artificial heat. (USDA Forest Products Wood Handbook) (2) Wet materials in a building that are dried naturally or through

mechanical drying methods.

Air drying – (1) Using the building's ambient air to dry damp surfaces naturally (passive/static) or (active) with forced air movement. (2) Using specialized equipment to dry indoor air or air around a material or object. (3) Removal of moisture from materials (usually structural wood) using natural circulation rather than kiln drying. (IICRC S520 Standard, 2008) Education Note: Moving indoor wet air without dehumidification can cause secondary damage to building materials and contents. Thus, air drying is often a combination of equipment and processes necessary to dry wet building materials.

Air drying process – A mechanical process of removing elevated humidity from indoor air by using controlled air-drying processes. Education Note: In water damaged buildings, air drying is the process of removing wet (humidified) indoor air from a structure. The air-drying process may be completed using natural means or engineering controls (drying equipment), sufficient enough to dry the indoor air, wet and humidified wall cavities and other building materials, within a relatively short period of time before building damage occurs or mold growth occurs.

Air duct – A ventilation duct; a conduit for conveying air (1) - Ventilation portals (metal or flexible ducting) that direct managed air flow in a building. Air ducts include metal ducts and flex duct that transfers forced air from one room or zone to another. (2) A passageway for distribution and extraction of air, excluding plenums not installed in accordance with SMACNA Standards. (ASHRAE Terminology of Heating, Ventilation, Air Conditioning & Refrigeration, 1991)

Air duct, supply – A ventilation system duct that carries conditioned air from air supply units to room diffusers or grilles.

Air ducts and smoke odor – (1) Ventilation ducting that is impacted with smoke and soot from a building fire. Heat from the fire moves towards a cooler airmass such as in ventilation ducting and fills ducting and the mechanical system with smoke and soot. (2) Ventilation system ducting that becomes smoke odor, soot, char, and ash particulate from a wildfire. The pressure of heated winds envelope a building, where air returns, filters and mechanical systems bring wildfire gases, vapors, and particles into ducting.

Air erosion, resistance to – The property that indicates the ability of an insulation material to resist erosion by air currents over its surface.

Air exfiltration – Air from the conditioned space leaking outside of the thermal boundary of a structure.

Air exchange rate – (1) The speed measured in terms of time at which the indoor air volume is to be completely changed one time from a building or given air space. (2) The number of times that the outdoor air replaces the indoor air volume, per unit of time, typically expressed as air changes per hour. (3) The number of times that the ventilation system replaces the air within a given space, room, or area within a building. Education Note #1: Depending on the mode of use, an AFD that filters (usually HEPA) and re-circulates air is referred to as an air scrubber. An AFD that filters air and

creates negative pressure is referred to as a negative air machine (NAM). Education Note #2: EPA says: the air exchange rate is expressed in one of two ways: 1) the number of changes of outside air per unit of time air changes per hour (ACH); or 2) the rate at which a volume of outside air enters per unit of time - cubic feet per minute (cfm).

Air exhaust – The exhaust unit of an air conditioning system that extracts the contaminated indoor air from a room, zone, or building.

Air filter – (1) A filtering media designed to capture and remove contaminates from passing air streams. (2) A porous device used to capture dust, dirt, soot, char, and gaseous particles as air passes through the filter. Depending on filter efficiency, air filters reduce solid matter and particulates from entering the indoor air, thus, increasing the air quality of the interior space. (3) A device used to reduce or remove airborne solids from heating, ventilation, and air conditioning systems. Education Note: In cleanroom technology, cleanroom air filters are comprised of fibers that are designed to capture particulates like dust, bacteria, pollen, chemicals, and mold spores down to 0.3 microns through adsorption, straining, absorption, and static electric charge.

Air filters – Adhesive filters made of metal or various fibers that are coated with adhesive liquid to which the particles of lint and dust adhere. These filters will remove as much as 90% of the dirt if they do not become clogged. The more common filters are of the throwaway or disposable type.

Air filtration device (AFD) (cleaning; remediation) **–** (1) A machine and filtering system capable of removing particulate matter from air. The filtering device (HEPA filter) is 99.97% efficient down to particle size of 0.3 microns (micrometers) in diameter. (2) A portable or transportable, self-contained blower assembly designed to move a defined volume of air equipped with one or more stages of particulate filtration. Education Note: Depending on the model of use, an AFD that filters (usually HEPA) and re-circulates air is referred to as an "air scrubber." One that filters air and creates negative [air] pressure is referred to as a "negative air machine."

Air filtration device (AFD) (ventilation system cleaning) – A portable or transportable, self-contained blower assembly designed to move a defined volume of air equipped with one or more stages of particulate filtration.

Air filtration device (AFD), application of – The use of AFDs application for specific purposes. Depending on the AFD's application, they can be engineered to become: 1) An air scrubber that filters and recirculates indoor air. (When used as an AFD that filters (usually HEPA) and re-circulates air, it becomes an "air scrubber.") 2) A negative pressure machine that filters air to a control area or an outdoor source. When engineered to work in the negative air pressure mode the machine is called a negative air-pressure machine (NAM), becoming a "negative air machine."

Air filtration, PCO – Photocatalytic oxidation (PCO), which may be the next generation in filtering systems in buildings, for removing airborne pollutants. PCO technology was developed by NASA to purify the air and sanitize surfaces throughout the indoor environment. PCO air purifiers do not rely

on passing air through the unit, but actively dispersing clean molecules into the surrounding environment. The photocatalytic oxidation technology developed by NASA actively outputs a continuous stream of multi-clustered ions which can attack and destroy pollutants, pathogens, viruses, and bacteria both in the air and on surfaces by more than 99.6%. PCO systems substantially reduce odors, smoke, volatile organic compounds (VOCs), and mold spores throughout the entire indoor environment, which is something that passive air treatment devices, like HEPA filters and passive UV lamps, cannot do. The UV light within the PCO cell activates the photocatalytic coating to create cleansing molecules capable of destroying viruses and pathogens and decomposing common indoor contaminants including allergens, ozone, odors, nitrous oxides (NOx), carbon monoxide (CO), formaldehyde, and other volatile organic compounds (VOCs), where they are converted into carbon dioxide and water. https://www.usananocoat.com/product/air-purifiers-stand-alone-units-copy/

Air Filtration, PCO and Hydroxyl Deodorization Debate – An industry debate between manufacturers and technology involving photocatalytic oxidation (PCO). The author is providing sources for the reader to review, where after further research on the subject, they are to make up their own mind on the validity of PCO, and how it affects their company and customers. https://www.odoroxhg.com/odorox-hydroxyl-vs-titan-pco-more and https://pdfs.semanticscholar.org/71be/055f3652f2e1a404bf0d4486531b2fa3acf6.pdf and https://cdn2.hubspot.net/hubfs/434512/Documents/Contents_Industry_Review_Magazine_Article_Re_Hydroxyls_July_2013.pdf?t=1529593440910 and https://www.randrmagonline.com/articles/87407-hydroxyl-radicals-truths-vs-myths and https://www.randrmagonline.com/articles/88292-are-hydroxyl-generators-safe-for-odor-removal and http://www.hydroxylnews.com/hydroxyl-news/understanding-how-new-indoor-air-treatment-systems-optimize-indoor-environmental-quality-and-safety/ (See: PCO; PCO and NASA)

Air flow #1 – (1) The flow of air from one space to another. (2) The volume flow rate of an air stream. (3) Stream of air as it passes over the surface of a moving object or within a wind tunnel where air may move over the surface of a stationary object. Air flow occurs when a high pressure goes to a low pressure. The bigger the difference between high and low pressure the faster the air speed.

Airflow #2 – (1) The volume of air passing by an area or moving through a duct at a particular velocity. (2) The ability of air to move and flow in a pre-designed direction by positive pressure or negative air pressure. (3) Stream of air as it passes over the surface of a moving object or within a containment or wind tunnel where air may move over the surface of a stationary object. (4) One of several ways of evaluating vacuum efficiency.

Air flow, return – Air that has circulated through a building and is being returned to the air handling system for recirculation.

Airflow uniformity – The consistency of which a stream of air passes over the surface of an object. Airflow uniformity is measured in volume occupied relative to time elapsed. Common airflow

uniformity is measured in cubic meters per second (m^3/s), liters per second (L/s), or cubic feet per minute (ft^3/min).

Air handler / Air-handling unit – The interior of an air-conditioning system that contains the blower, cooling (evaporator) coil, and heater.

Air handling unit (AHU) – (1) Equipment that includes a fan or blower, heating and/or cooling coils, regulator controls, condensate drain pans, and air filters. AHU does not include ductwork, registers or grilles, or boilers and chillers. (EPA) (2) A packaged assembly, usually connected to ductwork, that moves air and may also clean and condition the air.

Air heater (water damage restoration) – A device such as a radiant heater that heats the air which is directly in contact with a wet surface.

Air infiltration – The unintentional leaking of air into a building: 1) The amount of air leaking in and out of a building through cracks in walls, windows, and doors. 2) Uncontrolled inward leakage of air (that may contain entrained water vapor) through cracks and interstices in any building element and around windows and doors of a building, caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density (Gatley, "*Understanding Psychrometrics*")

Air inlet – (1) Any building opening that allows air to enter the interior space. (2) Any opening through which air is removed from a space and returned to an air distribution system or exhausted from the space. (RIA) (3) An exhaust or return ducting system that removes air from a space.

Air leakage – (1) Uncontrolled and/or unintended airflow through a building enclosure or between units of occupancy. Leakage from indoors to outdoors is known as exfiltration and leakage from outdoors to indoors is known as infiltration. Air leakage can cause indoor air quality problems, condensation, excess energy use, comfort complaints, and smoke transport. (Building Science Corporation) (2) The flow of air that passes through fenestration products. (WDMA)

Air-line respirator – A respirator that is connected to a compressed breathing air source by a hose of small inside diameter. The air is delivered continuously or intermittently in sufficient volume to meet the wearer's breathing requirements and meet OSHA breathing air standards. (IICRC S520 Standard, 2008)

Air lock (mitigation; remediation) – A chamber that restricts air from leaving one environment and entering another.

Air lock (plumbing) – A restriction of a flow of a liquid caused by vapor that is trapped at a high point.

Air makeup – The outdoor air supplied indoors to makeup and replace exhaust air and exfiltration. Education Note: Air makeup is also known as makeup air.

Air management (remediation; restoration) – The ability to control supply and exhaust air at all times.

Air mass – (1) A large volume of air with certain meteorological or polluted characteristics. (2) A large volume of air (often covering thousands of square kilometers) with temperature and humidity characteristics that vary little horizontally. (3) Building air that is forced from one room to another or outdoors. The particulate, temperature, relative humidity, and vapor pressure characteristics can change as the air mass (mass of air) moves.

Air mixture – The mixing of air with temperature and humidity; combining of contaminated air with fresh air. Education Note: Mixing air may be an appropriate engineering control approach to lessen airborne particles, vapors, and gases; to keep breathable oxygen above 19.5%.

Air monitor, stationary – An air sample monitor that is placed in a single location and is not moved during one or more sampling events.

Air monitoring (outdoor air quality) – The measurement of pollutants and particulate matter in the air.

Air monitoring (wet; humidified buildings) – Testing and recording of indoor and outdoor air using scientific instruments (for the purpose of assessing the values of the air) including dry bulb temperature, humidity and dew point, grains of moisture per pound, enthalpy and vapor pressure.

Air mover (more commonly written in the industry as "airmover") – (1) Specialized fans that move air and promotes drying. (2) A mechanically operated drying machine that promotes evaporation. Education Note: Air movers are used to assist with drying wet building materials, finishes and contents. Airmovers in the water damage restoration industry are specialized mechanically operated drying unit that promotes evaporation. (IICRC S500 Standard, 2006) Education Note: Airmovers incorporate an electric motor, fan and specially designed housing for use in drying carpet, cushion, and sub-floors or structural components (wood floors, walls, crawl spaces, etc.), often by injecting air movement over or under the flooring or inside structural cavities or air spaces.

Air openings – Holes and voids in floors, walls, ceilings, and interstitial spaces that provide an access for air to freely pass through.

Air, outdoor – Air outside a building. Outdoor air can enter the conditioned space via the ventilation system, or by infiltration through holes in the pressure boundary or designed ventilation openings. (ANSI/IICRC S500 Standard)

Air outlet – (1) Any opening that allows air to escape from the building. (2) Supplied air ducting such as a ventilation register through which fresh air is delivered to a space. (3) Any opening through which air is delivered to a space from an air distribution system. (RIA)

Air parcel – A volume of air that is present or transported as a single entity. Education Note: A

parcel of air can be the air in a smoke-filled wall cavity which is different from the room's air.

Air passages – Openings through or within walls, through floors and ceilings, and around chimney flues and plumbing chases, that permit air to move out of the conditioned spaces of the building. (EPA)

Air pathway – The direction in which building air is forced through pressure.

Air-permeable material – A material having an air permeance greater than 0.02 l/s-m2 at 75 Pa pressure differentials when tested according to ASTM E 2178 or E 283.

Air plenum – (1) A designated air space within a building's void acting as an exhaust point that is often found in a ceiling, flue, or furnace. Education Note: Some air plenums are return boxes and chases that mix a portion of the return air with fresh makeup air that is sent back through the building. (2) In Cleanroom technology, the space between an inner and outer wall or the ceiling of a cleanroom. "Dirty" air is forced into the plenum and then flows through a HEPA or ULPA filter and is returned as "clean air" to the inside working area.

Air pollutant – (1) Any unwanted substance in air. (2) The presence of contaminants or pollutant substances in air that interfere with human health or welfare or produce other harmful environmental effects. (3) The presence of unwanted contamination or pollutants indoors, where they have not dispersed naturally, resulting in a potential occupant, and building exposures. Education Note: An air pollutant can be considered as a substance in the air that, in high enough concentrations, produces a detrimental environmental effect. These effects can be either health effects or welfare effects. A pollutant can affect the health of humans, as well as the health of plants and animals. Pollutants can also affect non-living materials such as paints, metals, and fabrics. (EPA)
https://www.law.cornell.edu/uscode/text/42/7602

Air pollution – (1) Any irritant or unwanted substances in air that could, in high enough concentration, harm man, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of airborne matter capable of being airborne. They may be in the form of solid particles, liquid droplets, gases, or in combination thereof. Education Note: Generally, they fall into two main groups: a) those emitted directly from identifiable sources, and b) those produced in the air by interaction between two or more primary pollutants, or by reaction with normal atmospheric constituents, with or without photoactivation. Exclusive of pollen, fog, and dust, which are of natural origin, about 100 contaminants have been identified. Air pollutants are often grouped in categories for ease in classification; some of the categories are solids, sulfur compounds, volatile organic chemicals, particulate matter, nitrogen compounds, oxygen compounds, halogen compounds, radioactive compounds, and odors. (2) Degradation of air quality resulting from unwanted chemicals or other materials occurring in the air that interfere with human health or welfare or produce other harmful environmental effects. (3) The presence of substances in the atmosphere resulting either from human activity or natural processes, in sufficient concentration, for a sufficient time and under circumstances such as to interfere with comfort, health or welfare of

persons or to harm the environment.

Air pressure – (1) The force exerted by air that can be expressed and measured either positively or negatively. (2) The cumulative force exerted on any surface by the molecules composing air. (Desert Research Bureau/Western Regional Climate Center)

Air pressure boundary – The air pressure boundary is the boundary (comprised of a series of planes to form a three-dimensional boundary) that generates the largest pressure drop (usually much more than half the total) when the enclosure is subjected to a pressure difference.

Air purifying respirator (APR) – (1) A filter cartridge half-face or full-face respirator having the proper filters to remove known or suspected airborne contaminates so they will not be allowed to enter the wearer's nose or lungs. (2) A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air- purifying element. (OSHA) Education Note: An air-purifying respirator cleans contaminants from the air via cartridges and/or filters before the air is inspired by the wearer. APRs are the most commonly used respirators and are available in half-mask, full-face or powered units. Properly worn, the air purifying respirator provides the remediation technician with safe, clean, uncontaminated air to breathe. For more information go to: https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134 and https://www.osha.gov/SLTC/etools/respiratory/respirator_selection_airvsatmos_resp.html (See: Self-containing breathing apparatus)

Air pollution control system, indoor (industrial hygiene) – A group of measures or processes used to minimize or prevent air pollution from the workplace including but not limited to an office or a group of offices, warehouse, factory, etc.

Air pollution hot spot – A location where the emissions expose individuals or populations to elevated risks of adverse health effects.

Air-purifying respirators, powered (PAPR) – An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

Air quality – (1) The condition or attributes of air that are acceptable to the majority of a population or occupants. (2) A measure of the condition of air in an environment that meets the requirements of human needs and the materials and space it contains. (3) The absence of allergenic, toxic, and harmful pollutants. Good air quality allows people to breathe and function normally without experiencing any harmful effects from the air they breathe. Education Note: Air quality may change in fire damaged and/or wildfire impacted buildings due to outside conditions, ventilation and filtration, degree of impaction, use, temperature, humidity, and stack effect.

Air Quality Related Values (AQRVs) – The values of air quality that including visibility, flora, fauna, cultural and historical resources, related values of odor, soil, water, and virtually all resources that are dependent upon and affected by air quality. "These values include visibility and those scenic, cultural, biological, and recreation resources of an area that are affected by air quality" (43 Fed.

Reg.15016).

Air return – (1) Air returned from conditioned spaces to an air-handling unit. (2) Air that has circulated through a building as supply air and has been returned to the HVAC system for additional conditioning or release from the building.

Air sampler – Equipment used to monitor the quality of air.

Air sampling – (1) The metered collection of ambient air for purposes of analysis. (2) One of several collection methods used to capture airborne contaminates (particulates, vapors, and gases) from outdoor and indoor air.

Air sampling, ambient – One of several collection methods used to capture airborne contaminates from one particular environment as compared to surrounding control or non-affected air.

Air sampling, personal – Air sampling units located in a worker's breathing zone. Air sampling units are usually clipped on to personal clothing or outer protective clothing.

Air scrubber / Air Scrubbing – (1) An air filtration device (AFD) using HEPA filtration configured to re- circulate air within a defined space. (2) A device or system for removing contaminants and odors from an air stream; a high-volume air mover connected to a HEPA or carbon filter so as to remove particulate materials and odors from the air. Air scrubbing is a way of cleaning the ambient air within a building. (RIA) Education Note: In fire damaged structures and wildfire impacted buildings, the goal of installing one or more air scrubbers is to capture (eliminate or reduce) airborne pollutant, which produces a cleaner (airborne particulate, vapors and gases) space for workers and occupants.

Air scrubber efficiency – As related to air filtration of particulate matter, a machine with HEPA filtration capable of removing 99.97% of particles that are greater than 0.3 microns in diameter that are in contact with the machine's capture zone.

Air scrubber, HEPA – An air-scrubbing machine that uses a HEPA filtering system. HEPA filters are designed to capture micro-fine and larger particulates. (See: HEPA)

Air scrubber verses a negative air machine – The difference between an air scrubber and a negative air machine. An air scrubber removes particulates in air that are in its capture zone; a negative air machine creates negative air pressure (a vacuum effect) that reduces the spread of airborne contaminants in an area. Education Note: The terms "air scrubber" and "negative air machine" are often used interchangeably; however, the two terms refer to different applications: An air scrubber usually is positioned in the center of a room with no ducting attached, allowing the HEPA filter to capture and recirculate (reprocesses) the same air (now cleaner air) within the area; an air scrubber becomes a negative air machine when it's attached to exhaust ducting that filters out processed air.

Air scrubber with activated charcoal – An air scrubber that incorporates the use of a charcoal

(activated charcoal) filtering system. Activated charcoal filters are designed to capture vapors and gases.

Air scrubbing – (1) The act of removing large and fine particulates out of air. (2) The process of removing vapors, gases, odors, and particulates out of air with a mechanical air filtration machine. Education Note: Most air filtration machines engineered to complete air scrubbing include HEPA or ULPA filtration and/or carbon absorption. The scrubbing process returns treated filtered air back into the air stream.

Air shower – (1) A contained area acting as a pass-through that provides forced air and downdraft pressure to remove particles off employee clothing or PPE before entering or leaving a work area. (2) A pass-through room or containment leading to the entrance of a cleanroom where high velocity air removes particles that could contaminate a cleanroom. Education Note: Air showers are sometimes combined with static removal equipment and HEPA filters to make them more effective at removing lose skin, hair, spores, pollen, and other contaminants. (See: Air barrier)

Air-source – (1) Incoming air or the conditioned source of air. (2) Air that is the heat source or heat sink for a heat pump.

Air sparging – (1) The use of pressurized air that is forced across a surface, to breakaway and strip-off settled smoke, soot, lint, dust, mold spores and other contaminates to a capturing device such as a HEPA filtering system or bag filter. (2) Injecting air or oxygen into an aquifer to strip or flush volatile contaminants as air bubbles up through the ground water that is captured by a vapor extraction system. http://www.cpeo.org/techtree/ttdescript/airspa.htm

Air stripping – (1) Processes used to remove (strip) harmful contaminates, gases and toxins from indoor air. (2) A treatment process used to remove dissolved gases and volatile substances from water. Large volumes of air are bubbled through the water being treated to remove (strip out) the dissolved gases and volatile substances.

Air, supply – (1) Fresh and conditioned air delivered to a space that is used for ventilation, heating, cooling, humidification or dehumidification (2) The total quantity of air supplied to a space of a building for thermal conditioning and ventilation. Education Note: Typically, supply air consists of a mixture of return air and outdoor air that is appropriately filtered and conditioned.

Air sweeping (cleaning ductwork) – (1) Cleaning of ventilation ducts that is accomplished through pressurized air in combination with handheld blowguns, or an air hose having a remote nozzle to move settled matter from ducting. (2) A process that uses a pressurized air source combined with either handheld blowguns or a hose with a remote nozzle attachment to move particulate and debris within an HVAC system during cleaning.

Air tanker (wildfire) – A fixed-wing aircraft equipped to drop fire retardants or suppressants.

Air track, fire behavior (fire science) – The movement of air towards the fire and movement of hot,

buoyant combustion products out of the compartment or structure.

Air track, direction (fire science) – The movement of both smoke and air. In a compartment fire, smoke generally moves away from the fire and air moves towards the fire due to gravity current. However, actual air movement is influenced by openings, barriers, and the compartment's geometry. Education Note: Air tracking is commonly assessed at openings, where they direction can be out (smoke completely filling the opening and moving outwards).

Air track turbulence (fire science) – Turbulence is an important air track indicator in studying fire behavior. Turbulence is related to velocity of air and smoke movement. The faster the air movement occur, where restrictions and obstacles can create turbulent flow. Education Note: Turbulence results in increased mixing of smoke (fuel) and air which may precipitate extreme fire behavior such as backdraft.

Air toxics – Toxic air pollutants, also known as hazardous air pollutants, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects.

Air vapor barrier (ventilation) – A layer of material impervious to moisture, applied to the surfaces enclosing a space to limit moisture migration.

Air vapor retarders – A membrane meeting the water vapor resistance rating of a vapor retarder combined with the air infiltration characteristics of an air retarder, used to restrict both the rate and volume of air and of water vapor through ceilings, walls, and floor elements. Education Note: Air/vapor retarders may be constructed from polyethylene, extruded polystyrene, foil-covered foams, and exterior sheathings. All joints, air/vapor retarders seams, and penetrations, including at windows, doors, electrical outlets, plumbing stacks, and vents must be effectively sealed. Detailing and installation requirements for air/vapor retarders are the same as for air retarders.

Air velocity meter – A portable electronic device capable of measuring and sometimes data-logging air movement.

Air vent (ventilation system) **–** A valve, either manual or automatic, that removes unwanted air from the highest point of a piping system.

Air ventilation and recirculation – Outdoor air plus any recirculated indoor air that has been treated (filtered) for the purpose of maintaining acceptable indoor air quality.

Air void (concrete) – An air-filled space in cement paste, mortar, or concrete. These voids may be in the form of entrapped or entrained air.

Air wash – (1) The movement of air through insulation. (2) The movement of air through carpeting and draperies where it leaves a black film of atmospheric oils and particles.

Air washing – (1) Cleaner air that is forced into another body of air of lesser quality, sending it down stream to be ventilated or captured. (2) Dry clean air that is forced across a surface for the purpose of dislodging and removing loose and settled particles.

Air washing of building contents – The process by which controlled air pressure is forced across contents to remove loose dust, dirt, spores and fire-related char and soot.

Air washing of building interiors – A process of air-pressure washing that removes dust, spores and fire-related char and soot.

Airborne coarse particles – The relatively large particles suspended in air produced by the mechanical breakup of even larger solid particles.

Airborne contaminants – (1) Particulate matter and gases acting as airborne pollutants (e.g., vapor, gas and solid contaminates, fumes and emissions, carbon monoxide, carbon dioxide and hydrocarbons, dusts, pollens and other bioaerosols, including bacteria, viruses, fungi and yeasts). (2) A constituent of unwanted airborne substances based on type, makeup, and amount.

Airborne matter – Any substance consisting of organic or inorganic matter that is suspended in air.

Airborne microorganisms – (1) Living, decaying and dead microorganisms suspended in air as free-floating particles and cells which can be inhaled. (2) Biologically active microorganisms (including cells and cell parts) suspended in the air either as free-floating particles surrounded by a film or organic or inorganic material or attached to the surface of other suspended particulates.

Airborne mold – Mold spores in air.

Airborne particle – (1) Any particle of any substance that is suspended in air. (2) Any particulate that varies in size or in composition that is in the air.

Airborne particles – (1) The total suspended solids, gases, fumes, and liquid droplets in air. (2) Any particle of solid matter this is in air. Airborne particles vary widely depending on location and time of year, and environmental influences that cause them to become airborne. Education Note: Airborne particles are gaseous suspension of solid or liquid particles about 100 µm or smaller in size.

Airborne particulate matter (PM) (wildfire) – Air, the sum of solids and liquid particles being coarse, fine, and ultra-fine that are suspended in air which some may be hazardous. This complex mixture contains for instance smoke, soot, ash, and char, dust and pollen, other vegetative organic matter, and chemical agents that are part of incomplete combustion. Airborne particulate matter is emitted into air from combustion or because of wildfire storm turbulence.

Airborne particulates – ACGIH defined airborne particulates in one of three categories: 1) "Inhalable particulate mass (IPM)," TLVs are designed for compounds that are toxic if deposited at any size within the respiratory tract. The typical size for these particles can range from submicron size to

approximately 100 micrometers. 2) "Thoracic particulate mass (TPM)," TLVs are designated for compounds that are toxic if deposited within the airways of the lung or the lung's gas exchange region. The typical size for these particles can range from approximately 5 to 15 micrometers. 3) "Respirable particulate mass (RPM)," TLVs are designated for compounds that are toxic if deposited within the gas exchange region of the lung. The typical size for these particles can range from 5 micron or less.

Airborne particulates, size of – Airborne particulates are discrete particles having measurable physical boundaries in all directions and of such size and mass as to remain suspended in air long enough to be sampled and measured (usually 100 micrometers or less except for lint fibers). Education Note: Particulates are distinguished from particles that may have the connotation of atomic or sub-atomic matter.

Airborne pathogens – Microorganisms such as a bacteria, virus, or fungus that is capable of causing disease. (NFPA) https://www.ncbi.nlm.nih.gov/books/NBK20370/

Airborne release – The discharge of contamination/pollutants (particles, vapors, and gasses) in the air.

Airline respirator – A respirator that is connected to a compressed breathing air source by a hose of small inside diameter. Education Note: The air in an airline respirator is delivered continuously or intermittently in sufficient volume to meet the wearer's breathing requirements and meet OSHA breathing air standards.

Airlock – A system that permits entry and egress with minimum airflow between a contaminated and uncontaminated area. Education Note: Normally an airlock consists of two curtained doorways separated by a distance of at least three feet, enabling a person to pass through one door opening into the airlock, allowing the doorway sheeting to overlap and close off the doorway before proceeding through the second doorway. An airlock prevents flow-through contamination.

Airmover (sometimes improperly spelled air mover) **–** (1) Specialized fans that move air and promotes drying. (2) A mechanically operated drying machine that promotes evaporation. Education Note #1: Air movers are used to assist with drying wet building materials, finishes and contents. Airmovers in the water damage restoration industry are specialized mechanically operated drying unit that promotes evaporation. Education Note #2: Airmovers incorporate an electric motor, fan and specially designed housing for use in drying carpet, cushion, and sub-floors or structural components (wood floors, walls, crawl spaces, etc.), often by injecting air movement over or under the flooring or inside structural cavities or air spaces.

Airtight – A relative term indicating the extent to which a system (e.g., a building envelope) is resistant to the passage of air; thus, air tightness.

Airway (building) **–** (1) The passage air intake and air stream that allows fresh air to ventilate through the building. (2) A space between roof insulation and roof boards for movement of air.

Airway (respiratory) **–** Any conducting segment of the respiratory tract through which air passes

during breathing.

Alcohol – A class of colorless, volatile, flammable, organic dry solvents containing one or more hydroxyl groups (OH). Alcohols are used as cosolvents in some cleaning or spotting compounds. Education Note: Alcohols commonly used in light duty and liquid laundry detergents are isopropanol or ethanol (isopropyl or ethyl alcohol). In detergents they control viscosity, act as solvents for other ingredients, and provide resistance to freezing temperatures encountered in shipping, storage, and use. Alcohols also may be used in a 60-90% concentration for disinfecting.

Alcohol cleaners – Organic compounds that contain one or more hydroxyl groups (-OH functional groups) in each molecule. Alcohols used in cleaners include ethyl, methyl, propyl, and butyl. Education Note: Alcohols are used as cosolvents ("cosolvent," a second solvent added to the original solvent, generally in small concentrations, to form a mixture that has greatly enhanced solvent powers due to synergism), in some cleaning and spotting compounds. The alcohols commonly used in light duty and laundry detergents are isopropanol or ethanol (isopropyl or ethyl alcohol). In detergents, they control viscosity, act as solvents for other ingredients, and provide resistance to freezing temperatures encountered in shipping, storage, and use. Alcohols also may be used in 60-90% concentration for disinfecting.

ALE – Additional living expense. (1) In residential insurance policies, that portion of the insurance contract which allows for the insured to temporarily relocate, because of damage, disaster, or health consequence, caused by the dwelling from its damage. (2) A form of extra expense paid to a policyholder by their insurance policy for temporary shelter due to damage by a covered peril that makes the home temporarily uninhabitable. (Insurance Institute; III) Education Note: When a covered property loss makes the residential premises unfit to live in, the insurance policy typically covers the necessary increase in living expense incurred by the insured so that the insured can maintain their normal standard of living.

Alien migratory dust – (1) Any foreign matter as airborne or settled dust that invades an indoor environment. (2) Foreign dust particles in air that can affect the health of an individual or group of individuals.

All-purpose cleaner – A powder or liquid detergent suitable for general household cleaning.

Allergen (medical) – (1) Any substance that can cause allergies. (2) A substance capable of causing an allergic reaction because of an individual's sensitivity to that substance. (3) A substance that brings on an allergic reaction in humans such as dust, soot, ash, char, pollens, and mold spores. Education Note: Common indoor allergens include organic dust, human skin cells, animal dander, pollen, and microorganisms (mold and bacteria) that causes acute defensive reactions in a person's immune system. These reactions include sneezing, itching, skin rashes, and respiratory irritations.

Allergen reaction (medical) – An abnormal physical or psychological reaction (response) by a sensitive person to a chemical or substance.

Allergens (medical) – Those substances that act as an antigen, (e.g., pollens, dander, dust mite proteins, mold, smoke particulate) causing the formation of antibodies.

Allergic rhinitis (medical) – Inflammation of the mucous membranes in the nose.

Allergic sensitizers (medical) – Certain chemical and allergen producing substances that act as antigens to produce an allergic reaction after repeat sensitizing exposures to the skin or respiratory system.

Allergic skin reaction (medical) – Reddening, swelling, and/or itching of the skin following contact with a substance to which a person has become sensitized due to previous skin contact or natural body conditions.

Alligatoring (weather and water) – (1) The splitting or cracking of a paint film in a pattern resembling the rectangles of an alligator skin that is often due to oxidation or shrinkage stresses. (2) The result of water damage and/or high humidity, causing paint film to release from the surface and run down on top of itself on a wall, due to excess moisture stress factors. (3) Coarse checking pattern characterized by a slipping of the new paint coating over the old coating to the extent that the old coating can be seen through the fissures. Education Note: Alligatoring can appear from an improper application of a paint film being applied on to a surface containing too much moisture, or by putting incompatible coatings over each other.

Alligatoring (building fire; wildfire) – Char patterns formed on paint or burned wood remains, usually in the shape of blisters. Education Note #1: The splitting or cracking of paint film that resembles the lines, cracks and rectangles found on alligator skin. Education Note #2: In fire damaged buildings or buildings exposed to heat, alligatoring is often due to a dramatic temperature and heat increase resulting in film expansion and sudden shrinkage as heat dissipates, moisture depletes, or effects caused by oxidation.

Allowance (insurance) – Funds allotted as a reimbursement or deduction for some action or condition.

Alveolar – Pertaining to air sacs (alveoli) of the lung where gas exchange occurs between the lung and the blood stream.

Ambient – (1) The surrounding area or environment; usual or surrounding conditions. (2) In environmental terms, of or relating to a condition of the environment surrounding a body or object (such as an organism or a building), especially a condition that affects this body or object but is not significantly affected by it. (3) Surrounding (applied to environmental media such as air, water, sediment, or soil). Education Note: Any unconfined portion of the atmosphere; open air; outside surrounding air.

Ambient air – (1) The surrounding encircling air of the outdoor environment penetrating indoor air. (2) The surrounding encompassing indoor air; the specific indoor air of a given environment, a room, wall, substructure, or attic. Education Note: Ambient air is the air to which the general public has

access, i.e. any unconfined portion of the atmosphere. The two basic physical forms of air pollutants are particulate matter and gases.

Ambient air analyzer – An electronic instrument capable of measuring organics, particulates, VOCs, and gases in ambient air.

Ambient air cleaning – The process of removing particulates from indoor air that is outside of the HVAC system.

Ambient measurement – Test and sample measurements taken from air, water or soil that identify outdoor concentrations of chemicals or pollutants such as a gas, particle, or organism. Ambient measurements are sometimes collected to create a baseline value against other measurements such as building air quality.

Ambient air cleaning – The process of removing particulates from indoor air that is outside of the HVAC system.

Ambient air conditions – The physical characteristics of the air environment (temperature, relative humidity, barometric pressure to chemicals and biologically derived agents). Education Note: Ambient humidity is affected by indoor water damages. Flooded buildings receive indoor humidity loads from 70% to 95% that must be removed and controlled before mold growth occurs.

Ambient air monitoring – (1) The measurement of outdoor air. (2) The measurement of air that is surrounding another environment. Education Note: Ambient air monitoring is often used to create a statistical baseline value. These values are then compared against values of other environments such as indoor air.

Ambient condition – Normal conditions, such as pressure, temperature, humidity, etc. which are considered normal for a given location.

Ambient humidity – (1) The outdoor humidity. (2) The indoor humidity in a building as it relates to its surrounding environment.

Ambient measurement – (1) Test and sample measurements taken from air, water or soil that identify outdoor concentrations of chemicals or pollutants such as a gas, particle, or organism. Ambient measurements are sometimes collected to create a baseline value against other measurements such as building air quality. (2) A measurement (usually of the concentration of a chemical or pollutant) taken in an ambient medium, normally with the intent of relating the measurement value to the exposure of an organism that contacts the medium.

Ambient medium – One of the basic categories of material surrounding or contacting an organism, e.g., outdoor air, indoor air, water, or soil, through which chemicals or pollutants can move and reach the organism.

AMC – Average moisture content. The average of the amounts of moisture in a specific material in the built environment (such as plywood and oriented strand board subfloor) that is moisture measured at several depths and points across a grid.

American Conference of Governmental Industrial Hygienists (ACGIH) – An organization of professional personnel in governmental agencies or educational institutions engaged in occupational safety and health programs. ACGIH develops and publishes recommended occupational exposure limits and threshold limit values (see TLV) for hundreds of chemical substances and physical agents. ACGIH also develops and publishes recommended occupational exposure programs. For more information about ACGIH go to: https://www.acgih.org/

American Industrial Hygiene Association (AIHA) – An association representing and setting standards for industrial hygienists. The AIHA organization and membership are dedicated to the anticipation, recognition, evaluation, and control of environmental factors rising in or from the workplace that may result in work-related injury or illness. For more information about AIHA go to: http://www.aiha.org

American National Standards Institute (ANSI) – A privately funded, voluntary membership organization headquartered in New York City, which identifies industrial and public needs for national consensus standards, and coordinates development of such standards. Education Note: Many ANSI standards relate to safe design/performance of equipment, such as safety shoes, eyeglasses, smoke detectors, fire pumps and household appliances. It also specifies safe practices or procedures, such as noise measurement, testing of fire extinguisher and flame arresters, industrial lighting practices, and the use of abrasive wheels. For more information about ANSI go to: https://www.ansi.org/

American Society for Testing and Materials (ASTM) – An organization having voluntary members representing a broad spectrum of individuals, agencies and industries who are concerned with testing standards for a variety of materials. Education Note: As the world's largest source of voluntary consensus standards for materials, products, systems and services, ASTM is a resource for sampling and testing methods, health and safety of materials, safe performance guidelines, and effects of physical and biological agents and chemicals. For more information about ASTM go to: https://www.astm.org/

American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) – A society of professional engineers that sets standards for heating, ventilation, and air conditioning (HVAC) equipment, and for equipment and materials relating thereto. They are the authoritative technical body for standards and procedures for indoor air comfort and health. Education Note: Standards include: *Standard 52* for testing air filters by means of discoloration; *Standard 62* for ventilation and indoor air quality which prescribes minimum ventilation levels for buildings for both comfort and health. For more information about ASHRAE go to: https://www.ashrae.org/

Amido black (AB) – A dye that is sensitive to blood and thus is used in developing fingerprints

contaminated with blood. Education Note: AB, a synthetic dye, is commonly found in clothing, and it is used in police forensic analysis to discover latent fingerprints containing blood or in detecting blood residues in a darkened room illuminated with the alternate light source and viewed through a filter of complementary color. For example, long-wave ultraviolet (black light) tubes emit some visible light in the deep violet part of the spectrum. Viewing a surface so illuminated through a deep yellow or orange filter blocks essentially all of the reflected incident violet light, making any inherent fluorescence emitted by the fingerprint residues in the yellow through red parts of the spectrum more clearly visible. The inherent fluorescence method is usable on any surface, including surfaces that cannot be treated with powders or chemical methods, and may reveal latent prints that are not revealed by any other method. Like visual examination, examination by inherent fluorescence is non-destructive. After visual examination and inherent fluorescence examination are complete, other methods may be used to reveal additional latent fingerprints. Fingerprint powders, iodine fuming, and silver nitrate are considered the "classic" methods, because they have been used since the 19th century. Despite their age and the availability of newer methods, all three of these methods, with some minor improvements, remain in use today.

Amino black soot testing methods, wildfire – Wildfire soot, char and ash laboratory analysis methods should not be based on analyzing amino black and carbon black. For example, several technologies and methods have been employed for assessing fire particulates. Published methods—such as IESO/RIA Standard 6001-2012 (Evaluation of Heating, Ventilation and Air Conditioning [HVAC] Interior Surfaces to Determine the Presence of Fire-Related Particulate as a Result of a Fire in a Structure), ASTM D1506-15 (Standard Test Methods for Carbon Black-Ash Content), and ASTM D6602-13 (Standard Practice for Sampling and Testing of Possible Carbon Black Fugitive Emissions or Other Environmental Particulate, or Both)—account for some aspects of wildfire contamination but are not suitable for all postfire sampling and analysis situations. Therefore, it is often necessary to go beyond these methods for best analysis methods. For more information go to: https://synergist.aiha.org/201711-wildfire-residue-contamination-testing

Amplification – The presence of particulate matter, VOCs, and PAHs indoors that were not present before a fire or wildfire. The amplification of particles and smoke can result in occupant health effects and impaction of the interior, which may require cleaning and deodorization, or replacement of some materials such as insulation. For more information go to: https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019-chapters-1-3.pdf and https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf and https://www.safeguardenviro.com/wp-content/uploads/Suggested-Guidelines-for-Wildfire-Smoke-Damage-Investigations-and-Remediation.pdf

Amplifier – A condition that encourages organisms to grow or increase in concentration. These conditions may involve food sources, temperature, light, air movement and moisture. (IICRC S500 Standard, 2006)

Analysis, accelerant testing – Accelerant testing analysis is usually performed by Fourier Transform Infrared Spectrometry (FTIR), Gas Chromatography/Mass Spectrometry (GC/MS) and High-

Performance Liquid Chromatography (HPLC). (See: Accelerant)

Analysis, black carbon soot/char (not carbon black) – Black carbon soot and char analysis is best analyzed through transmission electron microscope (TEM), scanning electron microscope (SEM) and for particle morphology coupled with energy (electron) dispersive X-ray for elemental composition. Black carbon soot is sub-micron particles formed through uncontrolled combustion of fossil fuels, biofuel, and biomass. (See: TEM analysis)

Analysis, carbon black – Furnace, lamp, acetylene black is manufactured spherical carbon materials with particle sizes below one micron. A typical use for carbon black includes paint pigmentation, copier toner and automobile tires. Analysis for carbon black requires the use of TEM with EDXA.

Analysis, carbonized material – Carbonized materials are characterized as char, ash, graphite, coke, and coal. This analysis is performed using polarized light microscopy (PLM) or epi-reflected microscopy (RLM). Additional analysis is necessary when attempting to determine the "source" or "point of origin" of carbonized material.

Analysis decisions, laboratory – Considering the use of one lab over another. It is important to differentiate between laboratories completing analysis because not all laboratories are the same providing the same types of analysis. When the analysis is for carbon black and soot, the analysis of nanoparticles with PLM analysis alone is often inconclusive and typically found to be legally indefensible. Inexpensive testing by PLM is limited at best and should not be the only instrument utilized for the analysis of wildfire residue but rather as the beginning phase of an extensive process.

Analysis, qualitative – Of, relating to, or involving quality or kind: (1) The identification of a material based on the chemical and physical properties of a sample. (2) The testing and laboratory analysis of a substance to ascertain the nature of its chemical constituents.

Analysis, quantitative – Of, relating to, or involving quantity or amount. (1) The identification of a material based on the chemical and physical properties of a sample. (2) The testing of a substance or mixture to determine the amounts and proportions of its chemical constituents.

Analysis, root cause – The process of determining the underlying cause of a problem which might warrant corrective action. Education Note: A root-cause-analysis is not a simple re-statement of what is wrong but is a process of repeatedly asking probing questions about what went wrong, obtaining answers, and asking questions about the answers until the underlying cause of the problem is determined. Problems tend to recur unless the root cause is determined and corrected.

Analysis, TEM – The transmission electron microscopy (TEM) testing and method is an evaluation of the morphology of the particles present in the sample to determine primarily if their morphology is consistent with the unique grape cluster, or acinoform, morphology of carbon black and soot. Education Note: Using ASTM D6602, it designates TEM analysis as the mandatory evaluation technique for black carbon/soot. Examination of the samples using light microscopy should be used only as a screening/presumptive method. The same ASTM D6602 method mentions using Scanning

Electron Microscopy (SEM) as ancillary method for black carbon/soot and carbon black analysis. But similar to polarized light microscopy (PLM), the PLM method should be used only for screening purposes or for supporting the TEM data. SEM is used to further characterize the morphology of particles where its data supports the TEM data.

Analytical blank / Field blank – An unused sample that is taken for quality control purposes and it/they are turned into the laboratory along with the field study samples. https://www.epa.gov/sites/production/files/2015-06/documents/blanks.pdf and https://www.eurofinsus.com/environment-testing/resources/blog/environment-testing-blog/12-field-and-trip-blanks/ and https://www.apexinst.com/faq/what-are-the-differences-between-the-different-blanks-discussed-in-lecturelab-field-reagent-and-trip

Analytical blank, carbon-based / Field blank, carbon-based – An unused filter sampling media containing carbon that acts as an absorber of airborne gases that is also turned into the laboratory for quality control purposes along with the field study samples. Education Note: When air sampling for gases, where samples are to be analyzed to PM_{10}, $PM_{2.5}$, field blanks are expected to be placed in the sampler and left for a specific duration of time.

Angle of char indicators – A forensic analysis identifying where fuels are burned at an angle that indicates the direction of fire spread. Also called vertical char.

Annoyance (medical; psychological) – A general feeling of displeasure or adverse psychological reaction toward a source material, and generally associated with disturbance, distress, and frustration.

Annular space, fire (building fire-rating) **-** The region, measured in a straight line, between penetrates, or between the outer most portion of penetrates and the inside periphery of a circular opening or the sides of a rectangular opening. Example: a pipe with an outside diameter of 4.5" centered in a 6" diameter hole has an annular space of (6 - 4.5) ÷ 2 = 3/4."

Annular space requirements Per NFPA Standard #13 - In building fire-rating terms, Section 4-5.4.3.4, it requires that sprinkler pipes in seismic areas, have a minimum annular space of 1-inch for pipes 1" through 3-1/2" and 2-inches for pipes 4" and larger. Education Note: Exceptions to this standard do exist. Consult NFPA Standard #13 for details.

ANSI – American National Standards Institute. ANSI is a private, non-profit membership organization representing over 1,000 public and private organizations, businesses, and government agencies. They seek to develop technical, political and policy consensus among various groups. Education Note: ANSI does not develop American National Standards (ANS's), but they accredit qualified groups to do so in their area(s) of technical expertise such as IICRC. (See: IICRC) There are over 14,000 ANSI-approved standards in use today. ANSI-approved standards are voluntary; however, it is possible that some of the content of these standards could be made into law by a governmental body. ANSI is the official U.S. representative to the International Organization for Standardization (ISO). For more information about ANSI go to: http://www.ansi.org

Antagonistic effect (medical) – A biological response to exposure to multiple substances that is less than would be expected if the known effects of their individual substances were added together. (ATSDR)

Antigen – A secretion (toxin or enzyme) of fungi and bacteria that can produce an immune response (allergic reaction) in humans. The reaction may be in the form of an asthma attack, eye irritation, rhinitis, or other immune response.

Antique – An object representing the materials, styling and techniques of an earlier time, enhanced in value by virtue of its age; an early version of a current object or device, such as an antique automobile, phonograph, or sewing machine. (RIA)

Appraisal (insurance) – (1) The process through which estimates of property value or restoration costs (structure and/or contents) are obtained. (2) An evaluation or estimate of the value of an object or other property, including the cost to repair or loss in value incurred by damage; Appraisal is also an arbitration procedure required in many insurance policies as a way to resolve differences in the amount of a claim. (RIA) Education Note: Many insurance policies provide for an "appraisal" process to be completed to resolve disputed claims.

Appraiser, insurance – A person that is qualified by training and experience to provide an estimate on the costs or value involving a disputed claim.

Appreciation (insurance) – An increase in property value due to economic or other causes that may or may not be permanent.

Appropriate PPE – The personal protective equipment that is most appropriate for a job. When required, PPE must be available and appropriate worn.

APR – Air Purifying Respirator. (1) A filter cartridge half-face or full-face respirator having the proper filters to remove known or suspected airborne contaminates so they will not be allowed to enter the wearer's nose or lungs. (2) A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element. (OSHA) Education Note: An air-purifying respirator cleans contaminants from the air via cartridges and/or filters before the air is inspired by the wearer. APRs are the most used respirators in the remediation industry, where they are available in half-mask, full-face or powered air-purifying units. Properly worn, the air purifying respirator provides the remediation technician with safe, clean, uncontaminated air to breathe.

Appraiser, insurance – A person that is qualified by training and experience to provide an estimate on the costs or value involving a disputed claim.

Aramid (PPE) – The generic name for a high-strength, flame-resistant synthetic fabric used in the shirts and jeans of firefighters. Nomex, a brand name for aramid fabric, is the term commonly used by firefighters.

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Arbitration – The binding resolution of disputes by a neutral party or persons as a substitute for litigation. Arbitration requires agreement of the parties to the dispute, which may be obtained in advance through a clause in a contract between them, or after a dispute has arisen. Arbitration proceedings are less formal than those of a court and require considerably less time and expense.

Arc / Spark – A high temperature luminous electric discharge across a gap or through a medium such as charred insulation. (NFPA 921 3.3.7) Education Note: Ark and spark arc interchangeably.

Arcing through char – Arcing which is associated with a matrix of charred material (e.g., charred conductor insulation) that acts as a semi-conductive medium. (NFPA 921 3.3.8)

Architectural details – Small details in buildings like moldings and carved woodwork. Education Note: In fire damaged and smoke contaminated buildings, architectural details often require careful attention to clean and deodorize them of smoke and soot.

Area cleaning – (1) The removal of loose dusts, debris, spores, etc., in a given area. (2) Area cleaning of perimeter and secondary areas known or suspect of having settled dusts, spores, and other contamination (e.g., smoke odor, soot, chemical fallout) outside the primary containment.

Area control sites (wildland fire environmental sampling) – Control sites in the same area (e.g., a city or district) as the sampling site but not adjacent to it. In general, local control sites are preferable to area control sites because they are physically closer.

Area ignition – Ignition of several individual fires throughout a building or area, either simultaneously or in rapid succession, and so spaced that they add to and influence the main body of the fire to produce a hot, fast-spreading fire condition. Also called simultaneous ignition.

Area of influence (wildfire) – Delineated area surrounding a base which can be reached first by the ground or air attack units assigned to the base. Also called zone of influence.

Area monitoring (environmental sampling) – The sampling, testing and assessment of fixed points, position in a workplace or building, often requiring repeat or continuous monitoring.

Area of concern (AOC) (building investigation sampling) – Area(s) of concern include the known or most probable areas where damage or contamination exists.

Area of origin, fire – The room or area where a fire began. (Also known as point of origin)

Area sampling (toxicological sampling) – The collection of environmental samples at fixed points reflecting areas of contamination, that are measured against areas not suspected of having contamination.

Area source (wildfire) – A source category of air pollution that generally extends over a large area. Prescribed burning, field burning, home heating, and open burning are examples of area sources.

Arson – The crime of maliciously and intentionally, or recklessly starting a fire or causing an explosion.

Artifact – (1) A manmade object shaped by human hands. (2) One or more items found in fire damaged structures.

As need – An indefinite term sometimes used when quantities cannot be precisely defined, indicating that the action will be performed until a complete and fully satisfactory result is obtained.

As possible – A limiting or qualifying term indicating that a fully effective result may not be obtainable by the procedure specified.

ASHRAE – The American Society of Heating, Refrigerating, and Air-Conditioning Engineers. For more information about ASHRAE go to: http://www.ashrae.org Source: Baxter, D., Mackelprang, C. Andrew, M., Knowles, J., Clutter, J. "*Wildfire Particulate in Proximally Located, Unburnt Buildings*." ASHRAE Spring 2011 Technical Conference.

Ash – (1) The mineral content of a product remaining after complete combustion. (2) A powdery substance left behind after a fire. (3) The end-product of incomplete combustion, which will be mostly mineral, but usually still contain an amount of combustible organic or other oxidizable residues.

Ash and soot nuisance – From a medical point of view, ash and soot that has no known adverse effect on the lungs and does not produce significant organic disease or toxic effect when exposures are kept under reasonable control.

Ash, caustic – Caustic alkali is part of ash which may include arsenic, copper, zinc, and lead. (U.S. Geological Survey 12-04-2007) Ash is caustic whether it comes from a building fire or a wildfire. https://oehha.ca.gov/media/downloads/public-information/report/fireash.pdf

Ash, char, smoke, and soot analysis laboratory – A laboratory that tests and analyzes propagates of particulates coming from or derived by combustion or incomplete combustion. Education Note: In building science, the laboratory analysis is expected to prove a hypothesis involving particulate matter, smoke, and PAH's capable of affecting buildings, contents, and the indoor environment.

Ash indicators – White ash deposited on the origin side of burned objects.

Ash, soot, and smoke damage assessment of antiques – (1) A visual antique assessment process that inspects each surface for signs of heat damage, char, smoke, soot and odor penetration. (2) A visual antique assessment process that evaluates each material and its condition and how it can be cleaned and deodorized or restored.

Ash, soot, and smoke removal cleaning process – Soot vacuuming and/or air washing followed by a mild alkaline detergent washing to neutralize, retard, or stop pitting and corrosion or discoloration

of finishes.

Ash, vegetative (wildfire impaction) – The light grey/white powder left over after vegetation is burned. In contrast, PLM ash is not opaque; rather it is light colored with birefringence due to the presence of calcium crystals. The original plant structure is often still present although faint and wispy. Education Note: The EDS spectrum of ash shows calcium with moderate carbon concentrations. "*Wildfire Particulate in Proximally Located, Unburnt Buildings."* (ACGIH Spring 2011 Technical Conference)

ASHRAE – American Society of Heating, Refrigeration and Air-conditioning Engineers. For more information about ASHRAE go to: http://www.ashrae.org

Asphyxiant – A vapor or gas that limits or prohibits the body's ability to assimilate (use) oxygen, even though sufficient oxygen may be present, and can cause unconsciousness or death by suffocation (lack of oxygen). In addition, some chemicals, like carbon monoxide, function as chemical asphyxiants by reducing the blood's ability to carry oxygen. Education Note: Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce oxygen in the air (normally about 21%) to dangerous levels (16% or lower). Asphyxiation is one of the principal potential hazards of working in confined spaces.
http://www.disaster.org.tw/ENGLISH/ann-med/Vol4suppl1/6.pdf

Assemblage – The collection of information related to a fire damaged building or a wildfire impacted structure, which includes but is not limited to the visual inspection and assessment, photos, customer interview, hypothesis modeling, sampling, and laboratory analysis.

Assemblage analysis, wildfire particle – In a wildfire impacted environment, the use of scientific sampling techniques along with laboratory analysis methods, that support a hypothesis for assemblage analysis. Assemblage analysis involves, characterizing the types of charred wood, phytoliths from the plants that made up the fuel, skeletonized cell structure of plant matter in char, the burnt soil from the updrafts, ash and pH, including aerosolized fire retardant. Education Note: Forests, chaparral, and savannahs are not made up of one or two plant types but many different plants, including, seeds, shrubs, grasses, and other vegetation. In a wildfire impacted building, all forms of fuel as burnt plant life, contribute to the smoke and particulate matter that ends up becoming smoke in the form of chemicals, VOCs and PAHs, and the biological signature of plant residue. For more information go to: https://www.safeguardenviro.com/wp-content/uploads/Wildfire-Smoke-Exposure-a-Comparative-Study-between-Two-Analytical-Approaches-Particle-Assemblage-Analysis-and-Soot-Char-and-Ash-Analysis.pdf and https://synergist.aiha.org/201711-wildfire-residue-contamination-testing (See: Phytoliths)

Assessment (environmental) – (1) A visual and sometimes scientific evaluation of a material or building and its relationship with other items, a community or space. (2) An inspection process where the building or area of damage and/or contamination is evaluated.

Assessment (insurance) **-** The valuation of damage or contamination after a loss or incident.

Assessment (building fire; wildfire) – The evaluation and interpretation of measurements, intelligence, and other information to provide a basis for decision-making.

Assessment, IEP – An investigation/discovery process performed by an indoor environmental professional (IEP) or qualified environmental hygienist, that evaluates the data obtained from a building history and inspection to formulate an initial hypothesis about the origin, identity, location and extent of wildfire impaction. If necessary, a sampling plan is developed, and samples are collected and sent to a qualified laboratory for analysis. The subsequent data is interpreted by the IEP. Then, the IEP, or other qualified individual, may develop a cleaning, deodorization, or a remediation plan. (2) The evaluation and interpretation of measurements and other information to provide a basis for decision making. (FEMA)

Assessment, fire/wildfire – An inspection process where the building or area of damage and/or contamination is evaluated.

Assessment, remediation – A process performed by an indoor environmental professional (IEP) that includes the evaluation of data obtained from a building history and inspection to formulate an initial hypothesis about the origin, description, location and extent of Condition 2 or 3. If necessary, a sampling plan is developed, and samples are collected and sent to a qualified mycology or microbiology laboratory (e.g., EMLAP, A2LA, NELAP, or equivalent program) or individual (e.g., National Registry of Microbiologists, Public Works Canada Accredited Mycologist, or equivalent program) for analysis. The subsequent data is interpreted by the IEP. Then, the IEP or other qualified individual may develop a remediation plan. (IICRC S520, 2015)

Assessment, pre-remediation – The determination by an IEP of Condition 1, 2, and 3 status for the purpose of establishing a scope of work. (IICRC S520 Standard, 2008)

Assessment, risk – (1) The use of factual information to define the nature and impact of an adverse effect from exposure of individuals or populations to hazardous materials and situations. (2) The quantitative or qualitative evaluation to determine the probable level of risk. (3) A methodology used to examine all possible risks involved with a particular product or organism. Education Note: Risk assessment can be divided into four parts: 1) Identification of hazards; 2) Dose response (how much exposure causes particular problems (i.e. cancer, convulsions, death)); 3) Exposure assessment (determining how much exposure will be received by people during particular activities); and 4) Risk characterization (determining a probability that a risk will occur).

Assessment, site – An inspection process that collects historical information and current. Information about the condition at the building, which may or may not be affecting occupants.

Assigned protection factors (APF) – (1) The expected workplace level of respiratory protection that is assigned for job-specific work requirements where a properly functioning respirator or a class of respirators is required from properly fitted and trained users. (2) The minimum anticipated

protection provided by a properly functioning respirator or class of respirators to a given percentage of properly fitted and trained users. Education Note: All filtering face piece respirators have an APF of 10. Mathematically, this means you can expect the respirator to reduce your exposure to a contaminant by a factor of 10. In practice, the amount of reduction depends on factors such as how well the mask fits your face, the particle size of the contaminant and the environmental conditions of use. Different types of respirators have different APF's (e.g., 10 to 5,000) where the higher the APF the more protective the respirator becomes.

Assumption of risk – A defense in the law of torts, which bars or reduces a plaintiff's right to recovery against a negligent tortfeasor if the defendant can demonstrate that the plaintiff voluntarily and knowingly assumed the risks at issue inherent to the dangerous activity in which a person was participating at the time of his or her injury. (IICRC S540, 2017)

Asthma (medical) – (1) A condition marked by recurrent attacks of difficult or labored breathing and wheezing resulting from spasmodic contraction and hypersecretion of the bronchi resulting from exposure to allergens such as drugs, foods or environmental pollutants or intrinsic factors. (2) A combining force of reoccurring episodes of exposure resulting in wheezing and coughing and labored breathing. Education Note: The episodes are often related to or precipitated by inhalation of allergens, pollutants, dander, molds, dusts, infections, cold air or vigorous exercise. Repeat attacks of asthma can result in permanent lung and bronchi damage.

Asthma promoters (medical) – Substances and conditions that produce an immune-response to allergy causing pollutants resulting in an asthma episode.

Asthmatic health condition (medical) – A health condition marked by recurrent attacks of paroxysmal dyspnea, with wheezing due to spasmodic contraction of the bronchi. Some cases of asthma are allergic manifestations in sensitized persons (bronchial allergy).

ASTM – American Society for Testing and Materials. ASTM, is a not-for-profit organization that develops and provides voluntary consensus standards, related technical information, and services having internationally recognized quality and applicability that promote public health and safety, and the overall quality of life and contribute to the reliability of materials, products, systems and services. For more information about ASTM go to: http://www.astm.org

ASTM D3924 -16(2019) ***"Standard Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials"*** – Using an Extech CG206 coating mil-thickness tester for ferrous and non-ferrous substrates, it may be helpful when testing finishes after a fire loss and during restoration. Education Note: D3924 specification defines standard environment for normal conditioning and testing of paint, varnish, lacquer, and related coating materials. Conditioning and testing of such materials shall be carried out in an atmosphere having room temperature and relative humidity within the limits of the standard specification. Moreover, the standard room or cabinet for conditioning and testing shall be well-ventilated and free of drafts, dusts, combustion products, and laboratory fumes. Conditioning, routine, and referee testing shall be

done in accordance with the specification.

ASTM D4840-99(2010) "*Standard Guide for Sampling Chain-of-Custody Procedures*."** This guide contains a comprehensive discussion of potential requirements for a sample chain-of-custody program and describes the procedures involved in sample chain-of-custody. The purpose of these procedures is to provide accountability for and documentation of sample integrity from the time samples are collected until sample disposal. These procedures are intended to document sample possession during each stage of a sample's life cycle, that is, during collection, shipment, storage, and the process of analysis. Sample chain-of-custody is just one aspect of the larger issue of data defensibility.

ASTM D5197-16 "*Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)*." In a wildfire or building fire, numerous products burn, which can release chemicals from burning materials including formaldehyde. Education Note: This test method presents a procedure for the determination of formaldehyde (HCHO) and other carbonyl compounds (aldehydes and ketones) in air. Other carbonyl compounds that have been successfully quantified by this method include acetaldehyde, acetone, propanal (propionaldehyde), 2-butanone (methyl ethyl ketone), butyraldehyde, benzaldehyde, isovaleraldehyde, valeraldehyde, o-tolualdehyde, m-tolualdehyde, p-tolualdehyde, hexanal, and 2,5-dimethylbenzaldehyde. This test method involves drawing air through a cartridge containing silica gel coated with 2,4-dinitrophenylhydrazine (DNPH) reagent. Carbonyl compounds readily form stable derivatives with the DNPH reagent. The DNPH derivatives are analyzed for parent aldehydes and ketones utilizing high performance liquid chromatography (HPLC). The sampling procedure is a modification of U.S. EPA Method TO-11A.

ASTM D5466 - 15 "*Standard Test Method for Determination of Volatile Organic Compounds in Atmospheres (Canister Sampling Methodology)*" – A sampling method used in some instances where VOCs may be an issue. Education Note: VOCs are emitted into ambient, indoor, and workplace air from many different sources. These VOCs are of interest for a variety of reasons including participation in atmospheric chemistry and acute or chronic human health impacts. Canisters are particularly well suited for the collection and analysis of very volatile and volatile organic compounds. This test method describes the collection and analysis of whole gas samples and is not subject to high volatility limitations. Chemically stable selected VOCs have been successfully collected in passivated stainless-steel canisters. Collection of atmospheric samples in canisters provides for: (1) convenient integration of air samples over a specific time period (for example, 8 to 24 hours); (2) remote sampling and central laboratory analysis; (3) ease of storing and shipping samples; (4) unattended sample collection; (5) analysis of samples from multiple sites with one analytical system; (6) dilution or additional sample concentration to keep the sample size introduced into the analytical instrument within the calibration range; (7) collection of sufficient sample volume to allow assessment of measurement precision through replicate analyses of the same sample by one or several analytical systems; and (8) sample collection using a vacuum regulator flow controller if electricity is not available.

ASTM D5755 – 09(2014)e1 "*Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading*" – (Which can be used to support micro-vacuuming of soot off of wildfire impacted surfaces.) A collection method after a fire to identify the presumptive presence of asbestos. Education Note: This microvacuum sampling and indirect analysis method is used for the general testing of non-airborne dust samples for asbestos. It is used to assist in the evaluation of dust that may be found on surfaces in buildings such as ceiling tiles, shelving, electrical components, duct work, carpet, etc. The test method provides an index of the surface loading of asbestos structures in the dust per unit area analyzed as derived from a quantitative TEM analysis. The test method does not describe procedures or techniques required to evaluate the safety or habitability of buildings with asbestos-containing materials, or compliance with federal, state, or local regulations or statutes. It is the user's responsibility to make these determinations. At present, no relationship has been established between asbestos-containing dust as measured by this test method and potential human exposure to airborne asbestos. Accordingly, the users should consider other available information in their interpretation of the data obtained from this test method.

ASTM D6345 - 10 "*Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air*" – A sampling method used in some instances where VOCs may be an issue. The standard provides assistance in the selection of active integrative sampling methods, in which the volatile organic analytes are collected from air over a period of time by drawing the air into the sampling device, with subsequent recovery for analysis. Where available, specific ASTM test methods and practices are referenced. Guidance is provided for the selection of active sampling methods based either on collection of an untreated air sample (whole air samples) or selective sampling using sorbent concentration techniques that selectively concentrate components in air. Advantages and disadvantages of specific collection vehicles are presented.

ASTM D6602-13(2018) "*Standard Practice for Sampling and Testing of Possible Carbon Black Fugitive Emissions or Other Environmental Particulate, or Both.*" A testing method when using wipe samples. Education Note: Using D6602, it covers sampling and testing for distinguishing ASTM type carbon black, in the N100 to N900 series, from other environmental particulates. The practice requires some degree of expertise on the part of the laboratory microscopist. For this reason, the microscopist must have adequate training and on-the-job experience in identifying the morphological parameters of carbon black and general knowledge of other particles that may be found in the environment. In support of this analysis, Donnet's book is highly recommended to be used as a technical reference for recognizing and understanding the microstructure of carbon black. The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. Education Note: This practice covers sampling and testing for distinguishing ASTM type carbon black, in the N100 to N900 series, from other environmental particulates.

ASTM D7144-05a(2016) ***"Standard Practice for Collection of Surface Dust by Micro-vacuum Sampling for Subsequent Metals Determination."*** Human exposure to toxic metals present in surface dust can result from dermal contact with or ingestion of contaminated dust. Also, inhalation

exposure can result from disturbing dust particles from contaminated surfaces. Thus, standardized methods for the collection and analysis of metals in surface dust samples are needed to evaluate the potential for human exposure to toxic elements. Field sampling involves the use of sampling equipment to collect surface dust samples that may contain toxic metals, and it is intended for use by qualified technical professionals. Analysis allows for the subsequent determination of collected metals concentrations on an area (loading) or mass concentration basis, or both.

ASTM D7297-14 "Standard Practice for Evaluating Residential Indoor Air Quality Concerns" – Investigation and test methods for determining the indoor air quality in residential buildings. IAQ-based complaints and problems including discomfort/health symptoms and unacceptable indoor environmental conditions such as odors exist in residential buildings, but the frequency of the occurrence of IAQ complaints and problems is not known. Characterization of IAQ concerns and identification of their underlying causes require systematic observations and measurements of the indoor environment, its occupants and contaminant sources. This practice provides background and procedures for the investigation of IAQ concerns. Education Note: Where the dwelling is not owner-occupied, formal permission to access certain areas of the property and to collect information essential to the IAQ investigation is often deemed essential to be obtained from the owner and, where applicable, from other tenants. An investigator should seek legal advice in these matters. The stepwise and phased approach described in this practice allows for an investigation that is commensurate with the nature of the problem and the level of resources available for the investigation.

ASTM D7910-14 "*Standard Practice for Collection of Fungal Material from Surfaces by Tape Lift.*" Guidelines for collecting surface wildfire particulate follow D7910-14, which is a consistent procedure for collecting surface material using clear, transparent, single sided adhesive collection medium, typically clear Scotch tape (also known as tapelift). A tapelift sample collected according to this practice is intended to be used to assess the material present at one specific location on a surface for fungal content. A tapelift sample collected from a point of interest can be used for qualitative analysis or to quantify fungal material per sample or per unit area. Note that the recovery efficiency of material from the surface sampled is unknown and a likely source of uncertainty for quantitative analyses. A tapelift sample collected according to this practice can be analyzed by direct microscopy.

ASTM D8141-17 "*Standard Guide for Selecting Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs) Emission Testing Methods to Determine Emission Parameters for Modeling of Indoor Environments.*" Emissions of VOCs are typically controlled by internal mass transfer limitations (for example, diffusion through the material), while emissions of SVOCs are typically controlled by external mass transfer limitations (migration through the air immediately above the material). The emission of some chemicals may be controlled by both internal and external mass transfer limitations. In addition, due to their lower vapor pressure, SVOCs generally adsorb to different media (chamber walls, building materials, particles, and other surfaces) at greater rates than VOCs. This sorption can increase the amount of time required to reach steady-state SVOC concentrations using conventional VOC emission test methods to months for a single

test. Thus, existing methods for characterizing emissions of VOCs may not be practical to properly characterize emission rates of SVOCs for use in modeling SVOC concentrations in indoor environments. A mass transfer framework is needed to accurately assess emission rates of SVOCs when predicting the SVOC indoor air concentrations in indoor environments. The SVOC mass transfer framework includes SVOC emission characteristics and its partition to multimedia including sorption to indoor surfaces, airborne particles, and settled dust. Once the SVOC emission parameters and partitioning coefficients have been determined, these values can be used to modeling SVOC indoor concentrations.

ASTM E337 - 15 "*Standard Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures*" – The Standard is used when measuring humidity in wet buildings. The object of this test method is to provide guidelines for the construction of a psychrometer and the techniques required for accurately measuring the humidity in the atmosphere. Only the essential features of the psychrometer are specified. Education Note: The test method covers the determination of the humidity of atmospheric air by means of wet- and dry-bulb temperature readings. The test method is applicable for meteorological measurements at the earth's surface, for the purpose of the testing of materials, and for the determination of the relative humidity of most standard atmospheres and test atmospheres. This test method is also applicable when the temperature of the wet bulb only is required. In this case, the instrument comprises a wet-bulb thermometer only. Relative humidity (RH/rH) does not denote a unit. Uncertainties in the relative humidity are expressed in the form RH ± rh %, which means that the relative humidity is expected to lie in the range (RH − rh) % to (RH + rh) %, where *RH* is the observed relative humidity. All uncertainties are at the 95 % confidence level.

ASTM E800-14 "*Standard Guide for Measurement of Gases Present or Generated During Fires*." Because of the loss of life in fires from inhalation of fire gases, much attention has been focused on the analyses of these species. Analysis has involved several new or modified methods since common analytical techniques have often proven to be inappropriate for the combinations of various gases and low concentrations existing in fire gas mixtures. In the measurement of fire gases, it is imperative to use procedures that are both reliable and appropriate to the unique atmosphere of a given fire environment. To maximize the reliability of test results, it is essential to establish the following: 1) That gaseous samples are representative of the compositions existing at the point of sampling; 2) That transfer and pretreatment of samples occur without loss, or with known efficiency, and 3) That data provided by the analytical instruments are accurate for the compositions and concentrations at the point of sampling.

ASTM E1216 - 11(2016) "*Standard Practice for Sampling for Particulate Contamination by Tape Lift*" – Standard applies when collecting surface particulate after a fire. The tape lift provides a rapid and simple technique for removing particles from a surface and determining their number and size distribution. By using statistically determined sample size and locations, an estimate of the surface cleanliness level of large areas can be made. The user shall define the sampling plan. Education Note: The sampling plan shall consider the importance of surface geometry and surface orientation to gas flow, gravity, obstructions, and previous history of hardware. These factors influence particle

fallout and entrapment of particles on the surface. The geometry of joints, recessed areas, fasteners, and the correspondence of particle-count data to area can be maintained. The selection of tape and the verification of its effect on the cleanliness of the hardware is especially important. The tape adhesive should have sufficient cohesion to avoid transfer of the adhesive to the surface under test. The impact of adhesive transfer should be evaluated by laboratory testing before using the tape on the hardware. Since potential for adhesive transfer exists, cleaning to remove any adhesive might be required. In addition, the tape should have low outgassing characteristics, and as a minimum, it should meet the requirements of less than 1.0 % total mass loss (TML) and 0.1 % collected volatile condensable materials (CVCM), as measured by Test Method E595. Care should be exercised in deciding which surfaces should be tested by this practice. The tape can remove marginally adhering paint and coatings.

ASTM E1370 - 14 "*Standard Guide for Air Sampling Strategies for Worker and Workplace Protection*" – A company safety officer occupational exposure assessment strategy for determining air quality impacting workers in a fire damaged or smoke contaminated building. Education Note: The standard describes approaches used to formulate air sampling strategies before actual air sampling occurs. For most workplace air sampling purposes, and for most materials sampled, air sampling strategies are matters of choice. Air sampling in the workplace may be done for single or multiple purposes, such as health impact, hazard or risk assessment, compliance assessment, or investigation of complaints. Problems can arise when a single air sampling strategy is expected to satisfy multiple diverse purposes. Proper consideration of limitations of cost, space, power requirements, equipment, analytical methods, training, and personnel result in a best available strategy for each purpose. A strategy designed to satisfy multiple purposes must be a compromise among several alternatives and will not be optimum for any one purpose; however, the strategy should be appropriate for the intended purpose(s). The purpose or purposes for sampling should be explicitly stated before a sampling strategy is selected to ensure that the sampling strategy is appropriate for the intended use. Good sampling practice, legal requirements, cost of the sampling program, and the utility of the results may be markedly different for different intended sampling purposes. This guide is intended for use by those who are preparing to evaluate air quality in a work environment of a location by air sampling, or who wish to obtain an understanding of what information can be obtained by carrying out air sampling. This guide should not be used as a stand-alone document to evaluate any given airborne contaminant(s). This guide cannot take the place of sound professional judgment in development and execution of any sampling strategy. In most instances, a strategy based on a standard practice or method will need to be adjusted due to conditions encountered in the field. Documentation of any professional judgments applied to development or execution of a sampling strategy is essential.

ASTM E1728 - 16 "*Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination*" – The standard may be important in some fire damaged buildings where lead paint may be present. Education Note: The practice is intended for the collection of settled dust samples in and around buildings and related structures for the subsequent determination of lead content in a manner consistent with that described in the HUD Guidelines 5 and 40 CFR 745.63. The practice is meant for use in the collection of settled dust

samples that are of interest in clearance, hazard assessment, risk assessment, and other purposes. Use of different pressures applied to the sampled surface along with the use of different wiping patterns contribute to collection variability. Thus, the sampling result can vary between operators performing collection from identical surfaces because of collection variables. Collection for any group of sampling locations at a given sampling site is best when limited to a single operator. This practice is recommended for the collection of settled dust samples from hard, relatively smooth, nonporous surfaces. This practice is less effective for collecting settled dust samples from surfaces with substantial texture such as rough concrete, brickwork, textured ceilings, and soft fibrous surfaces such as upholstery and carpeting.

ASTM E2458 – 17 "*Standard Practices for Bulk Sample Collection and Swab Sample Collection of Visible Powders Suspected of Being Biological Agents and Toxins from Nonporous Surfaces*" – These practices can be used to sample other types of surface biological agents, such as mold and bacteria, soot and other residue after a fire. These practices should be used only to collect visible samples that are suspected biological agents and toxins and have been field screened as defined by the FBI-DHS-HHS/CDC Coordinated Document for explosive hazard, radiological hazard, and other acute chemical hazards. Practices provide standardized methods for collecting, packaging, and transporting suspicious visible powder samples that are suspected biological agents and toxins. Education Note #1: Collection of a bulk powder material from a nonporous surface using a sterile swab and laminated card as the collection devices to move the material into a container will depend on several factors, including (but not limited to): (1) amount of visible powder present; (2) sample composition; (3) choice of collection device; (4) size and shape of the collection container; (5) ability of the powder to become aerosolized; (6) texture and porosity of the surface; (7) humidity; (8) air movement; and (9) electrostatic properties of powders and collection tools/containers. Similarly, these practices standardize methods for sampling suspicious visible powders for on-site analysis, although wipe and swab sampling are often employed in the field for subsequent LRN reference laboratory analysis. The ability to collect suitable samples from nonporous surfaces using a sterile moistened swab will depend on the following factors: (1) swabbing procedure; (2) swab material; (3) sample composition; and (4) texture of the surface. These practices standardize suspicious powder collection and packaging procedures and swab sampling procedures to reduce exposure risk, to reduce variability associated with sample handling and sample analysis, and to increase reliability of sampling visible powder samples from nonporous surfaces. The bulk sample collection practice and the swab sampling practice are recommended for collecting amassed or dispersed powder samples from all nonporous surfaces on which the suspicious powder sample is clearly visible. These practices are not recommended for samples on porous materials such as upholstery, carpeting, air filters, or ceiling tiles. These practices are recommended for collecting visible powders where the bulk of the powder sample is amassed or dispersed over a limited area (optimally, area should be less than 20 by 20 cm (approximately 8 by 8 in.) or 400 cm^2 (approximately 64 $in.^2$). Education Note #2: These practices are to be performed by personnel who are adequately trained to work with hazardous materials in the hot zone (refer to NFPA 472, or OSHA - 29 CFR 1910.120). Personnel performing collection or screening under these practices shall be adequately trained in the use of sampling equipment, materials, and procedures. This includes personnel performing the prior initial chemical and radiological screening. Personnel

should use the appropriate level of personal protective equipment (PPE) to mitigate hazards during collection and screening. Personnel performing collection or screening under these practices shall be aware of evidence preservation and sampling procedures (NFPA 472 section 6.5).

Atmosphere – A standard unit of pressure exerted by a 29.92-inch column of mercury at sea level and equal to 1000 grams per square centimeter.

Atmosphere supplying respirator (respiratory protection) – (1) Atmosphere-supplying respirators provide protection against oxygen deficiency and toxic atmospheres. The breathing atmosphere is independent of ambient atmospheric conditions. (2) A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units. Education Note: A breathing device that supplies the wearer with air from a source that is separate from the ambient air. Atmosphere-supplying respirators provide the greatest respiratory protection. They let the wearer breathe air from an outside source, such as an air tank or a compressor. Atmosphere-supplying respirators are used where oxygen levels may dip below 19.5 percent or where certain gases and vapors are highly concentrated.

Atmospheres in buildings – The ambient atmosphere containing temperature, humidity, gases, and particulates, that engulf and makeup the indoor regions of the building, including wall, floor, and ceiling spaces.

Atmospheric air – Air that contains nitrogen, oxygen, carbon dioxide, water vapor, other gases, and miscellaneous contaminants such as dust, pollen, and smoke. This is the air we breathe and use for ventilation.

Atmospheric clarity – An optical property related to the visual quality of the landscape viewed from a distance. Atmospheric clarity usually comes up after a windstorm where clouds of dust are created and after a wildland fire, where smoke soot and ash fill the sky.

Atmospheric conditions, standard – An ASTM standard testing atmospheric condition, with moisture equilibrium of 65% RH ("2%) and temperature of 70ºF ("2%)/21ºC ("1%).

Atmospheric hazards – Any airborne hazard in air. Most atmospheric hazards are inhalation hazards, but atmospheric hazards are airborne ingestion and skin absorption hazards, radiation, flammable, gas, vapor, mist, chemical and atmospheric explosion hazards. Education Note: Atmospheric hazards include too much or too little oxygen in air, and airborne pollutants that are easily inhaled.

Atmospheric pollutant, maximum average daily concentration of an – The peak daily average concentration of an air pollutant. Highest of the average daily concentrations recorded at a definite point of measurement during a certain period of observation.

Atmospheric stability of a building – An expression of the air and environmental influences

exerted on the building throughout the day. Education Note: Atmospheric stability includes variance in air pressure, thermal changes, occupancy use, and dispersion and dilution of airborne contaminates.

Atomic oxygen cleaning – (See: Cleaning, atomic oxygen)

Attic – A room or space directly below the roof of a building. In modern buildings, the attic is the space between the roof and the ceiling of the upper story.

Attic smoke and soot inspection (wildfire) – A process of inspecting and assessing attic spaces and other accessible voids (e.g., crawlspaces under buildings) for signs of smoke odor and visible soot, char, and ash. In some instances, a qualified restorer can determine the presence/absence of smoke odor and visible soot, char, and ash. In other instances, environmental professionals will complete an independent assessment and inspection, and when required, collect samples using tapelifts and bulk insulation for independent laboratory analysis.

Attic smoke and soot restoration and deodorization (building fire) – The process of removing char, smoke, and soot from attic surfaces. Attic restoration is one of the least understood and underappreciated cleanup processes. Education Note: Attics are non-living spaces where its wood framing consists of raw lumber that is very porous. Smoke and soot will absorb onto surfaces and can adsorb into porous materials, making cleaning (washing) smoke and soot off raw lumber almost an impossible task. Fire damaged buildings that experienced direct contact with heat and smoke and soot from combusted materials require a full attic restoration process to be completed. Generally, this includes removing all attic insulation and HEPA vacuuming all surfaces. In heat damaged attics, restoration may include dry ice blasting of smoke soot and char. In non-heat damaged attics that experience wet smoke where oily smoke is present, dry ice basting and/or a clear encapsulating sealant may be required.

Attic smoke and soot restoration and deodorization (wildfire) – The degree of smoke odor and particulate contamination that will determine how to mitigate smoke odor and soot, char, and ash. For example, in a light smoke odor and particulate impaction, the restorer may decide – insulation and attic framing can be cleaned and deodorized together, where in a moderate to heavy smoke odor and/or particulate impaction, insulation must be removed, which allows cleaning and deodorization of the attic framing before new insulation is installed.

Attics and heat stress/heat exhaustion – The mandatory government requirements to employers to provide employees with a work environment that is safe and where temperatures do not raise the body's core temperature greater than 100.4°F. Employees working in PPE in an attic that is 90°F can expect to have core body temperatures exceeding 100°F. Attic temperature above 100°F can easily cause the core body temperature to rise above the permissible exposure limit level. In California for example, attic temperature can easily reach 90°F to 120°F. Any attic cleaning or restoration work requires employers to follow OSHA/CDC/NIOSH guidelines for heat stress and heat exhaustion.

Attainment area – A geographic area in which levels of a criteria air pollutant meet the health-based National Ambient Air Quality Standard for that specific pollutant.

Audit – An investigation of the ability of a system of procedures and activities to produce data of a specified quality.

Authorization – Permission to perform some action, provided by an individual empowered to grant it.

Authorization to Proceed (ATP) – The agreement entered into by the parties involved, authorizing the contractor or remediator, to perform a certain portion of the contract pursuant to the agreement.

Autoignition temperature – The lowest temperature at which combustion material ignites in air without a spark of flame. The autoignition temperature, a material property, varies substantially with conditions; the term is sometimes presumed to refer to the temperature measured for a given material using an ASTM specified procedure. In this program we use it the term to refer to the temperature of combustion without spark or flame in the conditions appropriate to the discussion at hand. (NFPA 921 3.3.13)

Available match (insurance) – Indicates that replacement material will be provided as available, where exact matching may not be assured.

Average humidity for electronics – Ideally, the average humidity should be 30-65% at a temperature of 68-77°F. The "ideal" humidity would be exceptionally low, simply because humidity lends itself to causing corrosion to the circuit board and connectors, cause components to become brittle. Education Note: When humidity reaches a higher level, rusting of steel components to corrosion of the c circuit boards and connections can occur. ("*Modeling Effects of Relative Humidity, Moisture, and Extreme Environmental Conditions on Power Electronic Performanc*e")

Average moisture content (AMC) – (1) The average of the amounts of moisture in a specific material in the built environment (such as plywood and oriented strand board subfloor) that is moisture measured at several depths and points across a grid. (BDMA) (2) In water damage restoration, the measurement that gives an overall picture of all the affected materials in a structure and the progress of drying during the restoration.

(B)

Backdraft / Back draft – (1) A fire phenomenon caused when heat and heavy smoke (unburned fuel particles) accumulate inside a compartment, depleting the available air, and then oxygen/air is re-introduced, completing the fire triangle and causing rapid combustion. (2) An air-pressure event

resulting from rapid depressurization to pressurization. In fire damaged buildings, back draft can occur from the re-introduction of oxygen to combustion in an oxygen-starved environment. (3) A condition that building appliances create when: a) The furnace is turned off for some time and reigniting it produces a small or large plume of oily smoke sending it throughout a room or building; b) A fireplace or wood burning stove with its flue closed causing soot to migrate throughout a room or building. Education Note: Back drafts from an oiled-fired furnace produces thick black clouds of oily soot and smoke film while fireplace or wood burning stove back drafts' generally produce more of a grey-colored smoke and soot residue that is considerably less oily.

Backdraft, fire – Rapid flaming combustion caused by the sudden introduction of air into a confined oxygen-deficient space that contains hot products of incomplete combustion. In some situations, these conditions can result in an explosion. (ISO 13943, 2008, 4.21)

Backfire (wildfire) – (1) A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire and/or change the direction of force of the fire's convection column. (2) A tactic used in wildland firefighting associated with indirect attack, by intentionally setting fire to fuels inside the control line. Most often used to contain a rapidly spreading fire, placing control lines at places where the fire can be fought on the firefighter's terms.

Backflow (plumbing) – (1) An undesirable reverse in water flow where a cross-connection in building plumbing exists. Backflow occurs when the pressure of the non-potable line suddenly and unexpectedly becomes higher than the pressure of the potable water line. (2) A reverse in pressure in a drain line that allows wastewater to flow back into plumbing and the building.

Back pressure – Pressure against the flow of liquids or air due to various imposed constrictions.

Back trajectory – A trace backwards in time showing where an air mass has been or came from.

Background concentration – (1) A measure of the surrounding air, material, or soil, which are considered normal for that environment. (2) The level and concentration of air, organisms, and chemicals that are part of the natural decaying and environmental influence processes. Education Note: Background concentrations are collected outside or from a control area. They are airborne tests that establish levels of ambient gases, particles, and microorganism, which are compared to potential indoor contaminant levels of gases, particles, and microorganism levels.

Background level, toxicity – The average presence of a substance in the environment, originally referring to naturally occurring phenomena.

Background levels – Two types of background levels may exist for chemical substances: 1) Naturally occurring levels: Ambient concentrations of substances present in the environment, without human influence; 2) Anthropogenic levels: Concentrations of substances present in the environment due to human-made, non-site sources (e.g., automobiles, industries).

Background measurements / Background sampling – Base-level readings of a control atmosphere

that is compared against the values of other atmospheres. Education Note: Background measurements may include temperature, humidity, gases, particles, and microorganism; light, noise (sound), vibration, EMF, wind speed, and other variables such as odor detection.

Background testing – Baseline testing of conditions in background of another environment.

Background temperature, instrument (thermography) – The apparent temperature of the radiant energy impinging on an object that is reflected off the object and enters the instrument. Education Note: The apparent temperature originates from the scene behind and surrounding the instrument, as viewed from the target. The reflection of this background appears in the image and affects temperature measurements. Good quality quantitative thermal sensing and imaging instruments provide a means for correcting measurements for this reflection.

Background temperature, target (thermography) – Apparent ambient temperature of the scene behind and surrounding the target, as viewed from the instrument. Education Note: When the FOV of a point sensing instrument is larger than the target, the target background temperature will affect the instrument reading. The target background temperature is also called the surrounding temperature, foreground temperature.

Background sampling – One or several samples collected to identify normal background levels of non-affected areas or surfaces or an outdoor control.

Background testing – Baseline testing of conditions in background of another environment.

BACT - Best Available Control Technology (BACT). During the management of fire damaged and/or soot contaminated buildings and contents, BACT refers to the best means for controlling damage based on science and technology.

Baghouse filter - Large fabric bags used to eliminate intermediate and large particles from an air conveyance system. Education Note: A baghouse filter functions similar to several vacuum cleaner bags, passing the air and some microscopic particles, while entrapping larger particles. Generally, a baghouse filter can trap up to 85% of particles of one micron or greater in size.

Bailee (insurance) **-** A party which accepts the property of another into its care and custody.

Bailee insurance - Insurance purchased to cover the bailee's legal liability for loss to property: belonging to others, while in the bailee's care and custody. (RIA)

Baking soda ($NaHCO_3$) – Sodium bicarbonate. A powder cleaner and deodorizer. Education Note: Baking soda is safe for cleaning almost all surfaces including clothing (on the dry side). In removing smoke and soot, baking soda can be mixed in with soda water, a cleaner or degreaser, to provide better abrasive qualities. It can be used at the completion of the cleanup job to shine crystal chandeliers and silverware. It also acts as a deodorizer that can be applied directly to dry upholstery and carpets; allow it to set for a period of time to allow absorption such as 10 to 15 minutes followed

by vacuuming. (See: Soda blasting)

Baking soda, about – The proper chemical name for sodium bicarbonate (baking soda or washing soda) is sodium hydrogen carbonate. Sodium bicarbonate is a white powder which is commonly used as an antacid and in cooking as a leavening agent as it reacts with acidic ingredients such as buttermilk and yogurt. It is also used for cleaning and as a deodorizer. It is a very weak base and may be used as an ingredient in toothpaste. Baking soda can also neutralize both acids and bases due to its amphoteric nature (amphoteric - a chemical having the characteristics of an acid and a base, and capable of reacting chemically either as an acid or a base), and it is often used to mop up small chemical spills involving acidic-based substances.

Baking soda blasting – A baking soda product (e.g., Arm & Hammer, Natrium Soda) acting as a media to remove surface contaminants with compressed forced air.

Bank down – What smoke does as it fills a room, where it banks down towards the floor, creating several layers of heat and smoke at different temperatures. The coolest area is at the bottom, where the hottest area is at the top.

Barrier, fire (building construction; firefighting) – Any physical obstruction that impedes the spread of the fire; an area or strip devoid of flammable fuels.

Barrier(s), critical - One or more layers of polyethylene sealed over openings into a work area or any other similarly placed physical barrier. It must be sufficient to prevent airborne contaminants in a work area from migrating into an adjacent area. (ANSI/IICRC S500 Standard) Education Note: Barriers (usually 6-mil polyethylene fire retardant plastic sheeting), seal off all openings to or within the defined regulated abatement work area, including but not limited to operable windows and skylights, doorways, ducts, grills, diffusers and any other penetrations to surfaces adjacent to or within the remediation or abatement work area.

Baseline data – Environmental information which determines ambient surface and atmospheric conditions for biological, chemical and toxins.

Batch mix (firefighting) – Manually adding and mixing a concentrated chemical, such as liquid foam, or powdered or liquid retardant with water, or gelling agents with fuel, into solution in a tank or container.

Bead – A rounded globule of re-solidified metal at the end of the remains of an electrical conductor that was caused by arcing and is characterized by a sharp line of demarcation between the melted and un-melted conductor surfaces. (NFPA 921 3.3.15)

Before cleaning, surface preparation – The process by which a surface is prepared for cleaning. Education Note: In smoke and soot removal from sensitive materials, surface preparation generally requires a visual inspection but may require other forms of macro and microscopic of the surface for determining existing damage or potential problems that may occur during accepted cleaning

practices. Some problems may include heat damage, high moisture content, bubbling and flaking, swelling, and the presence of heavy soot across a surface. Surface preparation requires addressing each of these issues along with soot removal. Once gross soot is removed the surface should be sufficiently prepared allowing more extensive cleaning to be completed.

Betterment (restoration) – An improvement or increase in value resulting from repair or replacement after an insurance loss, exceeding the requirements of like kind and quality.

Bias – (1) An unfair influence, inclination, or partiality of opinion. (2) Deviation of results or inferences from the truth, or processes leading to such systematic deviation. Any trend in the collection, analysis, interpretation, publication, or review of data that can lead to conclusions that are systematically different from the truth. (CDC)

Bias, sampling – (1) A systematic error inherent in a method or caused by some feature of the measurement system. (2) A systematic error manifested as a consistent positive or negative deviation from the known or true value. It differs from random error that shows a random deviation from a run or true value.

Biased sample – Any sample which is not a random sample.

Bid bond (insurance) – A guarantee that the contractor will enter into a contract, if it is awarded to him, and furnish such contract bond (sometimes called a "performance bond") as is required by the terms of the contract.

Biomass – The total mass of living and dead material in an area.

Black carbon soot/char (not carbon black) analysis – Black carbon soot and char analysis is best analyzed through transmission electron microscope (TEM), scanning electron microscope (SEM) and for particle morphology coupled with energy (electron) dispersive X-ray for elemental composition. Education Note: Black carbon soot is sub-micron particles formed through uncontrolled combustion of fossil fuels, biofuel, and biomass.

Black carbon (carbon black) and soot – There is no clear definition that differentiates between black carbon and soot. Education Note: It is believed the indoor air quality industry uses black carbon and soot terms interchangeably. However, there are some important differences between carbon black and black carbon/soot: Microscopically, using TEM analysis, carbon black is more uniform in size than black carbon/soot and the particle and aggregate size vary depending on the grade. The size of primary particles range between 10-100nm up to 200-500 nm. The size of black carbon/soot particles is mostly in the upper range and the morphology of the aggregates differ. Also, the "neck" connecting the particles is small when compared to the primary particle diameter in carbon black, whereas it can be as large as the actual particle in black carbon/soot. Other important differences are: the amount of aciniform particles (>97% in carbon black and variable starting from 60% in black carbon/soot), the concentration of sulfur (<2% in carbon black and variable in black carbon/soot, but usually higher than in carbon black), and the amount of residual hydrocarbons (low

in carbon black, varying up to 20% in black carbon/soot). (EMSL)

Black fire – The presence of a large volume of turbulent, black, and extremely thick (optically dense) smoke at high temperatures.

Blasting media – The use of a media such as shells, beads, dry-ice, baking soda, sand, and foam pellets. They are propelled by a compressor onto a surface to remove contaminates such as soil, stains, accretions, mold, char, and smoke.

Blasting, media (system) – A system of machinery that uses a media to remove surface contaminants through forced air pressure. Generally, the blasting media "system" includes a compressor and generator to run the equipment, a supply of material, hopper, hose, and sprayer with a proper nozzle.

Blister – (1) An elevation of the surface of a substrate, somewhat resembling in shape a blister on the human skin; its boundaries may be indefinitely outlined, and it may have burst and become flattened. (2) An enclosed raised spot evident on the surface of a material or its finish. (3) A condition sometimes caused by heat, causing bubbles to form and break because of changes in surface temperature and the humidity underneath the bubble. After the release of surface tension causing paint film to lift, the bubble bursts and blistering results. Education Note: Blisters on building finishing materials (e.g., paint, urethane) are mainly caused by the expansion of heated trapped air, water vapor, moisture, or other gases.

Blistering – (1) Small bubbles or bulges of a finish coat caused by trapped moisture or vapor pressure exerting up through the material weakening the finish. (2) Small bubbles or bulges in a finish coat of plaster or paint, caused by entrapped moister, heat, or applying a coating over an improperly prepared surface. (RIA)

Blisters on hardwood floors – (1) The blistering of the finish coat on hardwood floors, such as a urethane finish. (2) Cloudy or milky-looking raised spots on finished surfaces. Education Note: Blisters are caused by trapped moisture and/or water, and vapor pressure exerting up through the material weakening the floor finish.

Blisters on painted surfaces – Paint film that bubbles up into a dome shape. Paint has released its adhesion from the surface. Education Note: Blisters are cause by vapor pressure or trapped moisture passing through the substrate.

Blow back – A change in wind direction causing wildfire smoke to come back to an area.

Blow-up (wildfire) – A sudden increase in fire intensity or rate of spread strong enough to prevent direct control or to upset control plans. Blow-ups are often accompanied by violent convection and may have other characteristics of a fire storm. (See: Flare-up)

Board-up – The temporary installation of barriers to secure roofs, windows, doors and other penetrations against intrusion or weather. (RIA)

Bodily injury (insurance) **–** Any physical injury to a person. The purpose of liability insurance is to cover bodily injury claims to a third party that results from the negligent or unintentional acts or an insured.

Boundary layer – The layered air mass separating the surface of a material from ambient air.

BRI (education) – The Building Restoration Institute. BRI is the company that created the "*Remediation and Restoration Glossary for Professional Fire Damage Restorers*;" and the "*Wildfire Glossary for Environmental Professionals, Adjusters and Restorers*, 2020." BRI creates technical manuals and they teach courses throughout the world involving water, fire, mold, sewage damage mitigation and restoration; health and safety, and specialty courses; such as wildfire assessment and remediation; wildfire sampling for environmental and industrial hygienists; pot grow house assessment and remediation; crime and trauma scene cleanup.

BRI (environmental) – Building related illness. (See: Building related illness)

Broker (insurance) – An insurance broker who ordinarily sells, places, or negotiates insurance coverage with companies designated by the insured or with companies of his own choosing. An insurance broker is sometimes incorrectly used to designate an agent of more than one insurance company.

Bronchial (medical) – The airways of the lung, below the larynx that lead to the alveolar region of the lungs. Bronchial airways provide a passageway for air movement.

Bronchitis (medical) – Inflammation of mucous membrane of the bronchial tubes.

Brush (wildfire) – A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low growing trees, usually of a type undesirable for livestock or timber management.

Brush fire – A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.

Bubbling – (1) The condition brought about by trapped moisture vapor pressure under paint or wallpaper. (2) Bubbles of entrapped air or moisture that protrudes from a coated surface. (See: Blistering)

Buckling – A structural deformation or failure often characterized by bending, twisting, or bowing, typically as the result of overloading or swelling from moisture saturation, thermal contractions from heat.

Building coverage / Building footprint – The first-floor footprint that includes the garage but does not include the second level and is not to be substituted for floor-area-ratio (FAR).

Building damage – (1) The direct impaction of a fire or wildfire that causes heat damage to building

materials and finishes. (2) The direct impaction of a fire or wildfire by smoke, soot, ash, chemical or a biological component.

Building ecology – Physical environment and systems found inside the building. Key issues include air quality, acoustics, and electromagnetic fields.

Building element – The integral parts of a built environment, which includes floors, walls, beams, columns doors, penetrations, but does not include contents. (ISO 13943, 2008,4.25)

Building envelope – (1) An outdated term for a building enclosure. (Building Science Corporation) (2) The exterior of a structure (building) that encompasses exterior walls, floor, windows, roof, etc. and separates the conditioned areas from non-conditioned areas and which defines the environmental space within. (RIA) (3) The ambient area and atmosphere within the confines of walls, roof, and floors of a building. (4) The separation between the interior and exterior environment of a building. Education Note: Elements of the building includes all external building materials, windows, and walls that enclose the internal space. (EPA) (5) In LEED's terms, the exterior surface of a building including walls, roof, and floor; also called the building shell. (6) A building envelope that includes all components of a building that enclose conditioned space. Building envelope components separate conditioned spaces from unconditioned spaces or from outside air. For example, walls and doors between an unheated garage and a living area are part of the building envelope; walls separating an unheated garage from the outside are not. Although floors of conditioned basements and conditioned crawlspaces are technically part of the building envelope, the code does not specify insulation requirements for these components. (DOE)

Building enclosure – The system or assembly of components that provides environmental separation between the conditioned space and the exterior environment. Education Note: The enclosure is a special type of environmental separator. Environmental separators also exist within buildings as dividers between spaces with different environmental conditions.

Building heat factors, fire-related – The building design and construction can have a significant influence on fire behavior and the structural performance under fire conditions. Key factors include contents, construction, size, ventilation profile, and fire protection systems.

Building related illness (BRI) – (1) All structural parts and components that enclose the interior air space. (2) A term that refers to a diagnosable illness brought on as a result of exposure to air in a building with specific contaminants or pathogens, and with a traceable etiology (unlike sick building syndrome). (3) Diagnosable illness whose symptoms can be identified and whose cause can be directly attributed to airborne building pollutants (e.g., Legionnaire's disease, individuals experiencing hypersensitivity pneumonitis). Education Note #1: Symptoms of BRI include specific diseases or illnesses, including infection, fever, and clinical signs of pathology, which are identified and an airborne pathway for the stressor is recognized. Education Note #2: BRI is also a discrete, identifiable disease or illness that can be traced to a specific pollutant or source within a building. (EPA)

Building restoration inspection – The careful and complete investigation of damage including structural, water, fire, smoke, and microbial damage.

Bulk sampling – (1) A physical piece of a material suspected of being contaminated with mold that can be sent to the laboratory for analysis. (EMLab P&K) (2) The random or specific sampling collection method of water, soil, air, dust, and building materials for testing and laboratory analysis. (3) The taking of samples in arbitrary, irregular units rather than discrete units of uniform size for biological, organic, and inorganic chemistry analysis and chemical analysis.

Buffer zone, fire-related – In firefighting, a buffer zone is the safe operation inside a burning building created by the application of water in a fog pattern in cool and inert the hot gas layer. Education Note: Gas cooling results in lower hot gas layer temperatures (reducing radiant heat flux) and add thermal ballast to slow reheating of gases and reduces the potential for ignition of gasses overhead.

Burn – (1) To undergo rapid combustion or consume fuel in such a way as to give off heat, gases, and, usually light. (2) To cause or undergo combustion or be consumed partly or wholly by fire.

Burn indicators (fire forensics) – Any effects of heat or partial burning that indicate a fire's rate of development, points of origin, temperature, duration, and time of occurrence and the presence of flammable liquids.

Burn out – (1) A fire that burns to a point which can no longer produce heat. (2) A fire that no longer produces a flame.

Burn severity (wildfire) – A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

Burn test, fiber – (1) A method employed by carpet inspectors to identify types of fibers. Once burnt, the flame produces differences in color, smoke and the hardness of ash, and the shape of the burnt fiber residue. (2) The testing of a fiber, where small tufts of fibers are burned to test its content. Education Note: When burned, a cotton fiber has a vegetable smell, wool fiber smells faintly like hair, while a silk fiber smells distinctly like human hair.

Burned vs. burnt (discussion) – *Burned* and *burnt* both work as the past tense and past participle of *burn.* Both are used throughout the English-speaking world, but usage conventions vary. Education Note: American and Canadian writers use *burned* more often, and they use *burnt* mainly in adjectival phrases such as *burnt out* and *burnt orange.* Outside North America, the two forms are used interchangeably, and neither is significantly more common than the other.

Burner capacity – The maximum heat output (in BTU per hour) released by a burner with a stable flame and satisfactory combustion.

Burning – (1) The undergoing of rapid combustion or consumption of fuel. When cooking, burning

may occur on purpose or by accident, where overheating and charring may be the end result. (2) Decomposition of material by the application of heat and oxidation. Also applied to propellants and other pyrotechnic mixtures, though the proper term there is "reacting." (See: Scorching)

Burning rate – The rate at which a propellant, and other combustible materials burn.

Burnt – (1) The effects of burning after a fire is out. (2) A charred material which was consumed by fire and can release gases. (3) The human effects of being burned, such as experiencing injury.

(C)

Cabinet smoke odor – Cabinets that smell like smoke. Cabinets are usually kitchen cabinets that have been exposed to a fire and/or smoke from a stove, oven, cooktop, or microwave. Education Note: Cabinets exposed to protein fires are the most difficult to remove since protein fires cause a layering of fat and solvents on surfaces, which inhibits easy removal by cleaning. After HEPA vacuuming, and/or chemical sponging, cabinets should be detergent cleaned on all sides including glides. Porous bottoms and backs of cabinet drawers should be sealed with a flat water-based agent such as a clear varnish or urethane. When the cabinet casement still smells like smoke, the cabinet is expected to be detached from the wall, where it is removed for further cleaning and deodorization. By separating the cabinet from the wall, one should be able to determine if the smoke odor is associated with the wall or cabinet or both. The same investigation practice applies to built-in appliances, hoods and ceiling lights.

Cabinets / Cabinetry – Referring to cabinet work, that are collection of cabinets or stand-alone cabinet as furniture, which may be attached and/or built-in, where they contain shelves, drawers, and the storage of items. Education Note: Cabinets generally have doors, but not all cabinets have doors and drawers. In bathrooms, a cabinet is referred to as a vanity that contain toiletries.

Calcination – A heating process that occurs when gypsum board (wallboard or sheetrock) is exposed to heat and the water of crystallization in the calcium sulfate layer is lost. As the paper and paint burn off the gypsum board, the gypsum turns gray and begins to disintegrate. As the carbon is burned away, the wall becomes whiter. The difference between colors on the wall may show lines of demarcation that can assist the investigator in interpreting fire flow.

Calcination of drywall – Calcination is a chemical and physical change in the nature of common GWB produced by heating temperatures exceeding 80^{o}C (176^{o}F). (Kennedy 2003) Calcination occurs when gypsum board (wallboard; sheetrock) is exposed to heat and the moisture in cells of calcium sulfate is lost. As the paint and paper burns off, gypsum turns to a grey color and begins to disintegrate. As carbons burns at a higher temperature, gypsum compounds turn white. The difference between colors of remaining drywall may show lines of demarcation which can assist a forensic

investigator to determine heat flow. (Corry, Robert, Director of Fire Investigation Services, American Re-Insurance "E*xamples of Thermal Effects on Materials: Calcination and Impingement*") (See: Temperatures in a building fire)

Calcium chloride – A highly hygroscopic compound ($CaCl_2$) used in an anhydrous (dry) state for testing moisture content of various surfaces. Education Note: A dry sample is weighed, then placed on a surface (concrete slab) and allowed to absorb moisture for a specified time. Then the sample is weighed again to determine the weight of moisture absorption.

Camera documentation – Any optical capturing device (e.g., digital or video camera including 3D and drone) that records and documents events and conditions at a fire damaged or soot, char and ash impacted building.

Canadian Centre for Occupational Health and Safety (CCOHS) – The Canadian equivalent to the US OSHA; UK Health and Safety Executive.

Canadian Environmental Protection Act (CEPA) – A Canadian legislative act administered by Environment Canada and Health Canada beginning in 1988. Education Note: CEPA is the cornerstone of federal environmental legislation since the 1980s, which addresses controlling toxic substances, preventing environmental harm rather than merely reacting to dangerous conditions after the fact, providing coherence among powers and authorities under federal environmental statutes, enforcing federal regulations, and encouraging penalties for environmental offenses.

Canadian Public Health Association (CPHA) – An organization responsible for the representation of public health interests located in Ottawa, Ontario and through whom IARC publications may be obtained.

Canadian Standards Association (CSA) – Canadian organization who is responsible for the establishment of product and testing standards.

Candle / Candling (brush, tree or wildfire) – A single tree or a very small clump of trees which is burning from the bottom up.

Canister, Summa - Sub atmospheric pressure canister. Summa canister sampling is performed without micro-metering valve for taking grab samples, especially in potentially toxic environments including fire damaged buildings. Education Note: With this configuration, a grab sample of ambient air is drawn into a pre-evacuated Summa passivated canister. The canister is placed in the approximate breathing height of the child. The hand valve is opened a quarter turn until the sound changes as it nears atmospheric pressure, and the hand valve is then closed. Normal documentation, custody and sealing of the sample are completed and the package is ready for shipping.

Capillary – (1) The tendency of the surface of a liquid to rise or fall when in contact with a solid material. (2) The general behavior of fluids acting with surface tension on interfaces or boundaries. (ANSI/IICRC S500 Standard)

Capillary action – The movement of a liquid in the interstices of soil or other porous material because of surface tension. This phenomenon explains the movement of liquids in absorptive materials to levels higher than the level of external saturation. (RIA)

Carbon – Organic substances in all life. When heated carbon compounds are released.

Carbon adsorption (soils mitigation) – A treatment system in a Phase II remediation operation that removes contaminants from ground water or surface water by forcing it through tanks containing activated carbon treated to attract the contaminants.

Carbon adsorption (building deodorization) – The process of an activated carbon filter to capture vapors, fumes, and gases from air.

Carbon absorber – An add-on control filter on an air scrubber that uses activated carbon to absorb volatile organic compounds from the air stream.

Carbon black – (1) A submicron black carbon powder commercially produced under controlled conditions by burning hydrocarbons in insufficient air; it is composed of colloidal carbon of well-defined acinoform morphology. (2) A powdered form of carbon. Carbon black in powder form is used for its mechanical properties and pigmentation effects in many automotive products, printers as well as rubbers inks and dyes. (3) The manufactured material produced from controlled combustion or thermal decomposition of hydrocarbons. Education Note: Carbon black is also called acetylene black, channel black, furnace black, lampblack or thermal black. A type of carbon black is toner printer ink.

Carbon black analysis – Furnace, lamp, acetylene black is a manufactured spherical carbon material with particle sizes below one micron. A typical use for carbon black includes paint pigmentation, copier toner and automobile tires. Laboratory analysis for carbon black requires the use of TEM with EDXA.

Carbon black in air samples – A NIOSH 5000 method that addresses the analysis for carbon black in air samples. This method is gravimetric (it measures the total dust that was collected during a certain period of time), non-specific, and therefore, prone to interferences with any other components of the dust present in the air at the time of collection. Education Note: The NIOSH 5000 method can be used as initial screening or for OSHA compliancy. Unless additional methods employing electron microscopy are used to characterize the particles in terms of morphology and assess if they really are consistent with carbon black, this method does not give any additional information than the regular methods used to measure the exposure to total nuisance dust (such as NIOSH 0500/0600).

Carbon break(TM) – A product made by Kleenrite Chemical. It is formulated to dissolve and suspend fire damage residue including carbon, soot, grease, and other organic soils.

Carbon dioxide (CO_2) – (1) A colorless, odorless noncombustible gas with the formula CO_2 that is present in the atmosphere. It is formed by the combustion of carbon and carbon compounds (such as

fossil fuels and biomass), by respiration, which is a slow combustion in animals and plants, and by the gradual oxidation of organic matter in the soil. (2) A gas that is generated by humans, animals and plants. It's also a by-product of the combustion of fossil fuels. Normal exhaled gaseous constituents which are the product of aerobic respiration and decomposition that are odorless and colorless. High carbon dioxide levels are a byproduct of human activity in a building having poor air circulation and ventilation. Education Note: CO_2 is the most prevalent of the greenhouse gases. CO_2 is emitted by burning fossil fuels. CO_2 is also naturally occurring from sources such as human and animal respiration, ocean-atmosphere exchange, and volcanic eruptions.

Carbon filtration – The use of carbon and activated carbon in a filter apparatus to remove gases, chemical vapors, toxic, and hydrocarbons from air. Education Note: Carbon filtration is a control method only since it cannot address the source of the contamination.

Carbon monoxide (CO) – (1) A colorless, odorless, poisonous gas that results from incomplete combustion of carbon. The EPA ambient air quality TLV for carbon monoxide is 35 ppm for 1 hour, and 9 ppm for an 8-hour period. (2) A toxic gas, odorless and colorless, that produced when substances are incompletely burned. (NFPA)

Carbon monoxide from fires – One of the six criteria pollutants. A colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels. Education Note: The EPA ambient air quality TLV for carbon monoxide is 35ppm for a 1-hour work period and 9ppm for an 8-hour work period. "As a wildfire burns, it emits visible pollution in the form of smoke, soot, and ash. All smoke contains carbon monoxide, carbon dioxide and particulate matter (PM or soot). Smoke can contain many different chemicals, including aldehydes, acid gases, sulfur dioxide, nitrogen oxides, polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, styrene, metals, and dioxins. The type and number of particles and chemicals in smoke varies depending on what burns, how much oxygen is available, and the burn temperature." (DOH-NY State) Fires affect air quality by emitting CO—carbon monoxide—and hydrocarbons, plus nitrogen oxides, all of which, along with sunlight, are needed to make ozone. Unlike ozone in the stratosphere, which protects us from ultraviolet radiation, high levels of ozone in the troposphere, closer to ground level, can injure or destroy plant life (vegetation), human living tissue, and cause corrosion to metals and finishes.

Carbonized (carbonaceous) material – The generic term of carbonized material applies to char, ash, and coke/coal. Carbonization, as a chemical term, is defined as a chemical process of transformation of an organic substance by means of pyrolysis in a residue with carbon as the main elemental component. Education Note: The carbonized material from a wildfire is not significantly different than the components of a residential fire where wood was the primary component that was combusted. However, residential fire debris usually contains a higher concentration of black carbon/soot and charring from plastics and fabrics.

Carbon, organic – Aerosols composed of organic compounds, which may result from emissions from incomplete combustion processes, solvent evaporation followed by atmospheric condensation, or the oxidation of vegetation that cause emissions of smoke, soot and ash and chemical byproducts.

Carbon soot – Impure carbon particles resulting from the incomplete combustion of the gas- phase combustion process. Morphology of soot particles are similar to carbon black, fine micron/ submicron sized spheroids. Education Note: Under the electron microscope using EDS spectrum of soot shows strong carbon concentrations with few or no trace elements present.

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Carbonized material, char – A solid decomposition product of naturally or synthetic origin that maintains, at least in part, its original form.

Carbonized material analysis – Carbonized materials are characterized as char, ash, graphite, coke, and coal. This analysis is performed using polarized light microscopy (PLM) or epi-reflected microscopy (RLM). Additional analysis is necessary when attempting to determine the "source" or "point of origin" of carbonized material.

Carcinogens – Agents that cause or contribute to cancer. (*Wildfire Smoke: A Guide for Public Health Officials*, revised 2019) For example, formaldehyde is a known cancer-causing agent sometimes found in smoke.

Care, Custody and Control (CCC) (insurance) – A condition which excludes property from liability coverage in standard commercial policies. Property in the care, custody, and control of another is not covered by that party's liability insurance.

Care, Custody and Control (CCC) (contractor) – The liability the contractor (mitigator; restorer) assumes once the contract is signed. The contractor has complete care, custody, and control of the project until they release the building or affected area back to the customer.

Cause – (1) Identifying the precise location and mechanism by which a fire originated.(2) The circumstances, conditions, or agencies that brought about or resulted in the fire or explosion incident, damage to property resulting from the fire or explosion incident or bodily injury or loss of life resulting from the fire or explosion incident. (NFPA 921 3.3.22)

Cause and origin (CO) (investigation) **–** Identifying the precise location and mechanism by which a fire explosion or even a water damage originated.

Cause and effect – The origin of a cause and the study of resulting damage.

Caustic – The property of a chemical (usually a base) that enables it to burn, corrode, dissolve, or

eat away other substances. When the term caustic is used alone, it usually refers to sodium hydroxide, which is used in manufacturing hard soap. Education Note: Caustic also refers to caustic potash (potassium hydroxide), which is used in manufacturing soft soap.

Cavitation – Vacuum bubbles created by negative pressure in ultrasonic and megasonic cleaning processes. The cavitation process is often successful in returning fire and smoke impacted contents back to a salvageable condition, where sometimes, the condition is pre-loss.

Cavity – An interior space or void within building construction.

Cavity wall – (1) An exterior wall, usually of masonry, consisting of an outer and inner with separated by a continuous air space, but connected by wire or sheet metal ties. The enclosed air space provides improved thermal insulation. (RIA) (2) Two separate walls for single wall purpose with some space or cavity between them. Two separate walls are called "leaves of cavity wall;" the inner wall is called "an internal leaf;" where the outer wall is called an "external leaf." Education Note: A cavity wall is also known as a "hollow wall."

CCA- Chromated copper arsenate. A pesticide that is forced into wood under high pressure to protect it from termites, other wood boring insects, and decay caused by fungus.

CCA (fire damage remediation) – The careful removal of CCA materials from a building including other pressure treated wood, which may require increased worker protection and disposal requirements. Treated wood waste (TWW) includes building materials containing but not limited to arsenic, chromium, copper, creosote, and pentachlorophenol. After a building fire, for weeks and months later, burnt treated wood can continue to release harmful and toxic gases. Depending on local and state regulations, TWW may be considered a hazardous material waste product, requiring disposal in specific landfills.

Ceiling jet, fire – (1) The gas motion in a hot gas layer near a ceiling that is generated by the buoyancy of a fire plume that is impinging upon the ceiling. (2) A relatively thin layer of flowing hot gases that develops under a horizontal surface (e.g., ceiling) because of plume impingement and the flowing gas being forced to move horizontally. (NFPA 921 3.3.23)

Ceiling layer – A buoyant layer of hot gases and smoke produced by a fire in a compartment. (NFPA 921 3.3.24)

Ceiling plenum – In commercial buildings, the ceiling plenum represents the space below the floor and above a suspended ceiling. The ceiling plenum accommodates the mechanical and electrical equipment for the HVAC system; electrical, gas and plumbing lines. The ceiling plenum space is kept under negative air pressure. Education Note: When fire affects building designs of this type, smoke, residue and soot are drawn to this area where the ceiling plenum must be cleaned and deodorized along with interior spaces.

Centigrade (C/c) – A scale for measuring temperature. On the centigrade scale, water boils at 100^{o}

and freezes at 0^{o} Centigrade is converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32.

Centigrade/Celsius (^{o}C) – An international thermometric (temperature) scale. Centigrade and Celsius are used in different countries. However, Celsius and Centigrade are one and the same. They relate to the "temperature scale that registers the freezing point of water as 0° and the boiling point as 100° under normal atmospheric pressure." Celsius is named after the Swedish astronomer Anders Celsius, who developed the centigrade thermometer. Centigrade uses the freezing point and boiling point of water to define 0 and 100. In describing a Centigrade/Celsius scale, a thermometer scale on which the interval between the freezing and boiling points of water is divided into 100 degrees with 0° representing the freezing point and 100° the boiling point. Celsius is a simple shift of the Kelvin scale by subtracting 273.15 degrees. Education Note: The Kelvin scale uses the triple point of water as a standardization point. This is measurement is much more accurate than the freezing point of water. The Kelvin scale can then be shifted to make the 0's on each scale line up.

CEPA – The Canadian Environmental Protection Act.

Certificate of Completion (COC) – (1) A document presented by the contractor to the customer or insured that states something like: "the contractor completed all of the contracted work as agreed to the satisfaction of the customer." (2) A document used to substantiate the satisfactory completion of the scope of work or services to release the contractor from all legal liabilities of the construction process; designates the start of the warranty process. (RIA) (3) A form the contractor signs, which is delivered to the customer at the end of the contract, reporting; all work approved and outlined in in the contract and change orders, are completed. Education Note: Signed copies of the Certificate of Completion are provided to all materially interested parties.

Certificate of Environmental Clearance (CEC) or a (Environmental Compliance Certificate (ECC) – A clearance document generated by an environmental professional that complies with the clearance goals and achievement for a project.

Certification / Certificate of Satisfaction (COS) – (1) A document used to substantiate the satisfactory completion of the scope of work or services. (RIA) (2) A document presented by the contractor to the customer or insured, stating the contractor has completed their work per the terms and conditions on the contract. (3) A form the contractor has, which is signed by the customer once the customer agrees; all or specific work tasks or services are completed to their satisfaction. Education Note: The building owner then signs the document and returns it back to the contractor. The contractor then submits it to the bank or insurance company for final payment of outstanding invoices.

Certified Fire & Smoke Restoration Technician (FSRT) – A person that successfully passed the IICRC course involving fire and smoke odor damaged environments. The course taught technical procedures for successfully completing the odor control and restoration of a fire and smoke damaged environments. Technicians learned how to combine technical procedures with a practical approach to managing the jobsite.

Certified Asbestos Consultant (CAC) – In California and several other states, an individual with training and experience that is qualified to become state certified in the practice of asbestos consulting. Each state may call a certified asbestos consultant by a different name such as certified asbestos inspector.

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Certified firm (IICRC) – A company that has registered with the IICRC and agrees to comply with its codes of conduct. A Certified Firm has marketing and on-line education privileges a non-Certified Firm does not have.

Certified Indoor Environmentalist (CIE) – A environmental consultant certificate issued to qualified persons by the American Indoor Air Quality Association (AIQA).

Certified Industrial Hygienist (CIH) – (1) An individual who has met the minimum requirements for education and experience, and through examination, has demonstrated a minimum level of knowledge in various scientific disciplines. (2) An individual that has been certified by the American Board of Industrial Hygiene (ABIH), with professional qualifications and experience. For more information go to: http://abih.org/

Certified Lead-based Paint Consultant – A lead-based paint consultant/certified risk assessor, and other names given by states to those who meet state certification regulations to inspect and test lead-based paint (LBP). Education Note: Certified lead-based paint consultants are able to combine various inspection methodologies from the: basic Essential Maintenance Practices (EMP) visual inspection and paint chip testing that identifies potential LBP hazards; to X-Ray Florescence (XRF) inspection that quantitatively identifies the exact location of LBP.

Certified Master Restorer – An individual who has years of experience, where he or she attained certifications in various subjects as a journeyman which qualifies them to receive a master's certification in either water damage remediation; fire damage restoration; or textile cleaning. For more information go to: https://www.iicrc.org/page/IICRCMaster

Certified Restorer (CR) – (1) A person that successfully passed the Restoration Industry Association (RIA) course as a certified restorer. (2) An advanced professional certification for property damage restorers who have been qualified by the Restoration Industry Association as meeting its standards of

experience, training, and commitment to ethical practice. (RIA) Education Note: Education and study addresses buildings and personal contents property, and the course is based on the structure and nature of materials, and the effects of various perils. Restoration theory addresses the mechanisms by which residue odors are removed. Toxic contamination, allergic response, water damage, contracts and insurance are also covered. For more information go to: https://www.restorationindustry.org/page/CertifiedRestorer (See: RIA Courses)

Certified technician – A person by training and experience that met the qualifications to complete certification.

Chain of custody (COC) (laboratory) **–** (1) A term used in controlled transmission of samples from collection to analysis, especially of samples of materials used for medico-legal or forensic purposes. (2) A written document which transfers environmental samples from a field technician to a laboratory, or materials from one party to another. Education Note: Chain of custody documentation includes date, location, names, and signatures of those transferring and those receiving material or property.

Chain of custody form (evidence) **–** The chronological documentation, and/or paper trail, showing the seizure, custody, control, transfer, analysis, and disposition of evidence, physical or electronic.

Chain of custody form (environmental testing) **–** A record documenting environmental testing, showing the date, location, and type of testing completed, and the transfer of the chain of custody with samples to a laboratory (delivered; mailed). Education Note: The chain of custody and samples are evaluated by the lab where the chain of custody is then signed by the receiving laboratory. The lab now has total control of the materials submitted. Some Chain of Custody forms have on it, the sampling method being requested, is this a rush order, who will receive lab results, and billing information.

Change order – (1) A written order to a contractor signed by the owner or authorized agent as an addendum to a contract which authorizes a change (deletion or addition) in the current work schedule or work to be completed. (2) A written document which modifies the plans and specifications and/or the price of the mitigation, remediation, repair, or reconstruction contract.

Char / Charred – (1) Matter that is composed of particles that are larger than 1μm and may preserve the original cellular morphology of the material that was burnt. These particles can range up to millimeter in size. (2) Particulate greater than or equal to "1-micron in size" (1μm) made by incomplete combustion which may not deagglomerate or disperse by ordinary techniques, may contain material which is not black, and may contain some of the original material's cell structure and inorganic materials. (3) To convert to charcoal or carbon by the application of heat; to bum slightly or almost completely. Particulate greater than or equal to 1 micron in size made by incomplete combustion which may not de-agglomerate or disperse by ordinary techniques, may contain materials which are not black, but they may contain some of the original material's cell structure and inorganic materials. Education Note: Char is mostly elemental carbon, but it may also

contain trace concentrations of mineral components and ash. The main difference between ash and char is that ash may not preserve any of the original morphology of the precursor and it may have a higher concentration of inorganic components due to the complete consumption of some of the organic matrix. (ASTM D 6602)

Char / Charring – (1) To convert to charcoal or carbon by the application of heat; to burn slightly or partly; to scorch deeply. (RIA) (2) A particulate larger than 1µm made by incomplete combustion which may not deagglomerate or disperse by ordinary techniques, may contain material which is not black, and may contain some of the original material's cell structure, minerals, ash, cinders and so forth. (3) Carbonaceous residue resulting from pyrolysis or incomplete combustion. (ISO 13942, 2008, 4.38) Carbonaceous material that burned or pyrolized has a black appearance (NFPA 921)

Char, ablative – The results of damage to a material's protective layer after exposure to heat, gases, and cooling.

Char as an indicator – The first indicator of building damage while smoke and soot are secondary indicators of damage.

Char blisters – Convex segments of carbonized material separated by cracks or crevasses that form on the surface of char, forming on materials such as wood as the result of pyrolysis or burning. ((NFPA 921)

Char damage – Heat damage to a material caused by a fire.

Char, vegetative – Wildfire char that is composed of vegetative material which is partially carbonized by incomplete combustion. Using PLM analysis these opaque particles maintain most of the the original plant's morphology, often elongated with holes from xylem structures. The EDS spectrum of char shows high concentrations of carbon, lower concentrations of oxygen and trace amounts of other elements (*Wildfire Particulate in Proximally Located, Unburnt Buildings.* ACGIH: Spring 2011 Technical Conference).

Characteristic (sampling; laboratory analysis) – A property of items, a sample or population that can be measured, counted, or otherwise observed.

Charged particles – A particle which possesses at least one-unit electrical charge, and which will not disintegrate upon loss of charge. Charged particles are characterized by particle size, number and sign of unit charges and mobility.

Charred wood – Lumber and finishing materials including hardwood that have been converted to charcoal by the application of heat. Charred wood may include wood that has been burnt slightly or partially and wood that has been scorched deeply.

Charring (fire science) – The scorching of materials by fire; used to deduce the direction of fire spread by comparing relative depths of char throughout the scene.

Charred wood – Lumber and finishing materials including hardwood that have been converted to charcoal by the application of heat. Charred wood may include wood that has been burnt slightly or partially and wood that has been scorched deeply.

Chase (ventilation) – A continuous recess or enclosure built into a wall to receive pipes, wiring, ducts, etc. Also, to decorate metalwork by tooling or engraving the surface.

Check appliance – Inspection and testing appliance(s) by qualified persons to confirm they are working correctly; are properly functioning.

Checking – (1) Cracks in timber due to uneven seasoning; (2) a series of fine map cracks in painted and transparent finishes.

Checking (fire science) – A pattern of surface cracks running in irregular lines caused by heat.

Chemical – Any substance consisting of matter, which includes liquids, solids, or a gas. A chemical is any pure substance (an element) or any mixture (a solution, compound, or gas). Chemicals can either occur naturally or can be created artificially in a laboratory. Anything consisting of matter is a chemical, however, energy is not a chemical and neither is light, heat, sound, gravity, or magnetism.

Chemical cartridge assembly – A respirator that uses a chemical cartridge to purify inhaled air of certain gases and vapors. This type respirator is effective for concentrations no more than ten times the TLV of the contaminant, if the contaminant was greater than this, then an alternative respirator system would be advised. (BDMA)

Chemical cartridge respirator – (1) A face-type mask usually of a butyl-rubber-latex configuration, having one or two chemical cartridges. (2) A respirator having chemical cartridges such as an organic acid gas vapor capturing cartridge(s). Education Note: A respirator that uses a chemical cartridge to purify inhaled air of certain gases and vapors. This type respirator is effective for concentrations no more than ten times the TLV of the contaminant, if the contaminant was greater than this, then an alternative respirator system would be advised.

Chemical family – A group of single elements or compounds with a common general name. For example: acetone, methyl ethyl ketone (MEK), and methyl isobutyl ketone (MIBK) are of the "ketone" family. (IICRC S500 Standard, 2006; BDMA)

Chemical reaction – A process involving the rearrangement of molecules or the structure of a substance, as opposed to a change in physical form.

Chemical sensitivity (humans) – A chronic physical response induced by certain substances, involving discomfort, loss of function or other allergic symptoms.

Chemical sponge – (See: Dry sponge)

Chemical sponge / Chem sponge – A dry rubberized cleaning sponge that has large cells within the sponge capable of capturing dry particles from surfaces. Education Note: As the rubber sponge is being applied on dry surfaces, the surface cleaning action debrides the outer sponge layer, exposing a cleaner surface area for additional cleaning. The chemical sponge picks up soot and captures smoke odor. Remediation Note: The name chemical sponge, more commonly referred to by industry as a chemical sponge, possesses no special chemicals in the sponge as the name suggests. As a rubber-type sponge, it does not pick up or absorb water or chemicals easily, and it should not be used for wet-side cleaning. (See: Dry sponge)

Chemicals in smoke (fire science) – A complex mixture of particles, liquids, and gaseous compounds, including polynuclear aromatic hydrocarbons (PAHs), organic acids, particulate matter (PM), semi-volatile and volatile organic compounds (VOCs) and the inorganic fraction of particles. Education Note: The types of particles, liquids and gaseous compounds released in smoke depend on the fuel type and the amount of fuel, among other factors. The fuel for a house fire or structure fire includes all the items burned in the building: carpet, carpet pad, paint, electronics, linens, clothing, synthetics, polymers, etc. The fuel for a wildfire is primarily plant material such as wood from trees and shrubs, as well as grasses.

Chemicals in smoke, about – Smoke consists of gases and airborne particles produces because of combustion or burning. The specific chemicals depend on the fuel used to produce the fire. Here is a look as some of the principal chemicals produced from wood smoke. Education Note: Keep in mind, there are thousands of chemicals in smoke, so the chemical composition of smoke is extremely complex. In addition to the chemicals listed in the table, wood smoke also contains a large amount of unreacted air, carbon dioxide and water. It contains a variable amount of mold spores. VOCs are volatile organic compounds. Aldehydes found in wood smoke include formaldehyde, acrolein, propionaldehyde, butryaldehyde, acetaldehyde and furfural. Alkyl benzenes found in wood smoke include toluene. Oxygenated monoaromatics include guaiacol, phenol, syringol and catechol. Numerous PAHs or polycyclic aromatic hydrocarbons are found in smoke, also, many trace elements are released.

Chemicals in soot (fire science) – The burning of carbon materials that produce black solid or tarry (oily) substance that form hydrocarbon combustion. Education Note #1: Combustion releases small molecular-weight polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) such as C8 to C20 compounds, and various chemicals such as benzene and aldehydes. The composition of soot varies depending on the hydrocarbons being burnt. Education Note #2: Combustion releases small molecular-weight polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) such as C8 to C20 compounds, and various chemicals such as benzene and aldehydes. The composition of soot varies depending on the hydrocarbons being burnt.

Chemicals that meet "criteria pollutant" designation – Chemical pollutants that have been identified as being both common and detrimental to human welfare and are found over all the United States (ubiquitous pollutants). Education Note: EPA currently designates six pollutants as criteria pollutants, which many can be found in char and fire damaged buildings. These criteria pollutants

include carbon monoxide (CO), sulfur oxides (SOx), nitrogen oxides (NOx), ozone (O_3), lead (Pb), and particulate matter (PM). On the other hand, EPA refers to chemicals that cause serious health and environmental hazards as hazardous air pollutants (HAPs) or air toxics.

Chimney effect, fire – The upward movement of hot fire effluent caused by convection currents confined within an essentially vertical enclosure. This condition usually draws more air into the fire. (ISO 13943)

Chlorine bleach – Strong oxidizing agents that have one or more chlorine atoms in their molecular makeup. Liquid chlorine bleach products for home use (e.g., Clorox®, Purex® Javex®) are normally 5.25-6% solutions of sodium hypochlorite (NaClO). Education Note: Chlorine bleach also may be found in bathroom cleansers, dish washing compounds, and powdered laundry detergents (potassium or sodium dichloroisocyanurate). Chlorine bleach should not be used with silk, wool, chlorine sensitive dyes and on certain stains, such as rust, which it can set. In a ½% solution (mixed 1:11), chlorine bleach is an effective germicide. The addition of ammonia or acids to chlorine bleach liberates toxic chlorine gas.

Chronic exposure (medical) – (1) Multiple exposures occurring over an extended period of time or over a significant fraction of an animal's or human's lifetime. (2) Long-term exposure lasting several weeks to a lifetime. (EPA; IICRC S500 Standard, 2006)

Chronic effect (medical) – An adverse effect on a human or animal body, with symptoms that develop slowly over a prolonged period, or that occur frequently. Education Note: Examples of chronic effect include cancer and irreversible damage to certain organs.

Chronic exposure (medical) – Long-term contact with a substance, usually lasting from several weeks to a lifetime.

Chronic health effects from smoke (medical) – There is the potential for chronic health effects from exposure to the components of smoke. Long term exposure to ambient air containing fine particles has been associated with increases in cardiovascular disease and mortality in populations living in areas with higher fine particulate air pollution. Education Note: Frequent exposure to smoke for brief periods may also cause long-term health effects. Firefighters, who are exposed frequently to smoke, have been examined for long-term health effects (for example, cancer, lung disease, and cardiovascular disease) of repeated smoke exposures. The findings from these studies are not consistent or conclusive. Some studies show an increased frequency of these diseases among firefighters compared to similar male reference populations (e.g., male policemen, white males in the general population), while others do not.

Chronic toxicity (medical) – Adverse (chronic) effects resulting from repeated doses of, or prolonged exposure to, a substance over a relatively prolonged period, with resulting long-term, poisonous human health effects. Education Note: Ordinarily, chronic toxicity is used to describe effects in experimental animals.

CIH – Certified industrial hygienist. An individual's designation issued by the American Board of Industrial Hygienists. (See: Certified Industrial Hygienist)

CL - Ceiling limit; upper exposure limit which workers can be exposed to a contaminant.

Claimant (insurance) – An individual or corporation asserting right or presenting a claim (for an insured loss).

Claim's made insurance policy (insurance) – Coverage which is limited to claims or incidents which take place on or after the retroactive date designated in the policy and are first reported by the insured during the policy period. An alleged incident before the retroactive date is not covered regardless when the claim is made. It may also be necessary to secure "tail coverage" for protection against claims submitted after your coverage has expired.

Clarity (visual perception) – Relative distinctness or sharpness of perceived scene elements. For more information go to: http://vista.cira.colostate.edu/Improve/

Class-A fires – (1) Fires caused by ordinary combustion. (2) Fires burning in natural fuels such as wood, paper, or other vegetative fuels.

Class-A flammable materials – These are fires involving solid, organic materials including wood, cloth, paper, and many plastics.

Class-B fire resistance – Fire-resistance rating that indicates that roofing material can withstand moderate exposure to fire originating from sources outside the building.

Class-B fires – (1) Fires caused by flammable and combustible materials. (2) Fires burning in hydrocarbon fuels such as gasoline, oil, or diesel.

Class-C fire resistance – Fire-resistance rating that indicates that roofing material is able to withstand light exposure to fire originating from sources outside the building.

Class-C fires – Fires caused by energized electrical equipment. A class C fire is known as an energized fire or electrical fire. "Energized" in this case means that it is fed by a power source. Education Note: Class C fires may begin from a short circuit, faulty wiring, power cord damage, overcharged devices, or overloaded electrical outlets. Any place where electrical equipment is used, or electrical wiring is present is a potential site for a class C fire.

Class-D fires – Fires caused by combustible metals. Education Note: A Class D fire is characterized by the presence of burning metals. Only certain metals are flammable, and examples of combustible metals include sodium, potassium, uranium, lithium, plutonium, and calcium, with the most common Class D fires involve magnesium and titanium.

Class-K fires – Fires caused by oils and grease normally found in commercial kitchens and food

preparation facilities using deep fryers. Education Note: Class K fires are fires with substances such as the animal and vegetable fats present in commercial cooking oils and greases. These types of fires can only be effectively quenched with a Class K fire extinguisher. It is vital for restaurants to have the proper firefighting equipment on hand to have success when encountering dangerous fires that can occur in the commercial kitchen.

Class IA Flammable Liquids – A class of flammable liquids with a flash point below 73°F and a boiling point below 100°F.

Class IB Flammable Liquids – A class of flammable liquids with a flash point below 73°F and a boiling point at or above 100°F.

Class IC Flammable Liquids – A class of flammable liquids with a flash point at or above 73°F and below 100°F.

Class II Flammable Liquids – A class of combustible liquids with a flash point at or above 100°F and below 140°F.

Class II hardboard paneling finish – A finish that meets the specifications of Voluntary Product Standard PS-59-73 as approved by the American National Standards Institute.

Class III Flammable Liquids – A class of flammable liquids with a flash point above 140°F.

Clean (restoration) – To remove residues or contaminates caused by a specific incident or damage, as distinguished from pre-existing or normal conditions. (RIA)

Clean for clean (restoration) – The ignition and final cleaning process in cleaning ceilings, walls, and flooring; doors windows and cabinets, without the necessity for painting or refinishing.

Clean / Cleaning for paint (restoration) – The removal of surface dirt, smoke film and other contaminates to a degree sufficient for the surface to have a proper application of a sealer and paint.

Clean room – (1) An unaffected room that has facilities for storing employees' street clothing and uncontaminated materials and equipment. (2) A room that was cleaned and deodorized where it can be used for other purposes, such as storing non-affected contents. (3) A room that has been signed off as being cleaned after restoration.

Clean water – Water that came from a potable source which can be used to clean the interior of a building or contents impacted by smoke, soot, char, and ash.

Cleaner, aqueous – A blend of water-soluble chemicals designed to remove smoke and soot from surfaces.

Cleaner, foam, and liquid – Foaming and liquid cleaners capable of removing soot and ash without

damaging hard surfaces and most textiles (see labeling instructions for application on textiles). Examples include but are not limited to Lysol disinfectant foam, Tuff Stuff, Blue Magic, Woolite Carpet Cleaning Foam, OxiClean Miracle Foam, Orange Cleaning Foam, Stainless Steel Magic.

Cleaner, foam and liquid abrasive – Aggressive abrasive cleaners capable of removing smoke and soot and imbedded grime without damaging most hard surfaces. (Some products should not be applied on brushed stainless steel and other sensitive finishes.) Examples include but are not limited to: Melamine Foam Cleaner, CRC HydroForce, Seige Porcelain and Enamel Cleaner, Soft Scrub.

Cleaner, professional – (1) An individual or company specializing in the cleaning of buildings and contents. (2) One who applies specialized knowledge about carpet components and construction, soiling (e.g., types, sources, distribution), cleaning agents and how they function, cleaning and spotting principles, and the methodology for removing maximum soil with minimum harm to textile floor coverings, end-users, and the environment. (IICRC S100, 2015)

Cleaning – The process of removing unwanted substances, where the material or finish has the absence of dirt and impurities.

Cleaning, acid – A cleaning solution that has a pH significantly below 7, typically a pH below 5.5 Acid cleaners contain acids and other cleaning ingredients including surfactants. Education Note: Acid cleaners clean using the cleaning mechanism of acid solubalization where acid reacts with soils, soot and smoke film to create a water-soluble molecule. Through hydrolysis this process can break molecules into smaller water-soluble substances.

Cleaning, air – An indoor air quality control strategy to remove various airborne particulates and/or gases from the air. The three types of air cleaning most commonly used are particulate filtration, electrostatic precipitation, and gas sorption. (CDC)

Cleaning, alkaline – A water-based cleaner that contains alkaline ingredients that cause the cleaner to have a significantly high pH. A cleaner having a pH of 8.5 is considered mild; a cleaner with a pH of 11-12.5 a medium quality cleaner; high pH cleaners are those that are above 12.5 and are considered corrosive. Alkaline cleaners promote saponifying, solubilizing and hydrolysis.

Cleaning, atomic oxygen – An atomic cleaning process for removing soot from paintings and other works of art. Atmospheric pressure generates a beam of monatomic oxygen that reacts with carbonaceous deposits that converts the carbon to CO and CO_2 thus, converting any hydrogen content of the deposit to H_2O (water vapor). Education Note: Until recently, conventional techniques for cleaning paintings involve the use of solvents, which are not effective in some cases. In contrast, the use of monatomic oxygen causes the removal or carbon deposits followed by cleaning at a controlled rate. (John H. Glenn Research Center, Cleveland, Ohio). For more information go to: https://www.nasa.gov/centers/glenn/business/AtomicOxRestoration.html

Cleaning attic insulation – The removal of visible soot and char off the surface of insulating materials sufficient to achieve an appearance acceptance. Education Note #1: One of the most difficult jobs is

working in attics and attempting to remove settled loose soot and char particles off insulation. At best, the cleaning process is only an attempt to bring back the remaining insulation to an acceptable condition; not 100% free of soot and char particles. Education Note #2: When attic insulation (especially blown-in insulation) is present and it must be soot cleaned, it is generally more cost effective to remove and replace insulation with new materials rather than attempt cleaning it. It is not unheard of to hear about a cleaning technician mixing (turning) blown-in insulation over so that is has a general soot-free appearance. At that point finding soot particles is like looking for a needle in the haystack.

Cleaning by maid service – The steps completed by maid service staff in dusting, vacuuming and general cleaning of surfaces.

Cleaning contents on-site – The cleaning of contents on-location (on-site) with cleaning solvents and portable equipment that are commonly found in a cleaning plant.

Cleaning, clothes – The process of fabric cleaning that removes smoke, soot and chemical byproducts, resulting in returning clothing back to an odor free (odor neutral), smoke stain free and sanitary state.

Cleaning, dry ice – (See: Dry ice blasting)

Cleaning, dry sponge – The removal of smoke and soot-based residues by applying a rubber or synthetic cellular sponge across a sooty surface.

Cleaning, dry steam – Steam that does not contain water droplets; it contains only moisture vapor.

Cleaning, emulsion – A cleaning technique that emulsifies surface contaminants. Emulsion cleaning solvents often include a combination of and synergy with cleaners and surfactants.

Cleaning, exterior building – The removal of damaging smoke and soot particles and residues from the outside surface of buildings and surrounding land. Education Note: Exterior building and the surrounding land cleaning usually requires a detergent chemical pressure washing. Side-by-side tests show chemical pressure washing works best when water temperature at the nozzle is extremely hot (above 200°F).

Cleaning, exterior contents – The removal of damaging particles and residues from the outside surface of contents, appliances furniture, and fixtures.

Cleaning, extensive – The widespread cleaning of dirty, sooty, or contaminated items or surfaces. Education Note: Extensive cleaning includes but is not limited to cleaning an entire item or material on all sides including dismantling its parts, such as required in smoke damaged appliance cleaning.

Cleaning, fabric – The inspection and determination how fabric (e.g., draperies, linens, and clothing) should be cleaned and what process should be used to remove dirt, residue, smoke, soot, stains and odors. (See: Cleaning, clothes)

Cleaning, final – The last of several cleaning process that achieves the desired level of cleaning.

Cleaning, foam – A spray foam cleaning method. Spray cleaning foams are intended to suspend loose and sometimes imbedded smoke and soot without damaging the substrate. Education Note #1: Products like Lysol Pro Disinfectant (for general surfaces); Screen Guard (for non-scratch surfaces including computer monitors); Woolite foam carpet cleaner (for most rugs and fabrics); Meguiar's Leather Foam cleaners and conditioners (car and house leather), and Leather Master Foam Cleaner (for suede and alcantara); Sea Foam Spray (for metal surfaces where soot and grease is present); and Orange Clean Foam (for general hard surface cleaning). Another product for sensitive surfaces is men's and women's shaving cream. Education Note #2: As it relates to soot contaminated sensitive materials and surfaces, and depending on the material and its porosity, consider doing a test area first (always read and follow foaming instructions): 1) HEPA vacuum loose soot particles; apply spray foam and let it set from 15 seconds to one minute; Carefully HEPA vacuum off foam (with a soft bristle attachment) without touching the surface and determine if the soot residue is gone or the surface responded positively to the treatment. 2) Another test is to HEPA vacuum loose soot particles; apply spray foam and let it set from 15 seconds to one minute; with a cotton ball wipe-test, wipe the test area and see what the underlying surface looks like.

Cleaning for clean – The ability to restore and item, content, upholstery or building back to a state of cleanliness without supplemental procedures such as base sealers, paint, and finishes.

Cleaning for paint – The removal of smoke, soot and ash residues to a degree that is sufficient for the proper application of paint.

Cleaning for restoration – The removal of surface and hidden contaminates from hard surfaces, semi-porous and porous materials through cleaning, before they are reconditioned, refurbished, or restored.

Cleaning green – An environmentally responsive process in using safe and environmentally accepted products to clean with. It is achieved by integrating cleaning products, policies, operational procedures, methods, or systems that are intended to minimize harmful environmental impact and maximize sustainability of the built environment.

Cleaning, general – The activity of cleaning, using products and processes designed to provide a specific level or type of cleaning; the removal of undesired organic substances by one or more cleaning method.

Cleaning, gross – The removal of massive unsanitary waste or contamination.

Cleaning, heavy – The removal of massive or large amounts of waste or debris.

Cleaning HVAC system – The removal of fire residue and particulates from the exterior and interior housing and all parts making up the air distribution system.

Cleaning, in plant – The process of cleaning, sanitizing, and deodorizing fabrics, contents, furniture

and works of art back to their pre-loss condition in the contractor's place of business.

Cleaning, interior – To dismantle as necessary and clean interior components. In a fire or wildfire soot odor cleaning situation, taking out furniture drawers to clean the drawers on all sides and the cabinet may be necessary.

Cleaning, laser – The removal of carbon-based smoke and soot with lasers. Laser cleaning is a state-of-the-art cleaning process for removing smoke and soot from paintings and murals in historical buildings and the building. Depending on the setup, laser cleaning can be completed onsite, in a cleaning plant or laboratory. The most accepted laser cleaning method is the Nd:YAG.

Cleaning, light – The removal of loose soot and debris by general housekeeping practices including vacuuming and washing.

Cleaning, mechanical – The removal of solid particles and smoke film through scrubbing.

Cleaning, medium – A middle position in the cleaning process by which the cleaning of surfaces is not light or heavy.

Cleaning, megasonic – A cleaning technique utilizing sound waves at frequencies higher than those for ultrasonic cleaning systems, from 500 kHz to 2 MHz.

Cleaning method for textiles – A textile floor cleaning method is the chemistry and the equipment used within a system. Textile floor covering cleaning methods can be utilized on their own or in combination with other methods in a textile floor covering cleaning system. (IICRC S100, 2015)

Cleaning, non-porous materials – The surface cleaning and removal of contaminants from non-porous materials and finishes such as glass, most plastics, dishware, ceramics, finished wood, vinyl flooring, and sealed marble, granite, and terrazzo.

Cleaning, on-location contents – The cleaning of contents on-location (on-site) with cleaning solvents and equipment that are commonly found in a cleaning plant.

Cleaning, periodic – The cleaning activities that are needed to be performed and completed on a regular basis. Some buildings, components and contents may require daily, weekly, monthly, quarterly, and seasonal periodic cleaning.

Cleaning, polyurethane flooring – In smoke and soot damage restoration, the appropriate soot, smoke film cleaning process for hardwood floors having a polyurethane finish. Education Note: 1) Check with the flooring manufacturer to ensure your recommendations and supplies are the same as theirs. When the manufacturer recommends a cleaning supply or topcoat finish, follow manufacturer recommendations. 2) Remove contents and rugs off the floor. 3) Make sure the ceiling, walls, windows, and doors are in a clean state and the floor has already been HEPA vacuumed before final floor cleaning begins. 4) Detergent wash floor with a grease-cutting dish soap such as Dawn and clean

warm water. 5) While it is important to not over saturate the floor (no standing water), the floor and sponge cleaning process must wet the floor sufficiently enough to remove smoke film, soot, and grime. 6) A second person is to follow the first cleaning person with freshwater rinsing. 7) When either the detergent washing or rinse water becomes cloudy or grey in color, it is time to change out the detergent and the warm rinse water and use a clean sponge mop. 8) This process is to be completed until the washing and rinse water is clear of color and floors are dry. 9) Per manufacturer instructions, apply appropriate topcoat finishes.

Cleaning, polyurethane flooring alternative – In smoke and soot damage restoration, cleaning methods that are different from traditional hardwood floor cleaning processes, but they may be appropriate for a situation. Education Note: 1) When the restorer has a truck-mount cleaning system, steam clean smoke and soot residue off the hardwood floor at 200°F or greater along with low pressure misting using a special wand that will not scratch hardwood floors and the system is capable of extracting any remaining surface water at the same time. Use a white glove test about 10 minutes after cleaning where surface drying should not be able to identify discoloration on the glove, cloth, or cotton wipe. 2) Vapor steam clean hardwood floors after HEPA vacuuming of loose smoke and soot residue with a vapor-mist steam cleaning system. The ease of use benefits become obvious within minutes, however, so do the drawbacks when steam vapor towels become overloaded with smoke and soot and must be replaced often in some soot cleanup situations. The two alternative methods described above work in conjunction with each other when smoke and soot is more than light fallout of soot particles.

Cleaning, porous materials – The cleaning of materials and contents that are porous and absorbent. Solvent spray and water-base cleaning processes are designed to clean pores that suspend dirt, grime, and contamination. Education Note: Once cleaned, the porous surface should be rinsed before drying.

Cleaning, powder – The process of removing dirt, debris, stains, smoke, soot, and other contaminants by applying and agitating an absorbent powder cleaner on the surface. Education Note: The powder cleaner dislodges and holds contaminants, which are removed along with it. Powder cleaning can be applied as a scouring powder surface abrasive or a blasting media.

Cleaning residue – Any removed material that is left on a surface or in a fabric following cleaning. (ANSI/IICRC S500 Standard, 2006)

Cleaning, responding to – (1) Contaminated materials that respond positively to cleaning. (2) The release of fire and other residues to a satisfactory degree by the application of restorative cleaning procedures.

Cleaning response – The ability of a chemical or process to clean smoke and soot off a surface.

Cleaning, restoration detail (detail cleaning) **–** Special restoration cleaning procedures that are necessary to remove the smallest amount of contamination.

Cleaning, restorative – The application of procedures designed to remove damaging residues from a surface while retaining as much of the original character and patina as possible. Education Note: 1)

Restorative cleaning often requiring the use of specialized cleaning techniques and equipment. 2) Restorative cleaning is part of the restoration process and refers to the cleaning or removal of smoke, soot, gases, floodwater, and sewage residues in buildings and contents.

Cleaning, routine – Cleaning that is scheduled and completed on a regular basis. Usually, routine cleaning involves daily tasks and is part of preventive maintenance procedures.

Cleaning, secondary – (1) The second cleaning step in a cleaning process. (2) An alternative approach to cleaning.

Cleaning, smoke restoration – The application of procedures designed to remove damaging smoke and soot residues and odor and returning the surface or material back to its pre-loss condition.

Cleaning smoke and soot, mechanical – The removal of solid particles and smoke film through vacuuming and scrubbing.

Cleaning, spray – A water spray device or rig that washes off smoke, soot, and other debris.

Cleaning, soaking – A process of immersion where items are submerged or encased in water bath for a period of time.

Cleaning, soda blasting – (See: Soda blasting)

Cleaning, solvent – (1) The use organics to dissolve and disperse other compounds. (2) A liquid material used for hand-wipe spray gun or flush cleaning. The term includes solutions that contain VOCs. Education Note: The term includes solutions that contain VOCs.

Cleaning, soot, and smoke removal process – Soot vacuuming and/or air washing followed by a mild alkaline detergent washing to neutralize, retard, or stop pitting and corrosion or discoloration of finishes. Education Note: Initially on building material surfaces, soot vacuuming and/or air washing followed by a mild alkaline detergent washing to neutralize, retard, or stop pitting and corrosion or the discoloration of finishes.

Cleaning, specific – The activity of cleaning, where that cleaning involves customized cleaning processes for the removal of known and unknown soils and other organic substances, such as spots, stains, and discoloration.

Cleaning, sponge – An act of wiping and cleaning. Sponges designed to clean (capture and retain) small particles and absorb liquids. Cleaning sponges can be rinsed out, washed, and reused multiple times.

Cleaning, sponge blasting – (See: Sponge blasting)

Cleaning, spray – A water spray device or rig that washes off smoke, soot, and other debris.

Cleaning, staging of – Supplies delivered to a loss and staged for the purpose of cleaning.

Cleaning, steam – (1) The process of removing unwanted residues by the application of detergents and steam. (2) The process where steam combined with detergents followed with vacuuming removes dirt, grime, soot and smoke from carpets and other fabrics; hard surfaces including wood and vinyl floors, marble, and granite. (See: Steam cleaning)

Cleaning, surface wipe – The process of cleaning a surface with a wipe, such as a natural or a synthetic sponge, Terry cloth towel, microfiber cloth, cotton rag, paper towel; static and antistatic cleaning materials.

Cleaning, surface preparation before – The process by which a surface is prepared for cleaning. Education Note: In smoke and soot removal from sensitive materials, surface preparation generally requires a visual inspection but may require other forms of macro and microscopic of the surface for determining existing damage or potential problems that may occur during accepted cleaning practices. Some problems may include heat damage, high moisture content, bubbling and flaking, swelling, and the presence of heavy soot across a surface. Surface preparation requires addressing each of these issues along with soot removal. Once gross soot is removed the surface should be sufficiently prepared allowing more extensive cleaning to be completed.

Cleaning supplies – (1) The equipment, tools, and chemicals necessary to complete a cleaning job. (2) Cleaning supplies that are in inventory and readily available for use.

Cleaning supplies, staging – Supplies delivered to a loss and staged for the purpose of cleaning.

Cleaning system – A textile floor covering cleaning system is the implementation of principles, procedures, and methods used to achieve a desired level of cleaning. (IICRC S100, 2015)

Cleaning, test area – A process by which a small area of a surface or material can be test cleaned without causing any appreciable damage to that area. Education Note: On sensitive materials and items, test area cleaning begins with the removal of loose soot and ash, followed by Q-Tip and cotton ball or cotton pad testing. In order, this small but ideal control test method provides valuable information how the surface responds first to water (preferably distilled or deionized water when testing contents and sensitive materials and surfaces); non-aggressive cleaning methods using foam cleaners and liquid detergents; more aggressive cleaning by either increasing the concentration of the liquid cleaning or increased agitation. Unless the surface is non-permeable and is scratch resistant, the use of scouring and abrasive cleaners is discouraged. However, when the surface is a painted wall or molding, a follow up scouring cleaning process may provide the best results for removing surface stains and chemical residues before repainting. Finally, test area cleaning may require the use of various kinds of cleaning agents including ammoniated and non-ammoniated cleaners; cleaners with low and high surfactantcy; cleaners that are less abrasive and more abrasive.

Cleaning, ultrasonic – (See: Ultrasonic cleaning)

Cleaning, upholstery light – The inspection and determination how upholstery (e.g., fabric and leather chairs, ottomans, couches) should be cleaned and what process should be used to remove surface dirt, oily residue, smoke, soot, stains and odors; smoke and odors trapped in foam and batting. (a) When light or nuisance soot deposits are present, HEPA vacuuming may be all that is necessary to clean upholstery. (b) However, even when light or nuisance soot consists of wet soot or oily soot, professional cleaning us generally recommended. (c) Adding to the complication is smoke odor. When smoke odor is present this is an indication an oily smoke film is present or has absorbed in fabrics, foam cushion and batting.

Cleaning, upholstery inspection before – The inspection and determination how upholstery (e.g., fabric and leather chairs, ottomans, couches) must be cleaned. Education Note Cleaning begins with an inspection process outdoors in sunny - clean air or upholstered furniture that is moved to a professional cleaning plant where they inspect upholstery under bright 100 to 500-watt lamps. In addition, identification of particulates or damage can be done in a controlled dark environment having a strong UV light, it may be possible to see surface contaminates including soot and char residue. (All of the just mentioned inspection processes may be necessary.)

Cleaning, upholstery moderate or extensive – The cleaning process once a thorough inspection of the condition of each piece of upholstery is complete including testing to determine best use of cleaning chemicals. Education Note: Oily soot is capable of permanently staining upholstery. However, light, and medium oily stains may not be visually apparent at first, but discoloration may appear weeks later as aging, dullness, loss of luster, color distortion or shading. Cleaning involves following manufacturer instructions. If allowed by the manufacturer, detergents having a pH of 9-12.5 should be applied and then thoroughly rinsed and dried. The rate of drying (i.e., fast or slow) may depend on the type of material and condition. Acid-based cleaners should be used only when the manufacturers recommend their use or color bleeding may be an issue. This recommended cleaning technique should only be attempted by certified upholstery & fabric cleaning technicians (UFT).

Cleaning, upholstery smoke odor – (1) A process that removes trapped smoke odor in upholstery framing, foam, batting, and surface textiles. (2) A process that incorporates different cleaning and deodorizing methods to clean upholstery.

Cleaning, vinyl flooring – (See: Cleaning, polyurethane flooring; Cleaning, polyurethane flooring alternative)

Cleaning, wet sponge – The application of a wet sponge to clean off dust, dirt, soot and oils. Unlike chemical sponges that have small pores and are intended to be used dry, wet sponges have large pores and work best when they are damp or wet. Education Note: In soot cleanup situations, damp cleaning a test area is preferred over an aggressive wet cleaning process. Damp cleaning will control surface moisture and wetness, and any water runoff that may occur which can harm a surface if they are not stopped. In most all situations, lightly HEPA vacuum loose soot first then begin cleaning the surface using a test area as an example of what you would expect to achieve if you cleaned the entire wall, floor, ceiling, or a cabinet surface.

Cleaning, wet steam – Steam, usually very low-pressure, that contains water droplets in suspension where the application wand, upholstery head or wall washing system produces less than 1 gallon of water (wet steam) per minute. Education Note: Wet steam can saturate the materials' surface for a few seconds which allows contaminates to soften and suspend, followed immediately by extraction.

Cleaning wipes - Dry wipes that pick-up surface particulate (dust and other lose surface matter) and wet wipes that remove surface debris, soiling, and grease.

Cleaning with air - A cleaning process by which air movement aids in the removal of pollutants from indoor air. Education Note #1: University of Florida and the University of Wisconsin's Disaster Handbook provides valuable information involving the management of fire damaged buildings. Education Note #2: One recommendation is to ventilate structures with outdoor fresh air, thus, cleaning the interior by removing airborne pollutants. While this is an accepted practice, it doesn't always work when the surrounding community continues to be affected by wildfire smoke and soot fallout. When this purging process is used in wildfire smoke and soot contaminated buildings, the building's incoming air must be filtered at the air intake (ventilation system intake or door and window intake). Makeup outside air should be filtered with no less than pleated filters that stop larger particles greater than 1-micro in size from entering the building.

Cleaning with forced air pressure – A cleaning process that uses dry compressed air to force settled and airborne matter off a material and out of the airstream. This process is also called air sparging.

Cleanliness level – An established maximum allowable level of contaminants based on size, composition, quantity, properties, etc. for a given area or volume.

Cleanup Guidelines (FEMA) – The Federal Emergency Management Agency (FEMA) provides wildfire smoke remediation guidelines in a pamphlet titled "*Tips From State And FEMA On Smoke Removal And Fire Cleanup*" (available on-line at http://www.fema.gov/news/newsrelease.fema?id=4046 and at https://www.fema.gov/news-release/2003/07/25/tips-smoke-removal-and-fire-cleanup The FEMA document outlines cleaning and remediation actions homeowners should undertake following a wildfire to reduce smoke and ash contamination of their properties. The course of actions specified by FEMA includes: 1) Pressure wash, scrub or disinfect all exterior surfaces including walls, walks, drives, decks, windows, screens, etc. 2) Wash and disinfect all interior walls and hard surfaces with mild soap or other appropriate cleaning solutions or products and rinse thoroughly. Do not forget inside cabinets, drawers, and closets; 3) Launder or dry clean all clothing; 4) Wash, dust or otherwise clean all household items including knick-knacks. 5) Disinfect and deodorize all carpets, window coverings, upholstered furniture and mattresses with steam or other appropriate equipment. 6) Upholstery, fabric window treatments, etc., can be spray-treated with deodorizing products available at most supermarkets, but do not use odor masking sprays. 7) Have heating, ventilating and air-conditioning units and all ductwork professionally cleaned to remove soot, ash, and smoke residue. Change filters when you first return to the premises and at least once a month for the first year. 8) If aerial fire retardant or firefighting foam residue is present on the house and/or automobiles, use a mild detergent and brush to scrub and dilute

the dried residue and flush it from surfaces, followed by rinsing with clean water. A follow-up with pressure washing may be beneficial but will not replace scrubbing to remove residue. 9) Ash and soot residue on the ground and vegetation in the vicinity will continue to generate smoke odors and airborne particles when distributed by air movement. Until the ash and soot are diluted and absorbed by the environment, indoor mechanical air filtration may help minimize the uncomfortable and potentially health-threatening impact of these pollutants. Education Note: A precaution not provided in the FEMA pamphlet is that cleaning actions should be performed in a way to minimize the re-entrainment of particles. Cleaning methods that should be avoided include vacuuming, dry dusting, sweeping, and vigorous wiping that will aerosolize smoke particulates from surfaces. In addition, cleaning of the interior of electronic components, such as computers, stereos, and televisions; as well as refrigerator condenser coils and fan or other appliances that would attract particulates should also be performed (Kristen Shaw, CSC).

Cleanup operation – Any operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people or the environment. (OSHA)

Clear coat – A transparent finish; the application of such a finish.

Clearance (air sampling; building; remediation) – (1) A process of testing indoor air quality at the completion of remediation, restoration, and abatement work. (2) A clearance method intended to confirm contaminants that were part of a remediation or abatement project do not exist in indoor air. (3) Independent inspection and testing that confirms the conditions that allowed contaminates to exist have been removed. (4) The amount of space needed for the proper and/or safe use of various installations such as opening appliance and cabinet doors and drawers.

Clearance (building) – The return of normal building conditions which are determined by inspection and testing.

Clearance air sampling – (1) A process of testing indoor air quality at the completion of remediation, restoration, and abatement work. (2) A clearance method intended to confirm contaminants that were part of a remediation or abatement project do not exist in indoor air.

Clearance, asbestos – An accepted method of air sampling used upon completion of final cleaning, during completion of final cleaning, at an asbestos abatement project. Education Note: An asbestos clearance method consists of using aggressive air sampling techniques to dislodge and stir up remaining asbestos fibers, where air samples are then collected for appropriate analysis to determine representative airborne fiber concentrations.

Clearance, baseline data – (1) Control data that is collected outside a cleaned or decontaminated area and is measured against a contaminated environment or an environment or material that was cleaned or brought back to normal service. (2) Data that is collected outside a cleaned or decontaminated area.

Clearance, environmental – The result of smoke, soot, and ash environmental contaminant

conditions, requires environmental clearance as an adherence to government regulations when regulated materials are present such as lead-based paint, asbestos, mercury, and PCBs.

Clearance form – A written form that outlines procedures for recognizing hazards to gaining clearance and closure after cleanup.

Clearance smoke – Surface testing and laboratory analysis confirming VOCs, PAHs and other substances are not elevated more than background; specific compounds are not present.

Clearance, soot – Surface and air test analysis results confirming particles of soot are no longer present that can cause or contribute to material damage and corrosion or poor indoor air quality.

Cleanup solvent – A VOC-containing material used for either of the following: 1) to remove a loosely held, uncured (that is, not dry to the touch) adhesive or sealant from a substrate; 2) to clean equipment used in applying a material.

Clinker – In a fire, clinkers are solid agglomerate of residues formed by either complete or incomplete combustion or partial melting.

CO – Carbon monoxide. An odorless, colorless, and highly poisonous gas. (See: Carbon monoxide)

CO_2 – Carbon dioxide. (See: Carbon dioxide)

CO_2 dry-ice blasting – A CO_2 pellet-blasting system normally consists of CO_2 at 200 to 300 psig (pounds per square inch gauge), which is transported through a hose to a pelletizer machine, where rapid expansion of the liquid in the chamber converts to CO_2 to a solid state of dry ice or snow. The ice is then compressed into pellets, which are transported through a hose at 40 psig to a blasting nozzle. At the nozzle, pellets are entrained in high pressure air (40 to 250 psig) and propelled from the nozzle onto a work piece at 75 to 1,000 ft/s.

Coagulation – The process by which small smoke particles collide with and adhere to one another to form larger particles.

Coarse mass – Mass of particulate matter having an aerodynamic diameter greater than 2.5 microns but less than 10 microns.

Coarse mode – A size range of particles between 2.5 microns and 10 microns. Coarse particles are mostly composed of soils. The sum of the masses of coarse and fine particles (all particles smaller than 10 microns) is called PM_{10}.

Cockloft – A structural space above a ceiling and below rafters, often connecting adjacent occupancies that permits a fire to spread laterally, where the fire goes unseen.

Cohesion – The tendency of similar or identical particles/surfaces to cling to one another. (See:

Adhesion)

Cold fire – A fire that has heavy oily residue from smoldering or incomplete combustion.

Cold fog / Cold fogging – A type of fog produced by the fine spray of water-based chemicals and deodorizers with an ultra-low volume (ULV) fogging machine. The ULV fogger relies on their ability to atomize fine droplets in air usually by a venture effect. Fine droplets (5-15 microns in size) are more likely to enter small pours, cracks, and crevasses where smoke and soot remains.

Collapse zone – The area around a structure that would contain debris if the building were to collapse.

Collateral building damage – Accompanying or associate building damage resulting from a direct or indirect relationship with the cause of damage.

Collateral damage (Secondary damage; Secondary disaster) **–** Disaster initiated by a primary disaster, such as a fire that was put out with water; a tsunami caused by an earthquake. Secondary disasters often cause more damage and problems than the primary disaster.

Collateral damage, remediation – Damage sustained by unaffected materials during the course of completing necessary remediation work. (IICRC S500 Standard, 2006)

Collectible – (1) Any object having value that is known to be a collectable item by other persons. (2) Money or an item that is available to be collected. Education Note: Virtually any object may be considered collectible if the market exists which establishes their value.

Collectible contents – Items worth being collected. One of a group or class of objects, such as 19th century children's dolls, 20th century Teddy bears or historic memorabilia that are sought by collectors.

Collectibles – Any physical asset that are expected to appreciate in value over time because they are rare, or they are desired by others. Collectibles are things like stamps, coins, fine art, or sport memorabilia, but there are no hard and fast rules as to what is or is not a collectible.

Color – A qualitative sensation by humans that describes hue, brightness, and saturation. Color plays a role in fire damage remediation since colors can change or be distorted by acid residue.

Color contrast or difference – Contrast between two adjacent scene element colors. Color contract difference is any difference in color hue, saturation, or brightness, between two perceived objects.

Colorimetric analysis – Chemical analysis based on the colors of dyes formed by the reaction of the analysis with reagents.

Combination fire and smoke damper (ventilation system ducting) **-** A mechanical device that eliminates, stops, or reduces heat and smoke traveling through ducting.

Combust – To consume by a fire, or the process of burning.

Combustible – (1) Items capable of burning, generally in air under normal conditions of ambient temperature and pressure, unless otherwise specified; combustion can occur in cases where an oxidizer other than oxygen in air is present (e.g., chlorine, fluorine, or chemicals containing oxygen in their structure). (NFPA 921) (2) Materials and solvents capable of undergoing combustion; any material that will burn. (1) A term used by NFPA, DOT, and others to classify based on flash points certain liquids that will burn. NFPA generally defines "combustible liquids" as having a flash point of 100°F/38.7°C or higher. In 1992, DOT modified their definition to a liquid with a flash point greater than 140°F. (2) A term for non-liquid substances such as wood and paper. Education Note: In this case, materials which are capable of burning are often referred to as combustible or as "ordinary combustibles."

Combustible liquid – Any liquid having a flashpoint at or above 100°F (37.8°C) but below 200°F (93.3°C) except any mixture having components with flashpoints of 200°F or higher, the total volume of which make up 99% or more of the total volume of the mixture.

Combustible construction materials – Any type of construction materials that do not meet the requirement for noncombustible construction. Combustible construction materials mean that a material fails to meet the acceptance criteria of test for determination of non-combustibility in building materials.

Combustible gas detector/sensor – Lightweight, battery-powered indicator used for field testing for the presence of combustible gas mixtures. Education Note: A combustible gas is any gas that will burn or ignite. Mixtures of combustible gases with air, when ignited, produce an explosion. A combustible gas sensor monitors the percentage of ambient gas in the air determining if the concentration is rich enough for the mixture to burn. When a high concentration is reached, best practice is to replace the air with fresh and/or shut down equipment and evacuate personnel from the area. (Sensidyne)

Combustible liquid – (1) Any liquid having a flash point at or above 100°F/37.8°C, but below 200°F/93.3°C, except any mixture having components with flashpoints of 200°F/93.3°C, or higher, the total volume of which make up 99 percent or more of the total volume of the mixture. (2) Any liquid having a flash point at or above 100°F/37.8°C. Combustible liquids are also referred to as either Class II or Class III liquids depending on their flash point. (NFPA 921 3.3.30)

Combustible liquids – (1) The classification of certain liquids that will burn, based on flash points. (2) Materials and substances having a flash point of 100°F or higher. They do not ignite as easily as flammable liquids; however, they can be ignited under certain conditions, and must be handled with caution.

Combustion products – Heat, gases, or solid particulates, and liquid aerosols produced by burning. (NFPA 921 3.3.31)

Combustion – (1) The rapid process of oxidation that occur when organic matter ignites and burns, producing light and heat. (2) The rapid oxidation of fuel in which heat and usually flame is produced.

Combustion can be divided into four phases: preignition, flaming, smoldering, and glowing. (3) An exothermic reaction of a substance with an oxidizing agent. (3) The incomplete burning of materials (byproduct residue). Often combustion residue is smoke and char that range from 0.1 to 4 microns in size. Soot particles can be much larger depending on the type of fire, temperature, humidity, wind, and the type of material being consumed. Education Note #1: Combustion generally emits fire effluent accompanied by flames and/or glowing. (ISO 13943) Education Note #2: In fire damaged buildings and in wildfires, combustion is the incomplete burning of materials (byproduct residue). (See: Products of combustion) For more information go to: https://www.grc.nasa.gov/WWW/K-12/airplane/combst1.html

Combustion byproducts – The spent fuel after a fire. Combustion byproducts are produced whenever carbon-based fuels such as gas, oil, kerosene, wood, or charcoal are burned and are also produced by tobacco smoking. The major pollutants released during combustion are carbon monoxide, nitrogen dioxide, sulfur dioxide, and particulates and water vapor that can form into sulfuric acid. Nitrogen dioxide is one substance responsible for yellowing and aging materials after a fire.

Combustion, complete – Combustion that occurs where the combusted products are fully oxidized. This means, when the oxidizing agent is oxygen, all carbon is converted to carbon dioxide and all hydrogen is converted to water. Education Note: When elements other than carbon, hydrogen and oxygen are present in the combustible material, those elements are converted to the most stable products in their standard states at 298K. (ISO 13943)

Combustion efficiency – The relative amount of time a fire burns in the flaming phase of combustion, as compared to smoldering combustion. A ratio of the amount of fuel that is consumed in flaming combustion compared to the amount of fuel consumed during the smoldering phase, in which more of the fuel material is emitted as smoke particles because it is not turned into carbon dioxide and water.

Combustion gases – The gaseous byproducts of the combustion of a fuel.

Combustion, incomplete – The response by heat to be inefficient and produces byproducts. Complete combustion uses up all the fuel in a reaction and produces a limited number of byproducts. Incomplete combustion occurs when there is not enough of an oxidant to burn up all the fuel in an efficient manner.

Combustion products – Heat, gases, or solid particles and liquid aerosols produced by burning. (NFPA 921 3.3.31)

Combustion, spontaneous – (1) Unprompted combustion within a material by localized heat and not by an external ignition source. (2) Combustion of a thermally isolated material initiated by an internal chemical or biological reaction producing enough heat to cause ignition. (3) Self-heating materials, those that exhibit spontaneous ignition or heat themselves to a temperature of 200°C/392°F during a 24-hour test period.

Combustion, the act of – The act or process of burning: 1) Burning, or rapid oxidation, accompanied

by release of energy in the form of heat and light. 2) The burning of building materials, in which heat chemically alters organic compounds, converting them into stable inorganics such as carbon dioxide and water. Education Note: Combustion is chemical oxidation accompanied by the generation of light and heat.

Commissioning – The start-up of a building after construction where testing and adjusting HVAC, electrical, plumbing, and other systems have been accomplished to assure the proper functioning and adherence to design criteria.

Complexities – Any condition at the jobsite that causes the job to become more difficult or detailed.

Complications – The act of becoming complex, intricate, or perplexing. A complication is generally any work condition that arises after the start of work that causes or necessitates a change in the scope of work activities.

Computer estimating programs - Loss estimating programs for the demolition, cleanup, repair and restoration of buildings and contents. Examples include BEST, BidMaster, BidPro, Excel, FileTrac, OnScreen, PreBuilt, PowerClaim, National Estimator, Sigma, Simsol, and Xactimate, XactContents and XactAnalysis.

Condensation – (1) A deposit of moisture droplets from humid air on surfaces that is cooler than the air. (2) A process by which molecules in the atmosphere collide and adhere to small particles.

Conditioned air - (1) The indoor air that has been filtered, heated, cooled, humidified, or dehumidified to maintain indoor comfort levels. (2) Air that has been heated, cooled, humidified, or dehumidified to maintain an interior space within the "comfort zone." Conditioned air is sometimes referred to as "tempered air." (EPA)

Conditioned air space – The part of the building that is designed to be thermally conditioned or controlled for the comfort of its occupants or contents.

Condo / Townhome insurance coverage – Coverage protecting the insured's personal property and loss of use. Coverage may include protection against fire, lightning, vandalism, malicious mischief, wind, hail, explosion, riot, civil commotion, vehicles, aircraft, smoke, falling objects, weight of ice, sleet, or snow, and volcanic eruption.

Condominium Association policy – Insurance covering the common property of a condominium as defined by the association's bylaws, in contrast to insurance carried by the individual unit owners. (RIA)

Conflicts - Limitations, complexities, or complications that result in a disagreement between the parties involved as to how the remediation is to be performed.

Conduction – (1) Heat transfer to another body or within a body by direct contact. (NFPA 921 3.3.33)

(2) The flow of heat through solid materials which are touching each other. (3) The flow of heat from one part of a substance to another part. (4) The transfer of heat energy within a body or between two bodies in physical contact. (NFPA 921 3.3.32) Education Note: Conduction is the transfer of thermal energy by molecular action, without any motion of the medium. Conduction occurs in solids, liquids, and gases, but the effect is most pronounced in solids. If one end of an iron bar is placed in a fire, in a relatively short time, the other end becomes hot. Thermal energy is conducted from the hot end of the bar to the cold end. The atoms or molecules in the hotter part of the body vibrate around their equilibrium position with greater amplitude than normal. This greater vibration causes the molecules to interact with their nearest neighbors, causing them to vibrate more also. These in turn interact with their nearest neighbors passing on this energy as kinetic energy of vibration. The thermal energy is thus passed from molecule to molecule along the entire length of the bar. The net result of these molecular vibrations is a transfer of thermal energy through the solid.

Confined space – Any area that has: 1) limited openings for entry and exit; 2) escape would be difficult in an emergency; 3) it lacks ventilation; 4) it contains known or potential hazards, and 5) it is not intended nor designed for continuous human occupancy.

Conflagration (wildfire) – (1) An uncontrolled burning that threatens property and life. (2) A raging, destructive fire. Often used to connote such a fire with a moving front as distinguished from a fire storm.

Conflagration threat (wildfire) –The likelihood that a wildfire can cause considerable damage.

Consequential damage / Consequential loss – (1) Loss of value that does not arise as a direct result of an event, but which is incidental to it. (IICRC S500 Standard, 2006; BDMA) (2) Damage incurred as an indirect cause of the loss. For example, the pulling of paint from a surface by masking tape and other tape adhesive materials is due to "consequential damage" that would not have happened if the cause of the loss did not occur. In this situation, there is no a guarantee paint will not release; temperature and humidity, paint type and its bonding strength to sub-layers, and the age and condition of paint, are some of the factors that cause paint to lift off a surface as tape is being removed.

Conservation and restoration – The efforts to rehabilitate, structurally and cosmetically, historically significant buildings and contents that have been soot contaminated or fire damaged.

Conservation, contents – Equipment and methods used to conserve artifacts, manuscript, works of art and historically significant items.

Construction design, fire – The application of science and engineering principles to protect people and their environment from destructive fire, which includes: 1) analysis of fire hazards; 2) mitigation of fire damage by proper design, construction, arrangement, and use of buildings; 3) materials, structures, industrial processes, and transportation systems; 4) the design, installation and maintenance of fire detection and suppression and communication systems, and 5) post/fire investigation and analysis. Education Note: Fire, heat, and smoke travel inside wood-frame and wood-construction

buildings can be affected significantly by the method of construction. Balloon-frame buildings typically experience quick and easy fire spread up the outside wall stud channels as well as across the floor joists which are interconnected to the studs. Platform-frame construction seldom sees extensive fire travel up the outside walls, due to the materials blocking the fire's path. Fire travel most often is observed in the inside walls.

Consultant – An expert in a particular field of service, technology or practice.

Contact burns (structure) – Damage to surfaces caused by heat from an object such as a lamp, iron, or an open flame.

Contact sensitizer (medical) – A substance that will induce an allergic response following skin contact. The definition for "contact sensitizer" is equivalent to "skin sensitizer." (OSHA)

Containment – (1) The isolation of an area of contamination within a building to prevent the spread of contaminate materials, by erecting a barrier of plastic sheeting or similar material. (2) Physical materials and/or air barriers that separate contaminated areas from non- contaminated areas. Any one of several acceptable methods for containing and controlling an environment, atmosphere, or contamination. (3) Physical separation and engineering controls required to prevent contamination of undamaged materials and occupied areas. The level of containment varies depending on the extent of the contamination. (4) A precaution used to minimize cross-contamination from affected to unaffected areas by traffic or material handling. Containment normally consists of 6-mil polyethylene sheeting, often in combination with negative air pressure, to prevent cross-contamination. (IICRC S500, 2015 and S520 Standard, 2015) (5) Any engineering control used to minimize cross-contamination from affected to unaffected areas. (IICRC S540 Standard, 2017) (6) Engineering controls used to minimize cross-contamination from affected to unaffected areas by airborne contaminants, foot traffic, or material handling. Education Note: Containment systems normally consist of 6-mil polyethylene sheeting, often in combination with air pressure differentials, to prevent cross-contamination. (IICRC S520 Standard, 2015)

Containment area – An engineered space within a work area designed to control the migration of contaminants to adjacent areas during assessment or cleaning procedures.

Containment barrier – A barrier made of appropriate materials that separate affected areas from non-affected areas.

Containment, levels of – Isolating a work area from the rest of a building to prevent the escape of contaminants: 1) Level I - containing a work area for removing visually contaminated materials. Education Note: Level I requires maximum isolation of the work area from occupied areas outside the containment area; 2) Level II - containing the remaining of the building that has no visible contamination outside the Level I containment area.

Containment signage – Signs placed on containment entry/exit doors that warns persons such as: 1) do not enter; 2) safety hazards present; 3) asbestos and lead-based paint hazards; 4) hazardous

chemicals are present; 5) dust hazards, etc. Education Note: Signage should also have the remediation contractor's name, 24-hour contact person and phone, date containment was installed, anticipated date for containment's removal and outlining specific hazardous conditions.

Contaminant – A substance or material capable of causing adverse health responses in humans or causing damage to the environment, including buildings and contents.

Containment barrier – A barrier made of appropriate materials that separate affected areas from non-affected areas.

Containment, levels of – Isolating a work area from the rest of a building to prevent the escape of contaminants: 1) Level I - containing a work area for removing visually contaminated materials. Education Note: Level I requires maximum isolation of the work area from occupied areas outside the containment area; 2) Level II - containing the remaining of the building that has no visible contamination outside the Level I containment area.

Containment signage – Signs placed on containment entry/exit doors that warns persons such as: 1) do not enter; 2) safety hazards present; 3) asbestos and lead-based paint hazards; 4) hazardous chemicals are present; 5) dust hazards, etc. Education Note: Signage should also have the remediation contractor's name, 24-hour contact person and phone, date containment was installed, anticipated date for containment's removal and outlining specific hazardous conditions.

Contaminant – (1) Any physical, chemical, biological, or radioactive substance that can have an adverse effect on air, water, or soil, or on any interior or exterior surface. (ANSI/IICRC S500 Standard) (2) Any substance not intended to be present that is located within the HVAC system. (3) The presence of smoke and chemical constituents that adsorbed into the building and may have affected contents.

Contaminated – (1) The presence of an undesired or unhealthy substance. (2) A material or environment that contains known or potentially harmful substances such as asbestos, lead-based paint, toxins, and toxic agents. (3) The presence of indoor mold growth or mold spores, whose identity, location and quantity are not reflective of a normal fungal ecology for similar indoor environments, and which may produce adverse health effects, cause damage to materials or adversely affect the operation or function of building systems. (IICRC S520 Standard, 2008) (4) The presence or the reasonably anticipated presence of blood or OPIM on an item or surface.

Contaminated / Contamination – (1) For the purposes of the S520 Mold Remediation Standard, contaminated/ contamination is the presence of indoor mold growth or mold spores, whose identity, location, and quantity are not reflective of a normal fungal ecology for similar indoor environments, and which may produce adverse health effects, cause damage to materials or adversely affect the operation or function of building systems. (IICRC S520 Standard, 2015) (2) State of having actual or potential contact with microorganisms. As used in health care, the term generally refers to the presence of microorganisms that could produce disease or infection. (IICRC S540 Standard, 2017)

Contaminated, smoke – Materials and finishes that are impacted by chemicals, VOCs, PAHs, and other substances that make up smoke.

Contaminated, Soot, ash, and char – (1) The presence of wildfire particulate matter in a building which may be capable causing damage to materials and finishes. (2) Contents including upholstery, electronics and electrical that can experience damage from exposure.

Contamination – (1) The presence of undesired substances; the identity, location and quantity of which are not reflective of a normal indoor environment, and may produce adverse health effects, cause damage to structure and contents, and/or adversely affect the operation or function of building systems. (IICRC S500 Standard, 2006) (2) The presence of sewage, wastes, chemicals, or other material rendering an article, habitation, or substance unfit for use, usually for reasons of toxicity and health. (RIA)

Contamination, medium smoke, and soot – The categorization of an average amount of smoke and soot deposits as compared to light and heavy smoke and soot deposits.

Contamination, smoke odor – (1) The unintended presence or introduction of smoke, soot, ash and chemical byproducts into a building, material, or content. (2) The soiling of materials by organic and inorganic substances after combustion. (3) The presence of particles, chemicals and gases and other undesirable substances after a fire.

Content assessment – A thorough inspection of item(s), determining age, condition, and effects from being damaged/contaminated.

Content cleaning – The removal of dust, dirt, and other contaminants from contents. Content cleaning involves vacuuming, wiping and/or a thorough immersion cleaning, or a combination of cleaning steps.

Content handling – A term in computer estimating programs that describe a process where contents had to be picked up, manipulated, moved.

Content inventory – An itemized list of contents that: are damaged; must be moved; are missing because of a loss.

Content itemization – An inventory of contents and amount.

Content manipulation – The moving of contents from one position to another. Example: 1) Contents need to be manipulated (moved) when a wall must be inspected or repaired. 2) Contents must be manipulated when they are setting in water or they are in the way of water extraction services.

Content moving – The content pickup and removal process. Contents are: 1) moved to a non-damaged part of a building or garage; 2) taken away to a storage facility.

Content packaging / Content packing – The careful wrapping and placement of items in a box or other storage container.

Content restoration – The cleaning, sanitizing, repair, and other services to bring contents back to a pre-loss condition.

Content salvaging – The rescue of contents that are almost ready to be discarded or abandoned. 1) Property that has some value more than its basic material content. 2) The condition of content is so bad that it has no reasonable prospect of use as it was initially intended. 3) The saving or rescuing of condemned, discarded, or abandoned property.

Contents – (1) Personal property items contained within a structure that are not construction fixtures or built-in cabinets. Contents usually include window coverings, area rugs, furniture, appliances, and electronics; works of art, utensils, and dishware. (2) Personal property, or items contained within a building, as distinguished from the building itself, for purposes of insurance. (RIA)

Contents adjuster – (See: Adjuster, contents)

Contents, fire damaged – (1) Contents that experienced an element of smoke, soot, char, or combustion byproducts. (2) Content's finish or a material that experienced damage because of heat, temperature, humidity, water/moisture, combustion byproducts.

Contents Loss Specialist (CLS) – A restoration specialist certified as a Contents Loss Specialist (CLS) through RIA. A restorer who by training and experience is qualified to inspect and assess damage to personal items and determine the best course for salvage, repair, or restoration. For more information go to: https://www.restorationindustry.org/page/cls

Contents manipulation – The required handling and positioning of furniture and other personal property at the time of loss to manage an emergency disaster or cleanup situation during the course of building repairs.

Contents processing – A systematic process for identifying, categorizing, removing, cleaning, and restoring contents. Education Note: Before handling contents, there must be a documentation process for fire damaged or soot contaminated contents followed by inventory and segregating them into process management categories such as: (1) cleanable; repairable, non-salvageable, not cost-effective to save; (2) irreplaceable (meaning, make every attempt to save and salvage the item), works of art and historically significant items (often requiring a conservator to evaluate their condition and how they must be handled), electronics and appliances (items that will continue to experience corrosion damage until they are cleaned and stabilized), antiques and collectibles (requiring special handling and cleaning).

Continuous sampling device – An air analyzer that measures air quality components continuously.

Contractor – (1) A person or company qualified and licensed in the field of construction and

installing its components. (2) A tradesperson, specialist or competent person qualified to complete specific services and work tasks. (3) An individual or firm that agrees, usually based on predetermined terms and specifications, to provide labor and materials and to be responsible for work (a specific job, overall construction, or reconstruction). Education Note: General contractors assume overall responsibility for overall job coordination, performance, and completion, while a subcontractor usually assumes responsibility for only a portion of the total work required to complete a project.

Contrast – Relative difference between fire and soot damaged materials and non-affected materials of like-kind and quality.

Convection – (1) Air currents induced by the different densities of warm and cool air. (RIA) (2) The transfer of heat through the movement of a liquid or gas. (3) The mechanical transfer of heated molecules of a gas or liquid from a source to another area. (4) The transfer of thermal energy by the actual motion of the medium itself. The medium in motion is usually a gas or a liquid. Convection is the most important heat transfer process for liquids and gases. (5) The form of heat transfer that takes place in a moving medium and is almost always associated with transfer between a solid (surface) and a moving fluid (such as air), whereby energy in transferred from higher temperature sites to lower temperature sites. (6) The process of transferring heat or thermal energy from the air to a solid, liquid, or other gas via the circulation of currents from one region to another. (7) The mechanical transfer of heated molecules of a gas or liquid from a source to another area. (8) The transfer of heat by means of a moving stream of air or water. Education Note: Convection involves the process of heat that is carried from one point to another by movement of a liquid or a gas (i.e., air). Natural convection is caused by expansion of the liquid or gas when heated. Expansion reduces the density of the medium, causing it to rise above the cooler, "denser" portions of the medium. Gravity heating systems are examples of the profitable use of natural convection. The air, heated by the furnace, becomes less dense (consequently lighter) and rises, distributing heat to the various areas of the house without any type of blower. When a fan, air mover or blower is used, the heat transfer method is called "forced convection."

Convection current – The upward movement of air caused by thermal expansion. (IICRC S500 Standard, 2006)

Convection, heat – A complex combination of heat conduction and mass flow; it is the most important form of heat transfer between solid surfaces and liquids or gases. (Kreith 1965) Education Note: Convection can be sub-classified as free or natural convection (the physical displacement of energy by movement of material (gas and liquid) induced by density differences) or forced convection (displacement and mixing induced by fans and pumps). Free and forced convection can take place independently or in combination.

Convection heat transfer – The transfer of heat from one place to another by the movement of fluids (e.g., hydronic heating). Although often discussed as a distinct method of heat transfer, convective heat transfer involves the combined processes of conduction (heat diffusion) and heat transfer by bulk fluid flow, a process technically called heat advection. Education Note: The term convection can refer to

transfer of heat with any fluid movement, but advection is the more precise term for the transfer due only to bulk fluid flow. (See: Hydronic heating system; Natural Convection Heat Transfer in Roofs with Above-Sheathing Ventilation)

Cool-down period – The time it takes for a heated space or material to reach equilibrium with the ambient environment's temperature and humidity.

Cool-flame ignition – A relatively slow, self-sustaining, barely luminous gas-phase reaction of the sample or its decomposition products with an oxidant. Cool flames are visible only in a darkened area. (NFPA 325, 1994) (See: Hot-flame ignition)

COPD – Chronic obstructive pulmonary disease, or COPD, refers to a group of diseases that cause airflow blockage and breathing-related problems. COPD includes emphysema, chronic bronchitis, and in some cases asthma. COPD is a leading cause of death, illness, and disability in the United States. Education Note: Persons with COPD must be removed from wildfire situations until their indoor air is safe to breathe.

Corrosion – Action or the effect of eating away gradually. Corrosion results through oxidation caused by acids or alkali (acid induced corrosion by smoke, soot, and ash).

Corrosive – (1) Residues of smoke soot and ash that cause or contribute to corrosion. Corrosive smoke contains chlorides and sulfates; when combined with water or surface moisture they form hydrochloric or sulfuric acids. (2) A liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact; or, in the case of leakage from its packaging, a liquid that has a severe corrosive effect on steel. Education Note: Two common corrosive liquids are caustic soda and sulfuric acid.

Corrosion action – The gradual decomposition or destruction of a material by chemical action, often due to an electrochemical reaction. (EPA) Education Note: Corrosion may be caused by 1) stray current electrolysis, 2) galvanic corrosion caused by dissimilar metals, or 3) differential concentration cells. Corrosion starts at the surface of a material and moves inward.

Cosmetic damage (insurance; restoration – Superficial damage that does not affect the functional use or structural stability of an item or property.

Cost breakdown (cleaning; insurance; restoration) – A breakdown of all the anticipated costs on a remediation, restoration, or renovation project.

Cost, insurance replacement – Insurance designed to provide coverage based on full replacement cost without deduction for depreciation on any loss sustained subject to the terms of the co-insurance clause. Education Note: Insurance cost replacement coverage applies to both building and contents items as specified on the face of the policy. No deduction is taken for depreciation in arriving at the proper amount of insurance needed to comply with the coinsurance clause.

Crawlspace – The enclosed ground area bounded by foundation walls located beneath an elevated floor, usually not excavated, and finished, that allows access to utilities and other services. A crawlspace contrasts with a basement, which is designed for human occupancy. Education Note: A crawlspace can be an overlooked area of the building after a fire or wildfire, where smoke impaction remains.

Creeping fire – A fire that burns with a low flame and spreads slowly.

Critical barrier – One or more layers of polyethylene sealed over openings into a work area or any other similarly placed physical barrier. Education Note: A critical barrier must be sufficient to prevent airborne contaminants in a work area from migrating into an adjacent area.

Criteria pollutant – EPA uses six "criteria pollutants" as indicators of air quality and established for each of them a maximum concentration above which adverse effects on human health may occur. Education Note: Threshold concentrations are called National Ambient Air Quality Standards (NAAQS). The criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter and lead.

Cross-contamination – (1) The spread of contaminants from an affected area to an unaffected area (IICRC S500 and S520 Standard, 2015; IICRC S540 Standard, 2017) (2) Materials, property or an environment that sustained exposure to contamination because of the spread of pollutants or pathogens from their source. (3) Causing contamination by means of transferring contaminants from one area to another. (RIA)

Crown fire (wildfire) – (1) A fire that has ascended from the ground into the tops of trees and can advance more or less independently of the ground fire. (2) The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

Cryogenic blasting / Dry ice blasting – Super frozen gases of carbon dioxide that are propelled through a high-pressure nozzle to remove surface contaminants such as soot and ash, rust, corrosion, and oxidation.

Cupping – A condition that occurs in wood in fire damaged buildings because firemen used water to put out the fire; humidity is dramatically altered because of the fire; the building is now exposed to outside weather conditions. Water/moisture becomes trapped in wood resulting in swelling and expansion.

Current conditions – Ambient, building and content conditions at this time.

(D)

Damage (wildfire) – Loss of a material or surface by contamination, oxidation, abrasion, moisture or heat. (Kutz, M. "*Handbook of Environmental Degradation of Materials*," 2016)

Damage allowance (insurance) – A discount to compensate for damage.

Damage appraisal (insurance) – An evaluation or estimate of the damaged caused by a fire or damage caused by wildfire fallout.

Damage assessment (insurance) – The process of assessing property damage that are directly or indirectly (e.g., environmental) relate to the claim.

Damage claim, smoke (insurance) – A claim by an insured made to their insurance carrier for building and/or property damage.

Damage, collateral (secondary damage; secondary disaster) – (1) Disaster initiated by a primary disaster, such as a fire that was put out with water; a tsunami caused by an earthquake. Secondary disasters often cause more damage and problems than the primary disaster. (2) Unintended damage sustained by non-affected building materials or contents during the course of cleanup, decontamination and remediation.

Damage, collateral from remediation (insurance) – Unintended damage sustained by non-affected building materials or contents during the course of cleanup, decontamination and remediation.

Damage, consequential – (1) Loss of value that does not arise as a direct result of an event, but which is incidental to it. (2) Damage incurred as an indirect cause of the loss.

Damaged/contaminated contents, microbial – Contents that are affected directly or indirectly by mold, bacteria, viruses, or their byproducts.

Damage, degree of fire – The degree a material sustained direct heat damage or a direct impact from heat such as smoke and soot; water and moisture; corrosion. Education Note: The degree of damage also includes the indirect impact from heat sources including transference of gases and vapor into walls, ceilings, and flooring; smoke and soot; water and moisture; corrosion. After assessment, the degree of fire damage is usually categorized as: light, moderate or extensive; heavy or extreme.

Damage, degree of water – The degree a material sustained a direct impact (absorption) from water or an indirect impact from moisture and/or corrosion. Education Note: The degree of water damage takes into consideration the Category of water including Category, 1; Category 2; Category 3; and

Special Situations. After assessment, the degree of water damage is usually categorized as: light, moderate or extensive; heavy or extreme.

Damage, degree of work-of-art – The degree art objects (work-of-art) sustained direct or indirect impact from damage. Art damage can be environmentally caused (i.e., sun light, fading, smoke and fumes, acids); or from an event such as a fire or water. Education Note: The degree of damage must take into consideration the condition of the piece prior to the time of an incident that may have caused further damage. After assessment, the degree of work-of-art damage is usually categorized as: negligible, slight, marked, minor, moderate, major, or extreme.

Damage, direct – (1) Physical damage to real or personal property. (2) The area most affected by damage.

Damage, ensuing – Damage that occurs from an earlier damage or loss.

Damage, extensive – Widespread material damage. Education Note: Extensive means the building or item has widespread damage to more than one area or part, requiring it to be replaced or restored at a cost that may be close to or greater than the estimated replacement cost value.

Damage, extensive smoke, and soot – Damage that consumes most if not all the building or item; or it has compromised the material's structural integrity or its environmental state. Education Note: Extensive smoke and soot damage is a general term describing not just the amount of damage but also the severity. In a wildfire, extensive damage includes but is not limited to wide-spread and far-reaching smoke and soot damage in walls, ceiling, and flooring, even though the building may not have sustained light to extensive structural damage. Extensive damage to contents describes a situation where a vast amount of contents or works of art are affected by heat, or significant smoke and soot; a single item that experienced major damage.

Damage, fire – (See: Fire damage)

Damage from fire, secondary – (1) Building damage that arises out of primary damage, such as wildfire soot fallout that occurs continuously over the next few days or a gust of hillside wind occurring weeks later. (2) Damage to materials or contents sustained from indirect or prolonged exposure to disaster contaminates such as heat, moisture, humidity, smoke, and soot.

Damage, heat – A material's degradation from elevated temperatures, which is the thermal decomposition in an inert environment. Heat damage is permanent, where the material or finish, if salvageable, requires repair, restoration, or replacement. (See: Damage, degree of fire; Damage, extensive smoke, and soot; Pyrolysis)

Damage, heavy smoke, and soot – Material damage that consumes a large portion of a building or item; compromised the material's structural integrity or its environmental state. Education Note: Heavy damage is a general term describing not just the amount of damage but also the severity. In a wildfire, heavy damage includes but is not limited to significant heat damage or serious smoke and

soot damage, even though the building may not have sustained structural damage. Heavy damage to contents describes a situation where a vast amount of contents or works-of-art are affected by heat, or significant smoke and soot; a single item that experienced major damage.

Damage, incidental – Damage that occurs coincidentally with another loss or disaster. An example is water damage caused by firefighters during the attempt to stop a wildfire or a building fire.

Damage, indirect – Losses resulting from direct damage to a property, such as income and expense loss that results from the inability to use damaged property.

Damage, latent – (1) Damage not yet apparent but which may occur at a subsequent time. (2) Building damage that is present, but it is not visible; secondary damage that later becomes noticeable, but it is found to be related to the initial cause of damage. (3) An event that caused damage that is not presently visible, or it can occur after a period of time. (4) Secondary damage that later becomes noticeable, but it is found to be related to the initial cause of damage. (5) Present or potential damage not evident or active. Education Note: In fire damaged structures and some wildfires, corrosion, decay, and oxidation may go undetected until an appliance or electronic component fails. Without investigation, cleaning and testing, a latent damage will not be identified.

Damage, light smoke, and soot – Minor isolated damage to a material or item. In restoration terms, light damage is damage that is easily repairable or restorable. Education Note: In wildfires, light damage may be heat discoloration or blistering to one side of a building siding or finish; soot in the attic as compared to soot in the building; the settling of specks of soot-like particles on horizontal surface such as flooring and contents. (See: Light damage)

Damage, medium – (See: Damage, moderate)

Damage, moderate – The amount of carbon combustion and smoke residue along with some physical material damage (charring or heat damage) to building materials and/or finishes. Education Note: Moderate damage includes soot and smoke film on vertical walls, horizontal ceilings and floors that must be cleaned and deodorized.

Damage, moderate smoke, and soot – Damage to a surface area or material that is damage somewhere between light and heavy. Education Note: Moderate damage in a wildfire may be described as soot contamination in an attic causing insulation to be removed and replaced; removal of soot by HEPA vacuuming followed by cleaning of contents and flooring; cleaning of ventilation systems because of the presence of soot; cleaning of contents, walls, floors and draperies because the windows were open at the time of loss. (See: Moderate damage)

Damage, negligible degree of (conservation management) – Insignificant damage to contents, works-of-art and furniture that may not need immediate attention and the cleaning process does not need to be monitored.

Damage notice, construction extreme degree of – Building materials that are so damaged that the

structure may need to be tagged-out as being "unsafe" until a proper structural damage survey can be completed.

Damage, primary – (1) Damage caused by the immediate, direct impact of a peril, as opposed to secondary damage, which occurs over time. (2) Damage sustained to a property or material because of direct exposure with contaminants (water, moisture, soot, heat, body fluids). (3) Property damage that is sustained by one event and it is the main cause of damage.

Damage, prior (insurance) – Damage or distress to a property or item that exists before a loss.

Damage, restoration extreme degree – Construction materials, building finishes and/or contents that experienced extensive damage. Extreme degree of damage takes into consideration salvageability and/or repair that may not be cost effective to complete.

Damage, secondary – (1) Building damage that arises out of primary damage, such as wildfire soot fallout that occurs continuously over the next few days or a gust of hillside wind occurring weeks later. (2) Damage to materials or contents sustained from indirect or prolonged exposure to disaster contaminates such as heat, moisture, humidity, smoke, and soot. Examples of secondary damage can include absorbed moisture or humidity, microbial growth, and acid residue discoloration. (IICRC S500 Standard, 2015) (See: Primary damage)

Damage, slight degree of (conservation management) – Contents, furniture to works-of-art, that are slight damaged, which is more noticeable than "negligible damage;" which should be monitored by a conservator or restorer.

Damage, smoke – Property damage that is caused by smoke. Property damage caused by smoke does not necessarily mean materials are/were in direct contact with the fire. Education Note: Smoke damage takes many forms including visible soot, residue, and ash deposits; discoloration, baked-on residue, acid and corrosion damage; invisible odor damage to building materials, furnishings, clothing, and other belongings.

Damage, substantial – Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damaged condition would equal or exceeds 50 percent of the market value of the building before the damage occurred. (FEMA)

Damage that is unavoidable – Property damage that is a result of an unavoidable incident such as fire, explosion, flooding, or pipe break.

Damage to contents, moderate (fire; smoke; soot) – The amount of carbon combustion and smoke residue along with some physical material damage (charring or heat damage) on contents or their finish. Education Note: Moderate damage includes soot and smoke film on more than one side of the content that must be individually inspected, cleaned, and deodorized.

Damage to property – (1) Physical injury to tangible property, including all resulting loss of use of

that property. All such loss of use shall be deemed to occur at the time of the physical injury that caused it. (ISO liability policy) (2) Loss of use of tangible property that is not physically injured. All such loss of use shall be deemed to occur at the time of the occurrence that caused it. (ISO liability policy) (See: ISO)

Damage to property of others – An insurance term involving coverage for an insured who damages another's property. Payment is made despite the lack of legal liability. Coverage is included in Section II of the homeowner's policy. (Coe Insurance)

Damage, works-of-art extreme degree (conservation management) – An extreme damage is the most severe damage, or the existing condition of a work-of-art has become very advanced. In other words, the work-of-art is insecure, no longer stable and is at great risk.

Damp condition – (1) In concrete pouring, an aggregate that has excess moisture on its surface to the point that it contributes water to the mix. (2) In buildings and contents, a condition that allows mold to grow. Generally, a damp condition occurs when the relative humidity is continuously over 60% for extended periods of time.

Dampers – Controls that vary airflow through an air outlet, inlet, or duct. A damper position may be immoveable, manually adjustable or part of an automated control system.

Datalogger – An electronic device for measuring analog or digital signals and recording the results on a storage media. Education Note: Some dataloggers can record several locations reporting them as separate channels. Dataloggers can measure particles and VOCs.

DBT – Dry bulb temperature. (1) The ambient (surrounding air) temperature taken with a thermometer. (2) The measured temperature of air using a traditional thermometer. Education Note: Dry bulb temperature is the temperature of air measured by a thermometer freely exposed to the air but shielded from radiation (heat, UV light) and moisture. (See: Wet bulb temperature)

Dead fuels (wildfire) – Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.

Debris burning – A fire spreading from any fire originally set for the purpose of clearing land or for rubbish, garbage, range, stubble, or meadow burning.

Defensible space – An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. Education Note: In practice, a "defensible space" is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation.

Debris – The building material waste after demolition and unwanted waste after a fire.

Debris removal – The removal and disposal of unusable items and materials that doesn't have any redeeming salvage value.

Decay stage, fire – As fuel is consumed, the energy release rate diminishes and thus, the average gas temperature in the compartment declines. (Also known as fire decay.)

Decomposition (Decomp) – (1) The breakdown of matter into simple compounds by heat, bacteria, and fungi, changing the chemical makeup and physical appearance of materials. (2) Breakdown of material or substance (by heat, chemical reaction, electrolysis, decay, or other processes) into parts, or elements or simpler compounds. (3) The reduction of a material to more elemental forms, for example, the decomposition of plastic with the resultant release of DOP plasticizer, etc.

Decomposition, thermal – A chemical reaction in which a heated compound breaks up into at least two other compounds.

Deconstruction – Dismantlement of a building so that components can be reused and recycled.

Decon / Decontamination – The process of being decontaminated.

Decon chamber – Decontamination chamber. The process of being decontaminated in a controlled environment.

Decontaminate – The process of removing pathogenic and undesirable microorganisms or soil from surfaces by chemical or physical means. (2) The process of removing harmful or undesirable substances from a surface.

Decontamination – (1) The removal of toxic, allergenic, or dangerous substances from a building or its contents. (The removal of harmful substance off worker's PPE before they doff their PPE.) (2) The systematic removal of toxic, allergenic, or dangerous substances from a building or its contents. (3) Disinfecting or sanitizing a surface or item exposed to pathogens. (4) The use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal [29 CFR 1910.1030]. OSHA

Decontamination (Decon; D-con) – (1) The use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or items to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal. (2) The process by which the unsanitary water and sewage cleanup and remediation process occurs. (3) Removal of harmful substances such as noxious chemicals, harmful bacteria or other organisms, or radioactive material from exposed individuals, rooms and furnishings in buildings, or the exterior environment. (4) The removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects. (5) A process of rendering harmless (by neutralization, elimination, removal etc.) a potentially toxic substance in the natural environment, laboratory areas, the workplace, other indoor areas, clothes, food, water, sewage

etc. Education Note: The decontamination process must take into consideration the potential health effects that can compromise technicians, equipment, building materials and the environment.

Decontamination area (Decon area; D-con area) – (1) An enclosed or secure area adjacent to and connected to a regulated work area. Generally, the decontamination area consists of various rooms or barriers, which are used for the decontamination of workers, equipment, and materials. (2) An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials and equipment that are contaminated with asbestos or other hazardous substance.

Decontamination, hazardous material – Area located on the upwind edge of the "hot zone" used to decontaminate personnel and equipment. All personnel coming out of the hot zone must pass through the decontamination area for decontamination.

Decontamination line (hazardous environments) – A line set up with stations for decontamination procedures between the exclusion zone and the support zone.

Decontamination, personal system enclosure – An enclosure designated for controlled passage of all persons to and from the remediation or regulated abatement work area.

Decontamination, restoration – (1) Disinfection or sterilization of infected articles to make them suitable for use. (2) The use of physical or chemical means to remove, make inactive, or destroy bloodborne pathogens on a surface or item to the point at which they are no longer capable of transmitting infectious materials, and the surface is rendered safe for handling, use or disposal.

Decontamination system enclosure, personal – An enclosure designated for controlled passage of all persons to and from the remediation or regulated abatement work area.

Deductible (insurance) – (1) The amount of loss paid by the policyholder. (2) The amount of a loss payment for which an insured is responsible. The deductible discourages small, nuisance claims and reduces the cost of coverage. (3) A clause within an insurance policy that states a specified amount (either fixed or by percent) that is subtracted from the settlement of each covered incident. (RIA) Education Note: Either a specified dollar amount, a percentage of the claim amount, or a specified amount of time that must elapse before benefits are paid. The bigger the deductible, the lower the premium charged for the same coverage. (ANSI/IICRC S500 Standard, 2006) (See: Depreciation)

Deep cleaning – A restorative (corrective) carpet or upholstery cleaning process that removes embedded dirt, spots, and odors. Restorative cleaning utilizes system that incorporates evaluating the condition of the fabric, testing fabrics for colorfastness, followed by washing, spotting, rinsing, extraction, deodorization, thorough drying, and post inspection.

Dehumidification – The process of reducing the moisture content of air.

Deflagration – (1) A rapid combustion of a material occurring in the explosive mass at sub-sonic

speeds. The event is usually caused by contact with a flame source but may also be caused by mechanical heat or friction. (2) A combustion wave propagating at subsonic velocity relative to the unburned gas immediately ahead of the flame, i.e. the burning velocity "U," is smaller than the speed of sound "C," in the unburned gas. (3) Propagation of a combustion zone at a velocity that is less than the speed of sound in the un-reacted medium. (NFPA 921 3.3.36) Education Note: The velocity of the unburned gas ahead of the flame is produced by the expansion of the combustion products. In an accidental gas explosion, the deflagration is the common mode of flame propagation. In this mode the flame speed, S, ranges from order of 1m/s up to 500 -1000 m/s corresponding to explosion pressures between a few mbar and several bar. For strong deflagrations, shock waves may propagate ahead of the deflagration (i.e., the flame).

Degreaser – A cleaner that is designed to remove oils and greases including heavily impacted smoke film.

Degree of damage – Fire is a result of an exothermic reaction where heat, types of combustible fuel, and the amount of oxygen influencing the fire determines' the degree of building and content damage.

Degree of damage (fine arts conservation) – The degree of damage varies from negligible to extreme.

Degree of damage (water damage restoration) – The degree of damage depends on the kind of materials that have been affected, the length of time they remained wet, the category of water affecting the material.

Degree of damage, extreme (conservation management) – (1) Contents, works of art, furniture that experienced extreme damage, which is the most severe damage or the existing condition that has become very advanced. (2) The work-of-art is insecure, no longer stable and is at great risk.

Degree of damage, major (conservation management) – Major damage or existing conditions are noticeable, if not conspicuous in extent; stability of the work-of-art, content, artifact or furniture is in question, often great risk of further damage is a factor. Education Note: Assessing damage requires the immediate attention by a conservator or restorer to prevent further damage or loss.

Degree of damage, marked (conservation management) – In conservation management of works of art, marked damage is readily identified damage, often with distinctive features and requires remediation by a conservator.

Degree of damage, minor (conservation management) – Some minor damage may be from existing conditions, which is relatively unimportant; generally, minor does not involve risk of loss; should be monitored by a conservator.

Degree of damage, moderate (conservation management) – Moderate damage is noticeable, and it may be in the middle or increasing severity or size; not serious but should be monitored or corrected by a conservator.

Degree of damage, negligible (conservation management) – Negligible damage is generally insignificant that may not need immediate attention but needs to be monitored.

Degree of damage, restoration extreme – Construction materials, building finishes and/or contents that experienced extensive damage. Education Note: Extreme degree of damage takes into consideration salvageability and/or repair that may not be cost effective to complete.

Degree of damage, slight (conservation management) – Works of art which are slight damage that is more noticeable than "negligible;" should be monitored by a conservator.

Degree of fire damage – The degree a material sustained direct heat damage or a direct impact from heat such as smoke and soot; water and moisture; corrosion. Education Note: The degree of damage also includes the indirect impact from heat sources including transference of gases and vapor into walls, ceilings and flooring; smoke and soot; water and moisture; corrosion. After assessment, the degree of fire damage is usually categorized as: light, moderate or extensive; heavy or extreme.

Degree of water damage – The degree a material sustained a direct impact (absorption) from water or an indirect impact from moisture and/or corrosion. The degree of water damage takes into consideration the Category of water including Category, 1; Category 2; Category 3; and Special Situations. Education Note: After assessment, the degree of water damage is usually categorized as: light, moderate or extensive; heavy or extreme.

Degree of work-of-art damage (conservation management) – The degree an art object sustained direct or indirect impact from damage. Art damage can be environmentally caused (i.e., sun light, fading, smoke and fumes, acids); or from an event such as a fire or water. Education Note: The degree of damage must also take into consideration the condition of the piece prior to the time of an incident that may have caused further damage. After assessment, the degree of work-of-art damage is usually categorized as: negligible, slight, marked, minor, moderate, major, or extreme.

Degrees Celsius (Centigrade) – The temperature on a scale in which the freezing point of water is 0°C and the boiling point is 100°C. To convert to Degrees Fahrenheit, use the following formula: °F = (°C x 1.8) + 32. (OSHA)

Degrees Fahrenheit – The temperature on a scale in which the boiling point of water is 212°F and the freezing point is 32°F. (OSHA)

Dehumidification – (1) The process of reducing the moisture content in air. (IICRC S500 Standard, 2006) (2) The process of removing moisture from air. (IICRC S500 Standard, 2015)

Dehumidifiers in fire/soot damaged buildings – A humidity control process that removes high or excess moisture content from air and soot contaminated or fire damaged surfaces. Education Note: The dehumidification effect reduces moisture content at the surface of soot contaminated materials allowing these materials to become stable (less damaged or contaminated by soot and ash. One or more dehumidifiers are used to control the relative humidity to around 40% while indoor cleaning and

deodorizing occurs.

Deliquescence – The process that occurs when the vapor pressure of the saturated aqueous solution of a substance is less than the vapor pressure of the water in the ambient air. Education Note: Water vapor is collected until the substance is dissolved and in equilibrium with its environment. Example includes the process by which solids absorb enough moisture from the air to dissolve themselves. Another example is calcium chloride that dissolves in the presence of moisture because of its moisture holding capacity.

Demolition – The systematic removal of damaged building components to allow repair and restoration.

Deodorant – A chemical or gas that covers, modifies, removes, or destroys odor causing agents. (IICRC S500 Standard, 2006)

Deodorization – (1) The practice of removing unpleasant odors. (2) The process of odor removal by removing physical materials containing odors or by adding chemicals. Education Note: There is a considerable amount of science and theory one needs to know before applying various deodorization techniques. From an IICRC prospective, a restorer should pass the IICRC-OCT (Odor Control Technician) course; the FSRT (Fire & Smoke Odor Technician) course to gain valuable fundamental information on deodorization. Additionally, the technician should download and read "*Odor Neutralization: Assessment and Removal*" by Patrick Moffett. https://www.scrt.org/scrt-free-reports/146-odor-neutralization-assessment-and-control/file

Deodorization chamber – A designated room which is designated or designed to deodorize contents, furniture, upholstery, and clothing. Education Note: Most deodorization chambers are constructed in a cleaning plant where the chamber is temperature and humidity controlled and ventilated to outside air.

Deodorization, fire – (1) The process of odor removal by removing physical materials containing odors or by adding chemicals or oxidizers. (2) The process of odor removal. There are four principles for effective, permanent deodorization: (1) Per BDMA: a) remove the primary source (debris, char, heavily contaminated items or surfaces); b) clean all surfaces exposed to direct contamination; c) apply odor counteractants; d) condition the air. (3) Per IICRC: a) remove the primary source (debris, char, heavily contaminated items or surfaces); b) clean all surfaces exposed to direct contamination; c) recreate the conditions of penetration with appropriate odor counteractants (through direct application, or by generating a fog or gas that combines with and neutralizes [the] malodor); d) seal (coat) salvageable, but heavily contaminated surfaces. (IICRC's FSRT course)

Deodorization, hydroxyl – A chemical compound in the form of a gas produced by a machine to provide odor control and deodorization of organics such as volatile organic compounds. VOC's include smoke odor that can be controlled or abated by hydroxyl deodorization.

Deodorize – Any process that eliminates offensive odors.

Deodorizer – Chemical fragrances applied in air or on surfaces to remove, bind with or mask odors. However, a lingering odor may indicate the structure has not been completely dried or wastewater is still present.

Deodorizing / Deodorization – (1) The act of depriving molecules to carry odors. (2) Elimination of odors. (3) To mask or eliminate an odor.

Depreciated value (insurance) – The value remaining after deduction for depreciation. (RIA)

Depressurization – A condition that occurs when air pressure inside a structure is lower than air pressure outside. (IICRC S500 Standard, 2006; BDMA)

Depreciation (insurance) – (1) Physical wear and tear or technological or economic obsolescence. (2) The amount or percentage by which something decreases in value over time. (RIA) (3) A decrease in the value of property over a period of time due to wear and tear or obsolescence. Depreciation is used to determine the actual cash value of property at time of loss. (Coe Insurance) (See: Deductible)

Dermal exposure (medical) – Contact between a chemical and the skin.

Dermal toxicity (medical) – Adverse effects resulting from skin exposure to a substance. Ordinarily used to denote effects in experimental animals.

Desorption – (1) The process of freeing from a sorbed state. (2) The release of moisture or moisture vapor through pores or interstitial spaces. Moisture moves faster through pores and interstitial spaces by increased heat and pressure. For more information go to: http://www.swst.org/meetings/AM05/almeida.pdf

Desorption, thermal – The use of heat to increase volatility of a contaminant such as aldehydes (formaldehyde). Thermal desorption is not combustion; it neither produces incineration nor is it designed to destroy organic materials.

Destructive inspection/testing – The application of inspection and test procedures that damage or destroy building materials.

Detergent – A cleaning agent. Usually, the term detergent refers to a prepared compound that may include surfactants, builders, dry solvents, softeners, brighteners, fragrances, etc. but does not include true soap.

Deteriorated paint – Any interior or exterior painted surface that exhibits cracking, scaling, chipping, peeling, or loose paint.

Detection – (1) Sensing the existence of a fire, especially by a detector from one or more products of fie, such as smoke, heat, ionized particles, infrared radiation, and the like. (2) The act or process of

discovering or locating a fire. (NFPA 921 3.3.37)

Detonation – Propagation of a combustion zone at a velocity that is greater than the speed of sound in the un-reacted medium. (NFPA 921 3.3.38)

Developed index, smoke (SDI) – A measure of the concentration of smoke a material emits as it burns. Like the Flame Spread Index, it is based on an arbitrary scale in which asbestos-cement board has a value of 0, and red oak wood has 100.

Deviation in remedial work – Substantive or material deviations from the original, agreed-upon contract or scope of work. Deviations should be documented in a written and detailed change order, which includes a description of the changes to the work, time for performance, price/fees, and method of payment. Further, it is recommended that the client or the client's designated agent, and the restorer's representative accept the change order in writing (IICRC S500 Standard, 2006)

Dew point – The temperature at which humidity in the air reaches saturation and will condense upon a solid surface.

Diffusion, gases from heat – In a fire or wildfire that affects a building with heat and combusted materials, diffusion refers to the spreading out of gases, vapors and particulates from a concentrated source resulting in an increase in the entropy (degree of disorder) of the substances that affect the building. Diffusion also occurs because of the random movement of molecules of the substance which allows them to separate from one another. Education Note: The greater the space between molecules the greater ability they must spread out from one another. The more packed the molecules are in the substance the less space to maneuver, and therefore, the more difficult for diffusion to occur. Gaseous substances in a wildfire are in a league all to themselves. The molecular particles of gas are much more distant from one another than either liquid or solid particles are to each other. Gaseous substances can penetrate deeper into building materials than particles.

Diffusivity, thermal – (1) The ratio of thermal conductivity of a substance to the product of its density and specific heat. In heat transfer analysis, thermal diffusivity is the thermal conductivity divided by the volumetric heat capacity. Education Note: Substances with high thermal diffusivity rapidly adjust their temperature to that of their surroundings, because they conduct heat quickly in comparison to their volumetric heat capacity or "thermal bulk." (NAIMA) (2) The ratio of conductivity (k) to the product of density (r) and specific heat (Cp) [a = k/rCp cm^2 sec^{-1}]. The ability of a material to distribute thermal energy after a change in heat input. A body with a high diffusivity will reach a uniform temperature distribution faster than a body with lower diffusivity.

Dilution ventilation – Airflow designed to dilute contaminants to acceptable levels. Also referred to as general ventilation or exhaust.

Dipole / Dipole forces – Intermolecular attraction forces between polar molecules that result when positive and negative poles of molecules are attracted to one another.

Direct attack – Any treatment of burning fuel, such as by wetting, smothering, or chemically quenching the fire or by physically separating burning from unburned fuel.

Direct damage – Physical damage to real or personal property.

Disaster – A sudden, unplanned event causing unacceptable damage or loss.

Discoloration (building fire; wildfire) – Any change in the apparent color of an image, material, or content. Discoloration can refer to the loss of color due to air pollution, smoke impaction, smoke containing acids and the oxidation process.

Disinfect – To free materials from biological contamination.

Disinfectant – Any chemical or physical process used on objects that destroys more than 99% of unwanted microorganisms. Education Note: Disinfectants may not kill all spores, on inanimate surfaces. Descriptions of products of this type generally include the suffix "-cide," meaning to "kill;" e.g., bactericide, fungicide, virucide.

Disinfectant-detergent – A chemical product that is formulated with cleaning agents and germicides, selected for soil removal (e.g., surface film involving smoke) and simultaneous disinfection.

Disinfectants – Any chemical agent applied on non-living objects such as building materials and contents that destroys or inhibits the growth of harmful microorganisms. Education Note: Disinfectants are one of three groups of antimicrobials registered by EPA for public health uses. EPA considers an antimicrobial to be a disinfectant when it destroys or irreversibly inactivates infectious or other undesirable organisms, but not necessarily their spores. EPA registers three types of disinfectant products based upon submitted efficacy data: limited, general, or broad spectrum, and hospital disinfectant, (EPA)

Disinfecting – (1) A process or treatment for retarding and killing microorganisms. (2) The process of killing pathogenic organisms or rendering them inert. (3) The act of disinfecting, using specialized cleansing techniques that destroy or prevent growth of organisms capable of causing infection.

Disposable respirator – A respirator that is discarded after the end of its recommended period of use, after excessive resistance or physical damage, or when odor breakthrough or other warning indicators render the respirator unsuitable for further use. (NIOSH)

Disposal – Final placement of waste materials.

Disperse – The scattering of smoke, soot, and ash from a heated source, which is sent (distributed) throughout a building to non-heat affected sources.

Disseminated (wildfire) – Particulates, vapors, fumes, and gases that released from its source and

traveled in air to other materials and surfaces. Particles of interest include asbestos and lead-based paint; soot, ash, smoke odor; PAHs and VOCs.

Dissolve – (1) To cause to pass into solution. (2) To disperse and disappear. (3) To separate into components.

D'limone – A solvent from the citrus family. D'limone combined with other chemicals is a cleaner and degreaser for smoke film. Plastics and ceramics respond positively to D'limone-based cleaning products.

Doctrine of avoidable consequence (insurance) – Also known as the "failure to mitigate," describing insurers who do not stop damage that causes the claim to become worse. Under the policy the insured has a duty to minimize their loss. Education Note: The general rule of mitigation of damage applicable to both breach of contract and tort, is that the aggrieved party must take all reasonable steps to mitigate the loss and cannot claim for avoidable loss. In the case of an insurance policy, damages for breach of contract are reduced by the amount of loss that should have been avoided if the insured had taken reasonable steps to mitigate the loss.

Dose-response – The relationship between the dose of a pollutant and its effect on a biological system.

Dropdown – The spread of fire by the dropping or falling of burning materials. Dropdown is synonymous with "fall down." (NFPA 921 3.3.40)

Dry – (1) The state of not being wet. (2) In building design and engineering, the ultimate properties of a wet state material which must evaporate volatile ingredients to keep the building in a state of dry. For more information on keeping buildings dry go to: http://www.epa.gov/iaq/largebldgs/i-beam/text/fundamentals_of_iaq.html#Factors

Dry air – (1) Air with no suspended moister vapor. (ANSI/IICRC S500 Standard) (2) Air devoid of water vapor and pollutants. Education Note #1: At sea level 14 cubic feet of dry air weigh one pound. The standard weight of normal average sea level air is .0765 pounds per cubic foot at 59°F (519 absolute Fahrenheit) or 1.224 ounces. Education Note #2: When air temperature goes up, air weight goes down. By doing the math and multiplying 519 by 1.224 you get 635. This means, heated air will weigh exactly one ounce per cubic foot at 635 absolute Fahrenheit or 175°F.

Dry bulb – The temperature registered by a thermometer with a dry sensing bulb.

Dry bulb temperature (DBT) (T_{db}) – (1) The ambient (surrounding air) temperature taken with a thermometer. (2) The measured temperature of air using a traditional thermometer. (3) The temperature on one of two thermometers on a sling psychrometer; this temperature corresponds to the bulb which does not contact the water-saturated wick. (NASA) Education Note: Dry bulb temperature is the temperature of air measured by a thermometer freely exposed to the air but shielded from radiation (heat, UV light) and moisture.

Dry chemical – Powdered products including soap and detergents that are emulsified in water. Some powdered chemicals are used in their dry form such as a fire extinguishing agent, usually composed of sodium bicarbonate, potassium bicarbonate, etc.

Dry clean – (1) To clean with a non-aqueous solvent, usually formulated for that purpose. (2) Cleaning with dry methods such as with a broom, towel, vacuum, HEPA vacuum, chemical sponge; dusting, air washing.

Dry cleaning (solvent) – (1) Any process that cleans clothing and textiles using a chemical solvent rather than water. (2) An in-plant cleaning process in which organic solvents, such as chlorinated or aliphatic hydrocarbons and a dry solvent compatible detergent are used as the cleaning medium rather than using water. Education Note: Dry cleaning can be done on site under special conditions where ventilation and solvent capturing is completed.

Dry cleaning (vacuuming; wiping) – Processes and procedures that remove loose dust, dirt and particulate from the surface or bed of a fabric. Education Note: Dry cleaning may include vacuuming or wiping with a dry cloth or a damp cloth having a detergent that will not leave a residue.

Dry cleaning facility – A facility engaged in the cleaning of fabrics in an essentially non-aqueous solvent by means of one or more washes in solvent, extraction of excess solvent by spinning and drying by tumbling in an airstream. The facility includes, but is not limited to, washers, dryers, filters and purification systems, waste disposal systems, holding tanks, pumps and attendant piping and valves.

Dry cleaning sponge – A natural rubber sponge used for dry cleaning surfaces. Education Note #1: A dry cleaning sponge may be capable of removing stubborn marks from drywall and wallpaper without chemicals or abrasives. Dry cleaning sponge can remove soot off ceilings, walls, and flat surfaces. Under normal household cleaning conditions, a dry-cleaning sponge may be able to surface clean a 12' x 20' wall surface. Education Note #2: In fire damage restoration, the cleanable square foot area is greatly reduced based on the amount of soot, wetness, and oily properties.

Dry cleaning sponge, soot – A chemical sponge that is an excellent dry compound cleaning device involving soot cleanup. Education Note: Dry cleaning sponges can be used to remove household dust and particulates from lampshades, paintings, wallpaper, heat registers and grills, computers, antiques, fireplace, wood burning stove, projection screen, painted walls, books, acoustic ceiling tiles, etc.

Dry foam – A detergent solution which is agitated or mixed with air to produce a frothy cleaning medium with low moisture content.

Dry foam cleaning – A minimum use moisture cleaning method for suspending and removing soils off a surface or textile.

Dry fog / Dry fogging – Molecules that land on a surface, but they do not moisten the surface. Education Note: Molecules produced by a dry fogger or ultra-low volume fogging machine are less

than 20 microns in size. Dry fogging machines can produce larger and smaller molecules (e.g., 5-50 microns). Setting the dry fogging machine to less than 20 microns will produce a dry fog. "Dry" fog of small particles may be superior to wet fogged larger particles because smaller droplets have a greater surface to volume ratio.

Dry foggers – Machines that produce medium to exceptionally fine size solvent-based particles.

Dry-ice blasting – (1) The surface treatment equipment and process for removing soot and char with pellets of dry ice. (2) A form of abrasive blasting, where dry ice, the solid form of carbon dioxide, is forced through an air compressor and directed at a surface to clean or remediate it. Education Note #1: Dry ice blasting uses soft dry ice, accelerated at supersonic speeds, and creates mini explosions on the surface to lift the carbon particles off an underlying substrate. The combined impact energy dissipation and extremely rapid heat transfer between the pellet and the surface cause instantaneous sublimation (vaporization) of the solid CO_2 into a gas. The gas expands to nearly 800 times the volume of the pellet in a few milliseconds in what is effectively a "micro-explosion" at the point of impact. At the point of pellet contact surface temperatures can be -109°F for a fraction of a second, and within a matter of seconds, warm back to ambient temperatures. Education Note #2: In another explanation of dry-ice blasting, it is the pressure of the blasting material and dry ice's sub-zero temperature of -109.3°F (78.5°C) that explodes against the contaminant, causing it to shrink and loose its adhesion. Carbon dioxide (CO_2) has 800 times greater volume as it expands, that then speeds up the removal process. Paint, oil, grease, asphalt, tar, soot, dirt, ink, resins, and adhesives respond positively to being removed.

Dry ice cleaning (remediation; restoration) – The cleaning of contaminated surfaces through dry-ice blasting; the use of dry-ice to clean surfaces.

Dry powder cleaning – A semi-moist powder that is spread onto a rug or carpeting. Before use, the dry powder was soaked in a detergent and/or solvent. Education Note: The dry powder may be corncob-based or a synthetic powder-based. Powder is agitated and worked into the fabric with an orbital floor machine or a machine having counter rotating brushes. The theory behind dry powder cleaning, the powder acts like thousands of little sponges scrubbing and absorbing dirt from the carpet as it is agitated. After the powder dries, usually in only a few minutes, vacuuming removes residual powder that is filled with dirt.

Dry powder extinguisher – A fire extinguisher which discharges fine, dry powder for specific applications in fire suppression.

Dry smoke – Fire residues characterized by loose, non-smeary particles which tend to remain on the surface. Dry smoke reflects a freely burning fire with cellulose materials as a primary fuel source. Education Note: Dry smoke comes from high temperatures and fast-burning fires as opposed to "wet" smoke which comes from slow-burning, smoldering fires. Dry smoke is usually easier to remove as compared to removing wet smoke.

Dry smoke residue – The small, dry particles, found throughout a structure that were created by a hot, vigorous fire, having plenty of oxygen.

Dry solvent – A non-water liquid (hydrocarbon) that has an ability to dissolve oils, greases, etc. (IICRC S300 Standard)

Dry solvent spotter – A non-water liquid (hydrocarbon-based) that can dissolve oils and grease.

Dry soot – Soot that has little moisture content and is not oily. Dry soot is often a byproduct of a wood burning fire.

Dry sponge / Chemical sponge – (1) A surface cleaning process for the removal of dry dirt, dust, hair, smoke, soot, and residue. (2) A cellular rubber cleaning sponge which cleans by capturing and retaining small particles. Education Note: These sponges have wide application in fire restoration for removing combustion residues, meaning, even though the fire restoration industry refers to the sponge as a chemical sponge, the sponge does not contain chemicals. Dry, or cellular sponges have no active chemical properties and deposit no residue of their own, they are made from natural rubber, a blend of natural and synthetic rubber and sometimes cellulose materials that absorb dry particles through physical action.

Dry sponging – (1) The removal of residues by applying a cellular rubber sponge. (2) A surface cleaning process for the removal of dry dirt, dust, hair, smoke, soot, and residue. Education Note: Dry sponges are made from natural rubber, a blend of natural and synthetic rubber and sometimes cellulose materials that absorb dry particles through physical action. Even though the fire restoration industry refers to the sponge as a chemical sponge, the sponge does not contain chemicals.

Dry standard – (1) The dry standard is determined by taking moisture content readings from known dry materials in an undamaged area or structure and using these reading s to establish a drying goal. (IICRC S500 Standard) (2) A reasonable approximation of conditions prior to the moisture intrusion, or by comparing moisture content conditions in unaffected areas of the building. (IICRC S500 Standard, 2006) (3) A reasonable approximation of the moisture content or level of a material prior to a water intrusion. An acceptable method is to determine the moisture content or levels of similar materials in unaffected areas or use historical data for the region. (IICRC S500 Standard, 2015) (4) The moisture content by weight or by volume found in unmodified hygroscopic materials that have resided and equalized in a historically average environment. (International Dry Standard Organization) For more information go to: http://www.drystandard.org

Dry steam blasting – The use of low pressure and high-temperature steam (e.g., to blast particulates off a surface. High-temperature dry steam also melts and suspends organics including dirt, grease, oil, soot, and paint making it easier for surface wiping. Education Note: Dry-steam blasting is cost-effective, and it is environmentally friendly. Dry steam makes it possible to clean contaminated surfaces and equipment gently and with utmost care, in the shortest of time. Professionally trained

persons using deionized water in dry steam blasting equipment may be able to clean and sanitize contaminated mechanical and electrical control systems without damaging them. Some systems boast a minimum water consumption of 0.8 to 1.4 liters (0.2 to .37 (1/3rd) gallon) per minute at the water intake, and a working pressure up to 30 bar. Some machines operate by manual control; others use electronic devices to control temperature, pressure, and detergent surfactant injection with anti-corrosion inhibitor. The maximum working temperature of most systems is 365°F (185°C) of dry vapor at the discharge.

Dry steam cleaning – Steam that does not contain water droplets to clean with; it contains only moisture vapor. It is called "dry steam cleaning," because no water, residue or dampness is left behind on the surface from the steam after treatment.

Dry vacuuming – The use of HEPA vacuums with fine horsehair brush attachments to remove loose soot and ash off surfaces.

Dry vacuum cleaning a lamp and silk shade in place – This direction is for an RIA Certified Restorer or an IICRC Certified Upholstery Cleaning Technician. Dry-vacuum cleaning maintenance of a lamp and its silk shade involves removing loose surface dust and soils; "*not*" completing a wet cleaning or spotting process. To complete dry vacuuming: a) Turn off and unplug the lamp to avoid unnecessary shock; b) Dry vacuuming can be completed by one person where the lamp is normally positioned. c) It is recommended to place a dry, soft cotton towel around the lamp, to capture falling dust, and avoid scratching finishes. d) Do not touch the dirty silk fabric with your hands; only hold the shade by the expose metal frame top; e) The success of the dry-vacuum cleaning process greatly depends on the age and condition of the lamp shade and silk fabric. f) Have several soft bristle brushes available (generally synthetic is preferred over natural brushes), also, several brushes may be necessary to complete the cleaning process since they can clog with lint and dirt. g) When possible use a HEPA vacuum to remove dust, skin cells, dander, allergens, and mold spores. h) Recognize some vacuums are so powerful they can suck-in tassels and damage them, and in some cases, loose sewing threads may cause the tassel to be pulled (sucked) off. i) Use a damp cloth to remove surface dust on the lamp. Education Note: 1) Avoid using a lint roller on a delicate silk fabric. The results can be disastrous. 2) When damp cleaning lamps, only use a very mild cleaning solution such as Downey. Make sure the lamp is dry and there are no streaks on the lamp or water spots on the table or counter. 3) When blowing dust off silk fabric with forced air pressure, recognize that you will be putting months and years of dust in the air. Therefore, complete this type of dust removal process outdoors.

Drying – (1) The process of removing excess moisture and keeping it out of materials. (2) The process of removing moisture from materials. (IICRC S500 Standard, 2015)

Dry sponge cleaning – The removal of smoke and soot-based residues by applying a rubber or synthetic cellular sponge across a sooty surface.

Drying chamber – (1) A designated room at the loss that is not affected by water or smoke where wet contents are taken to dry. (2) A specially constructed room at a cleaning or storage plant where wet

contents are dried. (3) When the type of damage to the structure prevents drying contents in the area of moisture intrusion, or if contents require special handling, specialized drying chambers can be created to process contents outside the affected area. (IICRC S500 Standard, 2006)

Duct cleaning, smoke, and soot – The process of removing fire residue and soot debris from the interior of supply and return air ducts. Education Note: Follow the NADCA ACR, 2006 standard when cleaning ventilation system ducting.

Duration – (1) The length of time it took for smoke, soot, and ash fallout to contaminate a building. (2) The length of time smoke, soot and ash remains on a surface to cause discoloration, oxidation, and material damage.

Dust – (1) A general name given to tiny solid particles having a diameter of less than 20 microns. (2) Finely divided solids that become airborne from their original state without any chemical or physical change other than fracture (MSHA). Education Note: Particles in air come from sources of dust lifted by wind currents. General indoor dust contains skin cell parts, hair, pollen, spores, textile and paper fibers, cotton lint, minerals from outdoors and many other airborne products coming from combustion.

Dust, soot – Fine particles which are generally less than 20 microns in size that were created as a byproduct of incomplete combustion.

Dust-lead hazard after a fire (lead paint) – Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead equal to or exceeding 40 ug/ft^2 on floors or 250 ug/ft^2 on interior window sills based on wipe samples. Education Note: No matter the type of structure, when lead-based paint is present after a fire, a dust-lead hazard is present which can affect the health of cleanup, demolition, remediation, and repair workers.

Dusting product (surface cleaning) – A product that dispenses a fine mist or spray that picks up and retains light dust and soil.

(E)

E&O – Errors and omissions insurance. A professional liability insurance that protects companies and individuals against claims made by clients for inadequate work or negligent actions.

EA – Environmental assessment.

Ease of cleaning – Cleaning that is most dependent on the porosity of the surface that provides voids for dirt entrapment, presence of surface coatings, uniform coverage of the coating, and toughness of the surface coating to stand-up to wear and maintenance routines.

Ecosystem – An area where energy, nutrients, water, and other biological and geological influences, including all living organisms, work together and influence one another.

Eddy effect – (1) A circulation of air that develops during wildfire combustion of vegetation resulting in temperature and humidity changes. A turbulent wind eddy can change the wildfire's direction. (2) A condition in a building fire where heated wind swirls around cooler corners.

EDS (laboratory analysis) – Energy dispersive spectroscopy. An analytical method that analyzes metallic species in diesel soot as compared to analyzing other types of soot. TEM/EDS are often used together to analysis carbon content. SEM/EDX analyzes elemental content and morphological parameters of diesel soot aggregates.

EDX (laboratory analysis) – Energy Dispersive X-ray. In soot and char testing, usually EDX analysis follows TEM analysis. From a laboratory use prospective, the EDX instrument could be an attachment to the TEM instrument.

Effective heat of combustion – Once a material is ignited, fire spreads across the fuel object unit it becomes fully involved. The spread at which flame travels over a surface of the material is dependent on the fuel consumption, orientation, surface to mass ratio, incident heat, and air supply. Education Note: Given sufficient air, the incident heat on the fuel and the fuel characteristics, most notably the heat of combustion and latent heat of vaporization, dictates the energy released from a fire. In typical building fires, as the fire grows the energy release rate increases to a peak value. The increase in the heat release rate with time depends on the fuel characteristics, incident heat, and available air supply. At some point, the heat release rate of the fire becomes limited by either the amount of fuel or the amount of oxygen that is available; this is referred to as the peak heat release rate.

Effective temperature – (1) After the building fire is out, the temperature of air and surface temperature in conjunction with humidity and surface wetness causes secondary damage. (2) In water damaged buildings, the temperature at which the effects of humidity are lessened so it does not produce secondary damage.

Egress – (1) An exit pathway out of a building. (2) An exit route out of a containment.

Electric spark – A small incandescent particle created by some arcs. (NFPA 921 3.3.42)

Electric vehicle fire – Vehicles having battery power storage systems. Education Note: Mitigation contractors removing a burnt electric or a hybrid vesicle may not be qualified to inspect and assess damage and the means and methods for removing it. Generally, because of batteries and other components, only a hazardous material's trained company that is compliant with fire and local ordinances can remove the vehicle, transport it and dispose it. For more information go to: https://www.usfa.fema.gov/training/coffee_break/061819.html

Electrical fire – A fire originating in an electrical device or wiring, which is often characterized by a distinctive, pungent odor. Education Note: Sometimes electrical fires start off as smoldering, where

increased heat melts wire sheathing. Smoke and odor produced by smoldering electrical equipment can produce toxic chemicals and vapors, even when there is no combustion.

Electrical hazard – A dangerous condition such that contact, or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

Electrical smolder – A condition caused by heat originating in an electrical device or wire. Electrical smolder odors are very distinct as an acrid or pungent odor. Education Note: Sometimes electrical fires start off as smoldering, where increased heat melts wire sheathing. Smoke and odor produced by smoldering electrical equipment can produce toxic chemicals and vapors, even when there is no combustion.

Electronics – The management and application of extremely small electrical currents, used in communications, process controls, computers, and various process equipment; collectively, the technology, theory and equipment relating to electronics.

Electronics restoration – The cleaning, restoration and repair of all contents and appliances that have electronic segments and parts. Education Note: Electronics restoration includes watches, printers, computers, toasters, vibrating toothbrushes, radios, smart tablets, and cell phones.

EMC – Equilibrium moisture content. The moisture in surrounding materials that will challenge damaged materials to again reach a state of equilibrium over time.

Emergency repairs – The process of providing immediate service to eliminate further damage. Emergency repairs include but are not limited to board-up, plumbing, and electrical, water extraction, pack-out of key valuable or irreplaceable items in unsafe buildings, corrosion control, and removal of hazardous situations in occupied buildings.

Emergency services – The rapid response by specialized contractors and service personnel to mitigate water, fire and other situations that affect property, contents, and the built environment. Education Note: A lack in immediate response (hours or a day) reduces the chance of survival, salvage and restoration of a fire or smoke damaged building and contents because of conditions continuing to cause damage.

Emergency treatment – Remedial action by trained fire damage restoration technicians to reduce property loss immediately after the damage.

Emission – Pollution discharge from a source. (1) In aerobiology, the release of particles and gases from specified sources into the atmosphere. (2) Pollution discharge from a source. (3) The release or discharge of a substance into the environment. Generally, refers to the release of gases or particulates into the air. (4) A release of a substance from a source, including discharges to the wider environment. Education Note: Emission is also known as discharge, effluent, and release. Emission must not to be confused with immission.

Emissivity – (1) Ability of a material to transfer far-infrared radiation across an air space. (2) A measure of the ability of a material to radiate energy. It is expressed as a ratio (decimal) of the radiating ability of a given material to that of a black body. Education Note: 1) A black body emits radiation at the maximum possible rate at any given temperature and has an emissivity of "1.0." 2) Materials such as aluminum foil has poor ability to do this (they have a low emissivity rating) and are therefore useful, when properly spaced next to an air space in controlling heat in a hot climate. For example, a roof radiant barrier placed below roof decking over the attic space keeps the attic cooler.

Emissivity adjustment – All surfaces emit infrared energy or heat. The level of emission varies much per surface and is described with the term emissivity. Painted coatings and materials usually have a high emissivity while polished aluminum has a low emissivity. Education Note: To measure the temperature of a material accurately it will be necessary to adjust the thermal imaging camera.

Emittance – (1) The ratio of the radiant flux emitted by an ideal, perfect emitter and absorber of thermal radiation at the same temperature and under the same conditions. (2) The ratio of the radiant heat flux emitted by a specimen to that emitted by a blackbody at the same temperature and under the same conditions. (DOE) (3) The rate at which a black body radiates energy across all wavelengths. (4) The ratio of a target surface's radiance to that of a blackbody at the same temperature, viewed from the same angle over the same spectral interval, a generic look-up value for a material. Values range from 0 to 1.0.

Emphysema – Chronic pulmonary disease characterized by loss of lung function due to destruction of many of the alveolar walls. Education Note: The area for gas exchange in the lungs is reduced in emphysema patients.

Employee exposure, inhalation – Exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

Encapsulation – The condition of being enclosed; to encase a substance or a contaminant.

Enclosed space – A volume substantially surrounded by solid surfaces such as walls, floors, roofs, and openable devices such as doors and operable windows. Education Note: Spaces not meeting these criteria for enclosure are exterior to the building for purposes of determining envelope requirements. For example, most parking garages do not qualify as enclosed space.

Enclosure (asbestos abatement) – Enclosures that are constructed with airtight walls, ceilings and floors between the asbestos material and the building/structure environment, or around surfaces coated with asbestos material, or any other appropriate procedure as determined by regulations that prevents the release of asbestos fibers.

Enclosure (contamination) – Enclosures contain and control contamination at its source.

Enclosure (environment) – A containment system that protects one environment from another.

Enclosure (lead paint) – The use of rigid, durable construction materials that are mechanically fastened to the substrate in order to act as a barrier between lead-based paint and the environment.

Enclosure (water damage restoration) – Enclosures that control humidity and temperature.

Enclosure system – That portion of a decontamination enclosure system designed for controlled transfer of materials and equipment in or out of a work area. Typically, it consists of a processing area and a holding area.

Enclosure system, personal decontamination – An enclosure designated for controlled passage of all persons to and from the remediation or regulated abatement work area.

Endorsement (insurance) – A document that amends an insurance policy by adding or deleting coverage or otherwise modifying the coverage.

Endothermic – (1) A chemical reaction that absorbs heat. (2) A description of a process that ultimately absorbs heat and requires large amounts of energy for initiation and maintenance.

Endothermic reaction – (1) A chemical reaction in which a substance absorbs heat energy (e.g., standing outdoors in the warm sun). (2) Absorption of energy during a chemical reaction; feeling cool to the touch. In a building fire, endothermic reactions occur at lower heat temperatures as materials are beginning to experience pyrolysis, where air and surface temperatures are rising, because they combust. Depending on the material, combustion can occur around 500°F. (See: Exothermic reaction)

Enthalpy – Heat content; a thermodynamic property of a system.

Environment – The sum of all external conditions affecting the life of an organism.

Environmental agents – Conditions other than indoor air contaminants that cause stress, comfort, and/or health problems (e.g., outside smoke entering the building from a fire, high temperatures and humidity, drafts, lack of air circulation).

Environmental Protection Agency (EPA) – A U.S. federal agency with environmental protection regulatory and enforcement authority. Administers Clean Air Act, Clean Water Act, FIFRA, RCRA, TSCA, and other Federal environmental laws.

Environmental toxicity – The hazardous effect that a given compound or chemical has on the environment (soil, water, air) observed during environmental tests on the effects of the substance on aquatic and plant life.

Entrapment – Fires where personnel are unexpectedly caught in a fire behavior-related, life-threatening position where planned escape routes or safety zones are absent, inadequate, or compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose.

EPA – The US Environmental Protection Agency.

EPA Registration Number (RN) – A unique compound number assigned by the EPA to individual registered products. The RN consists of two parts separated by a dash, such as 123-456. The first part of the RN designates the registrant; the second identifies the specific product registered by that registrant.

Equilibrium – The balance between opposing sides.

Equilibrium moisture content (EMC) (fire) – The moisture content that a fuel particle will attain if exposed for an infinite period in an environment of specified constant temperature and humidity. When a fuel particle reaches equilibrium moisture content, net exchange of moisture between it and the heated environment is at or close to zero.

Equipment – (1) The necessary items required to complete a particular task, service or function. (2) Items required operating a cleaning, remediation, or restoration business. (3) Devices for comfort conditioning, electric power, lighting, transportation, or service water heating including, but not limited to, furnaces, boilers, air conditioners, heat pumps, chillers, water heaters, lamps, luminaires, ballasts, elevators, escalators, or other devices or installations. (DOE)

Equipment clean up – The process of cleaning up tools and equipment that are either dirty or contaminated.

Equipment decontamination – Actions taken to remove contamination from restoration or remediation equipment after use. (BDMA)

Equipment decontamination enclosure system – That portion of a decontamination enclosure system designed for controlled transfer of materials and equipment in or out of a work area. Typically, it consists of a processing area and a holding area.

Equipment, decontamination of – Actions taken to remove contamination from restoration and remediation equipment after use so they can be safety handled by employees and others; so they can be safely removed from one jobsite to another; transported safely on a truck; returned safely back to the warehouse. Education Note: Decontamination of equipment requires removing all hazardous substances (e.g., bacteria, chemicals, mold, byproducts, and toxic agents; lead-based paint, asbestos, mercury, PCB's; bioterrorism) off the outer surface, and sometimes inner surfaces and parts. For more information go to: http://www.osha.gov/Publications/general_decontamination.html and http://www.osha.gov/SLTC/etools/anthrax/decon.html (See: ANSI/IICRC S500 Standard; ANSI/IICRC S520 Standard; Worker decontamination)

Equipment efficiency – The energy efficiency of equipment. The measure of equipment efficiency varies with the equipment type.

Equipment operation and function – Equipment that is properly functioning and is in good

operating condition.

Equipment room – A contaminated area or room that is part of the worker decontamination enclosure system. The equipment room has provisions for storing contaminated clothing and equipment.

ERH – Equilibrium relative humidity. The equilibrium relative humidity balance is achieved when vapor pressures within the material and the environment are equalized.

Escaped fire – A fire which has exceeded or is expected to exceed initial attack capabilities or prescription by the fire department.

Estimate of damage – A verbal or written estimate of approximate damage based on visual observation and other means of calculation and discovery. Education Note: An estimate of damage may change as new information becomes available including but not limited to the discovery of hidden or unforeseen damage.

Etching – A pitting on the surface of some finishes, glass, metal, and stone caused by chemical reaction from acid-based smoke and ash.

Etiology – A branch of medical science dealing with the study of all causes of disease or abnormal conditions.

Evaporation – The conversion of a liquid substance into a gaseous vapor state.

Exhaust fan (mitigation) – A fan that exhausts smoke and soot out of a building.

Exhaust fan (firefighting) – A fireman's fan that exhausts smoke and soot out of a building, usually through a roof or windows.

Exhaust fan (construction) – An exhaust fan is a generic building construction term for a ventilator (ventilation fan).

Exhaust ventilation – Mechanical removal of air from a portion of a building (e.g., piece of equipment, room, or general area).

Exothermic – (1) A chemical reaction which gives off heat. (2) An expression of a reaction or process that evolves energy in the form of heat. The process of neutralization evolves heat; this is an exothermic reaction.

Exothermic reaction – (1) A reaction in which heat is given off to the surroundings as the products of the reaction are formed, (such as when you get sick and your body temperature rises, resulting in sweating; you light a candle and feel its warmth, where the candle is giving off exothermic heat flow), (2) The production of energy during a chemical reaction; feeling warm to the touch. (3) A chemical reaction between two or more materials that change the materials and produces heat, flames, and toxic

smoke. Education Note: In a building fire, where there are high thermal energy materials combusted, they are giving off exothermic gases, often at a temperature above 750°F. (See: Endothermic reaction)

Expansion – (1) Dimensional changes in materials induced by fluctuations in temperature and moisture. (2) Moisture absorption causes wood to expand. Spacing between panel edges and ends is recommended to allow for any possible panel swelling.

Expansion (thermal) – All materials expand and contract to some extent with changes in temperature. Education Note: The Thermal Coefficient of Linear Expansion is expressed in "inches per inch per degree Fahrenheit." Example: gypsum board has a coefficient of (9.0 x 10-6 in. per in. per °F). This means that with an increase in temperature of 50°F, a gypsum board wall 100 feet in length will have a linear expansion of .54" or an excess of ½." The expansion characteristics of some other building materials are more pronounced; a 50°F temperature increase would produce expansion in a 100-foot length of approximately 3/4" in aluminum, 3/8" in steel and 1/2" in concrete.

Expansion coefficient – The amount that a specific material will vary in any one dimension with a change of temperature and moisture.

Explode – The rapid expansion of a material or container with the release of energy, heat, or pressure.

Explosion – (1) The act of exploding; detonation; a chemical action which causes the sudden formation of a great volume of expanded gas; as, the explosion of gunpowder, of fire damp, etc. (2) A violent and destructive shattering or blowing a part of something, as is caused by a bomb. (3) A violent expansion in which energy is transmitted outward as a shock wave. (4) A chemical reaction resulting in an abrupt expansion of gas which can result from a rapid oxidation or decomposition reaction, with or without an increase in temperature. (ISO 13943)

Explosion, gas – A phenomenon where combustion of a premixed gas cloud, i.e. fuel-air or fuel-oxidizer, is causing rapid increase of pressure. Gas explosions can occur inside process equipment or pipes, in buildings, in confined spaces, and even in open outdoor spaces. Education Note: The consequences of a gas explosion will depend on the environment in which the gas cloud is contained or which the gas cloud engulfs. It has been common to classify a gas explosion from the environment where the explosion takes place: 1) Confined gas explosions within vessels, pipes, channels or tunnels; 2) Partly confined gas explosions in a compartment, buildings and confined spaces; and 3) Unconfined gas explosions in processing plants and other unconfined areas. It is important to note; this term is not strictly defined. In an accidental event it may be hard to classify the explosion. As an example, an unconfined explosion in a processing plant may involve partly confined explosions in compartments into which the gas cloud has leaked.

Explosive – (1) A solid or liquid substance (or mixture of substances) which is in itself is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Education Note: Pyrotechnic substances are included even when they do not emit gases. (2) A chemical that causes a sudden, almost instantaneous release of pressure, gas, and

heat when subjected to sudden shock, pressure, or high temperature. Explosives are broken down into various classifications by the Department of Transportation.

Explosive article – An article containing one or more explosive substances.

Explosive level – The concentrations of a gas or vapor in air which can explode. It is usually expressed as a range between a "lower explosive level" (LEL) and an "upper explosive level" (UEL). The explosive level is commonly measured by an explosimeter which reads out the concentration of a possible dangerous gas in percent of LEL.

Explosive limits, chemical – The amounts of vapor in air that form explosive mixtures. These limits are expressed as lower and upper values and give the range of vapor concentrations in air that will explode if an ignition source is present.

Explosive substance – A solid or liquid substance (or mixture of substances) which is in itself is capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not emit gases.

Exposed surface, fire – The side or part of a structural assembly or object that is directly exposed to the fire. (NFPA 921)

Exposure (building or object) – Property near fire that may become involved by transfer of heat or burning material from main fire, typically by convection or radiation.

Exposure (workers) – Individuals who are directly subjected to a hazardous chemical in the performance of a task through any route of entry (inhalation, ingestion, skin contact, or absorption, etc.). Education Note: The Federal Hazard Communication Standard includes both accidental and possible exposures in its definition of exposure.

Exposure assessment – Measurement or estimation of the magnitude, frequency, duration, and route of exposure of humans, animals, materials, or ecological components to substances in the environment. The assessment also describes the size and nature of the exposed population. (IICRC S500 Standard, 2006)

Exposure incident – A specific eye, mouth, nose, other mucous membrane, non-intact skin, or parenteral (puncture, abrasion, penetration) contact with blood or other potentially infectious material that results from the performance of an employee's duties. (IICRC S540 Standard) For more information go to: https://www.osha.gov/OshDoc/data_BloodborneFacts/bbfact04.pdf

Extensive cleaning – The widespread cleaning of dirty, sooty, or contaminated items or surfaces. Extensive cleaning includes but is not limited to cleaning an entire item or material on all sides including dismantling its parts, such as required in smoke damaged appliance cleaning.

Extensive damage – Widespread material damage. Education Note: Extensive damage means the building or item has widespread damage to more than one area or part, requiring it to be replaced or restored at a cost that may be close to or greater than the estimated replacement cost value.

Extensive smoke and soot damage – Damage that consumes most if not all the building or item; or it has compromised the material's structural integrity or its environmental state. Education Note: Extensive smoke and soot damage is a general term describing not just the amount of damage but also the severity. In a wildfire, extensive damage includes but is not limited to wide-spread and far-reaching smoke and soot damage in walls, ceiling, and flooring, even though the building may not have sustained light to extensive structural damage. Extensive damage to contents describes a situation where a vast amount of contents or works of art are affected by heat, or significant smoke and soot; a single item that experienced major damage.

Exterior cleaning – To remove harmful and damaging residues from the outer surfaces of a device, furnishing, or enclosure. Examples include corrosion, smoke, and char.

Exterior contents cleaning – The removal of damaging particles and residues from the outside surface of contents, appliances furniture, and fixtures.

Exterior exhaust hoods – The termination of an interior air exhaust duct for a dryer, bath fan, kitchen or heat recovery ventilator.

Exterior intake hoods – Exterior wall or roof location of intake for fresh air, make up air, combustion air or heat recovery ventilator.

Extract – The physical process of removing, containing, and disposing of soils, contaminants, residues, and soluble materials from carpet or rug fibers and surfaces. (IICRC S100 Standard)

Extraction – A restoration process in which a liquid cleaning agent or solvent is sprayed on a surface and immediately vacuumed out, removing dissolved soils or residues. (BDMA)

Extraction, subsurface – (1) Vacuum pressure that suctions water from carpets and pad into a vacuum system such as a portable or truck mount extraction unit. (2) Water that is extracted through a floor mat drying system to dry wet underlayments, subfloors and finishing materials such as hardwood floors and certain types of ceramic floor tiles with grout. (See: In-place Drying; Vac-It Panels)

Extraction, vacuum – The partial removal of surface debris using a vacuum.

Extreme degree of damage notice, construction – Building materials that are so damaged that the structure may need to be tagged-out as being "unsafe" until a proper structural damage survey can be completed.

Extreme degree of damage, restoration – Construction materials, building finishes and/or contents

that experienced extensive damage. Extreme degree of damage takes into consideration salvageability and/or repair, which may not be cost effective to complete.

Extreme degree of damage, works-of-art (conservation management) – An extreme damage is the most severe damage, or the existing condition of a work-of-art has become very advanced. In other words, the work-of-art is insecure, no longer stable and is at great risk.

Extreme fire behavior (wildfire) – The term "extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One of more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column, where predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

Extremely hazardous substance – Chemicals determined by the Environmental Protection Agency (EPA) to be extremely hazardous to a community during an emergency spill or release because of their toxicities and physical/chemical properties.

(F)

F – Fahrenheit.

Fading – The natural occurrence or gradual loss of color intensity of material or finish usually due to light. Fading can occur when materials are exposed to heat, soot and acid-based residues.

Fahrenheit (f or F) – A scale for measuring temperature. On the Fahrenheit scale, water boils at 212°F and freezes at 32°F. Fahrenheit is converted to degrees centigrade (Celsius) by subtracting 32 and multiplying by 5/9ths.

Failure to mitigate – Also known as the "doctrine of avoidable consequence," is an insurance term describing insurers who do not stop damage that causes the claim to become worse. Under the policy the insured has a duty to minimize their loss. Education Note: The general rule of mitigation of damage applicable to both breach of contract and tort, is that the aggrieved party must take all reasonable steps to mitigate the loss and cannot claim for avoidable loss. In the case of an insurance policy, damages for breach of contract are reduced by the amount of loss that should have been avoided if the insured had taken reasonable steps to mitigate the loss. For more information go to: https://www.propertyinsurancecoveragelaw.com/2010/03/articles/insurance/an-insurers-actions-may-excuse-mitigation-requirements/ and https://fazcpas.com/the-mitigation-of-damages-doctrine/#:~:text=Along%20these%20lines%2C%20the%20law,did%20not%20take%20those%20steps and https://www.justia.com/trials-litigation/docs/caci/3900/3931/

Fast-flaming fires – Fires resulting from the ignition of flammable liquids, wood, paper or open flames that ignite other items. These fires produce large quantities of flames with smaller amounts of smoke and are the most common types of home fires. A smoldering fire can also become a flaming fire, as the fire moves through the home and ignites different materials. (NFPA 921)

Fallout, extensive soot (wildfires) – A person with average eyesight who can see soot and ash fallout covering most all horizontal and many vertical indoor surfaces; this typically represents an extensive wildfire soot fallout cleanup situation.

Fallout, heavy soot (wildfires) – A person with average eyesight can see soot and ash fallout covering many horizontal and some vertical indoor surfaces; this typically represents a heavy wildfire soot fallout cleanup situation.

Fallout, light soot (wildfires) – A person with average eyesight can see minute amounts (specks) of soot and ash fallout on some horizontal indoor surfaces; this typically represents a light wildfire soot fallout cleanup situation.

Fallout, moderate soot (wildfires) **–** A person with average eyesight can see sporadic soot and ash fallout on a number of horizontal indoor surfaces; this typically represents a moderate wildfire soot fallout cleanup situation.

Fallout, nuisance soot (wildfires) – A person with average eyesight can see minute amounts (specks) of soot and ash fallout on a few horizontal surfaces; this typically represents a nuisance wildfire soot fallout cleanup situation.

Fallout, positive/negative laboratory findings soot (wildfires) – The laboratory results are either: 1) positive for the presence of soot and char fallout; or 2) the results are negative for the presence of soot and char fallout.

f/cc – Fibers per cubic centimeter of air. The concentration of asbestos in air is reported as fibers of asbestos per cubic centimeter of air.

FDA – The US Food and Drug Administration.

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) – The U.S. federal regulations administered by EPA under this act require that certain useful poisons, such as chemical pesticides, sold to the public contain labels that carry health hazard warnings to protect users.

Federal Register (FR) – A daily publication of US Federal department regulations that are promulgated under a particular law.

FEMA Cleanup Guidelines, wildfire – The Federal Emergency Management Agency (FEMA) provides wildfire smoke remediation guidelines in a pamphlet titled "*Tips From State And FEMA On Smoke Removal And Fire Cleanup*" (available on-line

http://www.fema.gov/news/newsrelease.fema?id=4046 and https://www.fema.gov/news-release/2003/07/25/tips-smoke-removal-and-fire-cleanup The FEMA document outlines cleaning and remediation actions homeowners should undertake following a wildfire to reduce smoke and ash contamination of their properties. The course of actions specified by FEMA includes: 1) Pressure wash, scrub or disinfect all exterior surfaces including walls, walks, drives, decks, windows, screens, etc. 2) Wash and disinfect all interior walls and hard surfaces with mild soap or other appropriate cleaning solutions or products and rinse thoroughly. Do not forget inside cabinets, drawers, and closets; 3) Launder or dry clean all clothing; 4) Wash, dust or otherwise clean all household items including knick-knacks. 5) Disinfect and deodorize all carpets, window coverings, upholstered furniture and mattresses with steam or other appropriate equipment. 6) Upholstery, fabric window treatments, etc., can be spray-treated with deodorizing products available at most supermarkets, but do not use odor masking sprays. 7) Have heating, ventilating and air-conditioning units and all ductwork professionally cleaned to remove soot, ash, and smoke residue. Change filters when you first return to the premises and at least once a month for the first year. 8) If aerial fire retardant or firefighting foam residue is present on the house and/or automobiles, use a mild detergent and brush to scrub and dilute the dried residue and flush it from surfaces, followed by rinsing with clean water. A follow-up with pressure washing may be beneficial but will not replace scrubbing to remove residue. 9) Ash and soot residue on the ground and vegetation in the vicinity will continue to generate smoke odors and airborne particles when distributed by air movement. Until the ash and soot are diluted and absorbed by the environment, indoor mechanical air filtration may help minimize the uncomfortable and potentially health-threatening impact of these pollutants. Education Note: A precaution not provided in the FEMA pamphlet is that cleaning actions should be performed in a way to minimize the re-entrainment of particles. Cleaning methods that should be avoided include vacuuming, dry dusting, sweeping, and vigorous wiping that will aerosolize smoke particulates from surfaces. In addition, cleaning of the interior of electronic components, such as computers, stereos, and televisions; as well as refrigerator condenser coils and fan or other appliances that would attract particulates should also be performed (Kristen Shaw, CSC).

FHA – Federal Housing Administration. An organizational unit within the U.S. Housing and Urban Development (HUD).

Fiberglass – Flexible, non-flammable fiber formed by the extrusion of glass filaments, used primarily in drapery fabrics and insulation, and found in structures with rigid flame and sun resistance specifications.

Fiberglass in fire damaged buildings – A condition where smoke, soot and ash can affect fiberglass because of acids in the particulate cause fiberglass to permanently discolor (fade; turn yellow); and experience accelerated aging.

Filtering facepiece – A negative-pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Filtering facepiece N-95 – A type of EPA rated mask, where if it is worn correctly, it can protect

workers from exposure to wildfire particulate. For more information go to: https://www.cdph.ca.gov/Programs/EPO/Pages/Wildfire%20Pages/N95-Respirators-FAQs.aspx and https://www3.epa.gov/airnow/smoke_fires/respiratory-protection-508.pdf

Final cleaning (wildfire; building fire) – The last of several cleaning process that achieves the desired level of cleaning once smoke, soot and ash is removed. Education Note: The learning point is to complete an initial cleaning of flooring so that particles to oily residue are not crushed into salvageable finishes. Then, a thorough cleaning is completed of the indoor space followed by a final cleaning of flooring. The final cleaning process may proceed restoration and repair if it is necessary to complete this process.

Fine (light) fuels (wildfire) – Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a timelag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Fine particles – Particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). Fine particles are smaller than coarse particles and they are responsible for most atmospheric particle-induced extinction. Ambient fine particulate matter consists basically of five species: sulfates, ammonium nitrate, organics, elemental carbon, and soil dust. (See: Coarse Particles; Ultra-fine Particles; $PM_{2.5}$; PM_{10})

Fine particulate matter – Particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$). Since fine particles smaller than 10µm are only partly precipitated in the nose, they can be inhaled and transported to the human lungs. Hence the particle fraction PM_{10} (particulate matter <10µm) is commonly used nowadays for the definition of emission limits.

Fine soil – Particulate matter composed of pollutants from the Earth's soil, with an aerodynamic diameter less than 2.5 microns. The soil mass is calculated from chemical mass measurements of fine aluminum, fine silicon, fine calcium, fine iron, and fine titanium as well as their associated oxides.

Fingers of a fire (building fire; wildfire) – The long narrow extensions of a fire projecting from the main body.

Fire – (1) The result of a material experiencing combustion. (2) The burning of fuels, creating a flame that releases light and energy. (3) A combustion accompanied by a flame or glow which escapes its normal confines to cause damage. (4) The rapid oxidation of materials causing them to combust. Fire is the most common form of conflagration that causes burning. (5) The process of combustion characterized be the emission of heat and fire effluent and usually accompanied by smoke, flame, glowing or a combination thereof. (ISO 13943) (6) The rapid oxidation process, which is a chemical reaction resulting in the evolution of light and heat in varying intensities. (NFPA 921 3.3.53)

Fire alarm – An alarm either by person or mechanical system that notifies individuals in a building that smoke, or heat is present.

Fire, all about a – A NFPA document that outlines what is a fire, starting with "The ancient Greeks believed that fire was one the four basic elements that composed all things in the universe. In the mythology of virtually every culture, fire is a sacred substance that gives life or power. Fire is not, in fact, a substance. When you gaze at the leaping flames of a campfire, you are observing not an object, but a process – a chemical reaction. It is the same chemical reaction that occurs when a cut apple left on the counter turns brown, when silver tarnishes or when an iron nail rusts. That process is oxidation: combining oxygen with another substance. The defining difference between a fire and your half-eaten apple is speed: fire is an oxidation process that happens very fast, so that light, heat and sound are released — often with enough force and majesty to justify the ancients' reverence. The sudden release of energy causes temperatures to rise, sometimes by thousands of degrees. And it also results in smoke, the toxic waste of fire's leftovers." For more information go to: https://www.nfpa.org/News-and-Research/Publications-and-media/Press-Room/Reporters-Guide-to-Fire-and-NFPA/All-about-fire

Fire analysis – (1) The assessment of a fire damage (heat, smoke, soot damaged building, material, content or environment) using professional inspection methods which are often supported with laboratory testing. (2) The process of determining origin, cause, development, responsibility, and when required, a failure analysis of a fire or explosion. (NFPA 921)

Fire and cyanide – Cyanide is contained in cigarette smoke and the combustion products of synthetic materials such as plastics. Combustion products are substances given off when things burn. Education Note: Items commonly found to have been manufactured with cyanide include paper, textiles, and plastics. It is present in the chemicals used to develop photographs.

Fire and cyanide exposure, about (discussion) – Methods a person can use once they are known or believed to be exposed to cyanide. Education Note #1: Since inhalation is likely to be the primary route of exposure to cyanide, leave the area where the cyanide gas was released and get to fresh air. (1) Quickly moving to an area where fresh air is available is highly effective in reducing exposure to cyanide gas. If the cyanide gas was released outdoors, move away from the area where it was released. Education Note #2: If you cannot get out of the area where the cyanide gas was released, stay as low to the ground as possible. If the release of cyanide gas was indoors, get out of the building. If you are near a release of cyanide gas, emergency coordinators may tell you to either evacuate the area or "shelter in place" (stay put and take cover) inside a building to avoid being exposed to the chemical. (2) If you think you may have been exposed to cyanide, you should remove your clothing, rapidly wash your entire body with soap and water, and get medical care as quickly as possible. (3) Remove clothing: Quickly take off clothing that may have cyanide on it. Any clothing that must be pulled over the head should be cut off the body instead of pulled over the head. If you are helping other people remove their clothing, try to avoid touching any contaminated areas, and remove the clothing as quickly as possible. (4) Washing: As quickly as possible, wash any cyanide from your skin with large amounts of soap and water. Washing with soap and water will help protect people from any chemicals on their bodies. If your eyes are burning or your vision is blurred, rinse your eyes with plain water for 10 to 15 minutes. If you wear contacts, remove them, and put them with the contaminated clothing. Do not put the contacts back in your eyes (even if they are not disposable contacts). Education Note #3: If you wear eyeglasses, wash them with soap and water. You can put your eyeglasses back on after you

wash them. If you are wearing jewelry that you can wash with soap and water, you can wash it and put it back on. If it cannot be washed, it should be put with the contaminated clothing. Disposing of clothes: After washing, place clothing inside a plastic bag. Avoid touching contaminated areas of the clothing. If you cannot avoid touching contaminated areas, or you are not sure where the contaminated areas are, wear rubber gloves or turn the bag inside out and use it to pick up the clothes, inverting the bag over the clothes when you have all the clothes picked up. An alternative method is to put the clothes in the bag using tongs, tool handles, sticks, or similar objects. Anything that touches the contaminated clothing should also be placed in the bag. If you wear contacts, put them in the plastic bag, too. Seal the bag, and then seal that bag inside another plastic bag. Disposing of your clothing in this way will help protect you and other people from any chemicals that might be on your clothes. (5) When emergency personnel arrive, tell them what you did with your clothes. The health department or emergency personnel will arrange for further disposal. Do not handle the plastic bags yourself. Seek medical attention right away. Dial 911 and explain what happened.

Fire and smoke damaged on finishes – The acidic nature of smoke and soot is compounded by fire-suppression water. Moisture mixed with smoke and soot helps create a film on metal, plastic, glass, crystal, and ceramics that result in discoloration, corrosion, and increases overall damage.

Fire and Smoke Damper Requirements – As of July 1, 2002, must comply with new requirements from Underwriters Laboratory (UL). UL Standard 555, Fire Dampers (6th edition), and UL Standard 555S, Smoke Dampers (4th edition), have been revised with upgraded safety and reliability testing requirements. As a result, UL listings of almost all fire and smoke dampers classified under previous editions of these standards expired on June 30, 2002.

Fire apparatus access road (wildfire) – A road, fire lane, public street, private street, or parking lot lane that provides access from a fire station to a facility.

Fire area (specific types of building construction) – An area bounded by construction with a minimum fire resistance rating of 2 hours, unless otherwise approved by the authority having jurisdiction (AHJ), with openings protected by appropriately fire rated doors, dampers, or penetration seals. The boundaries of exterior fire areas (yard areas) are determined by the AHJ.

Fire backdraft – (See: Backdraft)

Fire backdraft color – The typical color of smoke when a backdraft occurs is black due to the amount of carbon-based materials that cannot be completely combusted because of a lack of oxygen. Education Note: Oxygen concentrations as low as 14% can support combustion at room temperature.

Fire barrier – A continuous membrane, either vertical or horizontal, such as a wall or floor assembly that is designed and constructed with a specified fire resistance rating to limit the spread of fire and restrict the movement of smoke.

Fire behavior (structure fire) – Changes in or the maintenance of the physical or chemical properties of an item and/or structure exposed to fire.

Fire behavior *(n)* (wildfire) – (1) The manner in which a fire reacts to the influences of fuel, weather and topography. (USFS) The manner in which a fire reacts to its fire environment. (SAF 1990) The term fire behavior is used to describe the magnitude, direction, and intensity of fire spread. Education Note: The magnitude is measured as the velocity, in m/s, of the leading edge of the flaming portion of the fire. The direction is measured as the bearing of the leading edge of the fire and will vary from 0 to 360 degrees. Finally, the intensity is measured as the energy released from the fire per unit area, in J/m^2. A fire which spreads rapidly and releases a large amount of energy is sometimes referred to as a conflagration or firestorm. Fires burning through Southern California chaparral can display this type of behavior. Fires which spread rapidly, but with low intensity, are sometimes referred to as flashy. Fires burning through grass, which lacks the biomass of chaparral, are often described in this way. A fire which spreads neither rapidly nor with great intensity is referred to as a creeping fire. Typically, a fire spreading downslope without the assistance of the wind is described in this way.

Fire block – (1) Short horizontal members of wood nailed between studs. (2) Short members of wood nailed between joists, usually at the half-way length of joists in a ceiling.

Fire blocking (Fireblocking; Fire stops) – Building materials installed to resist the free passage of flame of flame and gasses to other areas of the building through concealed spaces. Education Note: Lumber, structural wood panels, gypsum board, cement fiberboard or particleboard, batts or blankets of glass, or mineral wool, installed within concealed spaces to resist or block the migration of fire and hot gases for an undetermined period of time. Fireblocking is used to subdivide or block off the stud cavity inside a wall, in a soffit over cabinets, between stair stringers at the top and bottom of a run, in an exterior cornice, or in the space between the combustible finish materials and the wall itself.

Fire box (Firebox) – That portion of a solid fuel appliance where fuel (such as wood) is located and combusted.

Fire brick – Brick made of refractory ceramic material for use in fireplaces and boilers that resists high temperatures.

Fire bricks – Heat resistant bricks used for lining fireplaces.

Fire burning rate of wood – A general term used to describe the rate at which a given wood material is consumed by fire. Specifically, burning rate can be described in terms of heat release rate, mass loss rate or, in the case of charring materials, charring rate. All of these are related because wood is a charring material. Some relationships between these aspects of burning rate have been determined experimentally and by theoretical modeling methods.

Fire cause – The circumstances, conditions, or agents that bring together a fuel, ignition source, and oxidizer (such as air or oxygen) resulting in a fire or a combustion explosion. (NFPA 921 3.3.55)

Fire classes (American Classes of Fires) – Combustible and flammable fuels involved in American fires (European [En 2:1992, amendment A1: 2004], Australian and Asian countries fire classes are similar but different). The class of fire in America are described to be one of five classes: (1) Class A

fires - fires involving ordinary organic solids like paper, wood, etc.; (2) Class B fires - fires involving flammable liquids and gases; (3) Class C fires - fires involving electrical equipment; (4) Class D fires - fires involving combustible metals; and, (5) Class K fires - fires involving cooking oils and fats in kitchens.

Fire code official – The fire chief or other authority charged with the enforcement of the local fire code.

Fire compartment (Fire zone) – (1) A space, within a building, that is enclosed by fire barriers on all sides, including the top and bottom. (2) An enclosed space in a building that is separated from all other parts of the building by enclosing construction providing a "fire separation" having a required fire-resistance rating.

Fire control area – An area enclosed and bounded by fire walls, fire barriers, exterior walls, or fire-resistance rate horizontal assemblies of a building. Education Note: Control areas are spaces within a building and outdoor areas where quantities of hazardous materials not exceeding the maximum quantities allowed are stored, dispensed, used, or handled. Control areas must be separated from each other by not less than a 1-hour fire barrier.

Fire damage – (1) A building or material that experienced heat, smoke, or soot damage. (2) A material that was affected directly or indirectly (secondary damage) by heat, smoke, or soot. (3) Damage caused by fire or smoke. This type of damage can be minimal, or it can be so extensive that the entire property needs rebuilt. (HUD Education Note: Indirect secondary damage includes but is not limited to water damage and mold growth; corrosion and oxidation; vapor pressure; chemical fumes and film residue.

Fire damage and sulfur dioxide (**SO_2**) – SO_2 is important to identify because during combustion sulfur dioxide can convert to an aerosol that settles out of air with smoke and soot. Education Note: On a damp surface, SO_2 can convert into acid droplets consisting primarily of sulfuric acid. SO_2 is a gas consisting of one sulfur and two oxygen atoms.

Fire damage cleanup – (1) The process of removing physical material damage. (2) The process of cleaning surfaces back to a clean deodorized state.

Fire damage demolition – The process of removing fire damaged materials for disposal.

Fire damage from combustion – Many materials in our environment, including wood products, burn "indirectly" in the sense that the materials do not actually burn, but combustion takes place as a reaction between oxygen and the gases released from a material (an exception from this rule is the glowing combustion of charred wood where oxygen reacts directly with carbon). Education Note: Under the influence of heat, wood easily produces substances that react eagerly with oxygen, leading to the high propensity of wood to ignite and burn. Ignition and combustion of wood is mainly based on the pyrolysis (i.e. thermal decomposition) of cellulose and the reactions of pyrolysis products with each other and with gases in the air, mainly oxygen. When temperature increases, cellulose starts to pyrolyse (to undergo pyrolysis). The decomposition products either remain inside the material or are

released as gases. Gaseous substances react with each other and oxygen, releasing a large amount of heat that further induces pyrolysis and combustion reactions.

Fire damage health hazards – Wood smoke has been studies by the EPA and found to contain carbon monoxide, methane, VOCs, formaldehyde, benzene, acetic acid, formic acid, toluene, oxides of nitrogen, sulfur dioxide, organic carbon, and even traces of heavy metals.

Fire damage impacting electrical equipment – A study smolder and heat damage to components and wiring. An example of an industry article can be found at NEMA https://www.nema.org/Standards/Pages/Evaluating-Fire-and-Heat-Damaged-Electrical-Equipment.aspx and https://www.oregonbuildingofficials.com/assets/Resources_Page/evaluating_fire-_and_heat-damaged_electrical_equipment_as_published.pdf

Fire damage patterns – A forensic review of heat damage by fire investigators, such as "*Use of Damage in Fire Investigation: A Review of Fire Patterns Analysis, Research and Future Direction*" https://www.oregonbuildingofficials.com/assets/Resources_Page/evaluating_fire-_and_heat-damaged_electrical_equipment_as_published.pdf

Fire damage restoration – The process of rebuilding and restoring a building and/or its contents back to a pre-loss condition.

Fire damage, secondary – (1) Building damage that arises out of primary damage, such as wildfire soot fallout that occurs continuously over the next few days or a gust of hillside wind occurring weeks later. (2) Damage to materials or contents sustained from indirect or prolonged exposure to disaster contaminates such as heat, moisture, humidity, smoke, and soot.

Fire damage shading – The presence of an oily film (usually from a fire damage or smoke contamination) that causes a gradual color change across a surface over time.

Fire damaged buildings, acids in – Almost all fires result in some type of soot generation depending on fuel, time of burn and available oxygen. Soot can contain acidic deposits called chlorides created from the burning of carpet and plastics, urethane and paint, and other finishing materials. Education Note: Chlorides create hydrochloric acid [HCl], which is often responsible for staining, corrosion and intermittent or permanent damage to appliances and electronics. The successful removal of acids at the fire damaged building depends on the building's environmental conditions, temperature and humidity, materials affected, cleaning and deodorization supplies, training of technicians/conservators.

Fire damaged concrete – Concrete can spall under the influence of a fire. If reinforcement ties and rods are close to the surface of concrete and it heats up, it will expand at a different rate than the surrounding concrete. Internal expansion can cause cracking to the concrete structure. Education Note: Concrete is resilient to surface water. Fire suppression water that penetrates porous unsealed concrete and water that enters concrete through cracks and spalling, can lead to the chemical attack of the cement within concrete: 1) Lose particulate smoke and soot can produce acids that must be shoveled, swept and vacuumed off concrete. 2) Washing with detergents must remove residue from surfaces and

pores. 3) Wet concrete must be dried. 4) Concrete must be moisture monitored till it is dry (back to a dry state equilibrium moisture content).

Fire damaged contents – (1) Contents that experienced an element of smoke, soot, char, or combustion byproducts. (2) Content's finish or material that experienced damage because of heat, temperature, humidity, water/moisture, combustion byproducts.

Fire damaged content handling, cleaning/restoration classification – A process of prioritizing contents (e.g., collections, books, furniture, appliances, and clothing) based on the extent of damage. Improper handling can further damage contents causing permanent damage. Education Note: Contents surface soot contamination is classed as *Level 1* or *Level 2* depending on the heaviness of soot. Level 1: "dry surface soot" particulate is removed by dry-brush dusting or HEPA vacuuming; Level 2: "sticky; wet surface soot" cannot be easily removed by dry-brush dusting or HEPA vacuuming. It requires careful loose particulate removal with a pressurized air that is forced across the item. Professional cleaning is usually required. Reasons for not using brushing and wiping during cleaning: wet soot easily embeds into surfaces and restricts the attempt to remove soot contamination; improperly done, it may result in permanent surface damage. Level 3: contents show signs of heat damage and may be scorched, but not burned. Household fabrics generally cannot be restored but leather books, works-of-art, collectibles, appliances, and items having a finish can be restored or repaired. Level 4: contents are burned. Attempting to salvage and restore them must be done on a case-by-case basis. Level 5: contents having little or no salvage value, and their repair will exceed the replacement cost value.

Fire damaged drywall – (See: Calcination)

Fire damaged masonry – Brickwork and blockwork and some stonework that has been damaged by heat, smoke, soot, acids, and water. Often, they respond well in a fire-damaged building and can be restored. Education Note: Fire is used in a kiln to harden bricks, so they are more than capable of staying stable in a building fire. However, extreme heat can cause masonry to expand and crack; smoke and soot can cause blackening; fire suppression water cools surfaces too fast resulting in hairline cracking and spalling; breakdown of mortar joints. Surface debris can be washed- off, but smoke odor and staining may still be present. Generally, smoke-odor can be removed out of pores and mortar but staining and discoloration can be permanent. Power washing outside brickwork with a strong degreaser followed by rinsing is an option. Power washing inside brickwork is not a preferred remediation method; consider using baking soda blasting, dry-ice blasting, or a poultice. Architectural and historical brick and stonework having a patina that must not be damaged, responds well to laser treatments.

Fire damaged metal – Metal does not react well in a fire. As it heats up, the molecular structure weakens, and it loses up to half its strength at over 500°C (932°F). This can eventually cause a metal structure to weaken as aluminum and steel melts slightly, warps under extreme heat. However, this process takes time and may not immediately affect the evacuation of a structure. Education Note: Fire suppression water reacts with exposed metal and it may form rust. Surface rust generally does not

cause damage to steel but continual expose to the elements of unprotected metal can result in severe corrosion. An example of a reliable article can be found at: http://ethesis.nitrkl.ac.in/1546/1/raja_sekhar.pdf

Fire damage mitigation – Heat and soot damage that remains for an extended period, where salvage and restoration of materials and finishes depend on how fast the restorer can respond and provide services and lessen damage to potentially salvageable materials and finishes. Education Note: In mitigating fire damaged structures and salvaging materials and finishes, the restorer can reduce damage within a matter of days; not weeks. The longer fire damage resides and contaminates remain; the likelihood permanent damage is ongoing is probable.

Fire damaged timber – Heat and the presence of oxygen cause the combustion of timber by fire. The surface chars and eventually breaks down the structural integrity of the timber until it's burnt completely. Education Note: Smoke damage will remain on charred and surface heat damaged timber including discoloration. Water can damage timber by wetting which expands the hygroscopic material and causes dimensional change to the timber with eventual rot if this wetting persists.

Fire damaged trusses (discussion) – Heat that caused damage to truss(es) which may require an engineer to determine the structural integrity of solid wood and glulam trusses. Unless the mill, manufacturer, building inspector or structural engineer offers an opinion on heat impaction and structural integrity, there is no definitive method of determining the degradation of plates and lumber after trusses have survived a fire. Some professionals will specify repair or removal of any charred material. Some will specify repair or removal of lumber that has lost over 10 percent of its cross section due to charring. Some will allow up to 1/16 in. char depth on the assumption that it will not reduce the strength markedly. Education Note #2: Lumber that is discolored by smoke damage but not charred is usually considered acceptable after it has been cleaned, deodorized, and sealed. If there is damage to the plate area, the plate is discolored or there is charring under the plate, the plate should be considered ineffective. Truss chords and webs can be repaired using properly sized and attached lumber scabs over the damaged areas. Joints are often repaired using plywood or OSB gussets that are properly sized and attached to transfer 100 percent of the forces in that joint. In some cases, the entire truss is replaced. Structural engineers mention: there is no one-size-fits-all solution, where jobsite circumstances require a separate professional engineering assessment and sign-off after cleaning, sanding or blasting media is completed. The most conservative solution is to replace charred or smoke damaged trusses. (Structural Building Components Association)

Fire damage wood assessment – After a fire, the thermal degradation of wood in building framing, where after inspection and testing, some wood can be restored having light char, where other wood requires replacement. Source: https://www.fpl.fs.fed.us/documnts/pdf2005/fpl_2005_ross005.pdf

Fire damaged Stone – The effects of heat, flame, and quenching. Stone is often perceived as an enduring material, however, there are many forces that act on stone to cause its destruction. Of these forces, fire causes sudden and often irreversible damage on a large scale and is a risk to every building. Examples of technical articles include https://www.irbnet.de/daten/iconda/CIB18738.pdf and

https://www.researchgate.net/publication/51986201_Impacts_of_Fire_on_Stone-Built_Heritage_An_Overview and https://academiccommons.columbia.edu/doi/10.7916/D8QR4VM2

Fire damper – A damper arranged to seal off airflow automatically through part of an air duct system to restrict the passage of heat.

Fire debris – (1) The byproducts of burnt combusted materials. (2) The debris from a fire that is collected as evidence for laboratory examination.

Fire decay – The stage of the fire development, where the fire has reached its maximum heat release rate and where the temperature output is decreasing.

Fire deflagration – Thermal processes that proceed radially (outward) in all directions through the available fuel moving away from the ignition source. Education Note #1: As the volume of the reaction zone expands with every passing moment, the larger surface area contacts more fuel, like the surface of an inflating balloon. The reaction starts small and gathers energy with time. This process occurs at speeds depending largely on the chemistry of the fuel; from 1 to 10 meters per second in gasoline vapors mixed with air to hundreds of meters per second in black powder or nitrocellulose propellants. These speeds are less than the speed of sound in the fuel (The speed of sound through a material is not constant, but dependent on the density of the material; the higher its density, the higher the speed of sound will be through it). Education Note #2: Deflagrations, then, are thermally initiated reactions propagating at subsonic speeds through materials like: mixtures of natural gas and air, LP gases and air, or gasoline vapors and air; black powder or nitrocellulose (single-base) propellants or rocket fuels. The pressures developed by deflagrating explosions are dependent on the fuels involved, their geometry, and the strength (failure pressure) of a confining vessel or structure (if any). Pressures can range from 0.1psi to approximately 100psi for gasoline air mixtures to several thousand psi for propellants. Times of development are on the order of thousandths of a second to a half-second or more. Maximum temperatures are on the order of 1000-2000°C (2000-4000°F). Education Note #3: Sometimes "fire deflagration" is a misnomer since the explosion may not leave enough oxygen and fuel left to burn.

Fire deodorization – The process of odor removal. There are four principles for effective, permanent deodorization: (1) Per BDMA: a) remove the primary source (debris, char, heavily contaminated items or surfaces); b) clean all surfaces exposed to direct contamination; c) apply odor counteractants; d) condition the air. (2) Per the ANSI/IICRC S500 Standard: a) remove the primary source (debris, char, heavily contaminated items or surfaces); b) clean all surfaces exposed to direct contamination; c) recreate the conditions of penetration with appropriate odor counteractants (through direct application, or by generating a fog or gas that combines with and neutralizes [the] malodor); d) seal (coat) salvageable, but heavily contaminated surfaces.

Fire department master key – A special key carried by fire department officials that will open key boxes at commercial properties.

Fire detonation – A chemical an oxidation reaction that does not involve combining with oxygen. It involves only special chemically unstable molecules that, when energized, instantaneously splits into many small pieces that then recombine into different chemical products releasing exceptionally large amounts of heat as they do so. Education Note #1: High explosives are defined as materials intended to function by detonation, such as TNT, nitroglycerine, C4, picric acid, and dynamite. The reaction speeds are higher than the speed of sound in the material (i.e., supersonic). Since most explosives are roughly the same density, a reaction speed of 1,000 m/s (3,100 feet per second) is set as the minimum speed that distinguishes detonations from deflagrations. Due to the supersonic reaction speed, a shock wave develops in the explosive (like the sonic boom from supersonic aircraft) that triggers the propagating reaction. Detonation speeds are about 1,000-10,000 m/s, so times of development are on the order of millionths of a second. Education Note #2: Temperatures produced can be 3,000-5,000°C and pressures can be from 10,000 psi to 100,000 psi. It should be noted that a few materials can transition from deflagration to detonation depending on their geometry (long, straight galleries or pipes), starting temperature, and manner of initiation. Double-base smokeless powders (containing nitroglycerine), perchlorate-based flashpowders, hydrogen/air mixtures and acetylene (pure or with air) can detonate under some conditions. Education Note #3: Fire detonations are found in methamphetamine laboratory explosions.

Fire detonation/deflagration effects – The effects of detonations are different from those of deflagrations. Deflagrations tend to push, shove, and heave, often with limited shattering and little production of secondary missiles (fragmentation). Education Note: Building components may have time to move in response to the pressure as it builds up and vent it. The maximum pressures developed by deflagrations are often limited by the failure pressure of the surrounding structure. Detonations, on the other hand, tend to shatter, pulverize, and splinter nearby materials with fragments propelled away at extremely high speeds. There is no time to move and relieve pressure, so damage tends to be much more localized (seated) in the vicinity of the explosive charge (and its initiator) than a deflagration whose damage is more generalized. Damage from a deflagration tends to be more severe away from the ignition point, as the reaction energy grows with the expanding reaction (flame) front. It is for this reason that identification of an ignition source and mechanism for a deflagration may be more difficult than for a detonation.

Fire devil – A small, burning cyclone that results when heated gases from a fire rise and cooler air rushes into the resulting areas of low pressure; usually occurs during forest and brush fires but also in free-burning structural fires. (NFPA)

Fire Diamond – A hazard rating system of the National Fire Protection Association (NFPA). The Fire Diamond symbol provides a quick number rating for the material's degree of health (blue), flammability (red), reactivity (yellow), and specific (white) hazard. It is frequently seen on drums containing liquids and solids, and it is displayed on the front and side of buildings that contain such materials.

Fire, discussion about creating a – One generally accepted definition of combustion or fire, is a process involving rapid oxidation at elevated temperatures accompanied by the evolution of heated

gaseous products of combustion, and the emission of visible and invisible radiation. Oxidation occurs all around us in the form of rust on metal surfaces, and in our bodies by metabolizing the food we eat. However, the key word that sets combustion apart from other forms of oxidation is the word "rapid." Education Note: The combustion process is usually associated with the oxidation of a fuel in the presence of oxygen with the emission of heat and light. Oxidation, in the strict chemical sense, means the loss of electrons. For an oxidation reaction to occur, a reducing agent the fuel, and an oxidizing agent, usually oxygen must be present. As heat is added, the ignition source, the fuel molecules and oxygen molecules gain energy and become active. This molecular energy is transferred to other fuel and oxygen molecules which creates a chain reaction. A reaction takes place where the fuel loses electrons and the oxygen gains electrons. This exothermic electron transfer emits heat and/or light. When a fire is in a furnace, we refer to this process as a controlled fire; a building fire is an uncontrolled fire.

Fire doors – Doors designed to meet independent testing facilities' (Underwriter's Laboratory (UL) and Warnock Hersey (WH) standards for fire ratings of 20, 30, 45, 60, or 90 minutes. The specific rating is achieved through the application of special door cores and framing materials.

Fire dynamics – The detailed study of how chemistry, fire science, and the engineering disciplines of fluid mechanics and heat transfer interact to influence fire behavior. (NFPA 921)

Fire ecology – The study of wildland fires and their relationship to the living and nonliving environment.

Fire endurance – (1) The measure of elapsed time during which an assembly continues to exhibit fire resistance under specified conditions of test and performance. (2) A measure of the time during which a material or assembly continues to exhibit fire resistance under specified conditions of test and performance (USDA Forest Products Wood Handbook). Education Note: As applied to elements of buildings, fire endurance will be measured by the methods and to the criteria defined in ASTM. Methods E119, Fire Tests of Building Construction and Materials; ASTM Methods E152, Fire Tests of Door Assemblies; ASTM Methods E814, Fire Test of Through-Penetration Fire Stops; or ASTM Methods E163, Fire Tests of Window Assemblies.

Fire explosion – A very rapid release of high-pressure gas into the environment. Education Note: The energy from a very rapid release of the high-pressure gas is dissipated in the form of a shock wave. Explosions can be classified as 1) physical like a balloon bursting; 2) physical and/or chemical like a boiler explosion; or 3) a chemical reaction of a gas/particle mixture.

Fire explosion chemical – The process of a chemical reaction explosion is similar to the combustion process whereby a fuel and oxidant have premixed prior to ignition such as petroleum vapor or fine particles of grain dust mixed with air. Education Note: However, in a chemical explosion the oxidation process proceeds at a greatly accelerated rate. The oxidation process is usually, but not always, confined within an enclosure such as a tank, grain silo, so that a rapid high-pressure rise occurs with an associated flame front. Generally, it is this high-pressure shock wave that causes the damaging effects

from a chemical explosion.

Fire extinguisher – A portable device for immediate and temporary use in putting out a fire. Extinguishers contain wet or dry materials appropriate for specific types of fires.

Firefighting foam – A stable mass of small bubbles of lower density than most flammable liquids and water. Foam is a blanketing and cooling agent that is produced by mixing air into a foam solution that contains water and foam concentrate. Education Note: Firefighting foam extinguishes flammable or combustible liquid fires in four ways: the foam excludes air from the flammable vapors; it eliminates vapor release from fuel surface; it separates the flames from the fuel surface; and it cools the fuel surface and surrounding metal surfaces. Firefighting foam is best used on Class B fires, but it can be used on Class A fires, where the cooling and penetrating effect of the foam solution is important.

Firefighting foaming types and use – The most commonly used foaming agents are protein foam concentrates; fluoroprotein foam concentrates; film forming fluoroprotein foam concentrates; aqueous film forming foam concentrates; alcohol-resistant foam concentrates (AR-AFFF and AR-FFFP); synthetic detergent foam (mid and high expansion) foam concentrates. Education Note: Class B firefighting foams are used to put out fires caused by flammable liquids including gasoline, oil, and jet fuel. They may also be used in kitchen grease fires. Due to the nature of a building fire, using water as a spray is the preferred extinguishing method, where most applications for foaming agents is limited to outdoor use when Class B fire suppression is required.

Firefighting foam remediation – Low expansion foaming agents have an expansion ratio of 20:1., where mid-expansion foaming agents can vary from 20:1 to 200:1. High expansion foaming agents have an expansion ratio greater than 200:1. Education Note #1: In a building fire where foaming agents were applied, the type of foam and its expansion ratio is not important to the restorer, however, they should recognize; the use of a foaming agent indoors can make a difference in mitigating fire damaged structures and secondary damage to materials, finishes and electronics that are near or adjacent to where foaming agents were applied. Education Note #2: In indoor grease fires, garage and basement oil fires, and confined space fires; most foaming agents are those having low expansion ratio of 20:1. Once the fire is out, oxidation and corrosion of metals and finishes can occur more rapidly; electronics and electrical systems should be immediately protected using deionized water rinsing and treatment with corrosion control and moisture elimination chemical sprays, such as LPS and CRC. Note: Only certified electrical and electronic service technicians should complete the above. Education Note #3: Drywall (ceilings and walls), cabinets and flooring, may appear to be in good condition, where further inspection may find; the thermal transfer of heat into porous materials and the wetting and cooling effect of fire foam caused damage, where they should be replaced.

Firefighting gallons per minute – The measure of water flow in firefighting. It is used to measure the output of wildland and structural fire engines, pumps, hose streams, nozzles, hydrants, and water mains.

Firefighting gear – Turnout gear including footwear, trousers, a coat, gloves, a helmet, and

respiratory protection.

Firefighting resources – All people and major items of equipment that can or potentially could be assigned to fires.

Fire growth – The stage of fire development during which the heat release rate and the temperature of the fire are increasing.

Fire hazard – Materials, structures or processes that may result in creating a fire, permitting a fire to grow undetected, or preventing people from escaping a fire.

Fire hazard analysis – A comprehensive assessment of the risks from fire within individual fire areas in a facility.

Fire hazard assessment (FHA) – (1) A situation or materials which are dangerous, caustic, lethal, etc.; materials and conditions which endanger health or safety, or which may engender ignitions, explosions; conditions that hinder suppression activities. (2) A tactical, site specific measurement of the factors which affect fire behavior, fire suppression capability and effectiveness, structure survivability in a building or a wildfire situation, firefighter, and resident safety, etc.

Fire hazard classification (FHC) (wildfires) – FHC is a broad, strategic analysis which, while using many of the assessment parameters, focuses more on a matrix of fuels, slope and weather which pose specific fire prevention and fire protection concerns as influenced by fuel-bed type and continuity, topography and weather factors. FHC is an integral part of a State Fire Plan.

Fire hazard zoning (FHZ) (firefighting) – FHZ is a planning and regulatory activity (typically conducted by a local agency such as a city or county) which provides criteria for what kinds, how many and under what conditions development or other activities should be regulated in areas of various hazard classifications.

Fire heat line – A line in a fire damaged building, usually horizontal, showing the demarcation of heat at a certain temperature. Education Note: Generally, the heat line defines heat damage that is above the heat line and potentially less damage below the heat line. The heat line is also defined and seen as angled lines moving upwards from the source of the fire.

Fire ignition source – A fire begins by an external ignition source in the form of a flame, spark, or hot ember. This external ignition source heats the fuel in the presence of oxygen. Education Note: As the fuel and oxygen are heated, molecular activity increases. If sufficiently heated, a self-sustaining chemical chain reaction or molecular activity occurs between the fuel and oxygen. This will continue the heating process and the resulting chain reaction will escalate without the need for an external ignition source. Once ignition has occurred, it will continue until: 1) all the available fuel or oxidant has been consumed; 2) the fuel and/or oxygen is removed; 3) reducing the temperature by cooling; or 4) reducing the number of excited molecules and breaking the chain reaction.

Fire impaction – The presence of fire debris caused by burning. (See: Smoke impaction)

Fire insurance – (1) Coverage protecting property against losses caused by a fire or lightning that is usually included in homeowners or commercial multiple peril policies. (2) Coverage designed to protect against losses caused by fire and lightning plus resultant damage caused by smoke and water.

Fire intensity – A general term relating to the heat energy released by a fire.

Fire legal liability – Liability of a firm or person for fire or explosion damage caused by negligence of and damage to property of others. Coverage is needed for leased or rented property for which the insured could be held legally liable for damage to the property.

Fire load – (1) The number and size of fires historically experienced on a specified unit over a specified period (usually one day) at a specified index of fire danger. (2) The quantity of heat which can be released by the complete combustion of all the combustible materials in a volume, including the facings of all bounding surfaces. Fire load may be based on effective heat of combustion, gross heat of combustion, or the net heat of combustion as required by the fire.

Fire loss cost – The dollar cost of restoring damaged property to its pre-fire condition. In determining loss, the estimated damage to the facility and its contents includes replacement cost less salvage value. Losses will exclude costs of restoring: 1) property that is scheduled for demolition; 2) property that is decommissioned and not carried on the books as value; and 3) property that has no loss potential. Education Note: Personnel performing the loss estimate should include the cost of decontamination and cleanup, the loss of production or program continuity, the indirect costs of fire extinguishment (such as damaged fire department equipment), and consequent effects on related areas in all property loss amounts.

Fire mitigation (building) – After a structure fire, the implementation of processes for protecting salvable materials and finishes from secondary damage, such as rust and corrosion, water damage and humidity, acids, to having missing items.

Fire mitigation (wildfire) – The implementation of a variety of precautionary measures to property from experiencing heat and embers from burning a building.

Fire, ongoing damage – Damage that continues to occur once the fire is out. Ongoing fire damage is often a result of elevated humidity in the building that causes rust, corrosion, and pitting; acids in soot that produces hydrochloric acid.

Fire or explosion hazardous area – An area in or outside a building in which the atmosphere contains, or may contain, in sufficient quantities, flammable or explosive gases, dusts or vapors. Education Note: In such an atmosphere, fires and explosions are possible when three basic conditions are met that include fuel, oxygen, and an ignition source. This condition is referred to as the "hazardous area" or "combustion triangle area."

Fire, oxygen rich (an oxygen enriched fire) – Fires benefiting from a free flow of oxygen that burns at higher temperature producing more intense complete combustion. Generally, an oxygen rich fire produces drier and finer soot.

Fire, oxygen starved – Fires having a limited amount of oxygen that burn at a lower temperature producing less complete combustion. Generally, an oxygen starved fire produces smoldering, heavier stickier residues.

Fire particulate agglomeration – (1) The process by which collisions from wind turbulence cause moist sticky smoke and soot particles to stick together to form larger particles. (2) Micro-fine (sub-micron) size soot particles that have clustered together to form particles larger than one micron in size.

Fire, particulate matter – Suspension of fine solid or liquid particles in air, such as dust, fog, fume, mist, smoke, or sprays. Education Note: Particulate matter suspended in air is commonly known as an aerosol. Particulate matter or an agglomeration of matter in a wildfire cleanup situation has an observable length and width of 40 microns or above.

Fire partition – A vertical assembly of materials, having protected openings, designed to restrict the spread of fire.

Fire patterns – The visible or measurable physical effects that remain after a fire. (NFPA 921 3.3.58)

Fire perimeter – The entire outer edge or boundary of a fire.

Fire, plastic – (1) A type of fire caused by combustion of plastic products that produces hydrogen chloride gases, which are highly corrosive. (2) A fire involving polymers (a wide range of synthetic or semi-synthetic organic solids) as a primary fuel source, where the fire results in highly acid fire residues including greasy, heavy soot.

Fire point – (1) The lowest temperature at which a material can evolve vapors fast enough to support continuous combustion. (2) The temperature at which a flame becomes self-sustained to continue burning a liquid. (3) The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. Two tests are used -- open cup and closed cup. (4) The temperature at which sufficient vapors are being generated to sustain and support continuous combustion.

Fire propagation – The movement of fire from one place to another.

Fire protection – A broad term that encompasses all aspects of fire safety, including facility construction and fixed facility fire protection features, fire suppression and detection systems, fire water systems, emergency process safety controls, emergency firefighting operations (fire department), Fire Protection Engineer (FPE), and fire prevention. Education Note: Fire protection is concerned with preventing or minimizing the direct and indirect consequences of fire on people, property, and

programs. By extension, fire protection also includes aspects of the following perils as they relate to fire protection: explosion, natural phenomenon, and smoke and water damage from fire.

Fire protection engineering survey – The process of reviewing, inspecting, testing, conducting surveillance, appraising, and surveying to determine and document the compliance of facilities and operations with applicable directives, codes, and standards.

Fire protection program – A program that establishes the requirements, responsibilities, and organizational interfaces for implementing policy in the areas of fire protection, fire prevention, and life safety.

Fire protection review – A review of construction plans prior to contemplating construction for adequacy of fire risk appraisal and protection and for compliance with NASA fire protection criteria.

Fire protection system – Any system designed and installed to detect, control, or extinguish a fire; to limit fire damage; to alert occupants and/or the fire department that a fire has occurred; or to otherwise enhance life safety.

Fire protection system impairment – A shutdown of a fire protection system or portion thereof.

Fire-rated – A term for materials that have been tested to a fire-rating standard. The independent, for-profit company Underwriters Laboratories, Inc. (UL) has developed a series of laboratory tests to measure various types of materials to resist fires. These tests are widely accepted by the construction industry, and the results are widely quoted in industry promotional materials.

Fire rated partition – A partition having an assembly of materials that will afford a given fire resistance rating (expressed in hours) to impede the spread of fire from one area to another.

Fire-rated systems – Wall, floor and roof construction of specific materials and designs that has been tested and rated according to fire safety criteria (e.g., flame spread rate and fire resistance). Testing and approval are performed by agencies such as Underwriters Laboratories, Inc. Education Note: A one-hour rating, for example, means that an assembly similar to that tested will neither collapse nor transmit flame or high temperature for at least one hour after a fire starts. Wood structural panels are an approved material in a number of fire-rated designs.

Fire-rated wood framing – Wood building framing that meets fire codes. Code recognition of one and two-hour fire rating is described in the ASTM E119 - Standard Test Methods for Fire Tests of Building Construction Materials. Including but not limited to the following, fire-rated wood framing is found in the IBC, Underwriters Laboratories (UL), Fire Resistant Directory, and the American Wood Council (AWC).

Fire regime – The role fire plays in an ecosystem. It is a function of the frequency of fire occurrence, fire intensity and the amount of fuel consumed.

Fire residue – Solid or viscous combustion products transported as a component of smoke which falls out or are adhered to surfaces in its path. Fire residue usually contains black carbon/soot, char and ash, other organics, and chemical properties.

Fire triangle – An image of the three components--heat, fuel, and oxygen--that are necessary for a fire to ignite and continue burning.

Fire residue, degree of – The amount of residue on a surface caused by a fire. As smoke is released in the air the cause is unburnt combustion. Gases, vapor, and particles come in contact with surfaces from fallout or forced pressure on vertical and horizontal surfaces. Education Note: The degree of fire residue is based on the amount of oxygen present, temperature, humidity and thermal expansion/contraction; the type of materials burnt such as organics, petroleum products (e.g., carpet, plastic, urethane, and fiberglass), and protein.

Fire resistance – (1) A relative term used with a numerical rating or modifying adjective to indicate the extent to which a material or structure resists the effect of fire. (2) The property of a material or assembly to withstand fire or give protection. It is characterized by the ability to confine a fire and to continue to perform a given structural function. (3) The property of a material or assembly to withstand fire or give protection from it. As applied to elements of buildings, it is characterized by the ability to confine a fire or to continue to perform a given structural function, or both. Education Note: Fire resistance describes how well a building component can - for a stated period of time - hold back fire and prevent it from penetrating from one room to another. The basic criteria used to characterize the fire resistance of a product are flame spread; smoke development; non-combustibility.

Fire resistance rating – (1) The period of time a building or buildings component maintains the ability to confine a fire or continues to perform a structural function or both. This is usually determined or measured by ASTM E-119 test standard. (2) The time in hours or fraction thereof that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria.

Fire-resistive – (1) In the absence of a specific ruling by the authority having jurisdiction, the term fire-resistive applies to materials for construction that are not combustible in temperatures of ordinary fires and will withstand such fires without serious impairment of their usefulness for at least one hour. (2) Properties or designs that resist effects of any fire to which a material or structure may be expected to be subjected.

Fire-resistive joint system – A system consisting of specified materials designed and tested to resist the passage of flame and hot gases sufficient to ignite cotton waste for a prescribed period of time in accordance with UL 2079.

Fire restoration – The professional practice of mitigating fire that damages buildings and contents and returning them back to pre-loss condition.

Fire retardance (FR) – The property of a material that retards the spread of fire.

Fire retardant – Denotes substantially lower degree of fire resistance than fire-resistive. Fire retardant is often used to describe materials that are combustible but have been treated to retard ignition or spread of fire under conditions for which they were designed.

Fire retardant chemical – A chemical formulation used to reduce flammability or to retard the spread of flame.

Fire retardant treated (FRT) – Chemical treatment of wood and plywood to retard combustion. Plywood is pressure-impregnated with fire retardant chemicals mixed in water in accordance with American Wood Protection Association (AWPA) Standards U1 and T1. Education Note: Span Ratings and load capacities are based on untreated panels and may not apply following fire-retardant treatment. Obtain structural performance characteristics of FRT panels from the company providing the treatment and redrying service.

Fire-retardant-treated wood – As specified in building codes, a wood product that has been treated with chemicals by a pressure process or treated during the manufacturing process for the purpose of reducing its flame spread performance in an ASTM E 84 test conducted for 30 min to performance levels specified in the codes.

Fire science – The body of knowledge concerning the study of fire and related subjects (e.g., combustion, flame., products of combustion, heat release, heat transfer, fire and explosion chemistry, kinetics, fluid mechanics, fire safety) and their interaction with people, structures, and the environment. (NFPA 921)

Fire screen (fireplace) – A piece of furniture consisting of a tilting oval or square panel set in a frame. The panel is usually pressed metal (often copper) or woven metal thread. Fire screens are a protective barrier between the hearth and a fire. A fire screen has evolved to take on a much more decorative purpose.

Fire separation – A construction assembly that acts as a barrier against the spread of fire. A fire separation may or may not have a fire-resistance rating.

Fire service (FS) – Individuals who, on a full-time, part-time, or voluntary basis, provide life- safety services, including fire suppression, rescue, arson investigation, public education, and prevention.

Fire smoke and soot damage – Materials that burnt because of combustion and smoke; smoke that contains particles, vapors, and gasses, where soot is unburnt byproducts of combustion.

Fire/smoke acid deposition (acid deposits) – (1) Acids commonly found in smoke film, soot and ash that settle on surfaces. Acids can be responsible for corrosion of the underlying substrate. Education Note: Organic acids include hydrocarbons VOCs and PAHs, and organic acids including sulfur and nitrous oxides, benzene, 2-furaldehyde, and ketones and aldehydes can be responsible for property

damage. (2) Wet and/or dry deposition of acidic materials to water or land surfaces. Some chemicals found in acidic deposition include nitrate, sulfate, and ammonium.

Fire soiling – (1) The incomplete combustion of fire caused residue (soot) that lands on and in buildings and contents. (2) The incomplete combustion of fire residue that presents itself as soot. Education Note: Fire soiling is not soil or dirt, but incomplete combustion more commonly known as soot. Soiling represents a deposit of soot that must be removed to bring a material or surface back to a pre-loss state.

Fire stages – Three generally recognized stages in fire development. The incipient stage, smoldering stage, and flame stage. 1) The incipient stage is a region where preheating, distillation and slow pyrolysis are in progress. Gas and sub-micron particles are generated and transported away from the source by diffusion, air movement, and weak convection movement, produced by the buoyancy of the products of pyrolysis. 2) The smoldering stage is a region of fully developed pyrolysis that begins with ignition and includes the initial stage of combustion. Invisible aerosol and visible smoke particles are generated and transported away from the source by moderate convection patterns and background air movement. 3) The flaming stage is a region of rapid reaction that covers the period of initial occurrence of flame to a fully developed fire. Heat transfer from the fire occurs predominantly from radiation and convection from the flame.

Fire, stages of – The four stages of a fire: incipient, growth, fully developed and decay.

Fire stop (framing construction) – A solid, tight closure of a concealed space, placed to prevent the spread of fire and smoke through such a space. In a frame wall, this will usually consist of 2" x 4" cross blocking between studs. Framing designed to slow the spread of fire and smoke in the walls and ceiling (behind the drywall). In some instances, it may include using felt and foam around wire holes in the top and bottom plates; insulation and installing blocks of wood between the wall studs at the drop soffit line. This process may be an integral to passing a rough frame inspection.

Fire storm (building fire; wildfire) – Violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter, and sometimes by tornado-like whirls.

Fire, structural – Fire originating in and burning one or more parts of a building. Structure fire is capable of damaging nearby structures from: 1) increased heat that increases the possibility of combustion; 2) embers that land on buildings.

Fire, surface (building fire) – A fire that burnt or singes the top layer of materials and finishes.

Fire, surface (wildfires) – A fire that burns loose debris on the surface which includes dead branches, leaves, and low-growth vegetation.

Fire suppression – A range of firefighting tactics to contain, control and eliminate a fire. In professional firefighting, proper tactics include stamina, education, training in equipment and

training in fighting various types of fires.

Fire taping – The taping of gypsum board joints without subsequent finishing coats. A treatment method used in attic, plenum, or mechanical areas where aesthetics is not important.

Fire temperatures in a heated building – The typical temperature a material becomes during a fire through radiant heat. Hot gas layer 600-1,000°C/1,112-1,832°F; Floor temperature >180°C/356°F; Glowing smoldering combustion to 600°C/1,112°F; Flashover >600°C/1,112°F.

Fire testing – Resilient floor coverings are usually exempt from model building code flammability requirements. However, some building code officials, government agencies and other regulatory authorities require test information on the fire performance of resilient flooring. The most widely used test for flammability is based on the Flooring Radiant Panel Test. The current editions of the BOCA, Standard Building Code, and the NFPA 101 Life Safety Code reference the Flooring Radiant Panel Test. Education Note: Numerical flammability ratings alone may not define the performance of a product under actual fire conditions. Ratings are provided only for use in the selection of products to meet the specified limits. Flooring Radiant Panel Test - ASTM E 648 (NFPA Standard 253 and Federal Standard #372) - In this test, a horizontally mounted floor covering system is exposed to radiant energy from a gas/air fuel radiant panel mounted above one end of the sample and inclined at a 30-degree angle.

Fire tetrahedron – (1) Heat, fuel, oxygen, and a chemical chair reaction. (IFSTA) (2) A chemical reaction that helps the development of a fire. Education Note: For many years, the concept of fire was symbolized by the "triangle of combustion" representing fuel, heat, and oxygen. Fire research determined that a fourth element, a chemical chain reaction, was a necessary component of fire. The fire triangle was changed to a fire tetrahedron to reflect this fourth element. A tetrahedron can be described as a pyramid which is a solid having four plane faces. Essentially all four elements must be present for fire to occur, fuel, heat, oxygen, and a chemical chain reaction. Removal of any one of these essential elements will result in the fire being extinguished.

Fire thermal expansion/contraction – A dimensional change of materials due to temperature variances. Thermal expansion occurs as the building or materials heats; thermal contraction occurs as materials cool.

Fire thermal expansion of gypsum board – All materials expand and contract to some extent with changes in temperature. Education Note: The Thermal Coefficient of Linear Expansion is expressed in "Inches per Inch per Degree Fahrenheit." Example: gypsum board has a coefficient of (9.0 x 10-6 in. per in. per °F). This means that with an increase in temperature of 50°F, a gypsum board wall 100 feet in length will have a linear expansion of .54" or an excess of 1/2". The expansion characteristics of some other building materials are more pronounced; a 50°F temperature increase would produce expansion in a 100-foot length of approximately 3/4" in aluminum, 3/8" in steel and 1/2" in concrete.

Fire triangle – An image of the three components "heat, fuel, and oxygen" that are necessary for a fire

to ignite and continue burning. Education Note #1: Without sufficient heat, a fire cannot begin, and it cannot continue. Heat can be removed by the application of a substance which reduces the amount of heat available to the fire reaction. This is often water, which requires heat for phase change from water to steam. Introducing sufficient quantities and types of powder or gas in the flame reduces the amount of heat available for the fire reaction in the same manner. Education Note #2: The sides of a triangle are used to represent the three factors (oxygen, heat, fuel) which are necessary for combustion and flame production, where removal of any of the three factors causes flame production to cease.

Fireplace – (1) An opening made at the base of a chimney to hold an open fire. The opening is framed, usually ornamentally, by a mantel (or mantelpiece). (2) The hearth and chimney consisting of a masonry structure or metal frame. The hearth opens into a room and in which fuel is burned. Education Note: A fireplace is a medieval development that replaced the open central hearth for heating and cooking, the fireplace was sometimes large enough to accommodate a sitting space called an inglenook. Early fireplaces were made of stone; later, brick came into use.

Fireplace chase flashing pan – A large sheet of metal that is installed around and perpendicular to the fireplace flue pipe that is used to confine and limit the spread of fire and smoke to a small area.

Fireplace and wood burning stove EPA regulations – In the context of wood burning appliances, government regulations mandating fireplace and wood burning stove products sold after July 1, 1992 cannot emit more than 4.1 grams of particulate matter per hour for catalytic-equipped; no more than 7.5 grams for non-catalytic-equipped units.

Fireplace lintel – A horizontal, noncombustible member that spans the top of the fireplace opening.

Fireproof – An item or material that will not burn including at high temperatures. Education Note: Using this term about most building materials is discouraged because few, if any, building materials can withstand *extreme heat* for an extended time without experiencing some effect. The term "fire-resistive" or "resistant" is more descriptive.

Fireproofing – The protection of the structural steel and other supporting members in a building. Structural fireproofing for steel can be anything from concrete encasement, to mineral fiber, intumescent coating or lightweight cementitious materials applied to the steel to prevent overheating and warping supporting steel. Structural steel fireproofing is behind ceilings and walls, and it can be used as an aesthetic material inside the building.

Firestop – (1) An obstruction (blocking) in a wall, floor or ceiling designed to restrict the passage of heat and flame. Fire stops are sometimes referred to as fire blocks or fire blocking. (2) A solid, tight closure of a concealed space that is placed to prevent the spread of fire and smoke through the space. In a frame wall, this typically consists of 2x4 cross-blocking between studs.

Firestop material – Any device intended to close off an opening or penetration during a fire or materials that fill an opening in a wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and any poke-through termination devices, such as electrical outlet boxes

along with their means of support through the wall or floor opening.

Firestop system – (1) A specific construction consisting of a fire-rated wall or floor assembly, a penetrating item or items passing through an opening in the assembly, and the materials designed to help prevent the spread of fire through the openings. (2) A specific construction consisting of any device intended to close off an opening or penetration during a fire and/or materials that fill an opening in a wall or floor assembly where penetration is by cables, cable trays, conduits, ducts, pipes and any poke through termination device, such as electrical outlet boxes along with their means of support through the wall or the floor opening.

Firestop system test report – Results reported in accordance with the performance in material tests that are outlined in ASTM E-814.

Firestop, through-penetration – A system for sealing through-penetrations in fire-resistant floors, walls, and ceilings.

Firestopping (ventilation system engineering) – A passive form of fire protection. Firestopping provides the system of various components used to seal openings and joints in fire-resistance rated wall and/or floor assemblies, based on fire testing and certification listings. (NAIMA)

Firestops (Firestopped; Firestopping) – The assemblage of specially designed materials into an opening of a fire separation (floor, ceiling or wall) that could allow fire or smoke to pass to any other part of the building or to the interior of an adjoining fire separation area. Education Note: Firestopping is required at mechanical, plumbing, electrical openings, and penetrations, at the top of a wall, perimeter edges, and expansion construction joints. Added together, all firestop penetrations make up a "system" to protect the building from fire and smoke. Firestopping products vary in materials and application, but most are heat and air-rated dampers, doors, gaskets, caulking compounds, and sprays. In the usage of terms of fire stopped and firestop, firestop is a more modern term referring to the sealant of openings and penetrations.

Firestorm – (1) An atmospheric phenomenon, caused by a wildland fire in which the rising column of air above the fire draws in strong winds. (2) A conflagration which attains such intensity that it creates and sustains its own wind system. It is most commonly a natural phenomenon, created during some of the large bushfires, forest fires, and wildland fires. Education Note: The result of a firestorm, it burns fuel more rapidly, which then results in the fire spreading more rapidly.

Firewall, general purpose – (1) Any wall built for the purpose of restricting or preventing the spread of fire in a building. Such walls of solid masonry or concrete generally sub-divide a building from the foundations to two or more feet above the plane of the roof. (2) A wall having sufficient fire resistance and structural stability to restrict the spread of fire to adjoining areas or buildings. The design, materials and other requirements of fire walls are defined by local codes. (3) Fire-resistant partition extending to or through the roof of a building to retard spread of fire.

Firewall, rated – (1) A fire resistance rated wall, having protected openings, that restricts the spread

of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall. (2) A type of fire separation of noncombustible construction which subdivides a building or separates adjoining buildings to resist the spread of fire and which has a fire-resistance rating as prescribed in the NBC and has structural ability to remain intact under fire conditions for the required fire-rated time. (3) A continuous (basement to roof) wall having adequate fire resistance/rating (expressed in hours) with an adequate structural stability under fire conditions to completely subdivide a building or to separate an adjoining building, which restricts or limits the spread of fire.

Fire watch (hot work activities) – Individual(s) who monitor the area around hot work activities for any fires or hot spots caused by sparks or slag. Education Note: The personnel assigned to this task have received hands-on fire extinguisher training, and the hands-on training is renewed biannually. The personnel performing this task typically are drawn from the organization performing the hot work or possibly the fire department in special hazard situations and with the approval of the fire chief.

First aid (FA) – Emergency measures to be taken when a person is suffering from injury or overexposure to a hazardous material, before regular medical help can be obtained.

First air – The processed air which comes directly from the HEPA filter machine before it passes over any work location.

First party claim (insurance) **–** A demand for payment under an insurance policy made by a policyholder reporting an insured event directly to his company.

First party coverage (insurance) **–** An insurance coverage under which the policyholder collects for losses from the insured's own insurer rather than from the insurer of the person who caused an accident.

Fit test – The use of a standard testing method to evaluate the fit of a respirator qualitatively or quantitatively on an individual.

Flame – A body or stream of gaseous material involved in the combustion process and emitting radiant energy, where in most cases, some portion of the emitted radiant energy is visible to the human eye. (NFPA 921 3.3.63)

Flame height (wildfire) – The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind or slope.

Flame length (wildfire) – The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Flaming front (wildfire) – The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow

flaming front, whereas heavy fuels have a deeper front. Also called fire front.

Flame ionization detector (FID) – The flame ionization detector (FID) is the most sensitive gas chromatographic detector for hydrocarbons such as butane or hexane. With a linear range for 6 or 7 orders of magnitude (106 to 107) and limits of detection in the low picogram or femtogram range, the FID is the most widely and successfully used gas chromatographic detector for volatile hydrocarbons and many carbon containing compounds. Education Note: The flame ionization detector responds to any molecule with a carbon-hydrogen bond, but its response is either poor or nonexistent to compounds such as H_2S, CCl_4 and NH_3. Since the FID is mass sensitive, not concentration sensitive, changes in carrier gas flow rate have little effect on the detector response. It is preferred for general hydrocarbon analysis, with a detection range from 0.1ppm to almost 100%. The FID's response is stable from day to day and is not susceptible to contamination from dirty samples or column bleed. It is generally robust and easy to operate, but because it uses a hydrogen diffusion flame to ionize compounds for analysis, it destroys the sample in the process.

Flameover / Rollover – (1) The rapid spread of flame over a surface. (NFPA) (2) The condition where unburned fuel (pyrolysate) from the originating fire has accumulated in the ceiling layer to a sufficient concentration (i.e., at or above lower flammable limit) that it ignites and burns; can occur without ignition and prior to the ignition of other fuels separate from the origin. (NFPA 921 3.3.65)

Flame resistance (electrical) – The ability of insulation or jacketing material to resist the support and conveyance of fire.

Flame retardant – Chemicals or materials used to limit the flame spread across a building product's surface, including insulating surfaces.

Flame retardant, wood – A treatment, coating, or chemicals that when applied to wood products delays ignition and reduces the flame spread of the product.

Flame-retention burner – An oil burner designed to hold the flame near the nozzle surface. Generally, a flame-retention burner is the most efficient type of burner for residential use.

Flame speed and burning velocity – A forensic method for determining the burning velocity by the flame speed. Flame speed "S," is defined as velocity of the flame relative to a stationary observer i.e. the ground or another fixed frame. The burning velocity "U" is the velocity of the flame front with respect to the unburned gas immediately ahead of the flame. Education Note: The relation between flame speed "S," and burning velocity "U," therefore: $S = U + u$, where "u" is velocity of the unburned gas just ahead of the flame. For more information go to:
http://www.gexcon.com/handbook/GEXHBchap2.htm

Flame spread – (1) An index of the capacity of a material to spread fire under test conditions, as defined by ASTM Standard E84. Materials are rated by comparison with the flame-spread index of red oak flooring assigned a value of 100 and inorganic reinforced cement board assigned a value of 0. (2) The propagation of a flame away from the source of ignition across the surface of a liquid or a solid, or

through the volume of a gaseous mixture. (3) The spread of fire along the surface of a material. Flame spread ratings are expressed in numbers or letters and are used in building code interior finish requirements.

Flame spread index (FSI) – The sustained combustion classification of a material as listed in NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials. Education Note #1: NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials utilizes ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials. This test method measures flame growth on the underside of a horizontal test specimen. The result is derivation of a Flame Spread Index (FSI), which is a non-dimensional number which is placed on a relative scale in which asbestos-cement board has a value of 0, and red oak wood has 100. Education Note #2: Evaluation of a FSI by this test method does not provide a good understanding of how fire would propagate in full scale, such as in a room, for some materials. In particular, the results for materials that drip, such as thermoplastics, are not indicative of the fire hazard as installed on walls and ceilings because they tend to melt and drip away from the underside of the horizontal ceiling in the test chamber.

Fire resistance rating – The time, in minutes or hours, that materials and assemblies have withstood a fire exposure as established in accordance with the test procedures of NFPA 251, ASTM E 119, or UL 723, Standard Methods of Tests of Fire Endurance of Building Construction and Materials.

Flaming – The ignition temperature of the fuel is reached, where combustion begins.

Flammability (fire/wildfire) – (1) The relative ease with which a fuel ignites and burns regardless of the quantity of the fuel.

Flammability (clothing) – (1) In cleanroom fabric technology, an indication of the ease of ignition and speed of flame spread of textile fabrics. Garments are categorized as class 1 (normal), class 2 (intermediate), or class 3 (rapid and intense burning). (2) For clothing textiles, refer to: https://www.cpsc.gov/s3fs-public/pdfs/blk_pdf_textflamm.pdf and https://www.sgs.com/en/news/2016/07/clothing-flammability

Flammability (medical/surgical) – Flammability as it relates to hospital/surgical rooms containing sources of oxygen and other gases used for anesthesia, and/or potential fire hazards from electrosurgical procedures such as lasers or cautery equipment. Education Note: Flammability refers to all medical equipment and procedures that can cause fire or explosion. All products used within the operating room, including facemasks are ASTM F2100-11 tested for flame resistance. For more information go to: https://www.astm.org/Standards/F2100.htm

Flammability, facemask – As part of the medical/surgical facemask testing procedure, it follows ASTM F2100-11 testing of facemasks that must withstand exposure to a burning flame (within a specified distance) for three seconds. In addition, all facemasks must be tested to an international standard (ISO 10993-5, 10) for skin sensitivity and cytotoxic tests to ensure that no materials are

harmful to the wearer. Education Note: Facemask flammability tests are conducted on all materials used in construction of the mask, including ties (straps), elastic ear loops, anti-fog strips, visor shields, and any piping material used to hold side pleats together. For more information go to: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6198820/

Flammable – (1) Capable of being rapidly ignitable. (NFPA 921 3.3.66) (2) Capability of a combustible material to ignite easily, burn intensely or have rapid rate of flame spread. (3) Any material that can be ignited easily and that will burn rapidly. Education Note: Any liquid having a flash point below 100°F.

Flammable aerosol – (1) Product packaged in an aerosol container and can release a flammable material. (2) An aerosol that, when tested by the method described in 16 CFR 1500.45, which yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening.

Flammable, Categories of – A chemical that includes one of the following categories: *Flammable Aerosol*: An aerosol that, when tested by the method described in 16 CFR 1500.45, which yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening. *Flammable Gas*: (1) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or (2) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit. *Flammable Liquid*: Any liquid having a flash point below 100 degrees F (37.8°C), except any mixture having components with flash points of 100 degrees °F (37.8°C) or higher, the total of which make up 99 percent or more of the total volume of mixture: "Class I" - A class of flammable liquids with a flash point below 73°F and a boiling point below 100°F; "Class IB" - A class of flammable liquids with a flash point below 73°F and a boiling point at or above 100°F; and "Class IC" - A class of flammable liquids with a flash point at or above 73°F and below 100°F.

Flammable Class (Flammability Class) – A NFPA Hazard Rating System that defines the degree of flammability into: Hazard Class 0 – "Minimal:" Will not burn; will not exhibit a flash point; will not burn in air when exposed at 1,500°F (815.5°C) for 5 minutes; Hazard Class 1 - "Slightly flammable:" Must be preheated for ignition to occur; will burn in air when exposed at 1,500°F (815.5°C) for 5 minutes; flash point at or above 200°F (93.4°C); Hazard Class 2 – "Moderate or Very flammable:" Must be moderately heated or exposed to relatively high temperatures for ignition to occur; solids which readily give off flammable vapors; flash point at or above 100°F (37.8°C) but less than 200°F (93.4°C); Hazard Class 3 – "Serious or Highly flammable:" Vaporizes readily and can be ignited under almost all ambient conditions; may form explosive mixtures with or burn rapidly in air; may burn rapidly due to self-contained oxygen; may ignite spontaneously in air; flash point at or above 73°F (22.8°C) but less than 100°F (37.8°C); and Hazard Class 4 - "Extremely flammable:" A material or substance having a flash point below 73°F (22.8°C)

Flammable (an explosive) range – The range of a gas or vapor concentration (percentage by volume

in air) that will burn or explode if an ignition source is present. Education Note: Concentrations at the beginning of the flammable range are commonly called the "lower flammable (explosive) limit" (LFL/ LEL), and those at the end of the flammable range are called the "upper flammable (explosive) limit" (UFL/UEL). Below the lower flammable limit, the mixture is too lean to burn, and above the upper flammable limit, it is too rich to burn.

Flammable gas – (1) A gas having a flammable range with air at 20°C (68°F) and a standard pressure of101.3kPa. (OSHA) (2) A gas that: 1) at ambient temperature and pressure forms a flammable mixture with air at a concentration of 13 percent by volume or less; or, 2) a gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit; or, 3) one for which the United States Department of Transportation (DOT) requires their red flammable gas label or is labeled as Division 2.1.

Flammable limit – The upper and lower concentration limit at a specified temperature and pressure of a flammable gas or vapor of an ignitable liquid and air, expressed as a percentage of fuel by volume that can be ignited. (NFPA 921 3.3.67)

Flammable limits – Flammables have a minimum concentration below which propagation of flame does not occur on contact with a source of ignition. Education Note: This is known as the lower flammable explosive limit (LEL). There is also a maximum concentration of vapor or gas in air above which propagation of flame does not occur. This is known as the upper flammable explosive limit (UEL). These units are expressed in percent of gas or vapor in air by volume. For the novice, different materials have different flammable limits.

Flammable liquid – Any liquid having a flash point below 37.8^{o}C (100^{o}F), except any mixture having components with flashpoints of 100^{o}F or higher, the total of which make up 99 percent or more of the total volume of the mixture.

Flammable range – The difference between the lower and upper flammable limits, expressed in terms of percentage of vapor or gas in air by volume, and is also often referred to as the "explosive range."

Flammability – The relative ease with which a fuel ignites and burns regardless of the quantity of the fuel.

Flammable liquid – (1) Any liquid having a flash point below 37.8°C (100°F), except any mixture having components with flashpoints of 100°F or higher, the total of which make up 99 percent or more of the total volume of the mixture. (2) A liquid having a flash point of not more than 93°C (199.4°F).

Flammable Liquid classes – Three classes of flammable liquids which are: "Class IA" - A class of flammable liquids with a flash point below 73°F and a boiling point below 100°F. "Class IB" - A class of flammable liquids with a flash point below 73°F and a boiling point at or above 100°F. and "Class IC" - A class of flammable liquids with a flash point at or above 73°F and below 100°F.

Flammable range – (1) The difference between the lower and upper flammable limits, expressed in

terms of percentage of vapor or gas in air by volume, and is also often referred to as the "explosive range." (2) The concentration of gas or vapor in air that will burn if ignited. It is expressed as a percentage that defines the range between a lower explosive limit (LEL) and an upper explosive limit (UEL). A mixture below the LEL is too "lean" to burn; a mixture above the UEL is to "rich" to burn. (3) The range between the upper flammable limit in which a substance can be ignited.

Flammable solid – (1) A solid, other than a blasting agent or explosive as defined in 24 CFR 1910.109 (A), that is liable to cause fire though friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. Education Note: A substance is a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis. (2) A solid which is readily combustible or may cause or contribute to fire through friction.

Flanks of a fire (wildfire) – The parts of a fire's perimeter that are roughly parallel to the main direction of spread.

Flare-up – Any sudden acceleration of fire spread or intensification of a fire. Unlike a blow-up, a flare-up lasts a relatively short time and does not radically change control plans.

Flash fire – A fire that spreads rapidly through a diffuse fuel, such as dust, gas, or the vapors of an ignitable liquid, without the production of damaging pressure. (NFPA 921 3.3.70)

Flash fuels (wildfire) – Fuels such as grass, leaves, draped pine needles, fern, tree moss and some kinds of slash, that ignite readily and are consumed rapidly when dry. Flash fuels are also called fine fuels.

Flash hazard – A dangerous condition associated with the release of energy caused by an electric arc.

Flash hazard analysis – A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention, the determination of safe work practices, and the appropriate levels of PPE.

Flashover – The stage of fire when a liquid or solid release enough vapor to ignite when mixed with air. (NFPA)

Flash point / Flashpoint – (1) The lowest temperature at which evaporation of a substance produces enough vapor to form an ignitable mixture with air. (NFPA) (2) The critical temperature at which a material will ignite. (3) The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. Education Note: For testing vapor in a vessel, two test methods are used: an open cup and a closed cup. (4) The lowest temperature (corrected to a standard pressure of 101.3 kPa) at which the application of an ignition source causes the vapors of a liquid to ignite under specified test conditions. (OSHA) (5) The minimum temperature at which a liquid gives off sufficient vapors to ignite but not

sustain combustion.

Flash point of a liquid – The lowest temperature of a liquid, as determined by specific laboratory tests, at which the liquid gives off vapor at a sufficient rate to support a momentary flame across its surface. (NFPA 921 3.3.71) Education Note: Like autoignition, there is a specific ASTM test procedure for repeatably measuring flashpoint; the value of which will vary considerably with conditions.

Flash point test methods – Scientific methods that determine the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested by one of the following methods: 1) Tagliabue Closed Tester "American National Standard Method of Test for Flash Point by Tag Closed Tester" Z11.24 1979 [ASTM D5-79]) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 degrees F (37.8 degrees C), that do not have a tendency to form a surface film under test. 2) Pensky-Martens Closed Tester "American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester" Z11.77 (1979) [ASTM D9-79]) for liquids with a viscosity equal to or greater than 45 SUS at 100 degrees F (37.8 degrees C), or that contain suspended solids, or that have a tendency to form a surface film under test. 3) Setaflash Closed Tester "American National Standard Method of Test for Flash Point by Setaflash Closed Tester" [ASTM D 3278-78]).

Flash protection boundary – An approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur.

Flash suit (fire retardant worker protection) – A complete fire retardant (FR) clothing and equipment system that covers the entire body, except for the hands and feet. This includes pants, jacket, and bee-keeper-type hood fitted with a face shield.

Floor covering – Any of several types and constructions of decorative materials that cover floors in homes and businesses, e.g., carpet, sheet vinyl, VCT, etc.

Fly ash – Fine solid particles of soot, ash and dust carried into the air when fuel is burnt.

Foam and liquid abrasive cleaner (smoke and soot damage cleaning) – Aggressive abrasive cleaners capable of removing smoke and soot and imbedded grime without damaging most hard surfaces. (Some products should not be applied on brushed stainless steel and other sensitive finishes.) Examples include but are not limited to: Melamine Foam Cleaner, CRC HydroForce, Seige Porcelain and Enamel Cleaner, Soft Scrub.

Foam and liquid cleaner – Foaming and liquid cleaners capable of removing soot and ash without damaging hard surfaces and most textiles (Refer to labeling instructions for a application on a specific textile). Examples of foam and liquid cleaners include but are not limited to Lysol disinfectant foam, Tuff Stuff, Blue Magic, Woolite Carpet Cleaning Foam, OxiClean Miracle Foam, Orange Cleaning Foam, and Stainless-Steel Magic.

Foam blasting – A wet-type of foam blasting system in which a foamy lather is filled with abrasive particles is propelled through a small nozzle by gas pressure and sprayed on to the surface of the material to be cleaned. Foam blasting systems are a class of abrasive blasting that use: 1) grit-impregnated foam; or 2) nonabrasive blasting media using foam without grit. Both systems incorporate various grades of water-based urethane-foam cleaning media. Education Note: Restorers use nonabrasive media grades to clean delicate substrates; abrasive media grades remove surface contaminants, paints, protective coatings, and rust. In addition, the abrasive a variety of grit types are used in abrasive media including aluminum oxide, steel, plastic, or garnet. The foam cleaning media is absorptive and can be used either in a dry or wetted state with various cleaning agents and surfactants to capture, absorb, and remove a variety of surface contaminants such as oils, greases, lead compounds, chemicals, and radionuclides. The capability of using the foam cleaning media wetted also provides for dust control without excess dampening of the surface being cleaned.

Foam cleaner – To clean by the application and removal of detergent foam.

Foam cleaning – A method of cleaning where the cleaner (detergent) is mixed with air to form a foam. Foam cleaners uniformly cling to surfaces thereby allowing longer contact times.

Foam cleaning, types of – Types of spray foam cleaners. The uses of spray cleaning foams are intended to suspend loose and sometimes imbedded smoke and soot without damaging the substrate. Education Note: Products like Lysol Pro Disinfectant (for general surfaces); Screen Guard (for non-scratch surfaces including computer monitors); Woolite foam carpet cleaner (for most rugs and fabrics); Meguiar's Leather Foam cleaners and conditioners (car and house leather), and Leather Master Foam Cleaner (for suede and alcantara); Sea Foam Spray (for metal surfaces where soot and grease is present); and Orange Clean Foam (for general hard surface cleaning). Another product for sensitive surfaces is men's and women's shaving cream.

Foam cleaning, soot – The removal of soot with an application of foam. Foam tends to suspend lose soot particles and holds them in place till the foam can be safety removed. This process works best on hard surfaces as compared to soft fabric materials. Education Note: As it relates to soot contaminated sensitive materials and surfaces, and depending on the material and its porosity, consider doing a test area first (always read and follow foaming instructions): 1) HEPA vacuum loose soot particles; apply spray foam and let it set from 15 seconds to one minute; Carefully HEPA vacuum off foam (with a soft bristle attachment) without touching the surface and determine if the soot residue is gone or the surface responded positively to the treatment. 2) Another test is to HEPA vacuum loose soot particles; apply spray foam and let it set from 15 seconds to one minute; with a cotton ball wipe-test, wipe the test area and see what the underlying surface looks like.

Foam, fire-retardant – Firefighting material consisting of small bubbles of air, water, and concentrating agents. Education Note: Fire-retardant foam will put out a fire by blanketing it, excluding air and blocking the escape of volatile vapor.

Foaming agent – A material that increases the production of bubbles in liquid.

Fog and mist particle size – The size of liquid particles suspended in air: Dry fog is 10-15-micron volume mean diameter). Wet fog (20-30 microns in size). Mist (30-60 micron in size). Fine spray (above 60 microns in size). Education Note: The stability of a fog and mist can vary widely depending on the liquid (composition, vapor pressure, surface tension and density), particle size distribution, droplet density, air currents, sunlight, air temperature and condensation surfaces.

Fogger – A mechanical device used for diffusing and dispersing small (usually 1/2-20 micron) droplets of disinfecting or deodorizing compounds in air.

Fogger, thermal – A machine that produces high temperatures to create large quantities of fog without degrading the active ingredient. Education Note: Thermal foggers create a very large quantity of very small droplets, very quickly. This process makes the machine ideal for fogging large indoor open spaces. Thermal fog is visible, helping the operator to monitor the dispersion of fog and ensure thoroughness of application. Thermal foggers include product names Electro-Gen and Thermo-Gen that available through distributors like Abatix, Aramsco, Inline and Jon-Don.

Fogging – (1) Applying a chemical by rapidly heating or finely diffusing the liquid chemical so that it forms very fine droplets that resemble smoke or fog, and it remains suspended within air for relatively prolonged periods. (2) A restoration process involving smoke and soot odor control. In wet fogging practices the fogger broadcasts finely divided particles as a mist. In thermal fogging the fogger's solvent carrying agent is delivered as a fine mist of smoke.

Forensic science – The application of accepted investigation, science, and engineering practices. The investigation of a fire or crime scene for determining cause and origin.

Fogging, cold – (See: Cold foggers)

Fogging, deionizer – Ultrasonic foggers that use deionized (DI) water.

Fogging, dry – (See: Dry foggers)

Fogging, media – Solvents (water and petroleum-based) compounds formulated for dispersal through a fogging machine.

Fogging, solvent – The application of petroleum-based chemicals as an insecticide or odor control agent. Solvent foggers produce a fine hot fog mist called thermal fog.

Fogging, thermal – The use of high temperatures through a fogging machine to produce a chemical fog without degrading the active ingredient. Thermal foggers can be adjusted to produce extremely small chemical droplets. Education Note: In fire damage restoration, thermal foggers are used to assist with deodorization of air, pores of materials and surface contaminants.

Fogging, ultrasonic – (See: Ultrasonic fogging)

Fogging, visualization – Dry-ice CO_2 foggers used in semiconductor clean room that follow specific guidelines for airflow, pattern, and turbulence visualization. Also, visualization foggers can use DI water or CO_2 in compliance with USP 797 pharmaceutical in-situ airflow analysis. Education Note: Visualization foggers create a non-contaminating fog, leaving no residue behind as fog evaporates. The fog enters the airflow at very low velocity; thus, it does not create its own turbulence. When turbulence is required, a different model of machine needs to be used. Visualization foggers are the only foggers suitable for use in Class-1 to Class-8 cleanrooms for airflow & turbulence visualization, flow balancing and contaminant transport studies around process tools.

Fogging, water – The use of water-based chemicals to control or disinfect microorganisms; contain, mask, pair (paring), or deodorize odors.

Fogging, wet – (See: Wet fogging)

Food and Drug Administration (FDA) – Under the provisions of the US Federal Food, Drug and Cosmetic Act, the US FDA establishes requirements for the labeling of foods and drugs to protect consumers from misbranded, unwholesome, ineffective, and hazardous products. Education Note: FDA also regulates materials for food contact service, and the conditions under which such materials are approved.

Forensic science – The application of accepted investigation, science, and engineering practices. The investigation of a fire or crime scene for determining cause and origin.

Formaldehyde – A pungent, colorless, irritating gas (CH_2O) that is used as a preservative, sterilizing, and disinfecting agent, produced in liquid or gaseous form. Education Note: Formaldehyde is used in synthesizing several compounds and resins, and may be found in particle board, paneling and plastics. It enters air through off gassing from building components, resulting in symptoms ranging from mild irritation to cancer.

Formaldehyde in building fires – Materials made with formaldehyde can combust in the presence of heat, where there can be a strong odor that can be pungent and suffocating. Education Note: Health effects from formaldehyde exposure can result in a mild eye irritation and respiratory discomfort, to severe cases, where there can be swelling of the larynx and lungs.

Freeze drying – (1) A process that takes moist from wet contents (usually books, manuscripts, and files) and places them in a freeze-drying unit coupled with vacuum pressure. In a fire impacted building where contents are wet, this process can remove moisture by freeze drying, where all or some of the smoke odor is reduced. (2) A process by which moisture moves from a liquid state to a frozen state through sublimation. In water damage restoration of wet books and documents, freeze drying is one of the preferred conservations drying methods. For more information go to: https://www.archives.gov/preservation/conservation/drying-methods-01.html (3) he removal of ice or other frozen solvents from a material through the process of sublimation and the removal of bound water molecules through the process of desorption. For more information go to:

https://www.spscientific.com/freeze-drying-lyophilization-basics/ and
https://www.sciencedirect.com/topics/neuroscience/freeze-drying

Friable – Easily crumbled or pulverized. Friable materials are easily suspended in air currents and from there, they may enter the respiratory system of humans.

Friable asbestos – Any materials that contain greater than one percent asbestos, and which can be crumbled, pulverized, or reduced to a powder by hand pressure. Education Note: Friable asbestos may also include previously non-friable material that becomes broken or damaged by mechanical force.

Friendly fire – A fire located in a customary and intended place, such as a fireplace.

FSK – Foil scrim kraft paper. A glass scrim reinforced vapor retarder laminate of aluminum foil and kraft paper bonded together with a fire-retardant adhesive. The foil side faces outward to present a neat metallic surface finish.

FTIR – Fourier Transform Infrared Spectroscopy (FTIR). An analysis technique that measures absorbed light as a specific wavelength. Identifying the origin of black carbon/soot formation can help to eliminate the potential sources. Education Note: Source identification relies upon the analysis of the chemical fingerprint of the residual hydrocarbons that are still present in the residue. These methods analyze for the presence of selected functional groups that distinguish sources such as paraffin residue from candles or fuel oil from oil heaters. For example, in the case of combustion of liquid fuels and diesel, the residue usually contains a large variety of residual hydrocarbons and inorganic components (such as iron, chromium, and nickel-containing dust) besides black carbon/soot. Combustion of candles leaves residues that contain alkanes, alkenes, wax esters, and polycyclic aromatic hydrocarbons (PAH). Therefore, the combined analysis by FTIR, GC, and the elemental composition derived by EDX mentioned above offer a comprehensive picture that enables source identification. A2 Technologies just came out with the first handheld FTIR called Exoscan. (See Analysis, black carbon soot.)

Fuel (wildfire) – (1) A combustible material, such as vegetation, including grass, leaves, ground litter, plants, shrubs, and trees that feed a fire. (2) Any combustible material, especially petroleum-based products, and wildland fuels.

Fuel (building fire) – (1) Any material that will release energy during a controlled chemical or nuclear reaction. Fossil fuels (coal, natural gas, and petroleum) represent a common type that liberates its energy through chemical reactions that take place when heated (usually to the point of burning). (2) A material that will maintain combustion under specified environmental conditions. (NFPA 921 3.3.74)

Fuel arrangement (wildfire) – A general term referring to the spatial distribution and orientation of fuel particles or pieces.

Fuel bed (wildfire) – An array of fuels usually constructed with specific loading, depth, and particle

size to meet experimental requirements; also, commonly used to describe the fuel composition.

Fuel bed depth – Average height of surface fuels contained in the combustion zone of a spreading fire front.

Fuel break – A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.

Fuel characteristics – Factors that make up fuels such as compactness, loading, horizontal continuity, vertical arrangement, chemical content, size and shape, and moisture content.

Fuel condition – Relative flammability of fuel as determined by fuel type and environmental conditions.

Fuel-controlled fire – A fire in which the heat release ratee and growth rate are controlled by the characteristics of the fuel, such as quantity and geometry, and in which adequate air for combustion is available. (NFPA 921 3.3.77)

Fuel load (building fire) – The total quantity of combustible contents of a building, space, or fire area, including interior finish and trim, expressed in heat units or the equivalent weight in wood. (NFPA 921 3.3.76)

Fuel load (wildfire) – (1) The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. (2) The amount of potentially combustible material found in an area. Fuel load in this context is expressed as tons per acre.

Fuel loading (wildfire) – The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total fuel and is usually dry weight.

Fuel moisture (fuel moisture content) – The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit. (See: Equilibrium moisture content)

Fuel oil soot – Sticky/oily residue deposited over a time, resulting from a malfunctioning oil or gas furnace. Education Note: Fuel oil soot deposits fine particles on surfaces. When cleaning fuel oil soot, HEPA vacuuming should be considered as a first soot removal option. However, depending on the amount of soot, the length of time it has accumulated, and its consistency, can complicate the removal and cleaning process. Often, soot imbedded on surfaces will not respond to HEPA vacuuming but will respond to degreasing chemicals.

Fuel reduction – Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

Fuel type (wildfire) – An identifiable association of fuel elements of a distinctive plant species, form,

size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Full-face respirator – Filtering face piece respirator that fits over the eyes, nose, and mouth.

Full room involvement – Condition in a compartment fire in which the entire volume is involved in fire. (NFPA 3.3.78)

Full protective clothing – Fully protective gear that keeps gases, vapor, liquid, and solids from any contact with skin and prevents them from being inhaled or ingested.

Full scale containment – During the process of removing a building contaminant, a full-scale containment is constructed when more than 100 square feet of affected, or an entire room or building is contaminated.

Fuel temperature (wildfire) – The temperature reading measured from a fuel stick fully exposed to sunlight, above a representative fuel bed, using one of two methods (within a 3/4-inch or across a 1/2-inch pine dowel).

Fuel temperature (building fire) – The temperature where building materials and contents can catch on fire. Education Note #1: The peak of a building fire is expected when temperatures in a room are slightly greater than those found in free-burning fire plumes. The amount that the fire plume's temperature drops below the adiabatic flame temperature is determined by the heat losses from the flame. When a flame is far away from any walls and does not heat up the enclosure, it radiates to surroundings which are essentially at 20°C/68°F. If the flame is big enough (or the room small enough) for the room walls to heat up substantially, then the flame exchanges radiation with a body that is several hundred °C/200°F; the consequence is smaller heat losses, and, therefore, a higher flame temperature. Education Note #2: There is fairly broad agreement in the fire science community that flashover is reached when the average upper gas temperature in the room exceeds about 600°C/1112°F. Prior to that point, no generalizations should be made: There will be zones of 900°C flame temperatures, but wide spatial variations will be seen. Of interest, however, is the peak fire temperature normally associated with room fires. The peak value is governed by ventilation and fuel supply characteristics and so such values will form a wide frequency distribution. Of interest is the maximum value which is regularly found. This value turns out to be around 1200°C/2192°F, although a typical post-flashover room fire will more commonly be 900~1000°C/1652 ~ 1832°F. The time-temperature curve for the standard fire endurance test, ASTM E 119 goes up to 1260°C/2300°F, but this is reached only in 8 hours.

Fugitive color – A coloring agent used in fire retardants that is designed to fade rapidly following retardant application to minimize the visual impacts of the retardant.

Fume – (1) A solid condensation particle of extremely small diameter. A fume is an airborne particulate formed by the evaporation of solid materials commonly generated from metal emitted during welding. Fumes are generally less than one micron in diameter. (2) Small solid particles of

condensed vaporized metal that are formed when a metal is heated or burned. (3) Airborne particulate formed by the evaporation of solid materials, such as metal fume emitted during welding. Fumes are usually less than one micron in diameter. (4) An airborne irritating, noxious, or toxic smoke, vapor, or any combination of these produced by a volatile substance or a chemical reaction. (National Park Service; USFS)

Fume size, smoke and – The size of smoke and fume particles suspended in air. (1) According to journals of science, smoke and fume suspended in air can range from 0.001 to 100 microns. (2) According to IICRC's FSRT technical information; most smoke and fumes produced by building fires are 0.5 microns to 7 microns in size; the particulate size of most combusted smoke particles is in the range or 0.1 to 4 microns in size.

Fumes – (1) A general term for vapors, gases, or smoke. (2) Solid particles commonly formed by the condensation of vapors from normally solid materials such as molten metal. Education Note: Fumes may also be formed by sublimation, distillation, calcination, or chemical reaction wherever such processes create airborne particles predominantly below one micron in size. Such solid particles sometimes serve as condensation nuclei for water vapor to form smog.

(G)

Gas – (1) The physical state of a substance that has no shape or volume of its own and will expand to take the shape and volume of the container or enclosure it occupies. (NFPA 3.3.79) (2) A state of matter in which the material has very low density and viscosity; can expand and contract greatly in response to changes in temperature and pressure; easily diffuses into other gases; readily and uniformly distributes itself throughout any container. Education Note: A gas can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature. Examples include sulfur dioxide, ozone, and carbon monoxide.

Gas explosion – A phenomenon where combustion of a premixed gas cloud, i.e. fuel-air or fuel-oxidizer, is causing rapid increase of pressure. Gas explosions can occur inside process equipment or pipes, in buildings, in confined spaces, and even in open outdoor spaces. The consequences of a gas explosion will depend on the environment in which the gas cloud is contained or which the gas cloud engulfs. It has been common to classify a gas explosion from the environment where the explosion takes place: 1) Confined gas explosions within vessels, pipes, channels or tunnels; 2) Partly confined gas explosions in a compartment, buildings and confined spaces; and 3) Unconfined gas explosions in processing plants and other unconfined areas. Education Note: This term is not strictly defined. In an accidental event it may be hard to classify the explosion. As an example, an unconfined explosion in a processing plant may involve partly confined explosions in compartments into which the gas cloud has leaked.

Gas fireplace – An appliance fueled by either liquid propane or natural gas. They are completely sealed from the area that is heated and vent all exhaust gasses to the exterior of the structure.

Gas form of matter – A gas has no shape, diffuses readily, and assumes the full-volume shape of any closed container. Gas molecules are widely distributed and can move in any direction.

Gases – Materials that form one of the three states of matter. They move freely when released and can occupy the entire area of release.

Gases from heat diffusion during a fire – A fire or wildfire that affects a building with heat and combusted materials. Diffusion refers to the spreading out of gases, vapors and particulates from a concentrated source resulting in an increase in the entropy (degree of disorder) of the substances that affect the building. Diffusion also occurs because of the random movement of molecules of the substance which allows them to separate from one another. Education Note: The greater the space between molecules the greater ability they must spread out from one another. The more packed the molecules are in the substance the less space to maneuver, and therefore, the more difficult for diffusion to occur. Gaseous substances in a wildfire are in a league all to themselves. The molecular particles of gas are much more distant from one another than either liquid or solid particles are to each other. Gaseous substances can penetrate deeper into building materials than particles.

Gasification – (1) The process of converting solid or liquid products into a gaseous fuel through heating in the absence or reduced presence of oxygen. (2) A method for converting coal, petroleum, biomass, wastes, or other carbon-containing materials into a gas that can be burned to generate power or processed into chemicals and fuels.

Gas sorption – Devices used to reduce levels of airborne gaseous compounds by passing the air through materials that extract the gases. Education Note: The performance of solid sorbents is dependent on the airflow rate, concentration of the pollutants, presence of other gases or vapors, and other factors.

General cleanup – A description of labor necessary complete a cleaning task or job. Often general cleanup does not require skilled workers or tradespersons unless otherwise stated in the estimate of services.

General damages (insurance) – Damages awarded to an injured person for intangible loss which cannot be measured directly by dollars. Education Note: General damage is frequently called pain and suffering. General damages are distinguished from special damages which are awarded for actual economic loss such as medical costs loss of income etc.

General exhaust – (1) A system for exhausting air that contains contaminants from a general work area. (2) The main exhaust point of ventilation system that will not be reused as incoming clean air.

General liability insurance (GL) – A liability insurance coverage when something goes wrong on the job, where there is injury or property damage. GL insurance is designed to protect the assets of the

contractor/restorer when they are sued.

General liability insurance coverage – Coverage that pertains for the most part to claims arising out of the insured's liability for injuries or damage caused by ownership of property manufacturing operations contracting operations sale or distribution of products and the operation of machinery as well as professional services. Education Note: For small businesses general liability coverage can be included in the BOP or "Business Owners Policy."

General ventilation – (1) A building's ventilation system that lessens airborne contamination by diluting workplace air. (2) Removal of contaminated air and its replacement with clean air from general workplace area as opposed to local ventilation, which is specific air changing in immediate air of a contamination source.

Generating facility – An existing or planned location or site at which electricity is or will be produced.

Ghosting – (1) A condition usually caused by soot that represents residual pyrolyzed fuel particles on surfaces. (2) A discoloration to a surface produced by temperature and fuels. Education Note: In a building fire, ghosting is often caused by charged particles and gases that move to materials such as cloth, metal, ceramics, glass, plastic, and cooler surfaces. While ghosting is seldom seen in wildfires, further investigation may identify underlying carbonized soot conditions from candles, lack of ventilation of wood burning fireplace, furnaces, water heaters, cigarette smoking, cooking, and automobile exhaust. Hydrocarbons tend to seek equilibrium with their environment. (Frick's Law)

Ghosting, fire damage cleaning – A condition existing on ceilings, walls, flooring, and cabinets, after the cleaning process was not successful in removing all soot, oily residue and staining.

Glowing – A stage of combustion where oxygen is limited.

Glowing combustion (building fire; wildfire) – (1) Luminous burning of solid material without a visible flame. (NFPA 3.3.80) (2) The process of oxidation of solid fuel accompanied by incandescence. All volatiles have already been driven off, oxygen reaches the combustion surfaces, and there is no visible smoke. Education Note: The glowing phase follows the smoldering combustion phase and continues until the temperature drops below the combustion threshold value, or until only non-combustible ash remains.

GPM method – The measurement of gallon per minute involving how much water is required to put out a specific fire based on the fuel class, containment, exposure, etc.

Grass fire (wildfire) – Any fire in which the predominant fuel is grass or grass-like.

Grease fire – (1) Petroleum products or animal fats that combust to produce a very hot fire that creates extremely oily smoke. (2) A type of fire that typically refers to cooking oil and any other flammable cooking or lubricating materials in a kitchen. Education Note #1: Grease fires happen when collections

of oil or grease on a stove, oven or fryer get hot enough to ignite. Grease fires are extremely dangerous because the fuel source (the grease) is a liquid, and easily splashed. Grease fire burn very hot and can quickly spread to cabinets or other flammable areas of the kitchen. Grease fires are classified as Class B, F or K fire. The most important thing you can do to prevent a fire in the kitchen is to stay put. Education Note #2: The NFPA reports that unattended cooking is the leading cause of home cooking fires. One of the easier ways to smother a grease fire is to cover a pan or skillet with a metal lid. Be careful with glass lids; they can break from the extreme heat and open flame. A dry chemical fire extinguisher is required to put out a grease fire. Class K fire extinguishers are available to put out grease and other kitchen fires, but they are usually only found in commercial kitchens. Do not use water to put out a grease fire; water will only cause burning oil to splash that spreads the grease fire.

Ground fire (wildfire) – Fire that consumes the organic material beneath the surface litter ground, such as a peat fire.

Ground fuel (wildfire) – All combustible materials below the surface litter, including duff, tree or shrub roots, punky wood, peat, and sawdust, that normally support a glowing combustion without flame.

Gum thickness (wildfire) – A dry chemical product which is mixed with water to form a fire-retardant slurry.

Gypsum – A widely available chalk-like mineral, $CaSO_4 2H_2O$, consisting of hydrous calcium sulfate. Education Note: Gypsum is used in plaster of Paris and in making plasterboard (drywall, Sheetrock®, gyprock).

Gypsum board – A widely available chalk-like mineral consisting of hydrous calcium sulfate. Gypsum board is used in plasterboard (drywall and gypsum wallboard). The terms "drywall" and "gypsum wallboard" are commonly used in the construction industry to describe gypsum board. The CSA and ASTM standards and Gypsum Association (GA)'s specifications however refer to "gypsum board" as being the correct generic name for a family of sheet products consisting of a non-combustible core primarily of gypsum with paper surfacing. Education Note: The term "gypsum board" has therefore been incorporated throughout CSA (A82.27); ASTM (C36/36M; C360/C360M) and GA standards in lieu of "drywall" or "gypsum wallboard." Special gypsum board core formulations are available to provide fire and/or water-resistant base. Special surfacing materials are also available including water repellant facing, vinyl film laminated to gypsum board to provide pre-decorated facing and aluminum foil laminated to back surface of gypsum board to provide increased thermal resistance and resistance to vapor diffusion. Types of gypsum board include: Standard gypsum board, Fire-retardant gypsum board, Foil-backed gypsum board, Vinyl-faced gypsum board, and Specialty boards.

Gypsum board, fire rated – Gypsum is approximately 21 percent by weight chemically combined water which greatly contributes to its effectiveness as a fire resistive barrier. When gypsum drywall is exposed to fire, the water is slowly released as steam, effectively retarding heat transmission. Fire

rated gypsum drywall is more fire resistant because it contains glass fiber reinforcement and other additives within its specially formulated gypsum core to help it hold up longer to a fire exposure. Fire rated drywall is referred to as "Type X" and must be third-party certified by an independent testing and listing agency such as UL (Underwriters Laboratories Inc.) to meet the fire performance requirements prescribed in the ASTM C 1396 standard specification for gypsum board products. Type "X" fire rated gypsum drywall that is 5/8 -inch thick and installed on each side of nominal 2-inch x 4-inch wood studs spaced 16-inch on center or 3-5/8-inch steel studs spaced 24" on center, it has a minimum fire rating for the assembly of 1 hour, which is a typical requirement for most building codes. Type "C" fire rated drywall is similar in composition to Type X, except that it has more glass fiber reinforcement and other ingredients in the gypsum core that makes its fire resistive properties superior to Type X. Type C gypsum board is available in 1/2-inch and 5/8-inch thicknesses. Education Note: In residential homes, installation of fire rated drywall is required by state and local building codes on interior and exterior walls near furnaces and utility rooms. Fire rated drywall can also be installed in a basement or other places where a wood stove might be used or around the opening of a fireplace. Fire rated drywall is typically found on garage walls and ceilings that are adjacent to the main living area of the home. For commercial buildings, fire rated gypsum drywall is specified for most of the building walls and ceilings to meet building code requirements for fire partitions and assemblies. These fire rated partitions and assemblies provide life safety for the building's occupants.

(H)

H_2O – Inches of water lift. A measurement of vacuum efficiency (suction).

"*Handling Smoke Damage after a Fire: Getting Soot and Smoke Out.*" – Chapter 13 of the Disaster Handbook 1998, National Edition. Institute of Food and Agricultural Sciences, University of Florida.

HAP – Hazardous air pollutants.

Hazard (insurance) – A condition that creates or increases the chance of loss.

Hazard (building fire; wildfire) – Any real or potential condition that can cause injury, illness or death of personnel, or damage to, or loss of equipment or property.

Hazard abatement – The process of controlling and eliminating hazards. (NIOSH)

Hazard and risk assessment – The process of determining the hazards of a materials and interjecting action that will be taken.

Hazard assessment (work-related exposure) – (1) The identification of hazards on the job and the establishment for determining what to do to eliminate or control hazards. The process or methods of

assessing hazards to determine risks. Assess the impact of each hazard in terms of potential loss, cost, or strategic degradation based on probability and severity.

Hazard communication – The title of the OSHA regulation that is sometimes known as the Employee Right-To-Know rule. It requires employers to make information available to employees on all of the hazardous substances in the workplace to which they may be exposed.

Hazard Communication Standard (HCS) (HazCom) – (1) A U.S. OSHA standard requiring all employers to inform employees of the hazard of substances in the workplace and the steps necessary to avoid harm. (2) An OSHA regulation that requires chemical manufacturers, suppliers, and importers to assess the hazards of the chemicals they make, supply, or import, and to inform employers, customers, and workers of these hazards through a Safety Data Sheet (SDS).

Hazard determination – The process of evaluating available scientific evidence in order to determine if a chemical is hazardous pursuant to the HCS. This evaluation identifies both physical hazards (e.g., flammability or reactivity) and health hazards (e.g., carcinogenicity or sensitization). The hazard determination provides the basis for the hazard information that is provided in SDS, labels, and employee training. Education Note: Hazard determination does not involve an estimation of risk. The difference between the terms hazard and risk is often poorly understood. Hazard refers to an inherent property of a substance that can cause an adverse effect. Risk, on the other hand, refers to the probability that an adverse effect will occur with specific exposure conditions. Thus, a substance will present the same hazard in all situations due to its innate chemical or physical properties and its actions on cells and tissues. However, considerable differences may exist in the risk posed by a substance, depending on how the substance is contained or handled, personal protective measures used, and other conditions that result in or limit exposure. This document addresses only the hazard determination process, and will not discuss risk assessment, which is not performed under the OSHA Hazard Communication Standard (HCS).

Hazard evaluation – (1) Establishment of a qualitative or quantitative relationship between hazard and benefit, involving the complex process of determining the significance of the identified hazard and balancing this against identifiable benefit. (2) A component of risk assessment that involves gathering and evaluating data on the types of health injury or disease (e.g., cancer) that may be produced by a chemical and on the conditions of exposure under which injury or disease is produced. Education Note: A hazard evaluation may subsequently be developed into a "risk evaluation."

Hazard fuel (building fire; wildfire) – A fuel complex defined by kind, arrangement, volume, condition, and location that presents a threat of ignition and resistance to control.

Hazard reduction (firefighting) – Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Hazardous air pollutant (HAP) – Any air pollutant listed under CAA section 112(b). HAP is synonymous with air toxics.

Hazardous and toxic substances – Chemicals present in the workplace, which can cause harm. In this definition, the term chemicals include dusts, mixtures, and common materials such as paints, fuels, and solvents. OSHA currently regulates exposure to approximately 400 substances.

Hazardous area, fire or explosion – An area in or outside a building in which the atmosphere contains, or may contain, in sufficient quantities, flammable or explosive gases, dusts or vapors. In such an atmosphere, fires and explosions are possible when three basic conditions are met that include fuel, oxygen, and an ignition source. This condition is referred to as the "hazardous area" or "combustion triangle area."

Hazardous atmosphere – An atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (for example escape unaided from a permit space), injury, or acute illness from one or more of the following causes: "Flammable gas," vapor, or mist in excess of 10 percent of its lower flammable limit (LFL). "Airborne combustible dust" at a concentration that meets or exceeds its LFL. Education Note #1: This concentration may be approximated as a condition in which the dust obscures vision at 5 feet (1.52m) or less. "Atmospheric oxygen concentration" below 19.5 percent or above 23.5 percent. "Atmospheric concentration of any substance" for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this part and which could result in employee exposure in excess of its dose or permissible limit. Education Note #2: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, and impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision. "Any other atmospheric condition" that is immediately dangerous to life or health. Education Note #3: For air contaminants for which OSHA has not determined a dose or permissible exposure limits, other sources of information, such as Safety Data Sheets that comply with the Hazard Communication Standard 1910.1200 of this part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Hazardous chemical – (1) Any chemical whose presence or use is a physical hazard or a health hazard. (2) EPA's designation for any hazardous material that requires a Safety Data Sheet. Such substances can produce adverse physical effects (fire, explosion, etc.) or adverse health effects (cancer, dermatitis, etc.).

Hazardous decomposition – Breaking down or separation of a substance into its constituent parts, elements, or into simpler compounds accompanied by the release of heat, gas, or hazardous materials.

Hazardous ingredients – Hazardous substances that make up a mixture.

Hazardous material – (1) Any substance capable of causing harm to people, animals, property, or the environment. (2) To be considered hazardous, a waste must be on the list of specific hazardous waste streams or chemicals, or else it must exhibit one or more of certain specific characteristics including flammability, corrosivity, reactivity, and toxicity. The definition excludes household waste, agricultural waste returned to the soil, and mining overburden returned to the mine site. It also

excludes all wastewater returned directly or indirectly to surface waters. However, hazardous waste may physically be in the liquid state.

Hazardous materials containment – The negative-pressurized enclosure within the restricted area, which establishes the regulated abatement work area and surrounds the location where the asbestos, lead-based paint and other hazardous materials abatement is taking place.

Hazardous materials decontamination – Area located on the upwind edge of the "hot zone" used to decontaminate personnel and equipment. All personnel coming out of the hot zone must pass through the decontamination area for decontamination.

Hazardous material (HAZMAT) – A virgin product or material that has not been recycled or reclaimed, has a use to a user or facility, and meets the definitions of certain DOT classification as defined in the Code of Federal Regulations. Education Note: A chemical in sufficient quantity or concentration to pose a threat to health or property; or which can cause injury due to its nature, or its properties.

Hazardous waste – (1) By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. It possesses at least one of four characteristics: ignitability, corrosivity, reactivity or toxicity. (2) Related to fire damaged buildings, the byproduct waste of combusted hazardous materials. Education Note: The State of California Department of Toxic Substances Control determined buildings constructed before 1978 that burned in wildfires are likely to release hazardous lead-base paint; buildings constructed before 1980 that burned in wildfires are likely to release hazardous asbestos materials.

Hazardous waste, wildfire – The State of California Department of Toxic Substances Control determined buildings constructed before 1978 that burned in wildfires are likely to release hazardous lead-based paint; buildings constructed before 1980 are likely to release hazardous asbestos materials.

Haze (wildland fires) – (1) An atmospheric aerosol of sufficient concentration to be visible. The particles are so small that they cannot be seen individually but are still effective in scene distortion and visual range restriction. (2) Haze consists of sufficient smoke, dust, moisture, and vapor suspended in air to impair visibility. The term regional haze means haze that impairs visibility in all directions over a large area. (3) Fine dry or wet dust or salt particles dispersed through a portion of the atmosphere. Individually these are not visible but cumulatively they will diminish visibility.

HAZMAT – Hazardous material; Hazardous material management.

HCT – Health and Safety Technician. An IICRC approved course that teaches technicians the principles of: Health and safety in the workplace; Industry standards and government inspections; potential citations and penalties from not complying with health and safety regulations; recordkeeping; personal protective equipment (PPE); hazard communication; methods of containing and controlling the release of hazardous substances such as lead-based paint and asbestos; confined space; and bloodborne pathogens. The class is a 2-day course; 14 hours, not including exam time, lunch, and

breaks. In the US, students who pass the course may be qualified to receive a 10-hour OSHA Health and Safety card for general industry.

Head of a fire (building fire; wildfire) – (1) The side of the fire having the fastest rate of spread. (2) The main or running edge of a fire, the part of the fire that spreads fastest. (NFPA)

Health – A state of complete physical, mental, and social wellbeing and not just the absence of sickness or disease.

Health characteristics, smoke particle – The characteristics, sources, and potential health effects of particulate matter to human health. The size of particles inhaled affects their potential to cause health effects in humans. Education Note: Particles larger than 10 micrometers do not usually reach the lungs, but can irritate the eyes, nose, and throat. For purposes of comparison, a human hair is about 60 micrometers thick. Small particles with diameters less than or equal to 10 micrometers, also known as particle pollution or PM_{10}, can be inhaled deep into the lungs; exposure to the smallest particles can affect the lungs and heart. Particle pollution includes "coarse particles," also known as PM 10 – 2.5, with diameters from 2.5 to 10 micrometers and "fine particles," also known as $PM_{2.5}$, with diameters that are 2.5 micrometers and smaller.

Health hazard – (1) Any factor or exposure that may adversely affect health. (2) A chemical for which there is evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. (3) A form of debris that has the potential to contaminate and harm humans. Common items in this category include feces (both human and animal), mold, dead bugs, extremely stained carpeting, rotten food, bodily fluids, unknown chemical containers. (HUD)

Heat – A form of energy. (1) A relative term meaning air or surface temperature is warmer as compared to air or surface temperature being colder. (2) Temperatures higher than that of the normal atmosphere, produced by the process of burning or oxidation. (3) The release of energy from atoms through a solid or liquid by conduction and through an empty space by radiation: a) Heat is a form of energy coming from the random motion of molecules produced by conduction, convection, and radiation. b) Heat is energy transferred from one body or system to another due to thermal interaction or thermal contact. Education Note: Heat is a form of energy thought to be characterized by the rate of vibration of the molecules affecting a substance. The hotter the substance, the faster the molecules vibrate. On the other hand, when there is no heat present it is thought the molecules will be at rest, which theoretically occurs at absolute zero, -459.7°F (-273.15°C or 0.0°K)

Heat and oxygen – The relationship between heat, oxygen, and fuel in a fire. Oxygen does not burn, but readily supports combustion of other substances, where it can react with organic materials and most metals. The rate of reaction varies with the amount of free oxygen, heat and combustible materials, and other conditions.

Heat capacity – (1) The ratio of the heat absorbed (or released) by a system to the corresponding

temperature rise (or fall). (2) The amount of heat (thermal energy) necessary to raise the temperature of a given mass one-degree F. Numerically, the sum of the products of the mass per unit area of each individual material in the roof, wall, or floor surface multiplied by its individual specific heat.

Heat capacity, thermal – A measurable physical quantity that characterizes the amount of heat that is required to change a body's temperature by a given amount.

Heat, conduction – The energy transfer from a high to a low temperature through a medium (solid, liquid, or gas, alone or in combination).

Heat, convection – A complex combination of heat conduction and mass flow; it is the most important form of heat transfer between solid surfaces and liquids or gases. Education Note: Convection can be sub-classified as free or natural convection (the physical displacement of energy by movement of material (gas and liquid) induced by density differences) or forced convection (displacement and mixing induced by fans and pumps). Free and forced convection can take place independently or in combination.

Heat content – The net amount of heat that would be given off if fuel burns when it is "absolutely dry," noted as BTU per pound of fuel.

Heat damage – (1) Expansion and deformation caused by high heat (radiated temperatures). (2) The amount of carbon combustion and smoke residue along with extensive physical material damage (charring or heat damage) to building materials and/or finishes.

Heat damage, heavy – Damage that consumes a large portion of a building or item; compromised the material's structural integrity or its environmental state. Education Note: Heavy damage is a general term describing not just the amount of damage but also the severity. In a wildfire, heavy damage includes but is not limited to significant heat damage or serious smoke and soot damage, even though the building may not have sustained structural damage. Heavy heat damage to contents describes a situation where a vast amount of contents or works-of-art are affected by heat, or significant smoke and soot; a single item that experienced major damage.

Heat flow – The rate at which heat moves from an area of higher temperature to an area of lower temperatures. Btu/hr (W/hr) Heat flow is generally used to quantify the rate of total heat gain or heat loss of a system.

Heat line – A distinct discoloration or a smoke line along a wall or ceiling that represent areas affected by heat. The heat line is the visible division between areas affected by heat and those that are not.

Heat loss during the building's heat drying processes – The loss of heat occurring because of the building's drying process. Education Note: The energy-required to heat a fresh air makeup that is being heated and positively pressurized, and the humidified negatively pressurized air, represents a big part of the total energy required to dry wet building framing and other wet building materials. For this reason, therefore, more than 1,000 Btu's is required (per pound of water evaporated) to dry the

building. Because air will hold more water vapor at higher temperatures, less positive pressure supply air is needed at higher operating temperatures as compared to the negatively pressured exhaust air.

Heat of combustion – (1) Heat when it is liberated when a fuel (usually a hydrocarbon) reacts with oxygen to yield water and carbon dioxide. (2) The heat energy resulting from the complete combustion of a fuel, expressed as the quantity of heat per unit weight of fuel. The high heat of combustion is the potential available, and the low heat of combustion is the high heat of combustion minus several losses that occur in an open system (primarily heat of vaporization of moisture in the fuel).

Heat of ignition – The heat energy that bring about combustion.

Heat of vaporization – The heat (energy) required for a substance to change phase from liquid to vapor. Expressed as Btu/lb. The heat of vaporization is referenced to pressure and temperature. Education Note: The heat of vaporization for water at 29.921 inches of mercury (14.7psia) atmospheric pressure and 212°F is 970 Btu/lb. For many air conditioning calculations (70°F at 50% RH) the value of 1076 Btu/lb. is used for the heat of vaporization. At saturation (100% RH) and 70°F, a value of 1112 Btu/lb. would be correct. (Concepts and Designs, Inc.)

Heat pressurization / Thermal pressurization (building drying) – Any method or system that brings heat to a surface, material or substrate that allows evaporation to occur.

Heat release rate (building fire; wildfire) – (1) The total amount of heat produced per unit mass of fuel consumed per unit time. (2) The amount of heat released to the atmosphere from the convective-lift fire phase of a fire per unit time. (3) The rate at which heat energy is generated by burning. (NFPA 3.3.87) Education Note: Heat release rate is used as an objective means of comparing burn rate of a fuel or groups of fuels.

Heat recovery ventilator – In a fireplace, an energy recovery ventilation system which employs a cross flow heat exchanger (countercurrent heat exchange) between the inbound and outbound air flow.

Heat, sensible – (1) Heat that raises the temperature of a material without changing its phase. (2) The amount of energy released or absorbed by water during a change in temperature. (3) Heat energy that causes a rise or fall in the temperature of a gas, liquid or solid when added or removed from that material. Sensible heat changes the temperature by changing the speed at which the molecules move. Education Note: Sensible heat is the energy associated with the temperature of water; meaning, sensible heat is greater in warmer water as compared to colder water. Warmed water and moisture at the surface of wet materials dries faster than surfaces having cooler water. Heated air and warm air movement carries sensible heat from the air to a wet surface and then back to the air. When wicking of moisture occurs air movement changes some of the sensible heat into latent heat. (See: Latent heat)

Heat, specific – (1) The heat required to raise a unit mass of a substance one-degree Kelvin. It is the

heat capacity of a system per unit mass, i.e., the ratio of the heat absorbed (or released) to the corresponding cleanrooms and laboratory ovens. High temperature HEPA filters use stainless steel or aluminum for the frame and silicone or glass for the gasket.

Heat transfer – (1) The movement of heat from one point to another by conduction, convection and/or radiation. (2) Heat always flows toward a substance of lower temperature until the temperatures of the two substances equalize. For more information go to: http://coolcosmos.ipac.caltech.edu/cosmic_classroom/light_lessons/thermal/transfer.html

Heat transfer coefficient (U-value) – The overall heat transfer coefficient is influenced by the thickness and thermal conductivity of the mediums through which heat is transferred. The larger the coefficient, the easier heat is transferred from its source to the product being heated.

Heat transfer, radiant – Heat transfer that occurs when there is a large difference between the temperatures of two surfaces that are exposed to each other but are not touching. (EPA)

Heat transference – The transfer of heat that flows toward a substance of lower temperature until the temperatures of the two substances equalize, and travels by: conduction, convection, or radiation. Education Note: Heavy heat transference damage removal includes removing char, soot and smoke film on vertical walls, horizontal ceilings and floors followed by restoration and repair including a final cleaning and deodorizing process.

Heavy cleaning – (1) The removal of massive or large amounts of waste or debris that individually or collectively has substantial weight. (2) The degree to which there is extensive (heavy) amount of debris or contamination to be removed.

Heavy damage to buildings (fire damage restoration) – (1) A reference to extensive smoke damage affecting a structure and structural components. In some cases, heavy smoke and soot damage may not apply to physical material charring because a neighboring building was on fire; the burning of wildfire brush did not heat damage or char a building. (2) The amount of carbon combustion and smoke residue along with extensive physical material damage (charring or heat damage) to building materials and/or finishes. Education Note: Heavy damage removal includes removing char, soot and smoke film on vertical walls, horizontal ceilings and floors followed by restoration and repair including the final cleaning and deodorizing process.

Heavy damage to contents – The amount of carbon combustion and smoke residue along with extensive physical material damage (charring or heat damage) on contents or their finish. Education Note: Heavy damage typically includes heat damage and soot and smoke film on multiple sides of the content that must be individually inspected, controlled cleaned and deodorized and reevaluated for salvage or repair.

Heavy heat damage (building fire) – Damage that consumes a large portion of a building or item; compromised the material's structural integrity or its environmental state. Education Note: Heavy damage is a general term describing not just the amount of damage but also the severity.

Heavy heat damage (wildland fire) – In a wildfire, heavy damage includes but is not limited to significant heat damage or serious smoke and soot damage, even though the building may not have sustained serious structural damage. Heavy heat damage to contents describes a situation where a vast amount of contents or works-of-art are affected by heat, or significant smoke and soot; a single item that experienced major damage.

Heavy fuels (wildfire) – Fuels of large diameter such as snags, logs, large limb wood, that ignite and are consumed more slowly than flash fuels.

Heightened awareness – After a fire, a tendency by some persons to perceive one's surroundings with greater scrutiny, often mistaking long-standing conditions for new damage; perceiving smoke odor is still present after cleaning when it may not actually be there.

HEPA – (1) An acronym for high efficiency particulate air, which describes an air filter that removes 99.97% of particles at 0.3 microns in diameter. (IICRC S520 Standard, 2015) (2) High efficiency particulate arrestance (filters). (EPA)

HEPA-AFD – A high efficiency particulate air filtration device (HEPA filter and filtering machine).

HEPA air cleaner – A machine that scrubs particles out of the air using a HEPA air filter.

HEPA air filter – A type of air filter that satisfies certain standards of efficiency set by the United States Department of Energy (DOE). Education Note: A HEPA air filter must remove 99.97% of dry particulate matter in air that are greater than 0.3 microns in size. To be called a true HEPA filter, or certified HEPA filter, the filter must have a documented filtration efficiency of 99.97% at 0.3 micron-sized particles.

HEPA air scrubber – A portable filtration system that removes dry particles, gasses, and/or chemicals from the air within a given area. Education Note: HEPA air scrubbers draw air in from the surrounding environment and pass it through a series of filters to remove contaminants. The size and complexity of an air scrubber system depends on the size of the space being serviced, as well as the range, type, and size of contaminants that must be removed from the area.

HEPA cleaning – The removal of loose (unbound) fine dry particulate using a HEPA vacuum where the machine is capable of capturing particulates larger than 0.3 microns in size.

HEPA filter – High Efficiency Particle Air filter. (1) A filter that is at least 99.97% efficient in removing mono-disperse particles of 0.3 micrometers in diameter. (2) A replaceable extended- media dry-type filter in a rigid frame having minimum particle-collection efficiency of 99.97% for 0.3 micrometer thermally-generated dioctylphthalate (DOP) (or specified alternative aerosol) particles, and a maximum clean-filter pressure drop of 2.54cm (1.0 in) water gage when tested at rated airflow capacity. (3) An air filter that removes 99.97% of particles 0.3 microns in diameter. The equivalent NIOSH 42CFR84 particulate filters are the N100, R100, and P100 filters. (IICRC S540 Standard)

HEPA filter, high capacity – HEPA filters constructed to withstand high airflow levels. Measurements are estimated at 944 L/s at 350 Pa initial resistance.

HEPA filter, high temperature – HEPA filters that are constructed using materials that can withstand temperatures up to 400°C (752°F), providing filtration for the facility including cleanrooms and laboratory ovens. High temperature HEPA filters use stainless steel or aluminum for the frame and silicone or glass for the gasket.

HEPA filtered negative air machine – A negative air machine that uses HEPA filtration and exhaust ducting to remove airborne pollutants from a contaminated area. Often, filtered air is exhausted outdoors that becomes mixed with fresh air.

HEPA portable extraction – Equipment that is portable, moveable, and capable of removing loose dry micro-fine particulates off a surface that are larger than 0.3 microns in size.

HEPA sandwich – A term used in IICRC mold remediation classes that describe a cleaning procedure after mold remediation: a) HEPA vacuuming of surfaces followed by b) damp wiping, and c) a second application of HEPA vacuuming of surfaces.

HEPA vacuum – A vacuum incorporating a HEPA filter. A HEPA vacuum is different than a regular household vacuum in that it contains a special rated filter capable of trapping fine dust particles that are too small to see. This type of filter is called a High Efficiency Particulate Air (HEPA) filter. Education Note: There are differences between the quality and efficiency of household HEPA shop vacuums that are less than $200.00 and commercial HEPA vacuums starting at $600.00 and going up to $4,000.00. When a homeowner completes their own vacuuming of loose soot and char particles involving a nuisance or light particle fallout situation, a household HEPA shop vacuum should be sufficient to complete particle removal. However, in more complicated cleanup situations, a commercial HEPA vacuum is required. Several abatement distributors include Aramsco, Abatix, Inline and Jon-Don.

HEPA vacuum brush – A horse-hair brush and supporting fabricated plastic nozzle that attaches to a HEPA vacuum hose.

HEPA vacuum brush cleaning of flat building surfaces – Fine horse-hair attachment that's capable of removing loose dust and soot particles. Education Note: This process usually works well in removing dry non-oily soot particles in a nuisance or light soot fallout loss. In this situation the fine horse-hair attachment has physical contact with ceilings, walls and floor surfaces and soot from exposed building framing in attics.

HEPA vacuum brush cleaning of upholstery – The use of a long (1-2 inch) horse-hair brush attached to a HEPA vacuum that removes loose soot particles. Education Note: In this instance the HEPA vacuum brush cleaning process is poorly named. Meaning, the goal in HEPA vacuuming sensitive materials (upholstery and other fine finishes) is to use high vacuum pressure to remove loose soot particles. In this situation the brush is just a protector for the surface. When surface contact is

unavoidable the soft horse-hair brush reduces the chance scratching and damaging materials will occur or smearing soot causing it to imbed deeper into the fabric.

HEPA vacuum cleaning process – The systematic cleaning of soot particle fallout in a building. Each soot particle cleanup loss will be different. In other words, there are no two soot and char particle cleanup losses that will be exactly the same. Education Note: With some deviation, the recommended guidelines for cleaning soot particles through HEPA vacuuming tend to fall into a pattern: (a) Assess the extent of soot fallout in buildings; (b) seal-off all openings; (c) change building filters with pleated filters when the HVAC system must remain operational; (d) HEPA vacuum soot off of floors were foot traffic can grind in soot and contribute to cross-contamination; (e) in nuisance and light soot fallout situations, HEPA vacuum loose soot off of all horizontal surfaces; (f) in medium, heavy and extensive soot fallout situations, the first cleaning involves HEPA vacuuming loose soot off of all surfaces beginning with the ceiling, then walls and windows, and then flooring.

Hidden damage – Damage that is not readily noticeable to the naked eye. Examples include heat damage or smoke and soot damage that is not noticeable until soot vacuuming and exploratory investigation discloses the damage.

High explosive – A material that is capable of sustaining a reaction front that moves through the unreacted material at a speed equal to or greater than that of sound in that medium [Typically 1000 m/s (3000 ft/sec)]; a material capable of sustaining a detonation (See also detonation) (NFPA 3.3.88)

High-order explosion – A rapid pressure rise, or high-force explosion characterized by a shattering effect on the confining structure or container and long missile distances. (NFPA 3.3.89)

High-rise building fire – (1) Any building that is on fire, where it has three or four stories, depending on location and ordinances, which requires firemen to climb stairs and gain access into hot zones. (2) The height of a building for aerial ladders to access upper floors.

High temperature steam cleaning – The process of removing unwanted residues with high temperature steam (e.g., 220°F to 300°F) without the need of using detergents or disinfectants. Education Note: To mention a few, high temperature steam is used in food production facilities, health care and restaurants. High temperature steam cleaning systems typically produce 2 to 6 gallons of 300°F water per minute that must be cleaned up or sent to a floor drain. These systems are designed for commercial use as compared to residential use. However, there are applications where high temperature steam cleaning is beneficial in residential buildings. For more information go to: http://www.sanitech.com/about_technology.php

High volume air sampler – A particle collection device placed in ambient air to collect outdoor air samples and indoor air to show particulate differences or variance in types of particle size and distribution, and genus and species when biological substances are collected in a media.

Historic dust – Indoor dust that settles over time to represent common dust deposits in a building. Education Note: Why historic dust is important in wildfire soot contamination situations, is when some

persons claim their building experienced extensive soot fallout in almost all rooms. When an environmental professional is hired to identify soot in a building that is constantly cleaned, sampling historical dust (above ledges, cabinets, behind furniture) may provide valuable information that confirms or denies the merits of the claim.

Homeowner's insurance – Coverage for homes, including dwelling coverage. Homeowner's insurance protects owners and tenants against losses or damage to their residential property and provides protection against liability claims by others suffering injury or damages while on such property.

Hose lay – Arrangement of connected lengths of fire hose and accessories on the ground, beginning at the first pumping unit and ending at the point of water delivery.

Hose bib – An outdoor water faucet protruding from a building with a thread to allow a hose connection.

Hot fire – A term in the fire damage restoration industry that describes extremely hot heat (usually above 1,500°F) that leaves very little non-combusted materials behind. In other words, hot fires consume materials rapidly leaving behind ash as the remnant of its complete combustion.

Hot flame ignition – A rapid, self-sustaining, sometimes audible gas-phase reaction of the sample, or its decomposition products with an oxidant. A readily visible yellow or blue flame usually accompanies the reaction. (NFPA 325, 1994) Education Note: This visible means of identifying ignition was previously relied upon in test measurements of ignition temperature. Recent test procedures use other means of flame detection.

Hot fogging – A process of using thermal fogging and heated solvents to produce a hot fog.

Hot oily residue – Chemicals in smoke and soot that rapidly cool on the surface creating an almost baked-on like finish.

Hot-spotting (building fire; wildfire) – Reducing or stopping the spread of fire at points of particularly rapid rate of spread or special threat, generally the first step in prompt control, with emphasis on first priorities.

Hot water extraction – A surface cleaning process in which heated detergent solutions are sprayed directly on a contaminated material followed by the simultaneous extraction that carries off dissolved particles and residues.

Hot zone – A contaminated HAZMAT area that must be isolated; requires suitable protective equipment to enter and decontamination upon exit; minimum hot zone distance from unknown material with unknown release is 330 feet (United Nations Emergency Response Guidebook); surrounded by "warm zone" where decontamination takes place.

Household dust – Indoor contaminates including dead skin from humans and pets, finely ground plant and insect parts, minute particles of sand and soil, cotton and synthetic fabric fibers from clothes, carpets, and upholstery. Education Note: Dust typically accumulates in carpets, on horizontal surfaces, computer, and TV screens, and sometimes clumps into dirtballs of fabric fibers, also known as "dust bunnies." Daily activities can stir up dust into the air. Like other allergens, dust can trigger allergic reactions to people who are sensitive where this condition can lead to sneezing, runny nose, and itchy-watering eyes.

Humidity – The measure of moisture in the atmosphere. Education Note: From an air quality standpoint, humidity in a built environment should be maintained between 30 and 50%, according to the CPSC. Excessive humidity is encountered above 60% RH, with humidity above 70% creating an atmosphere that is highly conducive to rapid microorganism growth and corrosion in fire damaged buildings.

Humidity monitoring – The organized observation and recording of ambient temperature and humidity during the cleanup and removal of soot and ash. Keeping indoor humidity below 40% provides a better environment that can be cleaned easier because loose soot and ash particles remain dry reducing the opportunity for them to smear or agglomerate.

Hydrocarbons – Compounds containing only hydrogen and carbon gaseous byproducts. Examples include methane, benzene, decane, etc.

Hydrogen peroxide (H_2O_2) (remediation and restoration) – (1) An oxidizing bleach surface treatment for some fabrics to remove browning and staining. (2) A topical bacterial treatment for contents and hard surfaces after they have been washed and sanitized. (3) At 8 to 10%, along with deionized water (DI water), hydrogen peroxide becomes a deodorizing agent that can to be applied on water-based painted building materials, porous brick and stone, and it can be sprayed (misted) directly onto acoustic ceilings, including acoustic and tiles. This misting method of deodorization works best when there is light lingering smoke odor that permeated porous materials. Education Note: Commercially, hydrogen peroxide is used in some cleaners and sanitizers up to 8% per volume, such as Fiberlock's Advanced Peroxide Cleaner.

Hydrogen peroxide (H_2O_2) – A colorless, heavy, strongly oxidizing liquid. An unstable compound capable of reacting explosively with combustibles and used principally in aqueous solutions as an antiseptic, bleaching agent, oxidizing agent, and laboratory reagent. Hydrogen peroxide will release one oxygen atom when it comes into contact with blood causing a bubbling reaction. This reaction can also occur when hydrogen peroxide comes into contact with certain other materials such as rust, bleach, and organic materials containing the enzymes catalase or peroxidase. (IICRC S540 Standard)

Hydrogen sulfide (H_2S) – A colorless toxic gas that has a strong odor similar to rotten eggs. H_2S gas is slightly heavier than air, and it can be flammable and explosive. In the absence of oxygen (anaerobic state), H_2S is produced by some bacteria in putrefying matter including sewage. Education Note: In the human body, small amount of H_2S are produced that then becomes a signaling molecule which tells

you and others that flagellation (farting) occurred. On contact with water, H_2S produces weak sulfuric or hydrosulfuric acids. In contact with metal finishes H_2S may produce a darker color finish and it can corrode and pit finishes. (This is due to the slow reaction of hydrogen sulfide with the oxygen dissolved in water, yielding elemental sulfur, which precipitates out.)

Hydrogen sulfide (H_2S) detection – Visually, some metal finishes can turn dark in the presence of H_2S. In confined workspaces such as crawlspaces, tanks and manholes, multi-gas monitors are used to detect H_2S. PID/FID (photoionization detection/flame-ionization detection) can identify H_2S in building air. PID/FID instruments are also excellent for detecting sewer-gas leaks and area monitoring (EPA Method 21). Acetate paper (litmus test paper) applied to drinking water, wastewater, or a wet or damp surface can detect H_2S. When H_2S acids are present in water and on wet or damp surfaces, the acetate paper turns grey. Education Note: Most lead acetate paper can detect H_2S as low as 3ppm. Indigo Instruments' lead acetate paper will start to change color at roughly 1 to 3ppm, where it gets progressively darker up to 400ppm (Indigo Instruments).

Hydrolysis – (1) Chemical reaction of a substance with water, usually resulting in the formation of one or more new compounds. (2) A chemical decomposition of a substance by water. The product of the hydrolysis decomposition results in the formation of two or more new substances.

Hydrolyze – To break a molecule apart using acids and hydroxyl ions from water.

Hydroxyl deodorization – A chemical compound in the form of a gas produced by a machine to provide odor control and deodorization of organics such as volatile organic compounds. VOC's include smoke odor that can be controlled or abated by hydroxyl deodorization. When using a hydroxyl generator, it works better in a humid environment above 40% to 60%. Education Note: A hydroxyl is a chemical functional group having an oxygen atom connected by a covalent bond to the hydrogen atom, a pairing which can be understood as a substructure of the water molecule. This imparts to chemical structures some of the reactive properties of the OH of water (hydrogen bonding, ionizability, etc.). The neutral form of hydroxyl group is a hydroxyl radical. The anion form, (OH-) is known as the hydroxide anion; it has a single negative charge largely residing on the much more electronegative oxygen.

Hydroxyl generators – (1) A device that breaks down oxygen and water vapor molecules and restructures their atoms into a new, unstable molecule that destroys odors. (IICRC S540 Standard) (2) A machine that produces ultraviolet light that has contact with humidity, where the product is purified air and hydroxyls. Having ideal UV wavelengths and humidity a machine produces "superior hydroxyls that eliminate bacteria, mildew, mold, gases, odors, and volatile organic compounds. https://mrnatural.ca/how-it-works/

Hygrometer – Any of a variety of instruments used for measuring the humidity in air.

Hygrometric expansion – All materials, particularly those of organic origin, expand and contract in relation to their moisture content, which varies with environment. Education Note: The hygrometric

coefficient of expansion is expressed in, "inches per inch per percent of relative humidity." Education Note: Example: gypsum board has a coefficient of 7.2 x 10-6 in. per in. per % rH. This means that with an increase in relative humidity of from 10% to 50%, a gypsum board wall 300 ft. long will have an unrestrained linear expansion of 1.0368" or 1-1/32".

Hygroscopic – A material that readily absorbs and retains moisture or water vapor from air.

Hypergolic material – Any substance that will spontaneously ignite or explode upon exposure to an oxidizer. (NFPA 3.3.90)

Hypersensitivity – Exaggerated response by the immune system to an allergen.

Hypoallergenic – Easily stimulated by allergy causing materials.

Hypochlorite – The active bleaching and disinfecting ingredient in liquid chlorine bleach.

(I)

IAP – Indoor air pollution.

IAQ – Indoor air quality. The condition of the ambient air within a building. In maintaining good IAQ the indoor air is to remain free of harmful pollutants that can cause irritation or illness.

IAQA – The American Indoor Air Quality Association (IAQA). A nationally recognized organization that tests and certifies technicians and indoor environmental professionals. For more information go to: www.IAQA.org

IDLH – Immediately Dangerous to Life or Health. IDLH is NIOSH terminology for any atmosphere that poses an immediate hazard to life, or produces an immediate, irreversible debilitating effect; an international term that expresses, in parts per million, a condition "that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects, or prevent escape from such an environment." (NIOSH June 1997) OSHA's IDLH definition for respiratory protection reads "An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere." (OSHA 29CFR1910.134) Since established exposure levels of biological contamination will likely not be available, IDLH may be based solely on the potential presence of a specific pathogen.

IEI – Idiopathic environmental intolerance.

IEP – Indoor environmental professional. An individual who is qualified by knowledge, skill,

education, training, certification, and experience to perform indoor environmental assessments. (See: Indoor Environmental Professional)

IEQ – Indoor environmental quality.

Ignition – The initiation of combustion.

Ignitable liquid – Any liquid or the liquid phase of any material that is capable of fueling a fire, including a flammable liquid, combustible liquid, or any other material that can be liquefied and burned.

Ignition – The initiation of combustion.

Ignition energy – The quantity of heat energy that should be absorbed by a substance to ignite and burn.

Ignition fire temperatures in a heated building – The typical temperature a material becomes during a fire through radiant heat: hot gas layer 600-1,000°C (1,112-1,832°F); floor temperature is greater than 180°C (356°F); glowing smoldering combustion is 600°C (1,112°F); and flashover is greater than 600°C (1,112°F).

Ignition source – Anything that provides heat, spark or flame sufficient to cause combustion/explosion.

Ignition of wood – The temperature at which some wood such as softwood building framing (e.g., Douglas fir ignites (combusts). Wood may ignite by flaming directly, or it may ignite in a glowing mode, which may or may not be followed by flaming. Education Note: It is shown that the ignition temperature is around 250°C (482°F) for wood exposed to the minimum heat flux possible for ignition, and that it invariably ignites, at least initially, in a glowing mode under these conditions. The ignition temperature rises rapidly as the heat flux is increased.

Ignition, soot – The ignition of soot due to the presence of oxygen, unburnt particles, residue, and heat. Education Note: Ignition of soot arises at a flue, vent, boiler, or heater where soot deposits of combustible materials have a high temperature (higher than the flash point) at which they ignite by a spark or a flame. The main constituent of soot deposit is particulates, but some unburnt residues involve fuel and lubricating oils that contribute to combustion.

Ignition source – Anything that provides heat, spark or flame sufficient to cause combustion or an explosion.

Ignition temperature – (1) The minimum temperature to initiate or cause self-sustained combustion in the absence of any source of ignition. (2) The minimum temperature a substance should attain to ignite under specific conditions. (3) The minimum (lowest) temperature to which a fuel in air must be heated to start self-sustained combustion independent of the heating source. (4) The minimum

temperature to which a fuel in air must be heated to start self-sustaining combustion without a separate ignition source.

Ignition temperature of building materials – The temperature at which a material ignites. Wood slowly chars 120°-150°C/248-302°F; Decayed wood ignites 150°C/302°F; Ignition temperature of various woods is 190-260°C/374-500°F; ABS pipe melts at 88-125°C/190-257°F and ignites at 416°C/780°F.

Ignition, temperature of contents – The rate at which various materials combust. Paper yellows 150°C/302°F; Paper ignites 218-246°C/424-475°F; Leather ignites 212°C/414°F; Acrylics melt at 91-125°C/195-257°F and ignites at 560°C/1,040°F; Cellulosic materials melt at 49-121°C/120- 250°F and ignites at 475-540°C/887-1,004°F; Nylons melt at 160-275°C/320-527°F and ignites at 476-532°C/888-990°F; polyester melt at 220-268°C/428-514°F and ignites 432-488°C/810-910°F; Wool does not melt but ignites at 228-230°C/442-446°F; Cotton doesn't melt but ignites at 250°C/482°F.

IICRC – The Institute of Inspection, Cleaning and Restoration Certification (IICRC). 1) IICRC is a non-profit organization for the cleaning and restoration industry. The IICRC establishes standards for the industry. The IICRC is an American National Standards Institute (ANSI) member and accredited standards developer. 2) The IICRC trains and certifies technicians in water damage restoration, microbial remediation, fire damage remediation and many other specialized areas. For more information go to: www.IICRC.org

Immediately Dangerous to Life and Health (IDLH) – NIOSH terminology for any atmosphere that poses an immediate hazard to life, or produces an immediate, irreversible debilitating effect. IDLH is an international term that expresses, in parts per million, a condition "that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects, or prevent escape from such an environment." (Current NIOSH edition June 1997) Education Note: OSHA's IDLH definition for respiratory protection reads, "An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere."

Immune system – All internal structures and processes of the human body that provide defense against disease causing organisms, such as viruses, fungi, bacteria, or parasites. Education Note: The body's defensive mechanisms that produce antibodies or lymphocytes capable of neutralizing foreign substances or organisms that invade its system.

Immunocompromised individual – An individual who is unable to produce an adequate immune response to invasion by various pathogens, due to age, sickness, exhaustion or a regimen of drugs, any of which may render the body's immune system less than effective.

Impact assessment, smoke (environmental/industrial hygiene) – Sampling in the field and analysis in a lab that together provides valuable information about a smoke contaminated building.

Impacted – The results of being affected in a negative way.

Impaction, smoke (wildfire management) – The transference of smoke, soot, and chemical byproducts into a building through convection (heat transfer and mass particulate transfer by wind turbulence).

Impingement – The ability of smoke odors and vapors in a gaseous state to embed them self into porous materials through the force of high vapor pressure transfer and mass heat. Impinging airborne smoke odors and impinged drywall occurs with heat transference that can lock-in odors once surfaces cool. Education Note: What sometimes occurs, high velocity heated airflow that is directed towards or perpendicular to the material surface, causes heated air and smoke molecules to "impinge." Impingement may cause a surface to harden or crust as pores and cells fill with smoke and soot or because heat removed the material's moisture, which reduces the size of fissures, cracks, and pores. It is not unusual for a finish to blister or break apart.

Incendiary fire – A fire that is deliberately ignited when the person knows that the fire should not be ignited. An incendiary fire is not necessarily a fire that meets the legal definition of an arson fire.

Incident – (1) An event caused by humans or due to natural occurrences, which requires emergency action or services. Such events, like a wildland fire, require immediate attention to prevent injury or loss of life and to prevent damages to property and natural resources. (2) An occurrence either human-caused or natural phenomenon, that requires action or support by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources.

Incidental damage – (1) Damage occurring coincidentally with another loss or disaster. An example is water damage caused by firefighters during the process of putting out a fire; corrosion and pitting that result because of smoke, soot, and ash. (2) A loss that arises as a result of direct damage to property. (RIA) (See: Consequential damage)

Incineration – The destruction of solid, liquid, or gaseous wastes by burning. Organic compounds completely burnt are converted to ash, carbon dioxide, and water. Controlled burning destroys organics, reduces the volume of waste, and vaporizes water and other liquids the wastes may contain. The residue ash produced may contain some hazardous material, such as non-combustible heavy metals, concentrated from the original waste.

Incipient, fire – A fire that is at the initial or beginning stage, where it can be controlled or extinguished by portable fire extinguishers, a Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus. (29 CFR 1910.155(c)(26))

Incipient damage – Surface, subsurface or a general material damage that is just starting to begin, occur or happen, the earliest stage of damage. For example, in defining the coefficient of incipient cavitation of a value or pipe fitting one must investigate the cavitation index across a valve or pipe fitting, which is defined as the ratio of difference between upstream pressure and vapor pressure to the pressure drop across the valve or fitting. Education Note: The index at which incipient cavitation, damage, or choked flow occurs is based on testing several factors including but not limited to the type

of valve or fitting pressurized at various pressure-demand flow rates.

Incombustible – Non-combustible.

Incompatible – Materials which could cause dangerous reactions from direct contact with one another.

Incompatibility – Descriptive of two or more materials, which are not suitable to be used together.

Incomplete combustion – A combustion process that does not convert all the fuel's carbon components and hydrogen into carbon dioxide and water. Smoke is formed during incomplete combustion. (EPA) Incomplete combustion involves the generation of carbon monoxide and other chemicals including PAHs.

Incomplete combustion, smoke – The incomplete combustion of carbonaceous materials in a wildfire including trees and chaparral vegetation. (1) Smoke consists of exceedingly small organic particles of carbon, oily tar-like substances, liquid droplets, and gases such as CO, CO_2, VOCs, and PAHs, such as benzene, aldehydes (including formaldehyde) and acrolein. (2) The individual compounds present in smoke number in the thousands. Education Note: Smoke composition depends on multiple factors, including the fuel type and moisture content, the fire temperature, wind conditions and other weather-related influences, whether the smoke is fresh or "aged," and other variables. (3) Different types of wood and vegetation are composed of varying amounts of cellulose, lignin, tannins and other polyphenols, oils, fats, resins, waxes, and starches, which produce different compounds when burned.

Increase risk factor – Anything that increases the chance or opportunity a hazard or a circumstance will happen. Education Note: In remediation and restoration, increased risk factor involves a greater risk when an employee continues a habit of exposing them self and others to harmful substances and situations.

Incubation – (1) Maintaining cultures of microorganisms at a temperature favorable to their growth. (2) The period between the infection of an individual by a pathogen and the manifestation of the disease caused by that microorganism.

Indicators, spalling – Craters or chips in the surface of concrete and stucco which indicates direction of fire spread.

Indirect cost – A cost that cannot be meaningfully traced to a specific product or production process; normally allocated to overhead.

Indirect damage (insurance) – Losses resulting from direct damage to property, e.g., income and expense loss resulting from inability to use damaged property.

Indirect loss – Consequential loss.

Indirect exposure – (1) Exposure to a substance in a medium or vehicle other than the one originally receiving the substance. (2) Exposure of people to a substance by contact with a person directly exposed.

Indoor air – (1) Air in a conditioned space. (IICRC S500 Standard, 2006) Education Note: Breathing air inside a habitable structure, often highly polluted because of lack of exchange with fresh oxygen from outdoors. (2) Solvents, smoke, paints, furniture glues, carpet padding, and other synthetic chemicals trapped inside buildings and contribute to an often-unhealthy environment. (USEPA)

Indoor air pollutant (IAP) – Particles and dust, fibers, mists, bioaerosols, and gases or vapors.

Indoor air quality (IAQ) – (1) The air quality within and around buildings as they relate to the health, welfare, and comfort of building occupants. (2) The IAQ within and around homes, commercial buildings, and other structures. Education Note: IAQ refers to the quality of air in buildings as it relates to the health and comfort of its occupants. Some of the indoor air pollutants causing IAQ problems include microbial contaminants coming from mold or bacteria, chemicals like carbon monoxide and radon, natural or synthetic allergens, and other diffused matter in the air that can cause health effects. Some air pollutants are known to cause respiratory problems like asthma. Ways to improve indoor air quality include proper ventilation, filtration, and source control.

Indoor Environmental Professional (IEP) – (1) An individual with the education, training and experience to perform an assessment of the microbial ecology of structure, systems and contents at a job site, create a sampling strategy, sample the indoor environment and submit to an appropriate laboratory, interpret laboratory data and determine Category of water or Condition 1, 2, and 3 for the purpose of establishing a scope of work and verifying the return to a normal microbial ecology (e.g., Condition 1). (IICRC S500 Standard, 2015) (2) An individual who is qualified by knowledge, skill, education, training, certification, and experience to perform an assessment of the fungal ecology of structures, systems, and contents at a job site, create a sampling strategy, sample the indoor environment and submit to an appropriate laboratory, interpret laboratory data and determine Condition 1, 2 or 3 for the purpose of establishing a scope of work and verifying the return of the job site to Condition 1. (IICRC S520 Standard, 2015)

Indoor environmental quality (IEQ) – A term used to describe the quality of the indoor or enclosed environment including the purity of the air and the cleanliness or sanitary state of environmental surfaces or materials.

Industrial Hygienist (IH) – (1) A person qualified by education and field training and has the experience to anticipate, recognize, evaluate, and develop controls for occupational settings. (2) A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards.

Industrial Hygienist, Certified (CIH) – A person qualified by degree and field training and

experience to anticipate, recognize, evaluate, and develop controls for occupational settings.

Inert smoke – Smoke that is primarily carbon-based particles. Education Note: Carbon based smoke is like a fine dust without corrosive properties. In some situations, it can be cleaned off the surface of contents and appliances more easily, without harming or staining the substrate.

Infection – A condition in which pathogens have entered the body and produced an adverse reaction.

Infiltration – (1) When outside air leaks into a home or building through the cracks, fissures and holes in windows and walls. The differential between the indoor conditions against the outside pressure conditions causes these seepages to occur. (2) The ability of particulates, vapors, gases, and other pollutants to enter a building or area from an outside source. (3) A term in restoration describing leaks in the building envelope. Leaks include outside air entering through cracks, fissures, and holes in and around the roof, floor, windows, and walls; basement, crawlspace and attic; open windows and doors. The differential in pressure between conditions indoors and that outdoors, is contributing to seepages to occur. Education Note: Infiltration is the uncontrolled inward air leakage through cracks and interstices in any building element and around windows and doors of a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

Inflammable – Capable of being easily set on fire and burning, especially violently. Education Note: Inflammable means the same thing as flammable; a material that can burn easily.

Inflammation – A protective tissue response to injury that serves to destroy, dilute, or wall off both the injurious agent and the injured tissue, characterized by symptoms such as pain, heat, redness, swelling and loss of function.

Infrared detection – The use of heat sensing equipment, known as "infrared scanners," used in the detection of heat sources that are not visually detectable by the normal surveillance methods of either ground or air patrols.

Infrared drying – (1) A restoration process that decreases the drying time of a wet/damp area or material using infrared lamps or heaters through electromagnetic radiation. (2) The process of using infrared (IR) radiation equipment to dry wet building materials and contents. Education Note: Medium-wavelength electric IR heating may be ideal to dry coatings, finishes and core materials because the wavelength corresponds with the absorption bands of moisture. One unique ability of IR is the ability to direct exact amounts of heat to a specific point or area such as kitchen cabinets and small confined spaces. The Machine: An electrically operated infrared heater or lamp uses a filament (usually tungsten or carbon) that is enclosed in a heat-resistant casing or tube of quartz glass. A filling on an inert gas, usually halogen, is placed inside the quarts tube to prevent filament degradation. (See: Radiant heat drying)

Infrared radiation thermometer – An instrument that converts incoming infrared radiant energy from a spot on a target surface to a measurement value that can be related to the temperature of that spot.

Infrared thermal imager – An instrument or system that converts incoming infrared radiant energy from a target surface to a thermal map, or thermogram, on which color hues or gray shades can be related to the temperature distribution on that surface.

Infrared thermography – The process of using an infrared imaging system (e.g., thermal imaging camera) to generate thermal images of the surfaces of objects, which can be viewed electronically or printed.

Inhalable coarse particulate matter (PM_{10}) – Particles with an aerodynamic diameter less than or equal to a nominal 10 microns. PM_{10} can be found near roadways or dusty areas.

Inhalable particulates – (1) Airborne particles that are microscopic in size and can be ingested into the respiratory system. Some inhalable particulates are components of smog or smoke as a result of recent fires, or mold spores in air. (2) Particles that can be aspirated into the nose or mouth during normal breathing. The aerodynamic particle diameter for 50 percent penetration into the thorax is 10µM, and air samplers that mimic this penetration are used to determine PM_{10} (particulate matter of 10 micrometers [microns] or less in diameter). Education Note: For particulate matter in community air in the United States, the thoracic particulate matter (PM_{10}) is, by regulatory specification, divided into fine particulate matter (that fraction penetrating through an inlet with a 50 percent cut-size at 2.5 µm [$PM_{2.5}$], and the PM_{10} coarse fraction [$PM_{10-2.5}$]).

Inhalable particulate matter – Particles smaller than about 12 micrometers in diameter, capable of being drawn into the human bronchial system. Larger particles tend to be filtered out in the upper respiratory tract.

Inhalation – (1) The act of breathing. Meaning, the act of breathing and drawing in of air, vapor or gas and any suspended particulates and organisms such as mold into the lung. (2) An irritant or hazardous substance that can enter the body through breathing. (3) The drawing of air or other substances into the lungs. Education Note: Inhalation of hazardous materials affects the body in two ways: a) there can be irritation, allergic reaction or other damage to the lungs, respiratory tract, and/or mucous membranes; b) the foreign substance may be absorbed into the bloodstream in the lungs and then distributed through the body.

Inhalation, smoke, about – The taking in of air into the lungs containing fine and micro-fine particles, vapors, and gases in smoke, where exposure to high levels of smoke should be avoided. Education Note: Individuals are advised to limit their physical exertion if exposure to high levels of smoke cannot be avoided. Individuals with cardiovascular or respiratory conditions (e.g., asthma), fetuses, infants, young children, and the elderly may be more vulnerable to the health effects of smoke exposure. Inhaling smoke for a short time can cause immediate (acute) effects. Smoke is irritating to the eyes, nose, and throat, and its odor may be nauseating. Studies have shown that some people exposed to heavy smoke have temporary changes in lung function, which makes breathing more difficult. Two of the major agents in smoke that can cause health effects are carbon monoxide gas and very small particles (fine particles, or $PM_{2.5}$). These particles are two and one half (2.5) microns or less

in size (25,400 microns equal an inch) and individual particles are too small to be seen with the naked eye. Inhaling carbon monoxide decreases the body's oxygen supply. This can cause headaches, reduce alertness, and aggravate a heart condition known as angina. Fine particles can travel deeply into the respiratory tract, reaching the lungs. Inhaling fine particles can cause a variety of health effects, including respiratory irritation and shortness of breath, and can worsen medical conditions such as asthma and heart disease. During increased physical exertion, cardiovascular effects can be worsened by exposure to carbon monoxide and particulate matter. Once exposure stops, symptoms from inhaling carbon monoxide or fine particles generally diminish but may last for a couple of days.

Inhalation toxicity – Ratings corresponding to definitions derived from the test methods and categories of toxicity described in 16 CFR 1500.3, including: 1) Non-Toxic: The probable lethal concentration of the undiluted product to 50% of the test animals (LC50) is greater than 200 milligrams per liter by volume when inhaled continuously for one hour or less; 2) Toxic: The probable lethal concentration of the undiluted product to 50% of the test animals (LC50) is greater than 2 milligrams and less than or equal to 200 milligrams per liter by volume when inhaled continuously for one hour or less; and 3) Highly Toxic: The probable lethal concentration of the undiluted product to 50% of the test animals (LC50) is less than or equal to 2 milligrams per liter by volume when inhaled continuously for one hour or less.

Initial attack (building fire; wildfire) – The actions taken by the first resources to arrive at a building or wildfire to protect lives and property and prevent further extension of the fire.

Initial inspection, technically exhaustive – A building inspection that is a comprehensive and detailed inspection. A technically exhaustive initial inspection includes but is not limited to: 1) Documenting cause and origin and cause and effect; 2) Assessing building occupant and worker safety hazards; 3) Using visual and scientific exploratory investigation techniques; 4) Environment and material sampling and analysis; written reports and conclusions. A technically exhaustive initial inspection ends when all data is collected and analyzed, and remediation or restoration work begins.

Inorganic – Composed of matter other than that derived from plants or animals, such as a mineral, which is not organic.

In-plant cleaning – (1) The cleaning of contents, including appliances, upholstery, clothing, antiques, and collectibles, in a clean and temperature-controlled cleaning facility. (2) The process of cleaning, sanitizing, and deodorizing fabrics, contents, furniture and works of art back to their pre-loss condition in the contractor's place of business.

In-plant deodorization – A facility that has rooms and chambers specially designed to remove offensive and harmful odors from furniture and appliances, contents and books; antiques and works-of-art. Education Note: In-plant deodorization involves temperature and humidity control rooms that require increasing the temperature and humidity to accelerate paring of odors and off-gassing. Specially designed chambers are used for the introduction of ozone and hydroxyl gas, chemicals in a particulate and vapor phase. Chambers are to be mechanically vented outdoors for the safety of

workers and the surrounding indoor environment.

In-plant drying – A facility that has rooms and chambers specially designed to carefully dry wet furniture and appliances, contents and books; antiques and works-of-art. Education Note: In-plant drying involves a temperature and humidity control where items can be conditioned and equalized to atmospheres that reduce or eliminate damage.

In-plant restoration – A facility that has rooms and designated area for the inventory of contents, evaluation of condition, and restoration. Education Note: The in-plant restoration facility separates cleanable, restorable, and disposed items into groups. Typically, easy cleanable items are cleaned first, unless sensitive items such as antiques and collectibles must be processed first. Often the staging and processing of contents depends on the type of contamination that is affecting contents. Each situation is different.

In-plant storage – A cleaning and restoration facility that can store items in sealed containers. Containers are often stored two to three high in temperature-controlled facilities.

Inspection – (1) The process of gathering information needed to determine the category, condition, class, or status of a water intrusion, building material, assembly, or system. (IICRC S500 Standard, 2015) (2) The gathering of information regarding the mold and moisture status of the building, system, contents, or area in question. (IICRC S520 Standard, 2015)

Inspection, building restoration – The careful and complete investigation of damage including structural, water, fire, smoke, and microbial damage.

Inspection, material – The process of assessing something and evaluating its condition while deciding about what should be done to return the material or item back to its pre-loss condition.

Inspection, pre-remediation – The inspection by a remediator to implement or verify the remediation protocol by ascertaining work site conditions and the extent of work site preparation and to establish project scheduling.

Inspection process, indoor environmental – A systematic approach to completing a building inspection and its surroundings. Typically the inspection process starts with: 1) Meeting the building owner, property manager and/or tenants; 2) Gaining knowledge about the history of the building and a history of building related complaints; 3) Assess and inspect the building both from a non-complaint point of view and a complaint point of view; 4) Formalize a hypothesis about complaints and the most probable cause; 5) Attempt to disprove the hypothesis through visual and exploratory inspections and environmental testing; 6) Based on the limited set of inspections and test data, determine if the hypothesis cannot be disproved; and 7) Either follow up with a more scientific approach to identify building related complaints or come to a conclusion based on current data as to what must be done to remedy the situation.

Institute of Inspection, Cleaning and Restoration Certification (IICRC) – An international, non-

profit, industry-controlled certification organization sets standards and providing certification through education for the professional inspection, cleaning, and restoration service industries.

Insulation, heat damaged – Attic, wall or crawlspace blown, batt or rigid foam insulation that is heat damaged by a fire. Unless otherwise specified heat damaged insulation should be removed and replaced.

Insulation, smoke impacted – Attic, wall or crawlspace blown, batt or rigid foam insulation that is impacted by smoke containing particles, chemicals, and vapors. Unless otherwise specified smoke impacted insulation should be removed and replaced.

Insured (insurance) – A person, business, or organization whose property, life, or legal liability is covered by an insurance policy.

Insurer (insurance) – The insurance company.

Integrated sampling (environmental) – An air sampling device that allows estimation of air quality components device over a period of time (e.g., 24 hours to weeks) through laboratory analysis of the sampler's medium or database logging device.

Interim cleaning – (1) To dismantle as necessary and clean interior components. In a fire or wildfire soot odor cleaning situation, interior cleaning may require taking out furniture drawers to clean the drawers on all sides and the cabinet may be necessary. (2) The cleaning for appearance improvement, which can postpone or limit the need for restorative cleaning. Interim cleaning utilizes systems with a goal of maintaining a carpet's uniform appearance. Typically, such systems are intended to be high production and return the carpet to use quickly. Frequency of cleaning depends on carpet location, use, and exposure to soiling, and determines effectiveness of soil prevention, routine maintenance and need for restoration. (IICRC S100 Standard)

Interim cleaning after a fire – The emergency service mitigation process for removing soot, smoke, oily residue and other contaminates from the surfaces of materials that can become damaged (discolored, corroded, pitted) from acids produced by or resulting from the fire.

Interior finish – Material used to cover the interior's framed areas involving ceiling, walls, and floors.

Invasive investigation – An investigation process involving the cutting and opening building materials to inspect inside or behind the material, component, or system. Invasive investigation is the same as exploratory investigation.

International Standards Organization (ISO) – An organization made up of experts from various scientific disciplines who represent many countries. The ISO meets every 18 months to establish internationally acceptable standards for testing a wide range of goods and materials.

Intrusion, smoke – Smoke from prescribed fire entering a designated area at unacceptable levels.

Invasive investigation – An investigation process involving the cutting and opening building materials to inspect inside or behind the material, component, or system. Invasive investigation is the same as exploratory investigation.

Inventory – A listing or tabulation of items comprising a category (contents, parts, customer goods) of property.

Inventory – (1) An item by item listing of a group of articles or contents. (2) A listing or tabulation of items comprising a category (contents, parts, customer goods) of property.

Inventory assessment – The planning and development stage for the inventory of items and materials.

Ionization – The formation of ions. The process of separating atoms or molecules into ions by adding or removing charged particles like protons or electrons. Education Note: Ionization separation is done through the application of heat, electrical discharge, radiation or through a chemical reaction. Ionization has its basic importance in the electrical conduction thro ugh gas or liquid mediums.

Iron staining (marble) – (1) Iron or rust stains on marble are usually orange to brown in color and they follow the shape of the staining object such as nails, bolts, screws, cans, flowerpots, metal furniture. Copper and bronze stains appear as green or muddy-brown and result from the action of moisture on nearby or embedded bronze, copper, or brass items. Metal stains must be removed with a poultice. Deep-seated, rusty stains are extremely difficult to remove, and the stone may be permanently stained. (2) A type of rust stain that usually appears orange, pink, to a pigment having a darker color when the concrete slab or substrate is wet. Education Note: When the substrate becomes wet or it is affected by high relative humidity, inclusions of non-calcite minerals stain and can discolor marble causing a rust-like appearance to be noticeable in the stone. Applying a poultice or honing marble typically will not change damage causing by chemical changes.

Irritant (biological) – The result of an exposure from an airborne pollutant, such as dust, pollen, skin cells, dander, or mold.

Irritant (chemical) – A substance which, by contact in sufficient concentration for adequate time, will cause an inflammatory response or reaction of the eye, skin, or respiratory system. Education Note: Contact with an irritant may result from a single exposure or multiple exposures. Some primary irritants include chromic acid, nitric acid, sodium hydroxide, calcium chloride, amines, metallic salts, chlorinated hydrocarbons, ketones, and alcohols.

ISO – The Insurance Services Office. ISO is an advisory insurance organization that provides statistical and actuarial information to insurance businesses (insurance companies, agents, and brokers). ISO is mentioned in this glossary because they are a reference source for information. For more information about ISO go to: https://www.thebalancesmb.com/insurance-services-office-iso-462706

Isochar – A line on a diagram connecting points of equal char depth.

(J)

JHA (general construction industry) – Job hazard analysis. The JHA involves the assessment and inspection process which identifies known or reasonably anticipated hazards at the job and what is required to eliminate or control the hazards "before" fresh water, unsanitary or sewage cleanup and remediation work begins. A JHA may find building materials contain asbestos and lead-based paint, hazardous and toxic waste.

Job Hazard Analysis (JHA) (building fire; wildfire) – The analysis of a project is completed by staff to identify hazards to employees and the public. It identifies hazards, corrective actions, and the required safety equipment to ensure public and employee safety. Education Note: A job hazard analysis identifies hazards associated with work projects and worksites and identifies protective equipment or modified work procedures needed.

Job scope – The written guidelines for completing various work tasks over a day, several days or an entire project. The job scope refers to the restoration work, the procedures to be followed, and the safety and precautionary measures to be observed when performing fire, flood, sewage, smoke and water damage restoration of homes, buildings and other structures including their contents. Education Note: The basic guidelines and steps involved in a water damage restoration job scope includes: 1) loss assessment and evaluation including an assessment of hazards and how to control or eliminate them; 2) categorization of damage (water, fire, smoke, sewage, etc.); 3) a plan of action that outlines the cleanup and remediation procedures for both structure and contents; 4) following the principles of drying; 5) moisture mapping, charting and daily monitoring; 6) when restoration is not required, final drying inspection and completion of work.

(K)

Kalamein door – A fire door of composite material usually having a wooden core, which is sheeted with galvanized metal sheets or plates. Sometimes, Kalamein doors are layered with panels of sheetrock or asbestos for more fire retarding properties.

Kindling point – The lowest temperature at which sustained combustion can be initiated for a specified substance. Also called ignition temperature.

Kinetic energy – The energy possessed by a body because of its motion. Education Note: Heat, temperature and kinetic energy are linked to each other. In simplest terms, when we heat a substance, its temperature rises and causes an increase in the kinetic energy of its constituent molecules. For more information go to: https://www.enotes.com/homework-help/what-relationship-between-kinetic-energy-heat-529772

Kinetic energy, potential – The storage of energy in an object. Education Note: Wood, a form of fuel with lots of potential energy stored in its covalent bonds, will react with molecules of oxygen in the air in a dramatic chemical reaction we call fire. The complex molecules in the wood have "high energy" covalent bonds, as do the molecules of oxygen. As the oxygen molecules crash into the wood molecules with tremendous force (kinetic energy), the atoms fly apart and rearrange themselves into new molecules, including carbon dioxide and water. The energy in the covalent bonds of these molecules is much lower, so the second law of thermodynamics has been obeyed and the amount of usable, available energy has been decreased. For more information go to: http://www.brooklyn.cuny.edu/bc/ahp/BE/BioE/BE.ChemReact.2.02.html

Knock-down (firefighting) – (1) To reduce the flame or heat on the more vigorously burning parts of a fire edge. (2) The process of putting out a fire.

(L)

L/l – Liter.

Laboratory – (1) A facility that provides controlled conditions in which testing, experiments and scientific research are performed. (2) A facility where the "laboratory use" of hazardous chemicals occurs. Education Note: A laboratory is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory Analysis (soot, ash, char, and smoke) – The analysis it takes to prove a hypothesis involving particulate matter and smoke affecting buildings, contents, and the indoor environment. Education Note: There are no standards for analysis so that different qualified labs may have various methodologies for analysis, resulting in different findings for the same samples. Soot, or carbon black particle assessment is based on a visual assessment of morphology. Carbon black particles resulting from combustion are irregularly shaped. [Laboratory] identification of combustion by-product soot particles in a field of hundreds or thousands of irregularly shaped particles requires extensive experience in particle identification. Unburned wood or biomass particulates distributed in smoke have none of the characteristics of carbon black and are not identified in TEM analysis. Particles of metal oxides may appear the same as carbon black. Particles considered to be carbon black can be additionally assessed by energy-dispersive x-ray spectrometry (EDX). However, confirmation by EDX requires nearly pure carbon residue, so that fragments of hydrocarbons and

unburned portions of biomass that retain hydrogen and oxygen atoms may not be confirmed as carbon black or by-products of combustion. Other types of laboratory analysis for combustion by-products are available, such as Gas Chromatography Flame Ionization Detector (GC FID), for identification of fuel products, specifically diesel fuels. Data to identify combustion by-products in settled wildfire smoke particulates is not available in commercial analytical laboratories. Research laboratories that study wildfire smoke have the technology and the methodology for quantifying samples that are properly collected. However, most research laboratories study airborne smoke, not settled smoke particles. The cost for the analysis is usually prohibitively expensive. So, as indoor air quality professionals, what can we recommend to homeowners, property managers and school administrators in communities impacted by wildfire smoke? (Kristen Shaw, CSC).

Laboratory analysis decisions – Considerations the must be given by the environmental professional in choosing the use of one lab over another. It is important to differentiate between laboratories completing analysis because not all laboratories are the same providing the same types of analysis. Education Note: For example: when the analysis is for carbon black and soot study, the analysis of nanoparticles with PLM analysis alone is often inconclusive and may be found to be legally indefensible. Inexpensive testing by PLM is limited at best and should not be the only instrument utilized for the analysis of wildfire residue but rather as the beginning phase of an extensive process. Therefore, asking the laboratory to complete the right analysis is required on the chain of custody transfer sheet.

Laboratory analysis using TEM – The transmission electron microscopy (TEM) testing and method is an evaluation of the morphology of the particles present in the sample to determine primarily if their morphology is consistent with the unique grape cluster, or acinoform, morphology of carbon black and soot. Education Note: Using ASTM D6602, it designates TEM analysis as the mandatory evaluation technique for black carbon/soot. Examination of the samples using light microscopy should be used only as a screening/presumptive method. The same ASTM D6602 method mentions using Scanning Electron Microscopy (SEM) as ancillary method for black carbon/soot and carbon black analysis. But similar to polarized light microscopy (PLM), the PLM method should be used only for screening purposes or for supporting the TEM data. SEM is used to further characterize the morphology of particles where its data supports the TEM data.

Ladder fuels (wildfire) – Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

Laminar airflow – A "sheet" of airflow running parallel to and over the surface of a material to sweep evaporating moisture from that material's surface.

Large fire (wildfire) – (1) For statistical purposes, a fire burning more than a specified area of land e.g., 300 acres. (2) A fire burning with a size and intensity such that its behavior is determined by interaction between its own convection column and weather conditions above the surface.

Laser cleaning (smoke and soot) – The removal of carbon-based smoke and soot with lasers. Laser cleaning is a state-of-the-art cleaning process for removing smoke and soot from paintings and murals in historical buildings and the building. Depending on the setup, laser cleaning can be completed onsite, in a cleaning plant or laboratory. The most accepted laser cleaning method is the Nd:YAG.

Laser particle counter – Scientific test instruments capable of measuring airborne particle concentrations down to the submicron level.

Large loss fire damage – A general term that describes the extent of property loss as a percent of damage to a space or structure or calculated in monetary terms. To some insurers, a large fire loss is one that restricts occupants from safely entering the structure; moving back into the structure; it requires board-up; and it will require permits to complete demolition and repair.

Latent damage – (1) Damage not yet apparent but which may occur at a subsequent time. (2) An event that caused damage that is not presently visible, or it can occur after a period of time. (3) Secondary damage that later becomes noticeable, but it is found to be related to the initial cause of damage. (4) Present or potential damage not evident or active. Education Note: A hidden flaw, weakness or imperfection that cannot be discovered by reasonable inspection or detection. In water damaged buildings, latent damage may be multiple layers of wet drywall and insulation where the framing is wet. Without thorough probing and destructive testing, building framing wetness cannot be identified.

Latent damage (fire/wildfire) – Damage not yet apparent but which may occur over time, such as ash that is capable of corroding electrical and electronic components weeks and months later.

LCCC – An IICRC acronym for "Limitations," "Complexities," "Complications," and "Conflicts." LCCC's occur often on projects where hazards are identified and must be eliminated or contained; work becomes more complicated than expected; disputes arise where they must be resolved before proceeding. Refer to IICRC S500, S520 and S540 Standards for definition with explanations.

Lead-based paint – Films and coatings (paint) that contain lead. Lead-based paint levels are those that have 1.0 milligrams per square centimeter (mg/cm2) which is the same as 0.5 percent by weight, 600ppm in household paint, 5000ug/g, 5000 mg/kg. (EPA)

Levels of fire damage affecting contents – A process of prioritizing contents (e.g., collections, books, furniture, appliances, and clothing) based on the extent of damage. Level 1: "dry surface soot" particulate is removed by dry-brush dusting or HEPA vacuuming; Level 2: "sticky; wet surface soot" cannot be easily removed by dry-brush dusting or HEPA vacuuming. Level 3: contents show signs of heat damage and may be scorched, but not burned. Household fabrics generally cannot be restored but leather books, works-of-art, collectibles, appliances, and items having a finish can be restored or repaired. Level 4: contents are burned. Attempting to salvage and restore them must be done on a case-by-case basis. Level 5: contents having little or no salvage value, and their repair will exceed the replacement cost value.

Levels of PPE – After engineering controls are in place, the level of personal protective equipment (PPE) must be established. 1) "Level D" PPE is for the lease hazardous of environments or conditions, where a work uniform, smock, protective eye wear, gloves and an N-95 mask may be the appropriate PPE. 2) "Level C" PPE involves an increase in PPE, where liquids or airborne contaminates are known, requiring workers to donn (put on) full-body protective clothing with hood and feet protection, skin and eye protection, using an air-purifying respirator with appropriate canisters and gloves. 3) "Level B" PPE must be worn when the highest level of respiratory protection is required, including chemically protective clothing, boots, and gloves. 4) "Level A" PPE is worn when conditions and hazards are unknown or based on known conditions and hazards, it requires the maximum use of PPE. For more information go to: https://chemm.nlm.nih.gov/ppe.htm and https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.120AppB

Liability (insurance) – Policyholder's legal liability resulting from injuries to other persons or damage to their property.

Light cleaning – The process of removing loose dust and particulate residue from a surface using wipes, vacuuming, washing and or the use of other non-aggressive cleaning media.

Light damage (fire damage restoration) – The amount of carbon combustion and smoke residue. Light damage of soot and smoke film usually responds to HEPA vacuuming and general cleaning.

Light damage (water damage restoration) – Water that has affected a material to a point the item can be easily cleaned and/or restored to where there is no or minimal damage.

Light damage to contents (fire damage restoration) – The amount of carbon combustion and smoke residue on contents. Light damage of soot and smoke film is usually found on horizontal surfaces only; they usually respond to HEPA vacuuming and general cleaning.

Light (fine) fuels (wildfire) – Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a timelag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Light refinishing – A restoration process, usually involving cleaning, surface preparation and application of a spray coating. Light refinishing contrasts with full or complete refinishing, which involves the removal of existing finishes and building a new finish.

Lightening fire – A building or wildfire caused directly or indirectly by lightning.

Limitations – The act of limiting or the state of being limited constrained or restricted. Education Note: A "limitation" is a restriction that is placed upon the remediator that results in a limit on the scope or on the remediation activities.

Litter (wildfire) – The top layer of the forest, scrubland, or grassland floor, directly above the fermentation layer, composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves

or needles, little altered in structure by decomposition.

Load, fire – The availability of fuel to feed a fire such as trees and shrubs, including building materials and contents.

Loss (insurance) – (1) A reduction in the quality or value of real property or a possession. (2) A reduction in the quality or value of a property or a legal liability. (3) The occurrence of the event for which insurance pays.

Loss assessment – The process of inspecting a "damaged" or "contaminated" structure and its contents and collecting the necessary data to make an evaluation of the loss. (IICRC SD540 Standard)

Loss assessment and evaluation (insurance) – A professional damage assessment that documents what materials were affected and what is necessary to resolve the situation. The loss evaluation estimates the loss and follows the procedural process to bring damage property back to a pre-loss condition.

Loss avoidance (insurance; risk management) – A technique whereby a situation or activity that may result in a loss is avoided or the policy is abandoned or cancelled.

Loss avoidance (restoration and remediation) – The completion of a job hazard assessment (JHA) that establishes the extent of damage, the means for containing damage, and procedures for reducing unnecessary risk.

Loss control (insurance; risk management) – All methods taken to reduce the frequency and/or severity of losses including exposure avoidance, loss prevention, loss reduction, segregation of exposure units and noninsurance transfer of risk. Education Note: A combination of risk control techniques with risk financing techniques forms the nucleus of a risk management program. The use of appropriate insurance, avoidance of risk, loss control, risk retention, self-insuring, and other techniques minimize the risks of a business, individual, or organization.

Loss costs (insurance) – That portion of an insurance rate used to cover claims and the costs of adjusting claims. Education Note: Insurance companies typically determine their rates by estimating their future loss costs and adding a provision for expenses, profit, and contingencies.

Loss expense allocated – (1) Claims management handling expenses required to assess the extent of property loss. (2) Claims management handling expenses such as legal or independent adjuster fees paid by an insurance company in settling a claim which can be charged to that claim.

Loss inspection – The visual inspection process that identifies and estimates the amount of building damage and the recommended procedures for removing it.

Loss mitigation – (1) The processes required to stop further damage from occurring. (2) The removal

of damaged materials including regulated waste. (3) In insurance terms, loss mitigation includes, reasonable and prudent steps taken to preserve, secure and protect property from further damage.

Loss, notice of – The official communication from the insured to the insurance company notifying them of a loss that may be covered by the provisions of the insured's policy. (ANSI/IICRC S500 Standard)

Loss of use (insurance) – Not being able to use an item or building as it was intended; circumstances where a property cannot be occupied in the normal way. (1) Loss of use is a provision in homeowners and renter's insurance policies that reimburses policyholders for any extra living expenses due to having to live elsewhere while their home is being restored following a disaster. (2) Loss of use is a type of insurance which covers the loss resulting from the inability to occupy or use a building or other property damaged by a covered peril.

Loss of value (LOV) (insurance) – Fine art and other items that were not returned to their pre-loss condition.

Loss of value (LOV), cosmetic (insurance) – In the computation of an award involving cosmetic damage to non-decorative items, LOV should be awarded to compensate claimants for cosmetic damage to items that were not purchased for purposes of display or decoration. Education Note: For example, the casing of a washing machine is dented. The washing machine is not decorative in nature and still functions perfectly. An LOV, rather than replacement of the washing machine or the casing, is the appropriate measure of the claimant's loss.

Loss of value (LOV), minor (insurance) – During the computation of an award, LOV is for minor damage should be awarded when an item suffers minor damage that is not economical to repair but the item remains useful for its intended purpose. An LOV is particularly appropriate when the item is not of great value and has preexisting damage (PED). An LOV is also appropriate to compensate claimants for minor damage, such as a chip or surface crack to a figure or knickknack. For example, if an inexpensive, fiberboard coffee table with extensive PED is scratched, repair of the scratch would exceed the value of the table. Under the circumstances, LOV is appropriate.

Loss, notice of – (1) A verbal or written communication from the insured to the insurance company notifying the insurer about an accident or loss. (2) Part of the standard provisions defining a policyholder's responsibilities after a loss. (3) The official communication from the insured to the insurance company notifying them of a loss that may be covered by the provisions of the insured's policy.

Loss payee – The party to whom payment will be issued as the result of an insurance loss. (RIA)

Loss, partial (insurance) – An insured loss that does not completely destroy or render insured property worthless or exhaust the insurance monies available to cover the loss. (ANSI/IICRC S500 Standard)

Loss ratio (insurance) – Percentage of each premium dollar an insurer spends on claims.

Loss, repetitive (insurance) – (1) A loss that occurred by the same cause and origin more than once. (2) An NFIP-insured structure that has had at least two paid flood losses of more than $1,000 each in any 10-year period since 1978.

Loss, total – (1) The condition of an automobile or other property when damage is so extensive that repair costs would exceed the value of the vehicle or property. (III) (2) The condition of a structure or an object that is not economically feasible to repair. This level in particular, which is set when cost to repair already exceeds 80 percent of the actual value. (3) The complete destruction of property beyond reasonable repair; losses that exceed policy limits. (ANSI/IICRC S500 Standard) (4) Damage to structural components or contents whose repair costs exceed their value. (RIA)

Lower explosive (flammable) limit (LEL) – The lowest concentration (lowest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, electric arc, or flame) is present.

(M)

Major disaster – Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought) or, regardless of cause, any fire, flood, or explosion in any part of the United States that, in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby. (FEMA)

Major degree of damage – In conservation management of works of art, major damage or existing conditions are noticeable, if not conspicuous in extent; stability of the work is in question, often great risk is a factor. Education Note: Assessing damage requires the immediate attention by a conservator to prevent further damage or loss.

Make-up air – (1) Air that is brought into a building from outdoors through the ventilation system, and that has not been circulated previously through the building's HVAC system. (ANSI/IICRC S500 Standard) (2) Fresh air that is brought into a containment from an uncontaminated or neutral source. (3) Air introduced to the recirculated air system for the purpose of ventilation, pressurization, and replacement of exhaust air. (See: Outdoor air supply)

Management, risk – The process of evaluating alternative responses to risks and selecting among them. Risk management includes consideration of technical, scientific, social, economic, and political information. (/IICRC S500 Standard, 2006)

Manipulation – The required handling and positioning of furniture and other personal property during completing emergency cleanup, drying, restoration and building repairs.

Manipulation, contents – The required handling and positioning of furniture and other personal property at the time of loss to manage an emergency disaster or cleanup situation during building repairs.

Manometer – An analog or digital instrument that measures the static air pressure differential between two or more adjacent areas.

Manual, SOP – Standard operating procedures manual. An SOP manual establishes written procedure to be followed in carrying out a given operation or task in each situation. Education Note: The term standard operating procedure or SOP is used in a variety of different contexts, such as construction, restoration, healthcare, education, or the military. The use of the term "Standard" implies the operating procedure is the only correct one that must be followed. When a restorer or remediation company refers to "their SOP manual," it is the only correct one which employee must follow unless site conditions (e.g., hazards, health, and safety considerations; codes and regulations) dictate otherwise.

Manual, SOP regulations – Government regulations that mandate all contractors and restorers must create and use an up to date standard operating procedures manual. The SOP teaches and instructs employees on each of their work tasks; proper use of PPE; proper use of equipment and chemicals.

Marks – Visible scratches, impressions, indentations, or traces on a surface. Education Note: Marks should be identified immediately to document pre-loss conditions. Marks made by the cause of loss are direct damage. A mark made by the restorer in mitigating and remediating damage is consequential damage. Marks made by the restorer because of improper handling may be the restorer's responsibility.

Masking – The temporary cover-up or obstruction of an odor. Masking usually occurs when chemical sprays and sealers are used to cover up odors where they can reappear later.

Master Restorer – A person who has training, experience, and certification in the field of cleaning, remediation, and restoration. Education Note: A master restorer may need to be a licensed contractor to perform certain duties.

Master Fire & Smoke Technician (MSFT) – An IICRC designation describing a person who has achieved master status in their trade and education. To be qualified to achieve MFST status the technician must have a minimum of three (3) years after original certification date plus attainment of IICRC certifications in carpet cleaning technician, upholstery & fabric technician, odor control technician, fire & smoke technician, and health & safety technician (or OSHA equivalent).

Master Restorer – A person who has training, experience, and certification in the field of cleaning, remediation, and restoration. A master restorer may need to be a licensed contractor to perform certain duties.

Master Water Restoration Technician (MWRT) – An IICRC designation describing a person who has achieved master status in their trade and education. To be qualified to achieve MFST status the technician must have a minimum of three (3) years after original IICRC certification date plus attainment of certifications in carpet cleaning technician, carpet rug and repair and reinstallation technician, water damage restoration technician, applied structural drying technician, applied microbial remediation technician, and health & safety technician (or OSHA equivalent).

Material Safety Data Sheet (MSDS) – [Now safety data sheets (SDS).] SDS document the chemical manufacturers supply chemical products where they describe the chemical's general properties, its hazards, first aid and medical treatment for exposures, and how to safely use, handle and store it.

Maximum credible fire loss – The property damage that would be expected from a fire, assuming that: (1) all installed fire protection systems function as designed; and (2) the effect of emergency response is omitted except for post fire actions such as salvage work, shutting down water systems, and restoring operations. (3) The value of property, excluding land, within a fire area, unless a fire hazards analysis demonstrates a lesser (or greater) loss potential. This assumes the failure of both automatic fire suppression systems and manual firefighting efforts.

MCS – Multiple chemical sensitivity.

Media – (1) Specially prepared agar made by a laboratory that grows live (culturable) microorganisms. (2) An agar that sustains growth. (3) Soil, water, air, plants, animals, or any other part of the environment that can contain contaminants.

Media blasting – (1) A system using a media to remove surface contaminants by forced air. (2) In restoration, the use of a media such as shells, beads, dry ice, baking soda, sand, foam pellets. They are propelled by a compressor onto a surface to remove soil, stains, accretions, mold, char, and smoke.

Media blasting (sand) – An abrasive blasting operation using sand as the media. There are different types of sand in various grades. Some grades will remove surface paint while others are more aggressive that can remove multiple layers. The sand blasting process is controlled in most states and proveniences. Some states and cities require special licensing to complete outdoor sand blasting. OSHA and NIOSH require special types of respirators including inline air.

Media blasting system – A system of machinery that uses a media to remove surface contaminants through forced air pressure. Generally, the "system" includes a compressor and generator to run the equipment, a supply of material, hopper, hose, and sprayer with a proper nozzle.

Media fogging – Solvents (water and petroleum-based) compounds formulated for dispersal through a fogging machine.

Media hardness, blasting – The Moh's hardness scale for some abrasive media. For example: walnut shell "2.5-4.5;" clear-cut "2.0-2.5;" polyester type-1 "3;" urea type-II "5;" melamine type III "4;" glass bead "5-6.5;" silica sand (quartz) "8;" garnet "10;" zirconia "11;" aluminum oxide "12;" and silicon

carbide "13."

Media selection, blasting – The ideal selection of blasting media for a project. The media required to accomplish blast cleaning is far ranging. Abrasives are granular or powdered materials that will clean, cut, abrade, gouge, or otherwise change the condition or appearance of the targeted surface. These abrasives may be a natural substance or one manufactured for blasting. A short list of choices includes CO_2 snow and pellets, ice, baking soda, corncobs, walnut shells, plastics, glass, aluminum oxide, sand (silica), silicon carbide, steel grit, wire cuttings, and metal shot. The abrasive selected will greatly impact the speed and quality of the blast cleaning. Factors that influence media selection include but are not limited to: 1) tenacity of soil or finish to be removed from the surface; 2) recycling requirements; 3) environmental and worker compatibility; 4) safety; 5) media cost; 6) media disposability; 7) substrate sensitivity and type; and 8) level of desired cleanliness and finish. Note: CO_2, soda, foam, and sponge blasting are not included in the following referral website on bead blasting media.

Medium bead blasting – A light, low-dust abrasive using glass beads. Glass beads are manufactured from lead-free, soda lime-type glass, containing no free silica. Education Note: Glass bead blasting produces a clean, bright, satin finish, without dimensional change of the parts. Glass beads are primarily used in blasting cabinets for honing, polishing, peening, blending, finishing, removing light burrs and cleaning light foreign matter. Is also widely used for glass etching projects where a smooth finish is desired. For delicate thin-walled parts and thin welds, peening with glass bead abrasive material provides the right balance of stress relief without over-stressing and causing damage. Glass bead can be reclaimed and is most likely to be used in a blast cabinet. Best uses include paint & coating removal, surface preparation, removes carbon, rust, and corrosion from aluminum and steel and glass etching.

Medium cleaning process – A middle position in the cleaning process by which the cleaning of surfaces is neither light nor heavy.

Medium contamination – The categorization of an average amount of smoke and soot deposits as compared to light and heavy smoke and soot deposits.

Medium damage – Moderate damage.

Megasonic cleaning – A cleaning technique utilizing sound waves at frequencies higher than those for ultrasonic cleaning systems, from 500 kHz to 2 MHz.

Mg/mg – Milligram.

mg/kg – Milligrams per kilogram. A metric weight ratio used to express toxicological doses.

mg/m^3 – Milligrams per cubic meter. A metric weight/volume ratio used to express concentrations of dusts, gases, fumes, or mists in air.

Microbe / Microorganism – An extremely small life form that usually is visible only with the aid of a microscope (e.g., animals, protozoa, algae, bacteria, fungi).

Microbial volatile organic compound (mVOC) – Musty, moldy, or mildew-like odors produced by metabolically active bacteria and fungi. Education Note: MVOCs are primarily a number of alcohols and include such compounds as geosmin and 1-octen-3-ol. Although health effects have not been attributed to mVOC exposures, their presence is an indicator of microbial pollution and the need for proper remediation practices and the use of PPE.

Microbiological sampling – A method of analyzing small biocontaminants in air, water or on surfaces. Education Note: Complications arise in microbiological sampling based on the season of the year, variable humidity, variable environmental activities (indoor and out) and the need to use specific culture media to test for specific types of biocontaminants.

Micro-blasting (Pencil blasting) – Micro-abrasive blasting is dry abrasive blasting process that uses small nozzles (typically 0.25 mm to 1.5 mm diameter) to deliver a fine stream of abrasive accurately to a small part or a small area on a larger part. Education Note: Generally, the area to be blasted is from about a millimeter to only a few centimeters at most. When used as a type of pencil blasting, the fine jet of abrasive is accurate enough to write directly on glass and delicate enough to cut a pattern in an eggshell. The abrasive media particle sizes will range from 10 micrometers up to about 150 micrometers. Higher pressures are often required. The most common micro-abrasive blasting systems are commercial bench-mounted units consisting of a power supply and mixer, exhaust hood, nozzle, and gas supply. The nozzle can be hand-held, or fixture mounted for automatic operation. Either the nozzle or part can be moved in automatic operation.

Microburst – (1) A strong localized downdraft less than 4 km wide that occurs beneath severe thunderstorms. A strong downdraft greater than 4 km across is called a downburst. (2) A localized column of sinking air, producing damaging divergent and straight-line winds at the surface that are similar to but are distinguishable from tornadoes. Education Note: There are two types of microbursts: wet microbursts and dry microbursts. Both types go through three stages in their life cycle: the downburst, outburst, and cushion stages. The scale and suddenness of a microburst causes them to become a great danger to aircraft due to the low-level wind shear caused by its gust front that resulted in several fatal plane crashes. A microburst often has high winds that can knock over fully grown trees and can rip off a roof. They usually last a couple of seconds to several minutes.

Microclimate – (1) The climate structure of the air space near the surface of the earth. (2) An atmospheric condition that affects a small group of people or organisms; especially when they differ from the climate of the rest of the community. (3) A climate within a building that is different from other parts of the building such as a surgery room, burn patient room or a cleanroom.

Microenvironment – A specific part of an environment. Sometimes used to describe the indoor environment, a subset of the global environment. (IICRC S500 Standard, 2006) (2) The environment around us. (3) The larger-scale conditions and long-term influences that affect humans, buildings and

materials, and the adaptation of humans and organisms to their surroundings.

Microgram (*u*g) – One millionth of a gram: e.g., *u*g/m^3 = micrograms of dust per cubic meter of air.

Micron (*u*) – One millionth of a meter (1/1,000,000). Education Note: 1) A metric unit of measure that is equal to one millionth of a meter and is used commonly to describe particle measurement. 2) A micron is approximately 1/25,400 of an inch; or actually, 0.000039 of an inch. 3) The unit of measure for wavelength. 4) The period at the end of this sentence is somewhere between 397 to 615 microns. For more information go to: http://www.engineeringtoolbox.com/particle-sizes-d_934.html

Migration – (1) The gradual movement of moisture, usually on a horizontal plane, as it is absorbed by materials outward from its source or point of origin. (2) The movement or leveling out of dye molecules on fiber stock, yarn or greige goods during dyeing.

Mil/mil – A measure of thickness usually describing containment plastic sheeting, vinyl wear layers, plastic film, trash bags, or liners. One mil equals one one-thousandth (1/1,000) of an inch.

Milligram – A metric unit of measurement. There are 1,000 milligrams in one gram (g) of a substance.

Mineral ash (building fire; wildfire) – The residue of mineral matter left after complete combustion of wood (wood ash) or other organic material; consists largely of oxides, carbonates, and phosphates of Ca, K and Mg, together with other compounds.

Mini-containment (also called an Enclosure) – Small confined areas that may be used where glove bag enclosures are not feasible. The use of "mini enclosures" must be approved by a remediation project manager. (ANSI/IICRC S500 Standard) Education Note: Mini containments are usually constructed using 6-mil thick polyethylene sheeting that is attached or glued to walls or floors, and they must be small enough for only one worker who can enter the enclosure at one time, complete the remediation work and pass out the containerized debris. The worker must have available a change room contiguous to the work area where he/she can clean coveralls [all personal clothing] before leaving the area. (IICRC S500 Standard, 2006)

Mists – Suspended liquid droplets generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, or atomizing. Mist is formed when a finely divided liquid is suspended in air.

Misting – The processes of misting (wet fogging) droplets of moisture in air to capture (absorb, knockdown) airborne particles, odors, and vapors.

Mitigate – (1) The means by which it takes to lessen or reduce damage that had significant impact on a structure, content, or environment. (2) to reduce or minimize further damage to structure, contents, and systems in the built environment by controlling the spread of contamination and moisture. (IICRC S500 Standard, 2015)

Mitigation – The process of mitigating; to lessen or reduce in force or intensity. 1) In restoration, reasonable and prudent steps to contain and control damage and to limit the loss from experiencing further damage. 2) Actions designed to stabilize and/or protect and secure structural components, contents, or the environment. (RIA) Education Note: Mitigation also refers to remediation and restoration work due to catastrophic flooding, water damage, sewage backflows, mold remediation, smoke and fire, with the aim of reducing occupant and worker exposure risks, while protecting, securing and preserving the property.

Mitigation (environmental) – (1) Measures taken to reduce adverse effects on the environment. (USEPA) (2) The creation or restoration of a wetland to replace an existing wetland damage. (3) Reasonable and prudent steps taken under the terms of an insurance policy to limit loss (preserve, protect and secure property from further damage).

Mitigation, ozone gas – The process of using gas-phase ozone to lessen/remove odors in buildings and contents through oxidation.

Mitigation theory, ozone gas – The theory that gas-phase ozone can remove odors that are biologically and chemically bonded to or are sitting on the surface of materials. Education Note: Ozone (O_3), an unstable form of oxygen, acts by oxidizing anything that it meets. In laymen's terms, ozone acts as a bleach (oxidizer) that has been proven to reduce the load of bacteria, mold and viruses. It has also been proven to reduce/remove smoke odors caused by fires.

Mobile home insurance – Insurance coverage issued to mobile homes, which are classified as portable units that are built to be towed on their own chassis with frame and wheels, but are permanently affixed to the real estate, and are designed for year-round living.

Mobilization costs – The hard costs a contractor must spend before they begin work. Education Note: In large-loss fires and wildfire damage situations, mobilization costs often include setting up a command post (motorhome) at the jobsite so that the building owner, tenants, adjusters, police, fire marshal, project supervisors and technicians have a safe place to meet, rest, eat and receive first aid. Mobilization costs also include bringing in generators and gas to run generators because building or community power is out, dumpsters for debris removal for burnt trees and brush and the building's charred wood, moving trucks to move contents out of the building.

Moderate damage – The amount of carbon combustion and smoke residue along with some physical material damage (charring or heat damage) to building materials and/or finishes. Education Note: Moderate damage includes soot and smoke film on vertical walls, horizontal ceilings and floors that must be cleaned and deodorized.

Moderate damage to contents – The amount of carbon combustion and smoke residue along with some physical material damage (charring or heat damage) on contents or their finish. Moderate damage includes soot and smoke film on more than one side of the content that must be individually inspected, cleaned, and deodorized.

Moderate degree of damage – In conservation management of works-of-art, moderate damage is noticeable, and it may be in the middle or increasing severity or size; not serious but should be monitored or corrected by a conservator.

Moderate smoke and soot damage – Damage to a surface area or material that is damage somewhere between light and heavy. Education Note: Moderate damage in a wildfire may be described as soot contamination in an attic causing insulation to be removed and replaced; removal of soot by HEPA vacuuming followed by cleaning of contents and flooring; cleaning of ventilation systems because of the presence of soot; cleaning of contents, walls, floors and draperies because the windows were open at the time of loss.

Moist adiabatic lapse rate (wildfire) – The rate of decrease of temperature with increasing height of an air parcel lifted at saturation via adiabatic process through an atmosphere in hydrostatic equilibrium. Rate varies according to the amount of water vapor in the parcel and is usually between 2.0- and 5.0°F per 1000 feet (3.6 and 9.2°C per 1000 meters).

Moisture content (MC) – The percentage or weight of moisture in materials, as compared to the weight of that material when completely dry (oven dried); e.g., structural wood with a moisture content of 10% indicates that 100 pounds of that wood contains 10 pounds of water.

Moisture detector – An instrument that has two stainless steel probes designed to penetrate the primary and secondary backing of carpet. Education Note: When moisture is encountered in the carpet, cushion or subfloor materials, a circuit is completed between the two probes and a light and/or buzzer will sound to indicate the presence of that water.

Moisture meter – An electronic moisture sensing device used to measure the internal moisture percentage of various construction materials, such as wood, gypsum board, masonry, etc. Education Note: There are two general categories of moisture meters: *penetrating and non-penetrating.* Penetrating meters use sharp pins or probes that are inserted into materials to measure the moisture percentage contained therein. Non-penetrating meters transmit electrical impulses into the material and measures resistance to electronically determine moisture content. Different settings on non-penetrating meters enable technicians to detect moisture in materials of various densities; i.e., wood, drywall, masonry; however, absorption or direct contact with the moisture and the material being tested is required for accurate readings from non-penetrating moisture meters.

Mold – A superficial or "wooly" growth of long chains of fungi cells formed on damp organic materials. Education Note: Toxigenic molds may produce a potentially harmful substance called a *mycotoxin*, which creates a variety of allergic responses or sickness (hypersensitivity diseases) in humans.

Molecule – The smallest unit into which matter may be subdivided and still maintain the original characteristics of that substance.

Morphology – The form, shape, or structure of a surface, object, or organism.

Morphology, soot – (1) The analysis of the size, shape, weight, and fractional dimension of soot as a particulate or agglomeration. (2) The analysis of the soot's dynamic shape, fractal aggregates, total mass and black carbon content. (3) The analysis of the mass-mobility relationship of weight and mass of soot to remain suspended in air.

Mop-up (building fire) – (1) To make a fire safe or reduce residual smoke after the fire has been controlled by extinguishing or removing burning material. (2) In a wildfire, it can include removing litter along or near the control line, felling snags, or moving logs so they will not roll downhill.

Mop-up (wildfire) – (1) In a wildfire, it can include removing litter along or near the control line, felling snags, or moving logs so they will not roll downhill. (2) Extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area has burned, to make a fire safe, or to reduce residual smoke.

Movement of negative air pressure – Air pressure in a building or space that moves from high to low. In a heated building, air pressures are high, pushing out to ceilings, walls and floors that have cooler lower air pressure spaces. In a building fire cooler air and surfaces become attracted to smoke and soot.

Movement, thermal – The measured amount of dimensional change that a material exhibits as it is warmed or cooled.

MSDS – Material Safety Data Sheet. (See: Safety Data Sheet)

MSFT – Master Fire & Smoke Technician.

MSR – Master Fire and Smoke Restorer. A master's certification given to students who have successfully passed their IICRC prerequisite courses.

Multiple chemical sensitivity (MCS) – (1) A condition in which a person reports sensitivity or intolerance (as distinct from "allergic") to several chemicals and other irritants at very low concentrations. (EPA) (2) A considerable body of anecdotal data suggests the possibility that a small segment of the population has become sensitized to chemicals in the environment. (ANSI/IICRC S500 Standard) Persons who experience MCS appear to suffer repeated acute reactions upon exposure. There are different views among medical professionals about the existence, causes, diagnosis, and treatment of this condition. Education Note: NIH says: "MCS is an intolerance condition attributed to extreme sensitivity to various environmental chemicals, found in air, food, water, building materials, or fabrics." Education Note: NIH also says, "This syndrome is characterized by the patient's belief that his or her symptoms are caused by very low-level exposure to environmental chemicals." The term "chemical" is used to refer broadly to many natural and man-made chemical agents, some of which have several chemical constituents. Several theories have been advanced to explain the cause of multiple chemical sensitivity, including allergy, toxic effects and neurobiologic sensitization. There is insufficient scientific evidence to confirm a relationship between any of these possible causes and symptoms.

Multiple component firestop system – The exact group of firestop materials identified within a listed systems design to create the building's firestop system.

Multi-gas detector – An electronic/electromechanical instrument capable of measuring combustible, toxic gasses and vapors, and oxygen deficient/oxygen enriched atmospheres all at the same time. Education Note: Multi-gas monitors are used during hazard assessments, while working in hazardous conditions, and when clearing work areas of hazardous atmospheres.

MWR; MWRT – Master Water Restoration Technician. A master's certification given to students who have successfully passed their IICRC prerequisite courses. For more information go to: http://iicrc.org/education-certification/certification-tracks/ (See: Master Water Restoration Technician)

Muriatic acid – Commonly used as a brick cleaner after masonry work is completed.

MVOC/mVOC – Microbial volatile organic compound.

MWR – Master Water Restorer. Education Note: A master's certification given to students who have successfully passed their IICRC prerequisite courses.

(N)

NADCA ACR Standard, 2013 edition: Assessment, Cleaning & Restoration of HVAC Systems – An updated industry ventilation system cleaning standard developed by the National Air Duct Cleaners Association, which supersedes the 2006 edition.

Nail pop (Nail-head pop) – The protrusion of the nail usually attributed to: 1) Shrinkage caused by improperly cured wood framing; 2) Shrinkage of surrounding materials caused by water damage; (3) Shrinkage of materials from thermal expansion caused by heat (e.g., fire, expansion of high temperature vapor pressure).

NAM – Negative air machine. A machine used to establish a pressure differential in an indoor space. (See: Negative air machine)

Named insured (insurance) – The individual or parties insured, signified by the inclusion of their names on the policy.

Named peril (insurance) – (1) A peril that is specifically mentioned as being covered in an insurance policy. (2) The perils listed and described in a policy. Education Note: In a named perils policy, only losses caused by those listed perils are covered.

Named perils – Coverage in a property policy that provides protection against loss from only the perils specifically listed in the policy (rather than protection from physical loss). Examples of named perils are fire, windstorm, theft, fire, smoke, etc.

National Fire Protection Association (NFPA) Hazard Classification – The National Fire Protection Association produces many standards, including the four-color diamond used on labels to indicate hazard. The numerical designation of a substance's relative accident potential based on probable outcomes should an accident occur. The system is used at fixed sites. Health, fire, and reactivity hazards are rated from 0 (none) to 4 (extreme). The Health rating is in the blue section, Fire in red, and Reactivity in yellow. The white section is reserved for other Specific Hazards (for example, radiation: do not use water, or fire).

National Institute for Occupational Safety and Health (NIOSH) – An agency of the Public Health Service, U.S. Department of Health and Human Services (DHHS). Education Note: NIOSH is a Federal agency that recommends occupational exposure limits for various substances and assists OSHA and MSHA in occupational safety and health investigations and research.

National Institute of Restoration (NIR) – An institute dedicated to the repair, cleaning and restoration of property damaged by fire, wind, water, and other disasters.

Natural conditions – Atmospheric conditions that is acceptable to the majority of persons.

Natural conditions – Atmospheric conditions that is acceptable to the majority of persons.

Natural ventilation – Air movement through a structure caused by wind, temperature difference (convection currents), or other non-mechanical factors.

Negative air pressure – Air pressure in a building or space that moves from high to low. In a heated building air pressures are high, pushing out to ceilings, walls and floors that have cooler lower air pressure spaces that also attract smoke and soot.

Negative air machine (NAM) – (1) A machine that produces negative air pressure between one space and another. (2) An electromechanical device used to create a negative air pressure in an enclosure. (3) A fan or blower system that creates a condition of negative air pressure by exhausting air outside the containment while drawing fresh makeup air from other parts of the building; often coupled with HEPA or carbon filters to capture particulates, vapors and odors. Education Note: NAM's are used for remediation and restoration work to control contaminants and to prevent the spread of contaminants to other areas in a structure. This includes asbestos and lead-based paint abatement and microbial remediation.

Negative pressure – A condition that exists in a building when less air is supplied to a space than is exhausted from that space, so that the air pressure within that space is less than that in surrounding areas.

Negative air pressure – Air pressure in a building or space that moves from high to low. In a heated building air pressures are high, pushing out to ceilings, walls and floors that have cooler lower air pressure spaces that also attract smoke and soot.

Negative pressure drying – A method of drying wet buildings through withdrawing moisture out from walls, floors, crawlspaces, cavities, and other areas.

Negative air pressure equipment – A local exhaust system, capable of maintaining air pressure within a containment at a lower pressure than the air pressure outside of such containment, and which provides for HEPA filtration of all air exhausted from the containment.

Negative air pressure, movement of – Air pressure in a building or space that moves from high to low. In a heated building, air pressures are high, pushing out to ceilings, walls and floors that have cooler lower air pressure spaces that also attract smoke and soot.

Negative pressure respirator, tight-fitting – A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside them respirator. (OSHA)

Negligence (insurance; legal) – (1) Failure to act in a manner that is reasonably prudent; failure to exercise the appropriate degree of care under given circumstances. (2) Failure to use the care that a reasonable and prudent person would have used under the same or similar circumstances. (3) Failure to exercise the degree of care which a reasonable person would have exercised under the same circumstances, whether by acting or by failing to act. Education Note: The essential elements of a negligence action are: 1) a duty of reasonable care owed by the defendant to the plaintiff; 2) a breach of that duty; 3) the causation, both actually and proximately of injury; 4) the suffering of damages by the plaintiff. (Williams v. Melby, 699 P.2d 723, 726 (Utah 1985))

Negligible degree of damage (conservation) **–** Involving conservation management of works-of-art, negligible damage is generally insignificant that may not need immediate attention but needs to be monitored.

Neutral cleaner – A cleaner that has a pH that is compatible with the finish to be cleaned. Generally, this means the cleaner has a pH of between 7 and 9. Higher pH cleaners are not defined as neutral cleaners because they may be able to attack a finish and dull it.

Newton's Law of Cooling – Isaac Newton, concerned with the rate at which hot bodies cool down to the same temperature as the environment, developed his law of cooling. Newton's law of cooling is an empirical law based upon experiment, states that the rate of change of temperature of a cooling body is proportional to the difference between its temperature and the temperature of the environment. The equation gives Newton's law of cooling and it provides the rate at which a body's temperature decreases with time. For more information go to: https://mathbitsnotebook.com/Algebra2/Exponential/EXCooling.html

Neutralization (fire; wildfire) – The neutralization is the removal of smoke odors.

Neutralize – (1) To render chemically harmless; to return the pH to the neutral level of 7. (2) To eliminate potential hazards by inactivating strong acids, caustics, and oxidizers. For example, acid spills can be neutralized by adding an appropriate amount of caustic substance to the spill. A neutralizer is a chemical used to bring the pH of a textile or surface to approximately 7.

NIH – The US National Institute of Health. The NIH provides research and education in environmental health impacting workers and consults with CDC and OSHA. NIH is also a source reference in this glossary.

NIOSH – The National Institute for Occupational Safety and Health. NIOSH is part of CDC through the Department of Health and Human Services. NIOSH is responsible for conducting research and making recommendations for the prevention of work-related illness and injuries. For more information go to: http://www.cdc.gov/niosh

Nitrogen dioxide (NO_2) – The result of nitric oxide combining with oxygen in the atmosphere. A major component of photochemical smog.

Nitrogen oxide (NO) – Product of combustion from transportation and stationary sources and a major contributor to acid deposition and the formation of ground level ozone in the troposphere.

NFPA – National Fire Protection Association. NFPA is an international technical society that disseminates fire prevention, fighting and protection information. NFPA technical standards include the National Electrical Code which is widely adopted throughout the restoration and construction industry. Education Note: NFPA promotes and improves fire protection standards and prevention, and they established safeguards against loss of life and property by fire. Best known on the industrial scene for the National Fire Codes, 13 volumes of codes, standards, recommended practices, and manuals developed (and regularly updated) by NFPA technical committees. Among these are NFPA 704, the code for showing hazards of materials as they might be encountered under fire or related emergency conditions, using the familiar diamond shaped label or placard with appropriate numbers or symbols, and NFPA 471 and 472 that cover practices for hazardous materials incidents, and procedures for responding to hazardous materials incidents.

NFPA Class A Fire Rating – The "Surface Burning Characteristics of Building Materials" qualifies products to receive a "Class A Fire Rating" under the National Fire Protection Association's NFPA 101 Life Safety Code, which is sometimes referred to as the Steiner tunnel test. This test is applicable to exposed surfaces such as walls and ceilings. The method, which is similar to NFPA No.255 and UL No.723, is an American National (ANSI) Standard and has been approved for use by agencies of the Department of Defense for listing in the DOD Index of Specifications and Standards. This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire-hazard or fire-risk assessment of materials, products, or assemblies under actual fire conditions.

Nitrile gloves – A hypoallergenic material used as a replacement for latex in gloves.

Nomex® – A trade name for a fire-resistant synthetic material used in the manufacturing of flight suits and pants and shirts used by firefighters (See: Aramid).

Non-bearing wall (construction; framing) – A wall supporting no load other than its own weight.

Non-combustible – (1) Materials made of cement, steel and fire-retardant substances that will not ignite when subject to fire. (2) Materials that meet statutory requirements for ignition and flame spread.

Non-combustible material – A material that, in the form in which it is used and under the condition anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

Non-flammable – (1) Materials not readily capable of burning with a flame. (2) Not liable to ignite and burn when exposed to flame. (2) Items not easily ignited, or if ignited, not able to burn rapidly. (3) A material that will release very little heat when exposed to fire or flame. Education Note: As it relates to building insulation, glass fibers in fiberglass insulation and the rock and slag wood in mineral wool insulation have a natural fire resistance and are considered non-combustible when tested in accordance with ASTM E136.

Non-friable ACM – Any material that contains more than one percent asbestos but cannot be pulverized under hand pressure.

Non-permit confined space – A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. (See: Permit-required confined space)

Non-point-source pollution – Runoff contamination from an overall site or land use and not discharged from a single pipe, such as sediment from construction sites, oils from parking lots, or fertilizers and pesticides washed from farm fields.

Non-porous / nonporous – (1) A material that does not absorb, nor is it easily penetrated by liquids, especially water. Generally, non-porous materials have a permeance factor of less than one. (IICRC S500 Standard, 2006; IICRC S540 Standard) (2) Materials that have poor absorption and evaporation rates are call non-porous. These materials have a permeance factor of <1.

Non-porous materials cleaning – The surface cleaning and removal of contaminants from non-porous materials and finishes such as glass, most plastics, dishware, ceramics, finished wood, vinyl flooring, and sealed marble, granite, and terrazzo.

Non-porous substrate – A substrate that is not permeable by air, water, etc.

Non-porous ventilation system – Any surface of the HVAC system in contact with the air stream that cannot be penetrated by water or air, such as sheet metal, aluminum foil, or polymeric film used to line flexible duct.

Non-volatile dry solvent (NVDS) – A spotting compound that may contain aromatic and chlorinated solvents, alcohols, amyl acetate, and fatty acids (oleic), and used in removing heavy oils and greases, paints, lacquers, varnish, and synthetic resins.

Non-volatile residues (NVR) – Residues that do not vaporize easily.

Normal cleaning – The process of thorough cleaning using one or more of the cleaning methods described in the S300 Standard. It must be performed periodically, approximately every 12 to 24 months, depending on the furniture's location, use and exposure to soiling. Normal cleaning should be accomplished before soiling causes permanent damage to fibers, dyes or fabric texture. (IICRC S300 Standard)

NO_x – Nitrogen oxides. The generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts [such as nitric oxide (NO) and nitrogen dioxide (NO_2)]. Education Note: Many of the nitrogen oxides are colorless and odorless. However, one common pollutant, nitrogen dioxide (NO_2) along with particles in the air can often be found as a reddish-brown layer over many urban areas. Nitrogen oxides form when fuel is burned in a wildfire. However, the daily primary sources of NO_x are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels (USEPA). The term nitrogen oxides and oxides of nitrogen may be used interchangeably.

Nucleation – In the context of air pollution caused by wildfires, nucleation is the first step of the process by which gases are converted to small liquid droplets (ultrafine particles). This occurs either when certain gases condensate or when different gases react with each other. The ultrafine particles formed are called "nuclei" and can grow in size when more gases condensate on them or when several droplets merge.

Nuisance dust (medical) – Dust that has a long history of little adverse effect on the lungs and do not produce significant organic disease or toxic effect when exposures are kept under reasonable control.

Nuisance soot and ash (medical) – Soot and ash that has no known adverse effect on the lungs and does not produce significant organic disease or toxic effect when exposures are kept under reasonable control.

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(O)

O_3 – Ozone.

Occupant interview – (1) The questioning of occupants about the cause and origin of a fire or wildfire. (Guide to Wildfire Origin and Cause Determination) https://www.nwcg.gov/sites/default/files/publications/pms412.pdf (2) A formal or informal interview with occupants, learning the history of the building, contents and environment before a wildfire, and conditions that exist afterwards, including the building, contents and environment, along with documenting potential occupant health concerns.

Occupational accident – An accident arising out of and in the course of employment and covered by workers' compensation laws.

Occupational disease – Abnormal condition or illness caused by factors associated with the workplace. Like occupational injuries, this is covered by workers' compensation policies.

Occupational health hazard – Any type of job-related noise, dust, gas, toxic chemical, substance, or dangerous working condition which could cause an accident, injury, disease, or death to workers.

Occupational environmental – Surrounding conditions at a workplace.

Occupational exposure – Experience of substances, pollutants, gases, vapors, fumes, light, noise, poor air quality, intensities of radiation etc. or other conditions while at work.

Occupational hazards (insurance) – Occupations which expose the insured to greater than normal physical danger by the very nature of the work in which the insured is engaged and the varying periods of absence from the occupation due to the disability that can be expected.

Occupational hygiene – Identification, assessment, and control of physicochemical and biological factors in the workplace that may affect the health or well-being of those at work and in the surrounding community.

Occupational medicine – Specialty devoted to the prevention and management of occupational injury, illness and disability, and the promotion of the health of workers, their families, and their communities.

Occupation Safety and Health Administration (OSHA) – A division of the U.S. Department of Labor. A federal regulatory agency with safety and health regulatory and enforcement authority for most U.S. industries involving employee safety and health.

Occupiable spaces – Any enclosed space inside the pressure boundary and intended for human activities, including but not limited to, all habitable spaces, toilets, closets, halls, storage and utility areas, and laundry areas. (IICRC S500 Standard, 2006)

Occurrence (insurance) – (1) An accident including continuous or repeated exposure to substantially the same general harmful conditions that results in bodily injury or property damage during the period of an insurance policy. (2) Insurance that protects the insured for claims stemming from alleged incidents that take place during the policy period, even if the policy has expired or been canceled. Education Note: Occurrence coverage is the most comprehensive kind of malpractice insurance.

Occurrence-based insurance policy – (1) Insurance that pays claims arising out of incidents that occur during the policy term, even if they are filed many years later. (2) A liability insurance policy that covers claims arising out of occurrences that take place during the policy period regardless of when the claim is filed.

Occurrence, natural – The presence of a substance in nature, as distinct from presence resulting from inputs from human activities. Education Note: The contamination of the natural environment by some man-made compounds may be so widespread that it is practically impossible to get access to biota with a truly natural level; only 'normal' levels can be measured, those which are usually prevalent in places where there is no obvious local contamination.

OCT – Certified Odor Control Technician. An IICRC approved course that teaches students the physics and mechanics of odors and smell. The OCT course covers olfaction and odor, odor sources, detection process, theory of odor control, equipment, chemical options, and applications. The student learns how to address odors caused from biological sources such as decomposition, urine contamination, and mold, combustion sources such as fire and smoke damage, and chemical sources such as fuel oil spills or volatile organic chemicals. The OCT is a 1-day course; 7 hours, not including exam time, lunch and breaks.

Odor – A description of the smell of a substance: 1) The sensations and mental images perceived by means of the olfactory organ in contact with particular gas phase substance; 2) A scent or a substance that affects the sense of smell. 3) That property of a substance that affects the sense of smell, or any smell, scent, or perfume. Education Note: Odors can be pleasant or can be disagreeable as in the case of sewage or smoke. Deodorizers are used to mask odors after restoration work.

Odor adaptation – The process by which one becomes accustomed to an odor. The adaptation time needed is greater when more than one odor is present. When adaptation occurs, the detection threshold increases. Education Note: The detection threshold limits change faster when an odor of high, rather than low, intensity is presented. Besides, adaptation occurs differently for each odor. Odor fatigue occurs when total adaptation to an odor has occurred through pro longed exposure. This situation would apply to dairy milkers or dairy managers who are exposed to the smell of dairy manure daily and appear virtually unaware of the odor. While ammonia and hydrogen sulfide are odorants, and not odors per se, they are produced through processes often associated with odor, including municipal

sewage treatment systems, coal burning, industries and factories, and livestock operations. Both ammonia and hydrogen sulfide can cause olfactory losses because of chronic or prolonged exposure. Ammonia also can affect the central nervous system. A number of other chemical pollutants, including some insecticides result in losses in olfaction by damaging olfactory receptors. The use of medications may exacerbate chemosensory disorders. On average, olfactory receptors renew themselves every thirty days. Pollutants may alter this turnover rate or disrupt the integrity of the lipid membranes of olfactory receptors. Threshold levels have been identified for several pollutants, above which odor or irritation occur. Unfortunately, however, knowledge of the exact mechanisms by which pollutants alter olfaction is limited.

Odor contamination, secondary smoke – In smoke odor assessment and recognition, secondary smoke odor contamination includes underlying contamination by chemical residues and oxidation; cross-contamination by vapors and gases transferred from an affected air stream to non-affected air stream, such as the building's ventilation system.

Odor contamination, smoke – (1) The unintended presence or introduction of smoke, soot, ash and chemical byproducts into a building, material, or content. (2) The soiling of materials by organic and inorganic substances after combustion. (3) The presence of particles, chemicals and gases and other undesirable substances after a fire.

Odor counteractant – Any substance which mitigates odors.

Odor counteractant, smoke – A chemical capable of adsorbing, paring, digesting, diffusing, oxidizing or neutralizing smoke odors.

Odor control (remediation) – The process of identifying the source of the odor and providing methods for containing and neutralizing odors.

"*Odor Neutralization: Assessment and Control*" – A technical article on the science of odors and how humans perceive various odors written by Patrick Moffett. For a copy of the article go to: https://www.scrt.org/scrt-free-reports/146-odor-neutralization-assessment-and-control/file

Odor pockets – Cavities, cracks, air spaces and voids in or behind building materials, finishes and contents that allows fire odor to remain.

Odor, smoke – The perceived presence of odors by olfactory nerves that detect quantities of aerosolized combusted substances and gases.

Odor threshold (Odor threshold; Odor detection threshold) – (1) The lowest concentration of a substance in air that can be smelled. Odor thresholds are highly variable because of the differing ability of individuals to detect odors. (2) In principle, the lowest concentration an odorant in the air that can be detected by a human being. Education Note: In practice, a panel of "sniffers" is often used, and the threshold taken as the concentration at which 50% of the panel can detect the odorant (although some workers have also used 100% thresholds). The odor concentration at the detection

threshold may be defined as one odor unit.

Odorant – A substance capable of eliciting an olfactory response whereas odor is the sensation resulting from stimulation of the olfactory organs. Education Note: Odors play an important part in our everyday life, from appetite stimulation to serving as warning signals for disease detection. A number of diseases have characteristic odors including gangrene, diabetes, leukemia, and schizophrenia. While many odors provide us with a pleasant smell such as fresh outdoor air and the cooking of food, which is a good thing, odors can stimulate past memories which have been implicated in depression and nausea. Detectable odors can have a significant impact on people by affect ing moods as well as having physiological impacts on the olfactory system. People associate odors with past experiences and, from those experiences, involuntarily assess the odor as likable, dislikable, or indifferent. Effects on individuals, however, vary from one person to another.

Odorcide – The name of a range of products that removes odors such as fire smoke, cigarettes and dumpsters.

Offgas/outgas – A process of evaporation or chemical decomposition through which vapors are released from materials.

OHS – (1) Occupational Health and Safety. A federal regulatory agency in Australia. (2) An abbreviation for occupational health and safety.

Oily fire – A furnace oil fire or a fire having a lot of combusted plastics, urethanes, resins, and polymers including carpets, finished hardwood floors, vinyl flooring, vinyl wallpaper, oil-based paint.

Oily smoke film – A film on a surface consisting of an oily carbon-based residue. Besides having a yellow, brown, or black carbon film color, oily films can vary somewhat based on its physical properties including viscosity and thickness. Education Note: Traction and friction are the other physical measurements for determining oily film. In environmental science, scraping oily film can be collected and sent to a lab for GC/MS analysis to identify VOCs and PAHs.

Oily (sticky) soot – Oily soot that is a result of incomplete combustion involving a plastics or petroleum-based fire, a low heat smoldering fire, a puff back.

Oily-type – (1) A category of paint remover which is viscous and does not evaporate readily, requiring flushing with more volatile solvents. (RIA) (2) A description of a type of chemical residue coming from a grease fire, or a puff-back from an oil-fired heating system.

Olf – A unit used to measure scent emission of people and objects. Education Note #1: One olf is defined as the scent emission of an "average person." For example, a sitting adult that takes an average of 0.7 baths per day and whose skin has a total area of 1.8 m^2; the scent emission of an object or person is measured by specially trained personnel comparing it to normed scents. Education Note #2: The olf should not be confused with the unit of scent immission (as opposed to emission), the decipol which also considers the ventilation system's air volume flow.

Olfactory – Relating to the sense of smell. The olfactory nerve endings (epithelium), located in the nasal cavity, sense and transmit the sensation of smell to the olfactory lobe, located at the base of the frontal lobe of the brain. Education Note: The olfactory lobe interprets the sensation of odor and transmits that information to the brain.

On grade – On the level of the surrounding ground or in contact with fill material that is in direct contact with the ground, such as "on-grade construction."

On-location – The process of cleaning and deodorizing contents at the space they were found.

Opaque particle (microscopy) – Any particle that does not transmit light. Examples of opaque particles include most minerals, char, soot, rust, paint, toner, plastic, ceramic, and partially degraded vegetative matter.

Open burning – A fire, the air contaminants from which are emitted directly into the outdoor atmosphere and not directed through a flue.

Open item (estimating) – (1) a component of an estimate or scope of work for which cost, procedure, or resource is yet to be determined (RIA); (2) a service or item listed in the estimate for which the cleanup or restoration procedure or cost cannot be determined without further inspection, exploratory inspection and testing, or investigation through sample cleaning and testing. Education Note: Open items do not generally include hidden damage or contamination because they could not have been anticipated.

Open transfer (vapor combustion) – Any transfer that at any time involves contact of a moving fluid with the atmosphere, air, or oxygen. Open transfer of flammable liquids, especially Class IA liquids, is dangerous due to the release of flammable vapors into the work area. Since there is a risk of fire or explosion if an ignition source is present, do these transfers only in a hood.

Oral toxicity – Adverse effects resulting from taking a substance into the body via the mouth. The term ordinarily is used to denote effects in experimental animals.

Organic – Of or related to or arising in a bodily organ; materials or chemicals containing carbon atoms. Substances derived from living organisms (plant or animal).

Organic carbon – Aerosols composed of organic compounds, which may result from emissions from incomplete combustion processes, solvent evaporation followed by atmospheric condensation, or the oxidation of vegetation that cause emissions of smoke, soot and ash and chemical byproducts.

Organic compounds – Chemicals that contain the element carbon.

Organic matter – Carbon-containing plant and animal residues that can burn in a fire.

Organic vapors – Organic compounds that become aerosolized as a gas with changes of vapor

pressure and heat. Organic vapors include new car smells to vapors that are not easily detected by smell such as formaldehyde. In wildfires, organic vapors can consist of a wide variety of volatile organic compounds (VOCs) that are attached to incomplete combusted particles and smoke film.

Organic waste – Waste material of animal or plant origin.

Organism – An individual animal or plant life form.

Oriented strand board (OSB) – (1) A manufactured wood sheet product made from large flakes of wood pressed together with glue, usually a dry phenol type. (2) A particle panel composted of strand-like flakes that are aligned in directions to make the panel stronger, stiffer, and with improved dimensional properties. (ANSI/IICRC S500 Standard) (3) A type of flakeboard product composed of strand-type flakes that are purposefully aligned in directions that make a panel stronger, stiffer, and with improved dimensional properties in the alignment directions than a panel with random flake orientation. (USDA Forest Products Wood Handbook) (4) Wood structural panels manufactured from reconstituted, mechanically oriented wood strands bonded with adhesive under heat and pressure. Oriented strand material may be produced as the center layer of composite panels or may be cross laminated in layered panels. (APA) Education Note: OSB is used for structural sheathing and subfloors.

OSB – Oriented strand board.

OSHA – Occupational Safety and Health Administration. A federal regulatory agency (division of the U.S. Department of Labor) with safety and health regulatory enforcement authority for most U.S. worksites.

Out-gassing – The liberation of a gas from a solid material or a liquid.

Outdoor air – (1) Air outside a building. Outdoor air can enter the conditioned space via the ventilation system, or by infiltration through holes in the pressure boundary or designed ventilation openings. (IICRC S500 Standard, 2006) (2) Air taken from the outdoors and therefore, not previously circulated through a ventilation system.

Outdoor air sample – An air sample taken from an outdoor source. The outdoor air sample is usually compared with a set of indoor samples to determine if there are elevated concentrations of spores indoors.

Outdoor air supply – Air brought into a building from the outdoors (often through the ventilation system) that has not been previously circulated through the system. Also known as make-up air. (EPA) (See: Make-up air)

Overexposure – Exposure to a hazardous material beyond allowable exposure levels. (ANSI/IICRC S500 Standard)

Outer glove – A work glove that is worn over an "inner protective glove." An outer glove is the "first level of skin protection." Education Note: Sometimes the outer glove is saved (cleaned, sanitized) while the inner glove (e.g., latex glove) is disposed. The outer glove must be an acceptable quality and type that protects workers against exposure to liquids, caustic and corrosive chemicals, and biological hazards.

Overexposure – Exposure to a hazardous material beyond allowable exposure levels.

Oxalic acid ($C_2H_2O_4$) – An acid primarily used in the cleaning industry for rust removal. An 8% solution of oxalic acid has replaced the more dangerous hydrofluoric acid rust remover.

Oxidation – (1) A chemical reaction where oxygen combines with other substances. (2) A process of removing hydrogen atoms or electrons from a compound or the addition of oxygen atoms to create oxides. This process applies to metals such as iron converts to rust or iron oxide; nonmetals such as sulfur is converted to sulfur oxide; and organic matter such as carbon is converted carbon oxide; and, hydrogen is converted to hydrogen oxide.

Oxidation, photo – Oxidation caused by rays of the sun; reactions induced by light. Common processes are: 1) Loss of one or more electrons from a chemical species because of photoexcitation of that species; 2) Reaction of a substance with oxygen under the influence of ultraviolet, visible, or infrared light. Education Note: When oxygen remains in the product this latter process is also called photo-oxygenation. Reactions in which neither the substrate nor the oxygen are electronically excited (i.e., photosensitized oxidations) are sometimes called photo-initiated oxidations.

Oxidization – (1) Process during which oxygen combines with another substance. (2) A chemical reaction involving the combining with oxygen atoms or molecules containing oxygen. (3) Any chemical reaction of a substance with oxygen (O_2) or an oxygen-containing material which adds oxygen atom(s) to the compound being oxidized. Oxidation is the principle behind the degradation of natural substances over time (e.g., latex adhesives), the effect of oxygen bleach (NaClO, H_2O_2).

Oxidize – (1) To combine with oxygen in the air. (2) The process of something combining with or being exposed to oxygen in the air, resulting in rust. (3) To chemically transform a substance by combining it with oxygen.

Oxidizer – (1) A substance that gives up oxygen readily. A common chemical reaction in which a substance combines or reacts with oxygen to form a different substance. (2) That portion of a chemical mixture or compound which furnishes oxygen for burning a fuel or propellant, creating an oxide. (3) A chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials, causing fire either by itself or through the release of oxygen or other gases. (4) A chemical other than a blasting agent or explosive as defined in 29CFR 1910.109(a), which initiates or promotes combustion in other materials; thereby, causing fire either of itself or through the release of oxygen or other gases. Education Note: Chlorate (ClO_3), permanganate (MnO_4), and nitrate (NO_3), are examples of oxidizers. Note, all oxidizers contain oxygen (O). Education Note: Oxidizers can be hazardous

when combined with fuel which can start or feed a fire.

Oxidizers – (1) A type of reactive chemical which can feed a fire and make materials ignite more easily. In some cases, strong oxidizers may ignite spontaneously. Examples are nitric acid, calcium peroxide, and fluorine. (2) A chemical compound that readily transfers oxygen atoms or a substance that gains electrons in a redox chemical reaction. (IICRC S540 Standard)

Oxidizing agent – (1) An agent that removes color by adding oxygen to a dye structure rendering it colorless (e.g., benzyl peroxide, sodium perborate, hydrogen peroxide, sodium hypochlorite). (2) An oxidation agent, also called an oxidant, oxidizer, is a chemical compound that readily transfers oxygen atoms that results to the conversion of metals, nonmetals, and organic matter to oxides. (3) A substance that gains (adds) electrons and causes the oxidation of another substance. Education Note: In an oxidation-reduction reaction, the substance that is reduced is the oxidizing agent.

Oxidizing bleach – An agent that removes color by adding oxygen to the dye structure rendering it colorless (e.g., benzoyl peroxide, sodium perborate, hydrogen peroxide, sodium hypochlorite). (IICRC S500 Standard, 2006)

Oxyacid – A type of acid wherein the hydrogen atom attaches to the oxygen atom resulting to a created atom that is attached to the central atom. An example is sulfuric acid used in industrial cleaning processes.

Oxygen – An element with an atomic symbol of O, which is an odorless and colorless gas. Education Note #1: Oxygen is the third most abundant element in the universe next to hydrogen and helium. It is the most abundant element by mass in the Earth's crust. Major molecules in living organisms contain oxygen like proteins, carbohydrates, and fats. It is also present in inorganic compounds that make up animal shells, teeth, and bone. Oxygen in the form of O_2 is vital to life and is used in all cellular respiration. It is produced from water by algae and through photosynthesis by plants. Education Note #2: A gas that makes up about 21 percent of the atmosphere. All animals and many microorganisms require oxygen to fuel their metabolism.

Oxygen and heat – The relationship between oxygen, heat, and fuel in a fire. Oxygen does not burn, but readily supports combustion of other substances. Oxygen can react with organic materials and most metals. Education Note: The rate of reaction varies with the amount of free oxygen, heat and combustible materials, and other conditions.

Oxygen barrier – A barrier that does not oxygen to pass through.

Oxygen deficient atmosphere – Any atmosphere with an oxygen content below 19.5% by volume.

Oxygen deficient fire – A fire capable of supporting smolder but not capable of supporting combustion.

Oxygen rich fires – Fires benefiting from a free flow of oxygen that burns at higher temperature

producing more intense complete combustion. Generally, an oxygen rich fire produces a drier and finer soot.

Oxygen starved fires – Fires having a limited amount of oxygen that burn at a lower temperature producing less complete combustion. Generally, an oxygen starved fire produces smoldering, heavier stickier residues.

Ozone (O_3) – (1) A powerful oxidizing agent formed by combining oxygen molecules (O_2) with an additional atom of oxygen, which reaction yields O_3 or ozone gas. (2) A photochemical oxidant and a major component of smog. Ozone is a form of oxygen having three molecules, an oxidizing agent with a weak chlorine odor, produced naturally through sun light and lightning or by a machine.

Ozone chamber (fire damage restoration; smoke odor control) – Contents, fixtures, appliances, books, upholstered furniture, draperies and garments, items placed in a room called an ozone chamber. Education Note: The room is engineered and designed to local building code requirements where items that contain an element of lingering smoke odor are deodorized. Continuous forced air circulation is required since ozone is heavier than air and it tends to build at the floor level. Room temperature and humidity is controlled. Generally, items are placed in the ozone chamber "dry" since ozone in the presence of unwanted moisture can oxidize dyes resulting in a color loss. If the ozone treatment works, it will work within 24 to 48-hours. Longer exposures can damage materials and linings made from elastic and rubber.

Ozone generator (fire damage restoration; smoke odor control) – A type of mechanically generated ozone used to destroy fire-caused odors through oxidation.

Ozone mitigation – The process of using gas-phase ozone to lessen/remove odors in buildings and contents.

Ozone mitigation theory – The theory that gas-phase ozone can remove odors that are biologically and chemically bonded to or are sitting on the surface of materials. Education Note: Ozone (O_3), an unstable form of oxygen, acts by oxidizing anything that it meets. In laymen's terms, ozone acts as a bleach (oxidizer) that has been proven to reduce the load of bacteria, mold, and viruses. It has also been proven to reduce/remove smoke odors caused by fires.

Ozone use after a fire – The introduction of gas-phase ozone equipment in a building after it experienced smoke or fire damage.

Ozonizing (ozonizer) chambers – Rooms specially designed to deodorize contents, furniture and fabrics. Ozone can eliminate a wide variety of inorganic and organic odor problems.

(P)

Pack-in / Pack-back – The return of contents after processing or on completion of building restoration.

Pack-out – (1) The documentation of damaged or contaminated items and contents followed by inventory, wrapping, boxing and removal. (2) The packing and transportation of contents to a cleaning and restoration plant for processing (cleaning and deodorization; damage assessment and repair).

PAH – Polycyclic aromatic hydrocarbon. A group of over 100 different organic compounds composed of several benzene rings. Some PAHs are persistent and carcinogenic. Education Note: PAHs are commonly formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are commonly found in wildfire smoke.

PAH and PNA – Polycyclic aromatic hydrocarbon and (PAH) and Polynuclear aromatic (PNA).

PAHs and PNAs, difference between – The difference between polycyclic aromatic hydrocarbons (PAHs) and Polynuclear aromatics (PNAs). (PAHs): 1) A group of organic contaminants that form from the incomplete combustion of hydrocarbons, such as coal and gasoline. PAHs are an environmental concern because they are toxic to aquatic life and because several are suspected human carcinogens (Van Metre and others, 1996). 2) A compound built from two or more benzene rings. Sources of PAHs include fossil fuels and incomplete combustion of organic matter such as in auto engines, incinerators, and even forest fires (National Research Council, 1994). 3) In general PAHs are ubiquitous environmental pollutants and are formed from both natural and anthropogenic sources. The latter are by far the major contributors. Natural sources include forest fires (Blumer and Youngblood, 1975); volcanic eruptions (Ilnitsky and others, 1977); and degradation of biological materials, which has led to the formation of these compounds in various sediments and fossil fuels (White and Lee, 1980). 5) Major anthropogenic sources include the burning of coal refuse banks, coke production, automobiles, commercial incinerators, and wood gasifers" (Lesage and Jackson, 1992). (PNAs): 1) Are often are byproducts of petroleum processing or combustion. Many of these compounds are highly carcinogenic at relatively low levels. Although they are relatively insoluble in water, their highly hazardous nature merits their positioning in potable waters and wastewaters" (Eaton and others, 2005). 2) Environmental contaminants found in coal tar and are common products of combustion of organic materials. 3) Any of a class of hydrocarbon molecules that have multiple carbon rings, and that include carcinogenic substances and environmental pollutants.

PAHs in soot – Polycyclic aromatic hydrocarbons in soot. (1) PAHs in soot are known as mutagens and a probable human carcinogen. They are classified as "known human carcinogen" by the International Agency for Research on Cancer (IARC). For more information go to: "*Assessing the Potential Health Risks of Wildfire Residue in the Indoor Environment*." https://aiha-ab.com/assessing-

the-potential-health-risks-of-wildfire-residues-in-the-indoor-environment/ and https://synergist.aiha.org/201608-after-the-fire

Paint-lead hazard – Any of the following: (a) Any lead-based paint on a friction surface that is subject to abrasion and where the lead dust levels on the nearest horizontal surface underneath the friction surface (e.g., the window sill or floor) are equal to or greater than the dust-lead hazard levels identified in the definition of "Dust-lead hazard." (b) Any damaged or otherwise deteriorated lead-based paint on an impact surface that is caused by impact from a related building component (such as a doorknob that knocks into a wall or a door that knocks against its door frame). (c) Any chewable lead-based painted surface on which there is evidence of teeth marks. (d) Any other deteriorated lead-based paint in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility.

Pall, smoke – Extensive, thick blanket of smoke spreading outwards from the fire, more or less horizontally from a fire.

PAP – (1) Positive air pressure. (2) Positive airway pressure.

PAPR – Powered air purifying respirator.

Parasitic fungi or bacteria – Microorganisms that obtain their food by absorbing minerals, sugar and moisture from the living material (plant or animal host) on which they grow.

Paring – The use of one substance to neutralize another. Paring agents are chemicals that bind with and remove (neutralize) aerosolized VOCs (chemicals that make up a smoke odor), odors at their source.

Partial loss – An insured loss that does not completely destroy or render insured property worthless or exhaust the insurance monies available to cover the loss.

Partial payment (insurance) **–** A payment for the agreed amount of the claim with the understanding it is only partial satisfaction of the claim.

Particle – (1) A solid or liquid object that is generally between 0.001 and 1000 µm in size. (2) A minute portion or fraction of matter; a speck. (3) Small, minute parts appearing dispersed in fluid or gaseous media. By character they can become harmful airborne substances if they are sufficiently small for both, to remain suspended in ambient air and for entering the human respiratory tract. (4) A small discrete mass of solid or liquid matter.

Particle concentration – The number of individual particles per unit volume of air.

Particle contamination control (cleanroom technology) **–** A minute quantity of solid or liquid matter that must be captured to avoid contamination.

Particle count – Concentration expressed in terms of the number of particles per unit volume of air or other gas.

Particle counter, airborne – (1) An instrument for continuous counting of airborne particles larger than a given threshold size. The sensing means may be optical, electrical, aerodynamic, etc. (2) Device that measures the size and quantity of particles per cubic air volume. Particle counters determine the cleanliness rating of a cleanroom.

Particle counter, optical – A light scattering instrument with display and/or recording means to count and size discrete particles in air, as defined by ASTM F-50-83.

Particle counter, optical surface – A light-scattering instrument with display and/or recording means to count and size discrete particles in air.

Particle diameter, mass-medium size – A measure of particle diameter based on the particle mass. For the mass medium size, one-half of the particles mass is contributed by particles with a size less than the mass medium size, and one-half of the particle mass by those particles larger than that size.

Particle health characteristics, smoke – The characteristics, sources, and potential health effects of particulate matter to human health. The size of particles inhaled affects their potential to cause health effects in humans. Education Note: Particles larger than 10 micrometers do not usually reach the lungs, but can irritate the eyes, nose, and throat. For purposes of comparison, a human hair is about 60 micrometers thick. Small particles with diameters less than or equal to 10 micrometers, also known as particle pollution or PM_{10}, can be inhaled deep into the lungs; exposure to the smallest particles can affect the lungs and heart. Particle pollution includes "coarse particles," also known as PM 10 – 2.5, with diameters from 2.5 to 10 micrometers and "fine particles," also known as $PM_{2.5}$, with diameters that are 2.5 micrometers and smaller.

Particle size – (1) The size of a piece of fuel, often expressed in terms of size classes. (2) The apparent maximum linear dimension of the particle in the plane of observation as observed with a microscope, or the equivalent diameter of a particle detected by automatic instrumentation. The equivalent diameter is the diameter of a reference sphere having known properties and producing the same response in the sensing instrument as the particle being measured. (3) The maximum linear dimension of a particle as observed with an optical microscope or the equivalent diameter of a particle detected by an instrument. The equivalent diameter is the diameter of a reference sphere having known properties and producing the same response in the sensing instrument as the particle being measured.

Particle size distribution (PSD) – The relative percentage by weight or number of different particle size fractions. The PSD of a material can be important in understanding its physical and chemical properties: 1) it affects the strength and load-bearing properties of rocks and soils; 2) it affects the reactivity of solids participating in chemical reactions, and needs to be tightly controlled in many industrial products such as the manufacture of printer toner and cosmetics. 3) PSD is also a concern when completing a sanding activity where particles smaller than five microns can be inhaled deep in

the lungs. Worker respiratory protection is expected to increase where the wearer dons a mask with HEPA filters.

Particle thickness burn (injury) – A burn where the outer layer of skin is burned through and the second layer of skin (dermis) is damaged and is typically, a painful injury. Burns of this type cause reddening, blistering, and a mottled appearance. Also called a second-degree burn.

Particles of incomplete combustion (PIC) – Generated wastes that are produced after a fire and coming from ignited materials.

Particles, partially decomposed organic – Brown/amber remains from partially decomposed vegetation which has not been combusted. By PLM, most particles appear brown/amber, thicker particles can be dark brown to opaque (*Wildfire Particulate in Proximally Located, Unburnt Buildings.* ACGIH: Spring 2011 Technical Conference).

Particles, primary – Suspended in the atmosphere as particles from the time of emission, e.g., dust and soot.

Particles, respirable – Airborne particles of combustion products, dust, and pollen. Education Note: Health effects from exposure to respirable-size particles in the air depend on the types and concentrations of particles present, the frequency and duration of exposure, and individual sensitivity. Health effects can range from irritation of the eyes and/or respiratory tissues to more serious effects, such as cancer and decreased lung function. Biological particles such as animal and insect allergens, viruses, bacteria, and molds, can cause allergic reactions or infectious diseases.

Particles, secondary – Particles form in the atmosphere by a gas-to-particle conversion process.

Particles that are partially decomposed organic matter (wildfire) **–** Brown to amber remains from partially decomposed vegetation which has not been combusted. By PLM, most particles appear brown/amber, thicker particles can be dark brown to opaque (*Wildfire Particulate in Proximally Located, Unburnt Buildings.* ACGIH: Spring 2011 Technical Conference).

Particulate matter – A suspension of fine solid or liquid particles in air, such as dust, fog, fume, mist, smoke, or sprays. Education Note: Particulate matter suspended in air is commonly known as an aerosol. Particulate matter or an agglomeration of matter in a wildfire cleanup situation has an observable length and width of 40 microns or above.

Particulate matter (PM) – Any vaporized liquid or solid particles, known as "total suspended particles." (1) A solid or liquid matter that is dispersed in a gas, or insoluble solid matter dispersed in a liquid. Education Note #1: The prime hazard of particulate matter is inhalation along with the possibility of the matter lodging in the lung tissue. Asbestos fibers are especially dangerous when captured by lung tissues. (2) Particulate matter or particulates are anything that is suspended in the air. Particulates are classified by size. Education Note #2: Larger or coarse particles range from 2.5 to 10 microns in size, while fine particles measure 2.5 microns in size or smaller. Particulates can be caused

by natural phenomena or human activity. In high enough concentrations, particulates can aggravate existing respiratory problems or trigger new ones. (3) A complex mixture of very tiny solid or liquid particles composed of chemicals, soot, and dust. Because only very small particles can be inhaled into the lungs, health standards for the quality of ambient air are based on the mass concentration of "inhalable particles," defined to include microscopic, invisible particles that are 10 microns (millionths of a meter) or less in diameter called PM_{10}. The smallest of these inhalable particles are those that are 2.5 microns in size and smaller; "particulate matter 2.5 or ($PM_{2.5}$).

Particulate matter, fire – Suspension of fine solid or liquid particles in air, such as dust, fog, fume, mist, smoke, or sprays. Education Note: Particulate matter suspended in air is commonly known as an aerosol. Particulate matter or an agglomeration of matter in a wildfire cleanup situation has an observable length and width of 40 microns or above.

Particulate matter, size of – Particles having a size of 2.5 microns are roughly one twenty-eighth the diameter of a human hair. Ten microns is about one-seventh the diameter of a human hair.

Particulate matter, wildfires – Another component of smoke, categorized as particulate matter, can be composed of any of the combustion by-products, including PAHs, organic debris, and inorganic residues. Numerous air pollution studies have shown that small increases in the concentrations of particulate matter are associated with notable increases in respiratory and cardiovascular disease mortality. The association between increased respirable particulate matter and childhood asthma and other respiratory diseases is also well established. Education Note: Particulate matter small enough to be inhaled is segregated by size: particles up to 10 micrometers (µm) in diameter (PM_{10}), which the EPA considers "inhalable coarse particles;" and particles smaller than 2.5 µm in diameter ($PM_{2.5}$), called "fine particulates." If inhaled, the larger PM_{10} deposit in the upper respiratory tract, while smaller $PM_{2.5}$ travel deeper into the lungs and generally are retained within the lungs. The EPA National Ambient Air Quality Standards (NAAQS) for particulate matter was first issued in 1971, and then revised in 1987 and 1997. In September 2006, the EPA again tightened the PM standards. The revised 2006 standards tighten the 24-hour fine particle standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and retained the current annual fine particle standard at 15 $\mu g/m^3$. Particulate matter is also categorized as "ultra-fine particles." Fine particles are less than 2.5 µm in diameter, while ultra fine particles are only 0.15 to 0.4 µm in diameter. (By comparison, the period at the end of this sentence is about 500 µm in diameter.) Most ultra fine particles are too small to be removed by HEPA filters, which can remove 99 percent of filtered particles that are larger than 0.3 µm in diameter. The majority of particulate matter produced in a wildfire is in the ultra fine particle size range. The majority of wildfire smoke particulates are in the fine particulate category. These wildfire smoke respirable particulates can contain organic materials that may have significant long-term health effects, such as PAHs, aldehydes, VOCs, and organic acids. The toxicity of particulates retained in the lungs varies with chemical composition. Chemical changes of smoke particulates may occur in the form of chemical reactions with other aerosols. Particles may stick together or break apart, changing the size distribution over time. Research has confirmed that fine particles outdoors will infiltrate indoors, even with all of the windows and doors closed. Some studies have found that as much as 70 to 100 percent of the fine particles outdoors will infiltrate indoors. Many commercial buildings and schools

mechanically draw outdoor air into the buildings. Usually, the outdoor air is filtered before it is supplied to the occupants. However, standard HVAC air filters will not remove most of the ultra fine wildfire smoke particles. Also, many schools that rely on portable buildings for classrooms bring in outdoor air by installing continuous exhaust fans. Unfiltered outdoor air is brought indoors by keeping the classrooms under negative pressure. When heavy concentrations of tiny wildfire smoke particles enter a home, school or other building, the particles can eventually settle out of the air to deposit on horizontal surfaces, or plate out on vertical surfaces, penetrate upholstery, drapes, and insulation; or electrostatically adhere to electronic components or other charged surfaces, as well as impact on surfaces in the path of air currents. Settled respirable particulate matter can be re-entrained into the air by even small disturbances. Research shows that large wildfires produce in excess of 36 tons of particulate matter per minute, which is 2,160 tons of particulate matter per hour. Under some conditions, wildfires can produce 30 times that amount of particulate matter (Kirsten Shaw, CSC).

Particulate respirator - Air-purifying respirators (e.g., N-95, N-100; P-95 - P-100; HEPA) that remove specific size particles out of the breathing zone.

Particulates - (1) Fine liquid (other than water) or solid particles such as dust, smoke, mist, fumes and fog found in air and emissions. (2) Miniscule segments of manmade or natural matter which are airborne and settled on a surface or become suspended in gas or liquid.

Particulates and their respirable size - Particulates in the size range that permits them to penetrate deep into the lungs upon inhalation.

Particulates, smoke and airborne - The compounds present in soot in the form of particulates. Particulate matter is the principal pollutant of concern from wildfire smoke for the relatively short-term exposures (hours to weeks) typically experienced by the public. Particulate matter is a generic term for particles suspended in the air, typically as a mixture of both solid particles and liquid droplets.

Parts per billion (PPB/ppb) - (1) A unit for measuring the concentration of a gas or vapor in air, expressed as parts of the material per billion parts of air. PPB (ppb) is usually used to express measurements of extremely low concentrations of unusually toxic gases. (2) The concentration of a gas or vapor in air, parts (by volume) of the gas or vapor in a billion parts of air; describing extremely low concentrations of unusually toxic gases or vapors. (3) The concentration of a substance in a liquid or solid.

Parts per million (PPM/ppm) - 1 ppm = 10^{-6} or .0001%, and 1% = 10,000 ppm. PPM is the concentration of a gas or vapor in air, parts (by volume) of the gas or vapor in air, parts (by volume) of the gas or vapor in a million parts of air; also the concentration of a particular substance in a liquid or solid.

Parts per trillion (PPT (ppt) - In the United States, 1 trillion is 1×10^{12} and "one part per trillion parts" (1 ppt) has a numerical value of 1×10^{-12}. Education Note: This terminology should also be used with great caution because: In the United Kingdom and other nations using British English,

France and continental Europe, 1×10^{12} is 1 billion and 1 trillion is 1×10^{18}. Concentrations are sometimes expressed as ppt (meaning, parts per thousand) which conflicts with ppt (meaning, parts per trillion). For more information go to: http://www.llojibwe.org/drm/environmental/content/concentrations.pdf and https://coachcokerschemistry.weebly.com/uploads/4/7/7/2/47728065/notes_percent-ppm-ppb-ppt.pdf and https://www.michigan.gov/documents/pfasresponse/1ppt_is_Equal_to_1_Drop_of_Water_in_20_Olympic_Swimming_Pools_664966_7.pdf

Pasteurization, structural - An engineered process in which high temperatures are introduced to a structure or portion of a structure for the purpose of reducing bio-organisms to acceptable levels without damage to the structure. (ANSI/IICRC S500 Standard)

Passive fire protection - A device or system designed to confine fire and smoke in zones (e.g. compartmentalization).

Passive smoking - Inhalation of sidestream smoke by people who do not smoke themselves.

PCO – Photocatalytic oxidation also known as UV-photocatalytic oxidation.

PCO deodorization technology – PCO air filtration equipment uses magnetically-charged plates coated with titanium dioxide nanoparticles, which are agitated using a magnetic field that is exposed to UV light. UV light is reflected onto a metal surface which in turns oxidizes toxins, bacteria, and mold, and converts harmful particulates and toxic gases into safer compounds such as carbon dioxide and water. Unlike similar deodorization equipment not incorporating PCO, PCO purification systems utilize UV lamps with additional wavelengths, which provide quicker reaction rates when it comes to degrading toxic compounds. For more information go to: http://www.greenmillennium.com/photocatalytic-oxidation/

PCO and EPA – According to the Environmental Protection Agency, PCO home air cleaners can break down many types of gaseous pollutants, but not many typically found in indoor air. The process can also react with some pollutants to generate other dangerous byproducts, such as ozone, formaldehyde, nitrogen dioxide, and carbon monoxide. Because of these factors, the EPA reports that to effectively and efficiently eliminate common gases and microbes found in homes in a safe manner, PCO technology needs to improve. https://www.consumerreports.org/air-purifiers/molekule-air-purifier-review/

PCO and FDA – PCO technology is FDA approved for reducing bacteria in meat processing plants and is used to cleanse pesticides from the fruits and vegetables. Essentially, PCO filtration can be summed up as such: An intense light is reflected onto a metal surface which in turns oxidizes toxins. In chemistry, photocatalysis is defined as the acceleration of a photoreaction in the presence of a catalyst, and an example of this would be the oxidation of organic contaminants such as bacteria and mold using magnetic particles coated with titanium dioxide nanoparticles, and agitated using a

magnetic field that is exposed to UV light. Therefore, this type of purification technology converts harmful particulates and toxic gases into safer compounds such as carbon dioxide and water. http://www.greenmillennium.com/benefit-other/

PCO and Hydroxyl Deodorization Debate – An industry debate between manufacturers and technology involving photocatalytic oxidation (PCO). The author is providing sources for the reader to review, where after further research on the subject, they are to make up their own mind on the validity of PCO, and how it potentially affects the equipment the buy and customer benefits. https://www.odoroxhg.com/odorox-hydroxyl-vs-titan-pco-more and https://pdfs.semanticscholar.org/71be/055f3652f2e1a404bf0d4486531b2fa3acf6.pdf and https://cdn2.hubspot.net/hubfs/434512/Documents/Contents_Industry_Review_Magazine_Article_Re_Hydroxyls_July_2013.pdf?t=1529593440910 and https://www.randrmagonline.com/articles/87407-hydroxyl-radicals-truths-vs-myths and https://www.randrmagonline.com/articles/88292-are-hydroxyl-generators-safe-for-odor-removal and http://www.hydroxylnews.com/hydroxyl-news/understanding-how-new-indoor-air-treatment-systems-optimize-indoor-environmental-quality-and-safety/

PCO and NASA – Photocatalytic oxidation also known as UV-photocatalytic oxidation, was created by NASA's Center for Independent Research & Development and its partners, where PCO is a primary candidate as an alternative to thermal-catalytic or sorbent-based technologies for VOC trace contaminant control due to its low energy demand, operation near room temperatures, and minimal logistic costs. A unique annular adsorption-enhanced Silica-Titania Composite (STC) UV-Photocatalytic Oxidation (PCO) reactor are in use at the Kennedy Space Center (KSC) to test and understand the interactions of the UV light and STC pellets and to further technological understanding of PCO for real world applications. From these tests a new unique design of a hybrid approach utilizing a PCO reactor and sorbent materials was realized and extensively modeled at KSC. The objective of this study was to construct the bench-scale version of this modeled Hybrid PCO reactor and validate its effectiveness in the reduction of trace air contaminates. A bench scale version of the PCO unit was designed, constructed, and tested against polar VOC's, including ethanol, as it constitutes the primary contaminant aboard a spacecraft. The test bed, which includes a Kin-tek VOC generator, a PCO reactor, and an FTIR analyzer, was used successfully in previous PCO studies in the Air Revitalization unit at KSC, and was tested successfully in spacecraft exploration beyond low earth orbit (LEO). Today, technical advances in such technologies have many applications outside of NASA. First, home and office air conditioning systems could incorporate H-PCO technologies for air purification. Second, aircraft and car manufacturers could utilize this technology for both biological air sanitization and VOC removal from cabin air. This technology is now incorporated in commercial air revitalization systems including hydroxyl deodorization generators.

Peeling – The release of paint and varnish from surfaces before wood becomes scorched. Finishes release (unbind) from their surface or substrate when heated. This condition can be a result of radiant heat drying moisture out of a substrate.

PEL – Permissible exposure limit. (1) The maximum amount or concentration of a chemical that a

worker may be exposed to under OSHA regulations. (2) The exposure limits a worker can work in 8 hours a day for 40 hours without experiencing side effects.

Permeability - (1) A measure of the ease with which water penetrates a material. (2) The ease with which water, or other fluid, passes through a substance. (USEPA) (3) The capability of the soil, geological or structural formations to transmit water. (4) The time rate of water vapor transmission through unit area of a material of unit thickness induced by unit vapor pressure difference between its two surfaces. (5) The process whereby a fluid or gas passes through a barrier at the molecular level. Passage of these materials through defects such as holes or tears in a HEPA filter does not constitute permeability. Education Note: 1) In inch/pond units, permeability is given as "perm," where one perm equals a transmission rate of 1 grain of water per hour for each square foot of area per inch of mercury (gr/h•ft•in.Hg). Permeability is sometimes given as perm per inch. 2) In metric/SI units, permeability is given in nanograms of water per second for each square meter of area per thickness in meters per "Pascal of Vapor Pressure" (ng/s•m•Pa).

Pencil blasting (Micro-blasting) - Micro-abrasive blasting is dry abrasive blasting process that uses small nozzles (typically 0.25 mm to 1.5 mm diameter) to deliver a fine stream of abrasive accurately to a small part or a small area on a larger part. Generally, the area to be blasted is from about a millimeter to only a few centimeters at most. When used as a type of pencil blasting, the fine jet of abrasive is accurate enough to write directly on glass and delicate enough to cut a pattern in an eggshell. The abrasive media particle sizes will range from 10 micrometers up to about 150 micrometers. Higher pressures are often required. The most common micro-abrasive blasting systems are commercial bench-mounted units consisting of a power supply and mixer, exhaust hood, nozzle, and gas supply. The nozzle can be hand-held, or fixture mounted for automatic operation. Either the nozzle or part can be moved in automatic operation.

Penetrant / Penetrating item (building fire-rating) **–** Any item passing completely though a wall or floor, such as pipes, conduits, cables, etc.

Penicillium – Any of a genus of saprophytic fungi (blue-green molds) that commonly are found on moist, non-living, organic matter (e.g., bread, fruits). Education Note: Generally, *Penicillium* requires less moisture (water activity) and cooler temperature for optimum growth.

Penicillium and Aspergillus growth after a fire – After a fire is suppressed with water, impacted rooms and contents must be dried as quickly as possible, generally within 24 to 48 hours after a fire to reduce secondary damage contributors such as rust and corrosion and the colonization of mold. A few of the common ubiquitous molds indoors include Penicillium and Aspergillus, which are also some of the fast colonizers in a damp environment. Penicillium species are commonly found in fire damaged buildings, where water was used to put out the fire.

Perceptible – Capable of being seen.

Percolation – The passage of liquid through a porous body, such as the movement of water through

soil.

Peril – A specific risk or cause of loss covered by an insurance policy such as a fire or windstorm.

Period of restoration – The period of time in which insurance coverage is in effect beginning when the damage occurs and ending when operation or property damages are fully restored and recovered.

Periodic cleaning – The cleaning activities that are needed to be performed and to be completed on a regular timetable. Some building components and contents may require daily, weekly, monthly, quarterly, and seasonal periodic cleaning.

Periodic odor sensing – The occasional presence of an odor detected through smell.

Permeability, concrete – The ability for liquids and gases to pass through the concrete matrix through the interconnecting void spaces inherent to concrete.

Permeable – Of a membrane, allowing a given substance to pass through. Education Note: When applied to nonbiological membranes with no qualification, the term normally refers to water.

Permeance (Perm) – (1) The ability of water vapor to pass through solid materials. (2) The physical property that defines the ease at which water molecules diffuse through a material. It is to vapor diffusion what conductance is to heat transfer. (Building Science Corporation) (3) The rate of water vapor transmission through unit area of a flat product induced by unit vapor pressure between its two surfaces. Education Note: 1) In inch/pound units, permeance is given in the unit "perm," where one perm equals a transmission rate of 1 grain of water per hour for each square foot of area per inch of mercury (gr/h•ft²•in.Hg). (1 grain is 1/700 of a pound.) 2) In metric/SI units, permeance is given in nanograms of water per second per second for each square meter of area per "Pascal of Vapor Pressure" (ng/som2oPa). One perm equals a flow rate of 57 ng/s•m²•Pa.

Permeance factor – (1) The measurement of the water flow through a material with a specific thickness. Materials can be classified according to permeance factor as porous, semi-porous or non-porous. (2) A measure of water flow through material(s) of specific thickness. Permeance factors (perms) specify the vapor flow in grains of moisture per hour, through one square foot of material surface, at one inch of mercury (1" Hg) of vapor pressure. (IICRC S500 Standard, 2006)

Permeate – (1) The passing or seepage of a liquid substance through a material until it is saturated. (2) To diffuse through or to penetrate throughout a gas or material (e.g., smoke permeates the air within a structure; moisture permeates gypsum board causing it to dissolve). (IICRC S500 Standard, 2006) Education Note: A permeable material is one having pores or holes capable of allowing liquids or gases to pass through. (IICRC S500 Standard, 2006)

Permeation – (1) The process by which chemicals pass through protective clothing material at a molecular level. (2) Action of entering or passing through a cell membrane. (IUPAC)

Permissible Exposure Limit (PEL) – The legally enforced exposure limit for a substance that is established by OSHA regulatory authority. Education Note: The PEL indicates the permissible concentration of air contaminants to which nearly all workers may be exposed repeatedly, eight (8) hours per day, forty (40) hours per week, over a working lifetime (30 years), without adverse effects.

Peroxide – Any of several oxidizing compounds, but peroxide is usually a reference to hydrogen peroxide (H_2O_2).

Persistent inorganic pollutant (PIP) – Inorganic substance that is stable in the environment, is liable to long-range transport, they may bio-accumulate in human and animal tissue and may have significant impacts on human health and the environment. Education Note #1: Examples are arsenides, fluorides, cadmium salts and lead salts. Education Note #2: Some inorganic chemicals, like crocidolite asbestos, are persistent in almost all circumstances, but others, like metal sulfides, are persistent only in unreactive environments; sulfides can generate hydrogen sulfide in a reducing environment or sulfates and sulfuric acid in oxidizing environments. As with organic substances, persistence is often a function of environmental properties.

Persistent organic pollutant (POP) – Organic chemical that is stable in the environment, is liable to long-range transport, they may bio-accumulate in human and animal tissue and may have significant impacts on human health and the environment. Examples include dioxin, PCBs, DDT, tributyltin oxide (TBTO). Education Note: The Stockholm Convention on Persistent Organic Pollutants was adopted at a Conference of Plenipotentiaries held from 22 to 23 May 2001 in Stockholm, Sweden; by signing this convention, governments have agreed to take measures to eliminate or reduce the release of POPs into the environment.

Personal property – Articles that are moveable and are separate from the structure, e.g., contents.

Personal property insurance – Property that is not attached to real property. Property other than real estate, or property that is movable or separable from real estate; for property insurance purposes, tangible property, which is often called "contents." Personal property may be used for business purposes and therefore may be covered by a commercial policy, while personal property not used for business is generally covered only by personal lines policies (such as homeowners or renters' insurance).

Personal property – (1) Articles that are moveable and can be separated from the structure, e.g., contents. (IICRC S500 Standard, 2006) (2) Things that are moveable and not attached to the land. Damage to personal property may be covered under the owner's building insurance, a separate policy or rider.

Personal property insurance – Property that is not attached to real property. Property other than real estate, or property that is movable or separable from real estate; for property insurance purposes, tangible property, which is often called "contents." Personal property may be used for business purposes and therefore may be covered by a commercial policy, while personal property not used for

business is generally covered only by personal lines policies (such as homeowners or renters' insurance).

Personal protective equipment (PPE) (mitigation; remediation) – Devices worn by the worker to protect against hazards in the environment. Respirators, gloves, coveralls, boots, and hearing protectors are examples.

Personal protection equipment (PPE) (mitigation; remediation) – (1) Specialized clothing worn by workers for protection against hazards. (2) Safety equipment worn by technicians, tradesmen, and restoration personnel. PPE is designed to protect people from exposure to pathogens, chemicals, and hazardous substances. (3) Clothing, helmets, goggles, or other gear designed to protect the wearer's body or clothing from injury by electrical hazards, heat, chemicals, and infection, for job-related occupational safety and health purposes. (RIA) (4) Safety items designed to prevent exposure to potential hazards. Examples include respirators, gloves, goggles, protective clothing, and boots. (IICRC S520 Standard, 2015) Education Note: PPE includes NIOSH approved respirators. All emergency response and restoration workers are always required to wear appropriate PPE.

Personnel Protective Equipment (PPE) (firefighters) – (1) Equipment issued to firefighters (equipment and clothing) to mitigate the risk of injury from, or exposure to, hazardous conditions encountered while working. PPE includes, but is not limited to 8-inch high-laced leather boots with lug soles, fire shelter, hard hat with chin strap, goggles, ear plugs, aramid shirts and trousers, leather gloves and individual first aid kits. (2) That equipment and clothing required to mitigate the risk of injury from or exposure to hazardous conditions encountered during the performance of duty. PPE includes but is not limited to fire resistant clothing, hard hat, flight helmets, shroud, goggles, gloves, respirators, hearing protection, chainsaw chaps, and shelter.

Personal protection, insulation – Building pipes, steam generation, and ventilation system insulating materials, insulation installed for the purpose of protecting personnel from hot or cold surfaces capable of injuring workers.

Personal safety – The safety of employees as protected by worker training, processes and other measures to prevent incidents such as slips, falls and work-related accidents.

Petroleum hydrocarbons – A large group of chemicals that make up oil and gasoline, synthetic and plastic products.

Petroleum jelly – A semi-solid oily product produced from de-waxing lubricating oil basestocks. Education Note: After a fire or smoldering situation, petroleum jelly is often used on metal finishes to stop corrosion from occurring until the finish can be cleaned.

PF10 – A respirator having a protection fit factor of 10. All filtering face piece respirators have a minimum APF of 10. Mathematically, this means you can expect the respirator to reduce your exposure to a contaminant by a factor of 10. In practice, the amount of reduction depends on factors such as how well the mask fits your face, the particle size of the contaminant and the environmental

conditions of use. Education Note: Different types of respirators have different APF's (e.g., 10 to 5,000) where the higher the APF the more protective the respirator becomes. (See: Assigned protection factors; Fit factor; Fit factor discussed; Protection fit factor; Protection fit factor discussed; Workplace protection factor)

pH – (1) A measure of acidity or alkalinity. (EIA) (2) A symbol for the logarithm of the reciprocal of the hydrogen-ion concentration of an aqueous solution, used to express its acidity or alkalinity. The pH scale ranges from 0-14, with 7 being neutral, above 7 indicating alkalinity (bases), and below 7 indicating acidity. (IICRC S500 Standard, 2006) Education Note: Acids have a pH less than 7 while alkaline have pH greater than 7. pH measures the concentration of hydrogen ions in a solution. Acids have high hydrogen ion contents while a solution with low concentrations are called alkaline or base.

pH strips – Paper-based strips that are chemically treated. pH strips respond to solvents that results in a color change of the paper. Depending on the solution's color, the pH guide will indicate the range of pH. For more information go to: http://www.scientificsonline.com/ph- test-strips.html For blood and urea go to: http://www.shopwiki.com/l/glucostix~reagent~strips~-(50/box)

PHCP – Primary health care physician.

Phenomenon, Santa Ana wind (wildfire management) – The type of wind near a large body of water and desert that is close to mountains; the drainage wind coming off a mountain or hillside where cooler offshore winds build up under the hotter air mass increasing air pressure. Education Note: As air becomes compressed it causes the air mass to warm and dry. High winds and low humidity help dry out vegetation that makes the wildfire more flammable.

Phosphoric acid – A commonly used acid to remove smoke film and soot from hard surfaces. Education Note: Phosphoric acid cleaners can be applied on fiberglass tub and shower enclosures, light fixtures, and crystal (with immediate rinsing), ceramic tile, grout, aluminum windows and door frames; clay and concrete blocks, brick, stone and mortar.

Photosynthesis – The process by which green plants convert solar energy into chemical energy in the form of organic (carbon-containing) molecules, releasing oxygen as a by-product; $6\ CO_2 + 6\ H_2O$ + sunlight ------> $C_6H_{12}O_6 + 6\ O_2$.

Physical damage auto insurance – Insurance that provides coverage to vehicles owned, leased, or operated by a covered person due to collision or under comprehensive coverage and non-collision hazards, such as fire, theft, or falling objects.

Physical hazard – A chemical for which there is scientifically valid evidence that it is a: combustible liquid, compressed gas, explosive, flammable material, organic peroxide, oxidizer, pyrophoric, no matter if it is unstable (reactive) or water-reactive.

Phytoliths – Ridged microscopic structures made of silica (as nutrients coming from minerals) found in some plant tissues after the plant decays or is burnt, such as from a wildfire. Education Note: Silica,

calcium and opal are the main minerals absorbed into a plant's cells. Phytoliths are tiny - no larger than a single plant cell, perhaps between 10 and 70 microns across, which can only be seen through a microscope. As the cells in most types of plants have a specific and identifiable morphology, the laboratory may be able to identify which plant was present (phytolith remains originated).

Phytoliths from burning plants – The combustion byproducts of living, decaying and dead organic matter that is burnt by a wildfire. Some phytoliths from burning plants are minerals, while others are small to microscopic plant matter. Education Note: In a Florida wildfire, some of the plant matter was poison ivy, which was not immediately identified, but the effects of individuals exposed, included rashes and respiratory distress. Analysis of plant matter discovered an oily residue called urushiol, which was found on small and microscopic stems, leaves and roots.

PIC – Particles of incomplete combustion. The generated waste produced during a fire from ignited materials.

Piloted ignition, fire – The ignition of combustible gases or vapors by a secondary source of energy, such as a flame, spark, electrical arc, or glowing wire.

Plaster – A powder mixed with sand and water and applied over a plaster base to form a hard finish surface on walls and ceilings; also, the surface itself.

Plaster board / Plasterboard – Wallboard made of a core of gypsum sandwiched between surface coatings, usually paper.

Plastic fire – (1) A type of fire caused by combustion of plastic products that produces hydrogen chloride gases, which are highly corrosive. (2) A fire involving polymers (a wide range of synthetic or semi-synthetic organic solids) as a primary fuel source, where the fire results in highly acid fire residues including greasy, heavy soot.

Plenum – (See: Air plenum)

PLM – Polarized light microscopy. A microscope technology that uses the polarity (or orientation) of light waves to provide better images from what is available in a standard optical microscope.

PLR (insurance; restoration) **–** Property loss restoration.

Plume (wildfire) – A convection column generated by combustion (of wildland/wildfire fuel).

Plume, fire – The column of hot gases, flames, and smoke rising above a fire.

Plume, smoke – The gases, smoke, and debris that rise slowly from a fire while being carried along the ground because the buoyant forces are exceeded by those of the ambient surface wind.

PM – Particulate matter. (1) Matter suspended in the air in the form of minute solid particles or liquid

droplets, especially when considered as an atmospheric pollutant. (2) A solid or liquid matter that is dispersed in a gas, or insoluble solid matter dispersed in a liquid. Education Note: The prime hazard of particulate matter is inhalation along with the possibility of the matter lodging in the lung tissue. For example, asbestos fibers are especially dangerous when captured by lung tissues.

PM 1 – Measure of particulate matter (pollutants from combustion and natural sources); denotes particles smaller than 1 micrometer in diameter and particles that are submicron. Education Note: As shown in some investigations, the main fraction of the particulate matter in burnt combusted materials can be smaller than 1μm. Consequently, most $PM_{2.5}$ investigations also focus on PM_1 along with submicron particles.

PM 2.5 – Measure of particulate matter (pollutants from combustion and natural sources); denotes particles smaller than 2.5 micrometers in diameter. (See: Fine particles; Fine particulate matter)

PM 10 – Measure of particulate matter (pollutants from combustion and natural sources); denotes particles with a nominal size less than 10 micrometers in diameter. Education Note: The number indicates the aerodynamic particle diameter in micrometers (μm) according to a separation efficiency of 50% in the sampling system. Further $PM_{2.5}$ and PM_1 are also used. Beside this, the *total suspended particulate matter (TSP)* was used earlier. This particle fraction is defined as fine particulate matter with a setting velocity of less than 10cm/s (Dockery, D.W. & Pope, C.A. *Acute Respiratory Effects of Particulate Air Pollution*.)

PM_{10} respirable particles – Airborne particles having an aerodynamic diameter <= 10 microns. Particles < 5 microns in size can penetrate deep into the lower respiratory tract.

Pockets of a fire (building fire; wildfire) – Unburned indentations in the fire edge formed by fingers or slow burning areas.

Pollutant – (1) A substance or material that contaminates air, soil, or water. (2) Substances added to the environment which has a deleterious effect on living creatures. (3) Any undesirable solid, liquid, or gaseous matter in a solid, liquid, or gaseous environmental medium. Education Note: Pollutants can cause a change in the physical, chemical, or biological properties of water and air that makes them unfit to consume or be exposed.

Pollutant pathways – Avenues for distribution of pollutants in a building. HVAC systems are the primary pathways in most buildings; however, all building components interact to affect how air movement distributes pollutants. (EPA)

Pollutant, primary – The pollutant that can be the most detrimental to humans, other forms of life and the environment. The primary pollutant is distinguished from a secondary pollutant.

Pollutant, secondary – Pollutants that are less hazardous or dangerous than the primary pollutant. Education Note: In some cases, secondary pollutants are precursors of the primary pollutant (e.g., fire damage buildings where chemical containers must be identified and removed). In other situations, the

secondary pollutants (or multiple pollutants) are standalone hazards or contaminants that need to be mitigated after the primary pollutant is abated such as asbestos and lead-based paint, then smoke and soot residue.

Pollutants – Substances that include, but are not limited to, any solid, liquid, gaseous, or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals, and waste. "Waste" includes, but is not limited to, materials to be recycled, reconditioned, or reclaimed. (FEMA)

Pollution – (1) The resulting presence of a foreign substance in other materials or atmospheres. (2) The alteration of the physical, chemical, or biological properties of air, soil, and water. (3) Any substances in water, soil, or air that degrade the natural quality of the environment, offend the senses of sight, taste, or smell, or cause a health hazard. The usefulness of the natural resource is usually impaired by the presence of pollutants and contaminants. (USEPA) (4) The introduction of a pollutant into a material that adversely affects its beneficial use. (5) Introduction of pollutants into a solid, liquid, or gaseous environmental medium, the presence of pollutants in a solid, liquid, or gaseous environmental medium, or any undesirable modification of the composition of a solid, liquid or gaseous environmental medium. (IUPAC)

Pollution insurance, sudden and accidental – Insurance that protects the insured with pollution coverage. (See**:** Sudden and Accidental) For more information go to: http://www.law360.com/articles/92110/clarifying-sudden-and-accidental-pollution-coverage and https://b-h-a.com/sudden-accidental-coverage/#:~:text=Sudden%20%26%20Accidental%20coverage%20is%20tied,is%20no%20coverage%20in%20place

Pollution prevention – Actively identifying equipment, processes, and activities which generate excessive wastes or use toxic chemicals and then making substitutions, alterations, or product improvements. Conserving energy and minimizing wastes are pollution prevention concepts used in manufacturing, sustainable agriculture, recycling, and clean air/clean water technologies.

Pollution, sudden and accidental – The release of a pollutant by an accidental occurrence. Example includes asbestos in a building that is released by an earthquake, tornado, storm, fire, or water damage.

Polycyclic aromatic hydrocarbons (PAHs) – A group of compounds formed because of the incomplete combustion of hydrocarbons. PAHs are often produced as a byproduct from fires that damage buildings and contents, where burning of plastics, carpet and some paints occurred.

Polyethylene – (1) A thermoplastic polymer possessing light weight, good resistance to chemicals and moisture, and good insulating qualities, making it suitable for packaging and insulation. (2) A closed-cell, thermoplastic material used for insulation.

Polyethylene sheeting – A polymerized ethylene resin formed into sheets. Polyethylene sheeting (poly) is used in the manufacturing of containers, kitchenware, and tubing, or in the form of films and sheets for packaging. Education Note: In the practice of mitigation, remediation and restoration,

poly sheeting is used to construct containments that restrict the passage of airflow containing vapors, gases and particulates that are capable of causing cross-contamination to non- affected parts of a building. Poly sheeting is also used to wrap a contaminated building material that allows them to be safely removed and disposed.

Polyurethane floor cleaning alternative – Cleaning methods that are different from traditional hardwood floor cleaning processes, but they may be appropriate for a situation. Education Note: 1) When the restorer has a truck-mount cleaning system, steam clean smoke and soot residue off the hardwood floor at 200^{o}F or greater along with low pressure misting using a special wand that will not scratch hardwood floors and the system is capable of extracting any remaining surface water at the same time. Use a white glove test about 10 minutes after cleaning where surface drying should not be able to identify discoloration on the glove, cloth, or cotton wipe. 2) Vapor steam clean hardwood floors after HEPA vacuuming of loose smoke and soot residue with a vapor-mist steam cleaning system. The ease of use benefits become obvious within minutes, however, so do the drawbacks when steam vapor towels become overloaded with smoke and soot and must be replaced often in some soot cleanup situations. The two alternative methods described above work in conjunction with each other when smoke and soot is more than light fallout of soot particles.

Polyurethane floor cleaning, smoke and soot contaminated – The appropriate soot, smoke film-cleaning process for hardwood floors having a polyurethane finish. Education Note: 1) Check with the flooring manufacturer to ensure your recommendations and supplies are the same as theirs. When the manufacturer recommends a cleaning process or topcoat finish, follow manufacturer recommendations. 2) Remove contents and rugs off the floor. 3) Make sure the ceiling, walls, windows, and doors are in a clean state and the floor has already been HEPA vacuumed before final floor cleaning begins. 4) Detergent wash floor with a grease-cutting dish soap such as Dawn and clean warm water. 5) While it is important to not over saturate the floor (no standing water), the floor and sponge cleaning process must wet the floor sufficiently enough to remove smoke film, soot and grime. 6) A second person is to follow the first cleaning person with freshwater rinsing. 7) When either the detergent washing or rinse water becomes cloudy or grey in color, it is time to change out the detergent and the warm rinse water and use a clean sponge mop. 8) This process is to be completed until the washing and rinse water is clear of color and floors are dry. 9) Per manufacturer instructions, apply appropriate topcoat finishes.

Pool fire – A turbulent diffusion fire burning above a horizontal pool of vaporizing hydrocarbon fuel where the fuel has zero or low initial momentum. Fires in the open will be well ventilated (fuel-controlled), but fires within enclosures may become under-ventilated (ventilation-controlled).

Porosity – (1) The state of being porous. A measure of how porous a material is, which is based on the ratio of the volume of pores to the total volume of the material. (2) The density of substance and its capacity to pass liquids, such as membranes including housewrap and vapor retarders.

Porosity, total – In measuring soil porosity, total porosity is the ratio of the pore volume to the total volume of a representative sample of the medium. Porosity is a dimensionless quantity and can be

reported either as a decimal fraction or as a percentage. For more information go to: http://web.ead.anl.gov/resrad/datacoll/porosity.htm

Porous – (1) A material that is permeable to water and air. (IICRC S540 Standard) (2) Numerous small openings or channels enabling air, moisture, and fluids to pass into or through a material. (3) Any surface of the HVAC system in contact with the air stream that is capable of penetration by either water or air. Examples include fiber glass duct liner, fiber glass duct board, wood, and concrete. (RIA) (4) A surface that was many tiny openings. In the application of a finish, a porous surface will require more finish or sealer to fill and smooth out large and micro-pores.

Porous building materials – Building materials that allow moisture, vapor, and gases to pass through or become held or bound.

Porous material – A substance that has tiny openings, often microscopic, into or from which fluids may be absorbed or discharged, including wood, paper, and corrugated paperboard.

Porous materials cleaning – The cleaning of materials and contents that are porous and absorbent. Solvent spray and water-base cleaning processes are designed are designed to clean pores that suspend dirt, grime, and contamination. Education Note: Once cleaned, the porous surface should be rinsed before drying.

Porous substrate – A substrate that is permeable by air, water, etc.

Porous surface – Surfaces of materials and sometimes its interior structure that have tiny openings which allows air, gas, vapor, moisture, and fine particulates to be absorbed or to pass through.

Porous ventilation – Any surface of the HVAC system in contact with the air stream that is capable of penetration by either water or air. Examples include fiberglass duct liner, fiberglass duct board, wood, and concrete.

Portable extraction (water) **–** Equipment that is portable and moveable that extracts water. Some portable extraction units contain a second pump for the automatic discharge of water.

Portable fan – Box fans, oscillating fans, table or floor fans, or other fans that can be moved.

Portland cement – Cement made by heating clay and crushed limestone into a brick and then grinding to a pulverized powder state.

Positive pressure – (1) Condition that exists when more air is supplied to a space than is exhausted, so the air pressure within that space is greater than that in surrounding areas. (EPA) (2) A condition in which more air is supplied to a space than is exhausted; thus, the air pressure within that space is greater than that in surrounding areas. Education Note: Under positive air pressure conditions, when an opening exists, air will flow from the positively pressurized space into surrounding areas, (EPA)

Positive pressure respirator – A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator. (OSHA)

Post conditions – After cleaning, deodorization and restoration, the absence of smoke, soot and gasses.

Post inspection – An inspection process that is measured against the pre-inspection findings.

Post-remediation – (1) Establishing a sampling strategy and performing sampling after remediation to verify that the building, system, or contents have been returned to a condition as close as possible to their pre-incident condition. (2) Following remediation; after removing contaminants and contaminated materials. (ICRC S520 Standard, 2015; S540 Standard)

Post-remediation evaluation – An inspection performed by a remediator after a remediation project, which can include visual and olfactory methodologies to confirm that the remediation process has been completed.

Post-remediation evaluation, mold – (1) An inspection performed by a remediator after a remediation project, which can include visual and olfactory methodologies to confirm that the remediation process has been completed. (IICRC S520 Standard, 2008) (2) A quality assurance inspection performed by a remediator after a remediation project, which can include visual inspection, odor detection, analytical testing or environmental sampling methodologies to confirm that the structure, system, or contents have been returned to Condition 1. (IICRC S520 Standard, 2015)

Post-remediation verification (PRV), mold – (1) An inspection and assessment performed by an IEP after a remediation project, which can include visual inspection, odor detection, analytical testing or environmental sampling methodologies to verify that the structure, system or contents have been returned back to Condition-1 status. (IICRC S520 Standard, 2008) (2) An inspection and assessment performed by an independent third-party IEP after a remediation project, which can include visual inspection, odor detection, analytical testing, or environmental sampling methodologies to verify that the structure, system, or contents have been returned to Condition 1. (IICRC S520 Standard, 2015)

Post-remediation verification (PRV), water – An inspection and assessment performed by an IEP after a remediation project, which can include visual inspection, odor detection, analytical testing or environmental sampling methodologies to verify that the structure, system or contents have been returned to a Category 1 or uncontaminated level. (IICRC S500 Standard, 2015)

Potash – The potassium carbonate derived from wood ash.

Potassium permanganate – A chemical ($KMnO_4$) capable of capturing odor molecules in air or combined as a poultice to remove adsorbed odor molecules in a material. Education Note: Potassium permanganate is highly reactive under high moisture content conditions. It will oxidize a wide variety of inorganic and organic substances. Potassium permanganate (Mn 7+) is reduced to manganese dioxide

(MnO_2) (Mn 4+) which precipitates out of solution. All reactions are exothermic. Potassium permanganate is only supplied in dry form.

PowerClaim – An insurance estimating software program that calculates labor and material costs, demolition and cleanup, repair, and restoration costs. For more information go to: http://www.powerclaim.com

Powder cleaning – The process of removing dirt, debris, stains, smoke, soot, and other contaminants by applying and agitating an absorbent powder cleaner on the surface. Education Note: The powder cleaner dislodges and holds contaminants, which are removed along with it. Powder cleaning can be applied as a scouring powder surface abrasive or a blasting media.

Power of Attorney – Authority given to one person or corporation to act for and obligate another, to the extent laid down in the instrument (e.g., contract) which creates the power.

Power washing – The process of washing buildings, decks, driveways, walkways, and contents using a hose or high-pressure system. Education Note: Power washing is a restoration process that utilizes a pressure-washing machine to remove and clean affected surfaces from dirt, smoke, soot, and other remnants.

Powered air-purifying respirator (PAPR) – A pressure demand respirator, which is usually full-face. (1) An air- purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering. (OSHA) (2) A device equipped with a facepiece, hood, or helmet, breathing tube, canister, cartridge, filter, canister with filter, or cartridge with filter, and a blower. (NIOSH) (3) A respirator in which the pressure inside the facepiece in relation to the immediate environment is positive during both inhalation and exhalation.

PPB/ppb – Parts per billion. A unit of measure expressed as parts per billion. PPB is equivalent to 1×10^{-9}. (1) A unit for measuring the concentration of a gas or vapor in air, expressed as parts of the material per billion parts of air. PPB (ppb) is usually used to express measurements of extremely low concentrations of unusually toxic gases. (2) The concentration of a gas or vapor in air, parts (by volume) of the gas or vapor is a billion parts of air. Usually the measurement of ppb is used to express extremely low concentrations of unusually toxic gases or vapors. (3) The concentration of a particular substance in a liquid or solid. Education Note: The term PPB is also used to indicate the concentration of a particular substance in a liquid or solid. To place this measurement in perspective, one part per billion is analogous to one second every 32 years, or one penny out of $10,000,000.

ppb (discussion) – Parts per billion or (1 in 10^9); where ppm is parts per million or (1 in 10^6); and ppt is parts per trillion or (1 in 10^12). (See: PPH)

PPE (utility) **–** The power plant and equipment.

PPE (safety equipment) **–** Personal protective equipment. The correct clothing and respiratory equipment that is needed to perform a job involving hazardous materials and protect the worker. (1)

Specialized clothing worn by workers for protection against hazards. (2) Safety equipment worn by technicians, tradesmen, and restoration personnel. PPE is designed to protect people from exposure to pathogens, chemicals, and hazardous substances. (3) Clothing, helmets, goggles, or other gear designed to protect the wearer's body or clothing from injury by electrical hazards, heat, chemicals, and infection, for job-related occupational safety and health purposes. (RIA) Education Note: PPE includes proper boots, gloves, splash protective clothing, gas protective clothing, Tyvek-like suits, eye protection, hearing protection, air purifying respirators and air supplying respirators It is important that all PPE be donned properly and worn when required. PPE includes NIOSH approved respirators. All emergency response and restoration workers are always required to wear appropriate PPE. (See: Appropriate PPE; APR; PAPR; Personal protective equipment; SCBA)

PPE, appropriate – The personal protective equipment that is most appropriate for a job. When required, PPE must be available and appropriate worn. For more information go to: http://www.osha.gov/SLTC/personalprotectiveequipment/ and http://www.osha.gov/Publications/osha3151.pdf and http://www.osha.gov/OshDoc/data_General_Facts/ppe-factsheet.pdf and https://www.osha.gov/personal-protective-equipment

PPE for Fire Damage Building Assessment – The necessary turnout gear and safety equipment to protect inspectors, project managers and estimators when completing an initial hazard assessment.

PPE for Fire Damage Building Emergency Services – After project supervisors complete a job hazard assessment (JHA), the PPE which is necessary as turnout gear and safety equipment that protects workers when completing emergency services involving board-up and roof wrap; securing the sides, walls and ceilings in fire damaged structures; containing and securing valuables and other important items.

PPE for Fire Damage Building Mitigation – The necessary turnout gear and safety equipment to protect workers when establishing environmental controls, such as temporary power, lighting, ventilation; completing fallout cleanup; inventorying contents; boxing and removing contents; etc.

PPH/pph – Parts per hundred (usually measured as a percent).

PPM/ppm – Parts per million. (1) A unit for measuring the concentration of a gas or vapor in air, expressed as parts of the material per million parts of air (2) A unit of measure expressed as parts per million. Equivalent to 1×10^{-6}. 1 ppm = 10^{-6} or .0001%, and 1% = 10,000 ppm. PPM is the concentration of a gas or vapor in air, parts (by volume) of the gas or vapor in air, parts (by volume) of the gas or vapor in a million parts of air. Education Note: PPM equals mg/kg, and, approximately, mg/L. PPM is used also to indicate the concentration of a substance in a liquid or solid. To place this measurement in perspective, one part per million is analogous to one inch in sixteen miles: or one penny out of $10,000.00.

PPM, PPB, PPT, difference in size – The size difference between parts per million, parts per billion

and parts per trillion. In parts-per-million (10^{-6}) it's like taking one drop of water and diluting it in a 55 gallon drum of solution; in parts-per-billion (10^{-9}), it's like taking one drop of water and diluting it in a gasoline tanker truck; in parts-per-trillion (10^{-12}) it's like taking one drop of water and diluting it into 20 Olympic size swimming pools.

Preconditioner – A preparatory solution applied to carpet fibers prior to cleaning.

Preconditioning – Chemical application of a cleaning solution used to prepare carpet for soil removal through emulsifying, sequestering and saponifying various types of soil.

Precursor – A substance or condition whose presence generally precedes the formation of another, more notable, condition or substance.

Preexisting damage (PED) – Damage to a property, material or item that occurred at an earlier time.

Preexisting damage (PED) to repairable items – In the computation of an award, PED is damage to an item that predates the incident giving rise to a claim. PED is most identified using symbols on household goods shipment inventories. Education Note: Whenever PED is listed on an inventory, claims personnel must determine whether the PED did in fact exist and whether the cost of repairing the item includes repairing PED. The fact that a claimant signed the inventory that listed PED is conclusive evidence that PED did exist unless the member has taken written exceptions on the inventory to the carrier's description of PED. These findings are essential for recovery purposes. Often inspecting the item or calling the repairman who prepared the estimate is the only way to make an effective determination Estimates that do not include repair of PED. 1) If the estimate does not include repair of PED, even if PED is listed on the inventory, no deduction should be made. This fact should be recorded on the chronology sheet and on carrier recovery documents. 2) If repair of PED is included in the estimate, the percentage attributable to repair of PED is deducted (32 C.F.R. § 751.12).

Prefabricated building – A building that has been made offsite, in a plant or construction yard, where parts are pre-engineered components.

Prefabricated platform – A framed assembly of one bay length, incorporating a walking surface that can connect to its support structure in such a way as not be inadvertently dislodged. (One or more prefabricated platform units can be used side by side and end to end to form a working platform.)

Prefabricated scaffold – A scaffold assembled from prefabricated components and manufactured so that the geometry of the scaffolding is predetermined.

Prefinished – (1) A ready-to-use panel with factory-applied finish such as paint, overlays, and coatings. (APA) (2) A flooring material, such as an engineered hardwood floor, already having a finish from the manufacturer. After acclimation and installation, the prefinished floor is ready for use.

Preframed – Panelized building in which wall, floor or roof sections are framed and sheathed at the factory.

Pre-heating – Temperature of the fuel is raised to the point where gases start to volatize.

Pre-ignition – In a fire, volatile materials in fuel are vaporized.

Preignition combustion phase – Thermal or chemical decomposition of fuel at an elevated temperature, which is the pre-combustion stage of burning during which distillation and pyrolysis predominate. Education Note: Heat energy is absorbed by the fuel which, in turn, gives off water vapor and flammable tars, pitches, and gases. These ignite when mixed with oxygen to initiate the flaming combustion phase.

Preliminary determination – (1) A conclusion drawn from the collection, analysis, and summary of information obtained during an initial inspection and evaluation to identify areas of contamination. (IICRC S540 Standard) (2) A conclusion drawn from the collection, analysis, and summary of information obtained during an initial inspection to identify areas of moisture intrusion and actual or potential mold growth and the need for assistance from other specialized experts. (IICRC S520 Standard, 2015)

Pre-loss condition – The appearance and state of repair which existed prior to the loss.

Pre-loss condition – The appearance and state of repair which existed prior to the loss.

Premium (insurance) – A periodic payment by an insured to an insurance company in exchange for insurance coverage.

Preparedness (firefighting; fire loss mitigation) – Condition or degree of being ready to cope with a potential fire situation.

Pre-remediation assessment – The determination by an IEP of Condition 1, 2, and 3 status for the purpose of establishing a scope of work. (ANSI/IICRC S520 Standard)

Pre-remediation inspection – The inspection by a remediator to implement or verify the remediation protocol by ascertaining work site conditions and the extent of work site preparation and to establish project scheduling. (ANSI/IICRC S520 Standard)

Pre-remediation sampling – (1) A preliminary inspection creating a sampling strategy and performing sampling services in order to establish Condition 1, 2, and 3 of buildings, systems and contents. (ANSI/IICRC S520 Standard) (2) A sampling strategy and performing sampling services in order to establish what the pre incident condition of the premises were, and potential results of the remediation will be. (3) A baseline set of data from the environment before mitigation, abatement and remediation takes place.

Preservation after a fire – The application and measures to prevent damage, change or alteration or deterioration. (NFPA 3.3.118)

Preservation conservation – The protection of cultural property through activities that minimize chemical and physical deterioration and damage and that prevent loss of informational content. The primary goal of preservation is to prolong the existence of cultural property. (AIC)

Pre-soak – A soaking operation before washing to remove stains.

Pre-spot – (1) Removal of obvious stains before general cleaning. (2) A cleaning process of treating and removing spots before the overall cleaning procedure takes place.

Prespray – A liquid that acts as a degreaser or conditioner that helps emulsify and suspend grease and grime allowing easier cleaning to take place.

Prespraying – The process of applying a cleaner, degreaser or conditioner on a material or textile.

Pressboard – A strong, highly glazed board sometimes used for case backs, dust proofing or as the underlying structural base for veneers, engraving or vinyl wrap. Pressboard is also known as composition board or particleboard.

Pressed wood products – A group of materials used in building and furniture construction that are made from wood veneers, wood particles, or fibers that are bonded together under heat and pressure with adhesive glues. (EPA)

Pressure boundary – The primary air enclosure boundary separating conditioned air from unconditioned air. For example, a volume of air that has more leakage to the outside than to the conditioned space would be considered outside the pressure boundary, such as vented unconditioned attics, and vented unconditioned crawlspaces. (IICRC S520 Standard, 2008)

Pressure demand respirator – A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation. (OSHA)

Pressure demand respirator, PAPR – A respirator in which the pressure inside the facepiece in relation to the immediate environment is positive during both inhalation and exhalation. (NIOSH)

Pressure differentials, the establishment of – In building remediation, pressure differentials are established between the affected and non-affected area or room. Relative to the contaminate area or room, clean areas or rooms are kept under positive air pressure while contaminated areas or rooms are kept under negative air pressure. When creating negative pressure, the Bioaerosols: Assessment and Control book states a desired negative pressure of –5 to –7 Pascal should be maintained throughout the remediation project, or -0.02 inches of water. Negative pressures can be evaluated by smoke tubes or pencils, visual inspection, or a manometer. (ACGIH "Bioaerosols: Assessment and

Control")

Pressure drop – Difference in pressure between two points in a flow system, usually caused by frictional resistance to fluid flow in a conduit, filter or other flow system. (ASHRAE)

Pressure, negative – (1) A condition that exists when less air is supplied to a space than is exhausted from the space, so the air pressure within that space is less than that in surrounding areas. (EPA) (2) A condition that exists in a building when less air is supplied to a space than is exhausted from that space, so that the air pressure within that space is less than that in surrounding areas. (IICRC S500 Standard, 2006) Education Note: Under negative air pressure condition, if an opening exists, air will flow from surrounding areas into the negatively pressurized space. (EPA)

Pressure washing – (1) The use of water under pressure along with detergents to remove surface contamination such as smoke, soot and ash and oily residues. (2) Applying water, detergent, or other preparations at moderate to high pressure. Education Note: In exterior wildfire smoke cleanup situations, hot water pressure washing (200°F to 300°F) temperatures at the pressure washing machine work best.

Pressure washing, high – Pressure washing systems using high-pressure water at 500 psi or greater. This type of pressure washing service is for outside use only.

Pressure washing, low – Pressure washing systems using low-pressure water between 40-100 psi. This type of pressure washing service is for outside use only.

Pressure washing, medium – Pressure washing systems using medium-pressure water between 100 to 500 psi. This type of pressure washing service is for outside use only.

Pressure washing smoke and soot – The use of water under pressure along with detergents to remove surface contamination such as smoke, soot and ash and oily residues. Education Note: In wildfire smoke building cleanup situations, hot water pressure washing (200°F to 300°F) sprayed on within 5 feet of the treated surface, can remove soot, ash, smoke, and oily residue. This type of pressure washing service is for outside use only.

Pressure washing, ultralow – Pressure washing systems using low-pressure water between 14-40 psi. It is a carefully controlled pressure washing service that can be used indoors.

Pressurized smoke – (1) Combustion products propelled by high heat, temperature differential, or vapor pressure which causes them to penetrate normally enclosed spaces including behind cabinets; ceiling and wall cavities, subflooring; pores of wood, plaster, and gypsum. (2) Smoke and gases that increased in size due to heat which cause moving particles to penetrate porous materials and small spaces. Education Note #1: Pressurized smoke occurs when smoke and other gases from a fire increased in size due to fuel and heat. The heat is causing the moving particles to penetrate confined

areas. Education Note #2: The properties of smoke can change due to changing conditions and gases present. For example, as temperatures rise, smoke can become more intense where pressurized smoke can penetrate small areas such as behind cabinets, and electrical and plumbing outlets.

Prevention – Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuel hazards.

Prevention of significant deterioration (PSD) (mitigation) – A program developed onsite to reduce fire, smoke, acid corrosion and other forms of control that limits further damage to property.

Primary & Secondary particles – "Primary particles" are directly released into the atmosphere by the wildfire combustion processes and turbulent wind. "Secondary particles" are those that form in the atmosphere from other gaseous pollutants from incomplete combustion, particularly sulfur dioxide, nitrogen oxides, ammonia, and volatile organic compounds.

Primary damage – (1) Damage to a building and contents because of direct contact with the cause, such as a wildfire or building fire. (2) Damage caused by the immediate, direct impact of a peril, as opposed to secondary damage which occurs over time. (3) Damage sustained because of direct contact with contaminants (water, soot, fire, body fluids, etc.). Education Note: Examples include staining, swelling, dissolving, cupping, and buckling of hardwood, delamination of furnishings and fixtures, migration of dyes, weakening of adhesives, rusting or corrosion, microbial contamination, etc.

Primary particles – Suspended in the atmosphere as particles from the time of emission, e.g., dust and soot.

Primary pollutant – The main pollutant. The pollutant that can be the most detrimental to humans, other forms of life and the environment. The primary pollutant is distinguished from a secondary pollutant.

Primary pollutant, remediation of – The pollutant that is most hazardous or dangerous that needs to be contained, controlled, or eliminated before remediating all other pollutants.

Prior condition – Pre-existing condition or pre-loss condition.

Prior damage (insurance) – (1) Damage or distress to a property or item that exists before a loss. (2) Physical injury to tangible property, including the resulting use of that property; or loss of use of tangible property that is not physically injured.

Professional Errors and Omissions (insurance) – Coverage pertaining to claims arising from the insured's liability for injuries or damage caused by acts of errors and omissions of the insured while performing duties of his/her profession.

Project – An organized undertaking designed to return structure, systems or contents to an acceptable state or condition that is comparable to that which existed prior to a water intrusion event.

(IICRC S500 Standard, 2015)

Project fire – A fire of such size or complexity that a large organization and prolonged activity is required to suppress it.

Proof of loss – (1) A written statement submitted by the insured to the insurance company, containing certain information required by the insurer as a precondition to closing a claim. (RIA) (2) Documentary evidence required by an insurer to prove a valid claim exists. (III) (3) A signed, written statement from an insured to an insurance company stating the conditions of a loss, in order to determine the insurance company's exact liability under policy provisions, and when those obligations have been satisfactorily met. (IICRC S520 Standard, 2008)

Proof of satisfaction – A statement that is signed by a customer that confirms the work completed by a contractor/restorer is acceptable and satisfactory. A "proof of satisfaction" is *not* the same as "satisfaction guaranteed." (See: Satisfaction guaranteed)

Property – Anything that is owned by a person or entity. Property is divided into two types: "real property" which is any interest in land, real estate, growing plants, or the improvements on it, and "personal property: (sometimes called "personality," which is everything else. "Common property" is ownership by more than one person of the same possession. "Community property" is a form of joint ownership between husband and wife recognized in several states. "Separate property" is the property owned by one spouse only in a community property state, or a married women's sole ownership in some states. "Public property" refers to the ownership by governmental body, such as the federal, state, county, city, or their agencies (e.g., school or redevelopment district. Source reference: Gerald and Kathleen Hill (Legal Dictionary) https://dictionary.law.com/Default.aspx?review=true

Property adjuster / Property loss adjuster – Property adjusters have two major functions to perform: first, that of policy interpretation when losses arise; and second, that of serving as a coordinating link between the insured and insurance company, and often with contractors involved in restoration services. (IICRC S500 Standard, 2006)

Property damage (insurance) – Physical injury to tangible property, including the resulting use of that property; or loss of use of tangible property that is not physically injured ("CGL Insurance Coverage Issues Implicated by Construction Defect Claims" by Robinson & Cole LLP)

Property damage coverage (insurance) **–** An agreement by an insurance carrier to protect an insured against legal liability for damage by an insured's automobile to the property of another.

Property insurance – Insurance that provides financial protection against the loss of or damage to real and personal property caused by perils such as fire, smoke, water, windstorm, hail, explosion, motor vehicles, theft, riot, vandalism, malicious, mischief, riot and civil commotion.

Property inventory – The physical accounting of capital equipment.

Property manager – A person or firm that controls the property of others. The property manager oversees building maintenance, condition, and tenants.

Property, personal – (1) Articles that are moveable and can be separated from the structure, e.g., contents. (2) Things that are moveable and are not attached to the land. Damage to personal property may be covered under the owner's building insurance, a separate policy or rider.

Property, scheduled (insurance) – Personal property that is individually listed on an insurance policy that is often accompanied by a description and appraisal.

Property survey – A survey conducted to determine the boundaries of a property.

Protection factor (PF) – The number assigned by OSHA to illustrate the level of protection for a type of respiratory protection equipment.

Protection films, stone floor – Plastic film products that protect finished stone flooring during remediation, restoration, and reconstruction. (See: Filmtech; Plasticover; Poly-Tak)

Protection program, respiratory – The standard set by government that protects workers in the workplace from harmful airborne substances. Education Note: In the U.S., contractors must provide workers with a respiratory protection program based on federal codes of regulations (CFRs) mainly CFR 1910.134.

Protection respiratory – (1) The means by which humans are protected from inhaling harmful particles, vapors, and gases. (2) Devices that are intended to protect the wearer's respiratory system from overexposure by inhalation of airborne contaminants. (3) Devices worn that are expected to protect persons from exposure or overexposure to harmful airborne pollutants and gases.

Protective equipment – (1) Personal protective equipment that protects workers health and safety while working in unsafe, hazardous, or contaminated workspaces. (2) Any equipment that protects the building, contents or indoor environment from damage or contamination, or from further damage or contamination.

Protective environment – In remediation and restoration, taking appropriate measures to protect an interior space from damage or contamination, from further damage or contamination. Education Note: In non-health care settings, a protective environment may require engineering a negative air HEPA filtration system having more than 4 air changes per hour (>4 ACH). (IICRC)

Protein – (1) Any of a group of complex organic compounds that are composed of amino acids. (2) Any number of naturally occurring, complex long-chain amino acids having high molecular weight that are essential components for growth and repair of living cells and their related tissue. Education Note: Protein is compromised of the element's oxygen, carbon, hydrogen, nitrogen, sulfur, and occasionally other elements including iron and phosphorous.

Protein fire (fire damaged restoration) – (1) The slow combustion or carbonization of meat, fish or fowl, which generates a highly obnoxious and persistent odor, combustion byproducts is carried in air that lands on surfaces leaving behind a clear and often invisible residue. (2) The burning of animal fats such as beef, poultry, fish. In some situations, a protein fire has little carbon waste. Instead it can burn to a fine clear mist. Education Note #1: A protein fire often has an obnoxious odor that is capable of penetrating even the smallest pores of wood and drywall, inside cabinets and appliances and even interior wall cavity spaces through light fixtures, fans, exhaust vents, and outlets. Education Note #2: Protein odor can penetrate the smallest of pores and spaces. Protein fires can be an isolated fire such as an over where a turkey is charred. In this instance there is no other visible damage besides a strong smell. Protein fire residue produces a baked-on finish. This strong finish requires scrubbing and degreasing to clean walls, cabinets, and floors. Even when surfaces are their cleanest, some odors persist (will not have gone away) because they penetrated cracks and pores of surrounding materials, back of cabinets, inside walls and appliances.

Protein residue (fire damaged restoration) – A nearly invisible residue with a pungent odor, created by smoldering protein (meat, poultry) that burnt on a stove or in an oven.

Protein smoke (fire damaged restoration) – Smoke that contains oils and fats from protein-based substances. Education Note: Fire involving protein such as meat or animal fats, the situation is known as a protein fire. Smoke from a protein fire is called protein smoke. Education Note: Protein smoke has a foul odor and it can penetrate exceedingly small areas. To breakup protein smoke, it requires the use of degreasing chemicals and cleaners that must meet all affected surfaces.

PRV – Post remediation verification.

PS – Point source. A stationary or confined conveyance where pollutants may be discharged. These are clearly identifiable sources, which includes pipes, ditches, channels, tunnels, etc.

PSA – Preliminary site assessment.

PSD – Prevention of significant deterioration. A program developed onsite to reduce fire, smoke, acid corrosion and other forms of control that limits further damage to property.

Puff back – (1) An uncontrolled discharge of soot from a clogged or malfunctioning heating system. (2) An uncontrolled explosion in a heating system which dislodges, and broadcasts accumulated soot throughout the building. (3) A clogged or malfunctioning furnace discharge deposited soot throughout the house and cause smoke and soot damage to the structure and its contents. (4) Wood burning in a fireplace that fills a room because the fireplace chimney's vent is closed. Education Note: A puff-back results in fine particles of soot that will deposit throughout an area, room, or building.

Pumice blasting – A type of surface plastic powder that removes surface contamination. Pumice powder is used as an abrasive and is among the softest of all blasting media. Consider using pumice

powder for less aggressive operations where the protection of the surface is of supreme importance. Pumice is also the best media choice for tumbling plastics.

Punch list – (1) A list of discrepancies in a construction project that need to be corrected by the contractor, typically at the end of the project. (2) A term describing a list of tasks necessary to finalize a substantially complete scope of work. (RIA)

Pure water / Purified water – Water from a source that has removed all impurities. Distilled water is the most common form of pure water. Pure water can be purified by carbon filtration, micro-porous filtration, and ultraviolet oxidation. Some places use a combination of purification processes. Pure water can be used in cooking, drinking, scientific studies, and laboratories. Pure water has a neutral pH of 7, which means it is neither acidic (<7) nor basic (>7). "Pure water does not conduct electricity. Water becomes a conductor once it starts dissolving substances around it." (USGS: *Facts and Figures about Water*) (See: Distilled Water) Education Note: Pure water/deionized water is preferred in fire damage restoration where electrical and electronic components must be cleaned.

Pyrolysis – (1) The second stage of ignition during which energy causes gas molecules given off by a heated solid fuel to vibrate and break into pieces. Education Note: Pyrolysis is the chemical decomposition of a condensed substance by heating. It does not involve reactions with oxygen or any other reagents but can take place in their presence. Pyrolysis is a special case of thermolysis and is most commonly used for organic materials; extreme pyrolysis, which leaves only carbon as the residue, is called carbonization and is related to the chemical process of charring. (2) The chemical decomposition of a compound into one or more other substances by heat alone; pyrolysis often precedes combustion. (3) The thermal or chemical decomposition of fuel at an elevated temperature. This is the preignition combustion phase of burning during which heat energy is absorbed by the fuel which, in turn, gives off flammable tars, pitches, and gases. (4) The chemical decomposition of a substance by the action of heat. Pyrolysis is often used to refer to a stage of fire before flaming combustion began. In fire science, no assumption is made about the presence or absence of oxygen. (ISO 13943) (See: Pyrolyzed calcium oxidation; Phytoliths)

Pyrolysis, the understanding of – Pyrolysis is a chemical changed affected by heat, and it is the second stage of ignition during which energy causes gas molecules given off by a heated solid fuel to vibrate and break into pieces. Burning (sometimes smoldering) may occur, without the air of oxygen. In other words, pyrolysis is the thermo-chemical decomposition of organic materials at elevated temperatures in the absence of oxygen. Education Note #1: In general, pyrolysis of organic substances produces gas and liquid products and it leaves a solid residue richer in carbon content. Extreme pyrolysis, which leaves mostly carbon as the residue, is called carbonization. Pyrolysis differs from other high-temperature processes like combustion and hydrolysis in that the fire does not involve reactions with oxygen, water, or any other reagents. In practice, it is not possible to achieve a completely oxygen-free atmosphere. Because some oxygen is present in any pyrolysis system, a small amount of oxidation occurs. Education Note #2: Pyrolysis is the chemical decomposition of a condensed substance by heating. It does not involve reactions with oxygen or any other reagents but can take place in their presence. Pyrolysis is a special case of thermolysis and is commonly used for

organic materials; extreme pyrolysis, which leaves only carbon as the residue, is called carbonization and is related to the chemical process of charring. Education Note #3: Pyrolysis can also be explained as: the thermal decomposition of biomass at high temperatures (greater than 400°F, or 200°C) in the absence of air. The product of pyrolysis is a mixture of solids (char), liquids (oxygenated oils), and gases (methane, carbon monoxide, and carbon dioxide) with proportions determined by operating temperature, pressure, oxygen content, and other conditions.

Pyrolyzed – A chemical process in which a compound is converted to one or more products by heat.

Pyrolyzed calcium oxidation – The process of burning plant matter (lignin) under different temperature conditions during a wildfire, where the burning of the biofuel leaves behind calcium (Ca) deposits. Calcium oxalate (CaOx) crystals occur in many plant species, and is the building block of lignin, where it can dominate the dry weight of the plant. When burned, pseudomorphs of calcium oxalate phytoliths formed of calcium carbonate, it is commonly found in soils of burnt plants and heated wind that brings in CaOx in the form of ash into buildings. Also, when burned, calcium oxalate loses its hydrocarbon portion and forms CaO, which recarbonates in the atmosphere's CO_2 (carbon dioxide) to form $CaCO_3$ (calcium carbonate). Depending on plant matter ash, calcium oxalates can have a pH between 4.5 to 8, increasing hysteresis, where oxidation may cause damage to some electrical and electronic components.

Pyrolyzed building materials and contents – Materials that have undergone a physical or chemical change due to heat or gases.

Pyrometer – (1) One of several types of devices designed to measure surface temperature. (2) Any instrument used for temperature measurement. A radiation or brightness pyrometer measures visible energy and relates it to brightness or color temperature. An infrared pyrometer measures infrared radiation and relates it to target surface temperature.

Pyrophoric – (1) A substance that will spontaneously ignite in an air temperature of 130°F (54.5°C) or greater. (2) A substance that is water reactive, reacting violently with water or high humidity, often igniting upon contact. In this situation spontaneous combustion occurs at relatively low ignition temperatures.

Pyrophoric liquid – (1) Any liquid that ignites and burns spontaneously in dry or moist air at or below 1,300°F. (NIOSH) (2) A liquid which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.

Pyrophoric material – A material that ignites spontaneously when exposed to air.

Pyrophoric solid – A solid which, even in small quantities, is likely to ignite within five minutes after meeting air.

Pyrophytes (wildland fire management) – Species of fire-loving plants that must be subjected to fire to complete a part of their life cycle.

Pyrotechnic article – An article containing one or more pyrotechnic substances.

Pyrotechnic substance – A substance or mixture of substances designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative, self-sustaining exothermic (heat-related) chemical reactions.

Pyrotechnic teargas – A type of hot-gas incendiary teargas device (grenade, projectile) shot by rifles and grenade launcher. The projectile is designed to explode on contact, producing heat over a few seconds to several minutes while releasing CS teargas. The production of heat can cause building materials and contents to catch on fire. A common type of military and police pyrotechnic teargas includes a M203 or a M79 grenade launcher and a M-651 40-mm cartridge.

(Q)

Qualified laboratory – EMLAP, A2LA, NELAP, or equivalent program or individual (e.g., National Registry of Microbiologists, Public Works Canada Accredited Mycologist, or equivalent program). (IICRC S520 Standard, 2015)

Qualitative fit test (QLFT) – (1) A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent. (2) An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Qualitative measurement – In thermography, the process of obtaining and interpreting thermal images based on thermal contrast in order to identify anomalies; the purpose is more to determine where a temperature difference exists than what the temperature difference is between the target and its surroundings.

Quality assurance – (1) The system of procedures used in selecting a good quality approach in management and labor within an organization and a restoration job site. (2) A program for the systematic monitoring and evaluation of the various aspects of a project, service, or facility to ensure that standards of performance are being met. (RIA) (3) All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality. (NIH) (4) A system of procedures, checks, audits, and corrective actions to ensure that all technical, operational, monitoring, and reporting activities are of the highest achievable quality. (USEPA)

Quality control – (1) Post-restoration or remediation activities performed by a restorer that are designed to check on the effectiveness of the remediation, as a pre-screening, prior to post remediation verification. (2) A system of procedures and standards that controls the quality of the production and installation of materials at a restoration job site. (RIA) (3) Systems and procedures

that ensure products and services meet or exceed performance standards. (4) Activities performed by a remediator that are designed to assure the effectiveness of the remediation process. (IICRC S520 Standard, 2008 and 2015)

Quantity, large (contents management; contents manipulation) – (1) A room that has a large amount of contents. (2) A term in Xactimate estimating describing a number of contents that must be moved (manipulated) or removed. Education Note: A room having a large amount of contents doesn't mean all contents must be handled, moved or packed out; but when a large segment or all contents must be touched, moved or processed, billing may identify the services as a "large quantity."

Quantity, medium (contents management; contents manipulation) – (1) A room that has a medium (normal) amount of contents. (2) A term in Xactimate estimating describing a number of contents that must be moved (manipulated) or removed. Education Note: A room having a medium amount of contents that must be touched, moved, or processed, billing for that room will identify these services as a "medium quantity."

Quantity, small (contents management; contents manipulation) – (1) A room that has a small (minimum) amount of contents in it. (2) A term in Xactimate estimating describing a number of contents that must be moved (manipulated) or removed. Education Note: A room having a small amount of contents that must be touched, moved, or processed, billing for that room will identify these services as a "small quantity."

Quiescent sampling – The act of sampling air or water while it is not in a state of motion.

(R)

R-value – (1) A measurement of resistance to heat transfer of insulating materials. (2) A unit of thermal resistance used for comparing insulating values of different materials; the higher the R- value of a material, the greater its insulating properties.

Radiant (radiant heat) **–** The transfer of heat energy by rays such as the sun or a heat source. Heat is not considered present until the energy strikes and is absorbed by an object.

Radiant burn – (1) A burn to a fireman or worker which is received from a radiant heat source. (2) The burn to building materials and contents from a radiant heat source.

Radiant heat flux – The amount of heat flowing through a given area in a given time, usually expressed as calories/square centimeter/second.

Radiant heat transfer – Heat that occurs when there is a large difference between the temperatures

of two surfaces that are exposed to each other but are not touching.

Radiant heating – A method of heating, usually consisting of a forced hot water system with pipes placed in the floor, wall, or ceiling. Radiant heating is also electric heating panels.

Radiation – (1) Energy transfer across transparent spaces by electromagnetic means such as infrared wavelengths. (2) The propagation of energy in free space by virtue of joint, undulatory variations in the electric or magnetic fields in space, (i.e., by electromagnetic waves). Education Note #1: The transfer of heat in straight lines through a gas or vacuum other than by heating of the intervening space. Education Note #2: The amount of energy transferred will be controlled in conduction by temperature difference ($t2 - t1$); in convection within a medium by density differences or forced means, or both; and in radiation by the difference in the fourth power of absolute temperature. In any system exhibiting energy transfer, any of these mechanisms may occur singly or in combination.

Rapid response – (1) The time it takes to respond to an emergency call. (2) The ability to safely respond in a timely manner. (3) The time it takes from receiving a phone call about building damage to the time it takes to getting to the building. Education Note: In the water and fire damage restoration industry an average response time is 1 to 2 hours depending on circumstances.

Rate of spread (wildfire) – The relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

RCC (insurance) – Replacement cost coverage. An insurance policy rider that provides for the payment of the actual replacement cost, as opposed to depreciation value, of items (usually contents) that are destroyed during a covered peril.

RCV – Replacement cost value. The cost to replace property with the same kind of material and construction without deduction for depreciation.

Re-entrainment – Situation that occurs when the air is being exhausted from a building is immediately brought back into the system through the air intake and other openings in the building envelope.

Re-entrainment of smoke and soot (wildfire building and content cleaning) – (1) Situations where the building was just or recently cleaned, and smoke and soot outside has reenter the cleaned space. Education Note: Example of re-entrainment of smoke and soot include: 1) wildfire affected land where air currents pickup soot and ash are deposited into cleaned and deodorized buildings; 2) Situations where a building underwent cleaning and deodorization but the ventilation system was not cleaned and deodorized before it was turned on.

Re-entry – A situation that occurs when the air that is being exhausted from a building is immediately brought back into the system through the air intake and other openings in the building envelope.

Reaction – A chemical transformation or change. The interaction of two or more substances to form a new substance.

Readily combustible solid – Powdered, granular, or pasty substance or mixture which can be easily ignited by brief contact with an ignition source, such as a burning match, and for which flame spreads rapidly.

Reasonable maximum exposure – Highest exposure that is reasonably expected to occur. Education Note: Typically, the 95% upper confidence limit of the toxicant distribution is used: if only a few data points (6-10) are available, the maximum detected concentration is used.

Reflected-light microscopy (RLM) (laboratory) – The scientific study of opaque particles by means of a polarizing reflected-light microscope. Systematic observations of reflectance and hardness are made to identify individual particles such as minerals, and the interpretation of textural relationships where studies may reveal the sequence of mineral formation. It is an important technique in the study of metallic mineral deposits, most metals, ores, ceramics, many polymers, semiconductors (unprocessed silicon, wafers, and integrated circuits), slag, coal, plastics, paint, paper, wood, leather, glass inclusions, and a wide variety of specialized materials. Education Note: Because light is unable to pass through these specimens, it must be directed onto the surface and eventually returned to the microscope objective by either specular or diffused reflection. As mentioned, such illumination is most often referred to as episcopic illumination, epi-illumination, or vertical illumination (essentially originating from above), in contrast to diascopic (transmitted) illumination that passes through a specimen. Reflected light microscopy is often referred to as incident light, epi-illumination, or metallurgical microscopy, and is the method of choice for fluorescence and for imaging specimens that remain opaque even when ground to a thickness of 30 microns.

Reflected (Reflective)-light microscopy vs. Transmission microscopy (laboratory) – Reflected light microscopy, also called episcopic illumination or just epi-illumination, uses top-down lighting to illuminate the specimen and the light is reflected back from the specimen to the viewer. Education Note: This type of illumination is most often used with opaque specimens like metallurgical samples. Transmitted light microscopy, also called diascopic illumination, uses bottom-up illumination where the light is transmitted through the specimen to the viewer. This type of illumination is most often used with translucent specimens like biological cells.

Relative humidity (rH) – (1) The relationship between air volume and the amount of moisture it holds at a specific temperature expressed as a percentage of that air's total moisture holding capacity; i.e., the amount of moisture in a given volume of air, expressed as a percentage of the total moisture holding capacity of that volume of air, at a given temperature. Education Note #1: As temperature increases, humidity "relative" to total air volume decreases; conversely, as temperature decreases, rH increases. (2) The ratio of the actual vapor density (which indicates the amount of water vapor present in the air) to the theoretical maximum (saturation) vapor density at the same temperature, expressed as a percentage. This may be expressed as: U = 100 e/e´w where "e" is actual vapor pressure and e´w saturation vapor pressure with respect to water at the same temperature. Education Note#2: In more

simple terms, rH is the ratio of the amount of moisture in the air, to the maximum amount of moisture that air would contain if it were saturated. The ratio of the actual vapor pressure to the saturated vapor pressure.

Remedial investigation – An investigation that collects information for identifying, evaluating, and developing effective remediation and restoration strategies including: 1) determining the nature and extent of the damage and contamination; 2) evaluating worker health and environment risk assessment; 3) strategizing methods and procedures to mitigate and remediate damage; and 4) evaluate the effectiveness of proposed actions.

Remediate – To fix a problem. As it relates to mold contamination, remediation includes fixing the water/moisture problem and the cleaning, removal, and/or replacement of damaged or contaminated materials. (AIHA's Facts About Mold, December 2011)

Remediate; Remediation, water/sewage – (1) A process of actions applied by the restorer to correct damage affecting property. (2) Cleanup and other actions necessary to lessen, control or remove contaminants or conditions that affect people and property. (3) To correct or counteract, to remedy. (IICRC S500 Standard, 2006) Education Note: In many cases, remediation actions are based on the finding of a remedial investigation and job hazard assessment.

Remediate; Remediation, mold – (1) To remove microbial contamination consistent with IICRC standards, including the S500 remediation contractor, where the remediation company or firm is responsible for the remediation project; the S520 and S540 Standard, the remediation contractor is responsible for removing contamination consistent within the standard.

Remediation – To correct or counteract, or to remedy.

Remediation – (1) Giving or providing a remedy. (2) To correct or counteract, to remedy. (3) Removal of pollution or contaminants from environmental media such as soil, groundwater, sediment, or surface water for the general protection of human health and the environment.

Remediation action plan – A written plan that describes all aspects of a remediation project starting with tailgate safety meetings, containment and control, methods and procedures of remediation, and clearance procedures. Barring unforeseen circumstances, once remediation and clearance is complete, the restoration and repair phase can begin.

Remediation contractor – The remediation company or firm that is responsible for the remediation project. (ANSI/IICRC S-520 Standard)

Remediation evaluation, post – An inspection performed by a remediator after a remediation project, which can include visual and olfactory methodologies to confirm that the remediation process has been completed. (ANSI/IICRC S520 Standard)

Remediation, mold – (1) The process of removing contamination consistent with the ANSI/IICRC

S-520 Standard. (2) The professional practice of completing mold removal from buildings, contents, and the indoor environment.

Remediation of a primary pollutant – The pollutant that is most hazardous or dangerous that needs to be contained, controlled, or eliminated before remediating all other pollutants.

Remediation, post – On completion of work, establishing a sampling strategy and perform sampling after remediation to verify that the building, system, or contents are returned to a condition as close as possible to their pre-incident condition. Education Note: Post remediation follows remediation, meaning, after removal of contaminants and contaminated materials, inspection and if necessary, testing is performed to gain job closure. (ANSI/IICRC S-520 Standard)

Remediation supervisor – An individual trained to supervise work being conducted by remediation workers. (IICRC S520 Standard, 2008)

Remediation verification, post – An inspection and assessment performed by an IEP after a remediation project, which can include visual inspection, odor detection, analytical testing or environmental sampling methodologies to verify that the structure, system or contents have been returned back to Condition 1 status. (ANSI/IICRC S520 Standard)

Remediation worker – A trained individual who works for a company that provides remediation services. (IICRC S520 Standard, 2008)

Remediator – (1) A competent person or company who remediates damaged property. (2) The remediation firm or contractor, or authorized representative, who is responsible for the remediation of damaged structures, systems and/or contents. (IICRC S500 Standard, 2015) (3) The remediation contractor or the remediation worker. (IICRC S520 Standard, 2008) (See: Remodeler; Renovator; Restorer)

Remedy – (1) Anything, such as a medicine or therapy, that relieves pain, cures disease, or corrects a disorder. (2) The process of cleaning, sanitizing, deodorizing, repairing, or replacing something that is broken or in disrepair. (See: Remediation)

Remedy, selected – The remedial action selected and approved through the signing of a contract or change order.

Remodeler – A licensed construction expert who is qualified to remodel physical components of a structure; adds or takes away structure components. (See: Remediator; Renovator; Restorer)

Remodeling – The practice of altering existing conditions and adding new space to existing structures.

Removable – Capable of being opened, dislodged, or transferred to another location easily.

Removal – In asbestos abatement, all operations where ACM and/or PACM are taken out or stripped from structures or substrates and include demolition operations.

Removal action / Remedial action – An immediate action that addresses a release or threatened release of hazardous substances, such as containing waste from a building fire, sewage backflow or water damage. Education Note: Removal action is a response to reduce or eliminate further problems; halt the further movement of contaminants.

Removal advice, soot – Professional advice to building owners, managers and engineers that comes from restorers and reliable third-party resources.

Removal of soot using wet cleaning methods – A detergent washing process where all impacted surfaces are cleaned one or more times until soot and smoke film is removed.

Removal of soot using dry sponge – A chemical sponging technique that removes loose "dry" soot particles and bonds them to the sponge.

Removal of soot using dry vacuuming – The removal of soot particles using a vacuum (HEPA vacuum) and soft bristle nozzle attachment.

Removal, source – The removal of the largest mass of a contaminant such as water and sewage, smoke, char and soot.

Remove and replace – The process of removing a building material or content for disposing the original item and replacing it with a new one. Remove and replace is commonly applied in fire, water, mold and sewage contamination situations.

Remove and reset (contents) – (1) The manipulation by means of picking up an item and moving it to another space. (2) The detaching of an item such as a toilet and reinstalling it at a later time, such as a toilet a sink or vanity. (3) The process of removing a building component, appliance, or content to facilitate remediation or restoration work. (4) Reinstalling/resetting the same item back in place.

Remove and restore – The process of removing a building material or content for the purpose of restoring (repairing, refinishing) so it can be returned to pre-loss condition.

Renovation – The alteration in any way of one or more structural components, excluding demolition.

Renovator (person) – (1) One who renovates (repairs) things. (2) An individual who either performs or directs workers who perform renovations.

Renters / Tenants (insurance) – Coverage for the contents of a renter's home or apartment and liability. Tenant policies reflect homeowner's insurance, except they do not cover the structure. Covers inside structure changes such as carpeting, kitchen appliance, and built-in bookshelves.

Repair – The fixing or restoration of an item or material.

Repair of items (insurance) – In the computation of an award involving items that can be economically repaired, the cost of repair or an appropriate loss in value is the measure of the loss. Education Note: The cost of repair may be the actual cost, as demonstrated by a paid bill, or reasonable estimated costs, as demonstrated by an estimate of repair prepared by a person in the business of repairing that type of property.

Repairs, temporary – (1) The use of equipment and supplies that secures or mitigates property damage or supports a structure until rebuilding activities begin. (2) A property restoration reference to structural or content related work for purposes of securing property, mitigating damage, or supporting rebuilding activity.

Replace – (1) To provide a property or component as a substitute for one which has been damaged or destroyed; where facsimile replacement is not feasible, the new article should be the closest equivalent currently available from regular sources. (2) To provide an equivalent property or building component as a substitute for that which has been damaged or destroyed. (RIA)

Replacement air – Air deliberately brought into a structure to compensate for the air being consumed or expelled.

Replacement cost (insurance) – (1) Based on calculation, the method of computing the fair value of an item insured at today's cost. (2) The current retail price of an equivalent property. (3) An insurance coverage which pays the full cost of repair, or replacement of items damaged beyond economical repair, payable when the repair or replacement is performed. (4) Insurance that pays the dollar amount needed to replace damaged personal property or dwelling property, without deducting for depreciation. Education Note: Replacement cost is not market value but is instead the cost to replace an item or structure at its pre-loss condition. By this method of determining value, damages for a claim would be the amount needed to replace the property using new materials.

Residue – (1) The remnants of smoke, soot, gases after combustion. (2) The remnant of smoke, soot and ash left on a surface after cleaning.

Replacement cost coverage (RCC) (insurance) – (1) Today's cost to replace an item with "Like Kind and Quality." (2) A rider that provides for the payment of the actual replacement cost, as opposed to depreciation value, of items (usually contents) that are destroyed during a covered peril. (ANSI/IICRC S500 Standard)

Replacement cost insurance – Insurance designed to provide coverage based on full replacement cost without deduction for depreciation on any loss sustained subject to the terms of the co-insurance clause. Education Note: This coverage applies to both building and contents items as specified on the face of the policy. No deduction is taken for depreciation in arriving at the proper amount of insurance needed to comply with the coinsurance clause.

Replacement cost "homeowner" – The amount needed to replace an insured's damaged or destroyed property with one of a like kind and quality, equivalent to actual cash value, minus physical depreciation (fair wear and tear) and obsolescence.

Replacement cost "minimum" – The cost to repair or replace property using new materials of like kind and quality with no deduction for depreciation.

Replacement cost value (RCV) (insurance) – The cost to replace property with the same kind of material and construction without deduction for depreciation. (FEMA)

Replacement (new for old) coverage – An insurance policy rider that provides for the payment of the actual replacement cost, as opposed to depreciated value, of items (usually contents) that are destroyed during a covered peril.

Residual smoke (building fire) – Smoke produced by partially burnt carbon materials and particles.

Residual smoke (wildfire) – Smoke produced by a smoldering material. The flux of smoke originating well after the active flaming combustion period with little or no vertical buoyancy and, therefore, most susceptible to subsidence inversions and down-valley flows.

Residual smoke film – Objects and surfaces having the settled byproducts of combustion including chemicals and particles.

Residue – (1) Any unremoved material that is left on a surface or in a fabric following cleaning. (ANSI/IICRC S500 Standard) (2) in biology, a contaminant remaining in an organism or in other material such as food or packaging, following exposure. (IUPAC)

Residue, fire – (1) Materials carried by air, smoke, water, or other substance that remains in air or on surfaces after the transporting medium is removed or has dissipated. (2) The remnant of smoke, soot, gases after combustion. (3) The remnant of smoke, soot and ash left on a surface after cleaning. Education Note #1: Common residuals in fire damaged buildings include soot, char, and ash. The components in soot and char can include glucans, creosols, polycyclic aromatic hydrocarbons (PAHs); volatile organic hydrocarbons (VOCs) including guaicols (methoxy phenols) and syringols (dimethoxy phenols), which are produced during the pyrolysis of wood lignin. Education Note #2: VOCs from burnt matter can also leave behind a number of other constituents such as benzene; aldehydes such as formaldehyde and acrolein; a wide variety of PAHs, including pyrene, phenanthrene, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene; and aerosolized particulate matter, principally in the $PM_{2.5}$-size range as mitigation, remediation and cleaning occurs.

Residue, removal – The removal of a substance that was left on a surface after general cleaning.

Residue, smoke – Combustion byproducts that remain after the settlement or dissipation of smoke.

Respirable particles – Airborne particles of combustion products, dust, and pollen. Education Note:

Health effects from exposure to respirable-size particles in the air depend on the types and concentrations of particles present, the frequency and duration of exposure, and individual sensitivity. Health effects can range from irritation of the eyes and/or respiratory tissues to more serious effects, such as cancer and decreased lung function. Biological particles such as animal and insect allergens, viruses, bacteria, and molds, can cause allergic reactions or infectious diseases (Public Health, North Carolina)

Respirable particles PM2.5 – Airborne particles that penetrate deep into lungs. Particles having an aerodynamic diameter <=2.5 microns. $PM_{2.5}$ particles settle slowly out of air because they are so light and any form of air movement keeps them airborne (e.g., several hours to several days). Wildfire soot particles can cover hundreds of miles such as from Los Angeles to Las Vegas.

Respirable particles PM10 – Airborne particles having an aerodynamic diameter <= 10 microns. Particles < 5 microns in size can penetrate into the lower respiratory tract.

Respirable size particulates – Particulates in the size range that permits them to penetrate deep into the lungs upon inhalation.

Respirator – (1) A safety device designed to protect the wearer from inhaling harmful dusts, fumes, vapors, and/or gases. (2) Any device designed to provide the wearer with respiratory protection against inhalation of a hazardous atmosphere. (NIOSH)

Respirator, approved – A device which has met the requirements of 30 CFR Part 11 and is designed to protect the wearer from inhalation of harmful atmospheres and has been approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA).

Respirator (APR), air purifying – (1) A filter cartridge half-face or full-face respirator having the proper filters to remove known or suspected airborne contaminates so they will not be allowed to enter the wearer's nose or lungs. (2) A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air- purifying element. (OSHA) Education Note: An air-purifying respirator cleans contaminants from the air via cartridges and/or filters before the air is inspired by the wearer. APRs are the most used respirators and are available in half-mask, full-face or powered units. Properly worn, the air purifying respirator provides the remediation technician with safe, clean, uncontaminated air to breathe.

Respirator cartridges – Various types of particulate cartridges that can capture airborne particles down to 0.3 microns in size along with chemical cartridges that are designed to capture specific airborne gases and vapors.

Respirator, continuous flow – An atmosphere-supplying respirator that provides a continuous flow of breathable air to the respirator facepiece. (OSHA) (2) A respirator that maintains air flow at all times, rather than only on demand. However, it may not maintain positive pressure within the mask at all times. Negative pressure conditions may occur during inhalation involving strenuous activity.

(NIOSH)

Respirator decision logic (RDL) – Respirator selection guidance developed by NIOSH that contains a set of respirator protection factors.

Respirator, demand – A respirator in which the pressure inside the facepiece in relation to the immediate environment is positive during exhalation and negative during inhalation.

Respirator, disposable – A respirator that is discarded after the end of its recommended period of use, after excessive resistance or physical damage, or when odor breakthrough or other warning indicators render the respirator unsuitable for further use.

Respirator, dust mask – Particulate respirators/dust masks only protect the wearer against particles. Education Note: Dust mask-type respirators do not protect against chemicals, gases, or vapors, and are intended only for low hazard levels. The commonly known "N-95" filtering face piece respirator is one type of particulate respirator used in hospitals to protect against infectious agents and workers in certain types of remediation and restoration projects.

Respirator, emergency situation – Any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant. (OSHA)

Respirator, emergency use situation – A situation that requires the use of respirators due to the unplanned generation of a hazardous atmosphere (often of unknown composition) caused by an accident, mechanical failure, or other means and that requires evacuation of personnel or immediate entry for rescue or corrective action. (NIOSH)

Respirator filter breakthrough – The penetration of challenge material(s) through a gas or a vapor air-purifying element. The quantity or extent of breakthrough during service life testing of the filter is often referred to as the percentage of the input concentration. (NIOSH)

Respirator, full-face – Filtering face piece respirator that fits over the eyes, nose and mouth.

Respirator, half-face – Filtering face piece that fits over the nose and mouth.

Respirator, orinasal – A respirator that covers the nose and mouth and that generally consists of a quarter - or half-facepiece. (NIOSH)

Respirator, particulate – Air-purifying respirators (e.g., N-95, N-100; P-95 - P-100; HEPA) that remove specific size particles out of the breathing zone.

Respirator, positive pressure – A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator. (OSHA)

Respirator, pressure demand – A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation. (OSHA)

Respirator program administrator – The person responsible for all aspects of the respirator program with full authority to make decisions to ensure its success. Education Note: The administrator must have sufficient knowledge (obtained by training or experience) to develop and implement the program. Preferably, he/she should have a background in industrial hygiene, safety, health care or engineering.

Respirator, supplied-air (or airline) respirator (SAR) – An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user. (NIOSH) Education Note: SAR is different from the Air Purifying Respirator (APR) in that the air that is breathed by the individual does not come from the atmosphere in the area where work is performed. Air that is breathed with a SAR system comes either an air bottle carried by the individual, or an airline system that either uses bottles or compressors that supply air from an outside clean-air source.

Respirators, powered air-purifying (PAPR) – An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

Respirators, single-use dust (dust and mist) – Respirators approved for use against dusts or mists that may cause pneumoconiosis and fibrosis. (NIOSH)

Respiratory inlet covering – The portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, a helmet, a hood, a suit, or a mouthpiece respirator with nose clamp.

"*Respiratory Morbidity in Office Workers in a Water-Damaged Building*" – A NIOSH study that identifies biological hazards and health condition issues in water damaged buildings. For more information go to: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1278490/

Respiratory protection – (1) The means by which humans are protected from inhaling harmful particles, vapors, and gases. (2) Devices that are intended to protect the wearer's respiratory system from overexposure by inhalation of airborne contaminants. (3) Devices worn that are expected to protect persons from exposure or overexposure to harmful airborne pollutants and gases. (3) Devices that should protect the wearer's respiratory system from overexposure by inhalation to airborne contaminants. Education Note: Respiratory protection is used when workers must work in areas where they may be exposed to concentrations of materials in excess of allowable exposure limits.

Respiratory protection factor – The assigned protection factor given to types of respirators. For more information go to https://www.osha.gov/Publications/3352-APF-respirators.pdf and https://www.nrc.gov/reading-rm/doc-collections/cfr/part020/part020-appa.html

Respiratory protection program – The standard set by government that protects workers in the

workplace from harmful airborne substances. Education Note: In the U.S., contractors must provide workers with a respiratory protection program based on federal codes of regulations (CFRs) mainly CFR 1910.134.

Respiratory sensitizer – A substance that induces hypersensitivity of the airways following inhalation of the substance. (OSHA)

Respiratory system – (1) The human breathing system. This includes the lungs and all passages to the air outside the body (trachea or "windpipe," larynx, mouth, and nose), plus the associated nervous system and circulatory supply components. (2) The organs used in breathing such as the nose, throat, larynx, trachea, bronchi, and lungs. This system takes in oxygen from the air and expels carbon dioxide.

Responding to cleaning – (1) Contaminated materials that respond positively to cleaning. (2) The release of fire and other residues to a satisfactory degree by the application of restorative cleaning procedures.

Response – (1) That portion of incident management in which personnel are involved in controlling a hazardous materials incident (ANSI/NFPA 471). (2) Immediate actions to save lives, protect property and the environment, and meet basic human needs. Response also includes the execution of emergency plans and actions to support short-term recovery. (FEMA)

Response (biology) – That proportion of an exposed population with a defined effect or the proportion of a group of individuals that demonstrates a defined effect in a given time at a given dose rate.

Response, 24-hour – The response time day or night, weekend and holidays, a restorer provides in responding to emergency situations.

Response, immediate (medical) – An emergency response to a location within a fast but safe period of time. Education Note: In emergency response and remediation activities, rapid response is usually within the first hour or two unless otherwise agreed.

Response parameter (medical) – Effect measure based on toxicological dose response benchmarks and/or dose-response measures i) in Model 4c the dose-response function has a default slope =1; the Response Parameter for carcinogens is the inhalation unit risk and for non-carcinogens is the ED05 Human Equivalent Concentration and ii) Model 4d the Response Parameter is modified by the slope parameter (for dose-response function where slope ≠1). Assessment of Comparative Human Health Risk-based Prioritization Schemes. (Health Canada)

Restoration – (1) The process of bringing a damaged or contaminated building and/or contents back to their pre-loss condition and appearance. (2) The process of bring a building and/or contents back to pre-loss condition (original state). (3) Completing a repair, which is an activity that restores materials and surfaces back to the same condition as they were before loss. Education Note:

Restoration usually follows remediation, which is the removal of contamination and damage. Examples include removing damage and contamination caused by a flood, sewage backflow or fire.

Restoration and remediation first responder(s) – The person or team of people qualified by training, experience and certification that first arrive at a jobsite requiring emergency restoration or remediation services. The duty of restoration and remediation first responders is to protect human life before attempting to protect the structure and its contents.

Restoration conservation – In the field of historical conservation, treatment procedures intended to return cultural property to a known or assumed state, often through the addition of non- original material. (AIC)

Restoration techniques – Methods used in rebuilding buildings and structures with historically accurate materials to achieve historical authenticity in keeping with a particular time period or event. The term should be distinguished from preservation techniques based on the difference in meaning between restoration and preservation, which is a matter of degree. While both seek to achieve historical accuracy, preservation does not imply rebuilding. Education Note: Restoration Techniques should also be distinguished from conservation technology, a distinction having to do with the range of reference present in each term. While restoration can include buildings, in U.S. usage the term conservation cannot.

Restoration decontamination – (1) Disinfection or sterilization of infected articles to make them suitable for use. (2) The use of physical or chemical means to remove, make inactive, or destroy bloodborne pathogens on a surface or item to the point at which they are no longer capable of transmitting infectious materials, and the surface is rendered safe for handling, use or disposal. (ANSI/IICRC S500, Standard 2006/S520 Standard, 2008)

Restoration detail / Detailed cleaning – Special restoration cleaning procedures that are necessary to remove the smallest amount of contamination.

Restoration extreme degree of damage – Construction materials, building finishes and/or contents that experienced extensive damage. Extreme degree of damage takes into consideration salvageability and/or repair that may not be cost effective to complete.

Restoration options – Methodology that can vary the outcome of a restoration project such as damage caused by water, mold, sewage, fire, hurricane, tornado, earthquake, and windstorms. Restoration options can result because of codes and regulations, funding, materials, and customer requests. Unless the contract scope of work is defined differently, the restorer is expected to return damaged property back to its pre-loss condition.

Restoration, principles of – A term in IICRC water damage restoration and mold remediation describing: 1) How employees are to work safely; 2) Documenting the conditions at the jobsite and work procedures; 3) Containing and mitigating (removing) the loss; 4) Using the principles of drying; 5) Cleaning and repair.

Restoration, period of – The period of time in which insurance coverage is in effect beginning when the damage occurs and ending when operation or property damages are fully restored and recovered.

Restoration reporting data – Report data that identifies a contaminant, pollutant, or condition; documented services and procedures to remediate/mitigate; documented recording methods that developed into providing project closure.

Restoration, sewage – The removal of wastewater and solids from a building or land including cleanup and disposal. (See: IICRC S-500 Standard, 2006 and 2015; Category 3)

Restoration techniques – Methods used in rebuilding buildings and structures with historically accurate materials to achieve historical authenticity in keeping with a particular time or event. Education Note: The term "restoration techniques" should be distinguished from "preservation techniques" based on the difference in meaning between restoration and preservation, which is a matter of degree. While both terms seek to achieve historical accuracy, preservation does not imply rebuilding. Restoration techniques should also be distinguished from conservation techniques/conservation technology. While restoration can include buildings in U.S. usage, the term conservation cannot.

Restoration, textile – The inspection, inventory, cleaning, and repair process for all types of textiles that have been affected by water, fire, mold, and odor. Textile restoration specialists come from the cleaning, deodorizing, disinfecting, and fabric repair industry.

Restoration time – The time it takes to bring a building and/or contents back to pre-loss condition (original state).

Restoration worker – A trained individual who works for a restoration company. (ANSI/IICRC S500 Standard)

Restorative cleaning – (1) The application of procedures designed to remove damaging residues from a surface while retaining as much of the original character and patina as possible. (RIA) Education Note #1: 1) Restorative cleaning often requiring the use of specialized cleaning techniques and equipment. 2) Restorative cleaning is part of the restoration process and refers to the cleaning or removal of smoke, soot, gases, floodwater, and sewage residues in buildings and contents. (2) Restorative or "salvage" cleaning is required when soiling has become severe and, by request of the consumer, the furnishing must be returned to a sanitary condition and improved state of order. Education Note #2: Restorative cleaning is not a normal cleaning process and typically is performed by technicians specially trained or skilled in restorative cleaning. Often, procedures that may go beyond those outlined in this standard must be used. (IICRC S300 Standard)

Restorative cleaning, smoke, and soot – The application of procedures designed to remove damaging smoke and soot residues and odor and returning the surface or material back to its pre-loss condition.

Restorative drying – (1) The process of removing moisture from wet building materials and

bringing them back to their dry equilibrium moisture content. (2) The removal of water and excess moisture and humidity from a structure and damaged materials following an unwanted release or infiltration of water from several possible sources and returning that structure and its components and contents to a pre-damage state of moisture content and humidity. Education Note: There are four principles involved in restorative drying: mechanical extraction of excess water; promotion of evaporation through air movement; temperature control, and dehumidification.

Restore / Restoration – (1) To return to a normal, former, or pre-damaged state. (IICRC S500 Standard, 2006 and 2015) (2) To return to pre-damage condition by the removal of damaging residues or odor. (3) To remedy damage or distress while preserving the original components and appearance to the fullest possible degree.

Restorer – (1) The restoration contractor or firm that is responsible for the restoration of damaged structures and/or contents. (IICRC S500 Standard, 2006 and 2015) (2) A person or company qualified by training, experience, and certification to remediate and restore damaged property. Education Note: In some states, restorers must be licensed contractors. (See: Certified Restorer; Contractor; Master Restorer; Remediator; Remodeler; Renovator)

Restricted Use Pesticide (RUP) – A biocide/pesticide that requires technician training and licensing, usually by the state or province, before application is permitted.

Retardant – (1) Any substance that slows or blocks a fire or an odor. (2) A substance or chemical agent which reduced the flammability of combustibles.

rH/RH – (1) The amount of water vapor that exists in a gaseous mixture of air. (2) The ratio of the water vapor density (mass per unit volume) to the saturation water vapor density, usually expressed in percent. Relative humidity is also approximately the ratio of the actual to the saturation vapor pressure. (3) The ratio of the partial pressure of water vapor in an air-water mixture to the saturated vapor pressure of water at a given temperature. Education Note: In the atmosphere, relative humidity is based only on the temperature and the amount of water vapor present. The atmospheric pressure has no effect. The relative humidity of air in a closed system will vary with both temperature (which determines the saturated vapor pressure) and total pressure (which implies changes in the vapor partial pressure). For more information go to: http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/cld/dvlp/rh.rxml

RIA – Restoration Industry Association. The Restoration Industry Association (formerly ASCR) is the oldest and largest non-profit, professional trade association dedicated to providing industry leadership, supporting science, and promoting best practices in the cleaning and restoration industry. Education Note: RIA represents over 20,000 cleaning and restoration professionals from 1,200 firms, specializing in textiles, environmental issues, and restoration. RIA provides credibility, education, and business improvement events to maximize industry exposure and to advance knowledge in the cleaning and restoration industry. With an extensive network of professionals working towards similar goals, RIA has become a trusted resource of knowledge for those involved in cleaning and restoration. For more information go to: https://www.restorationindustry.org/

RIA courses – Industry courses through the Restoration Industry Association, who provides advanced training in remediation and restoration of damaged and impacted buildings and contents. For example, several of RIA's newest courses includes the Contents Loss Specialist (CLS) and Fire Loss Specialist (FLS). https://www.restorationindustry.org/

Risk – The probability of injury, disease, or death under specific circumstances. Education Note: In quantitative terms, risk is expressed in values ranging from zero representing the certainty that harm will not occur to one representing the certainty that harm will occur.

Risk assessment (hazard assessment – (1) The use of factual information to define the nature and impact of an adverse effect from exposure of individuals or populations to hazardous materials and situations. (IICRC S500 Standard, 2006) (2) The quantitative or qualitative evaluation to determine the probability of an adverse effect to human health or the environment by the presence or potential presence of previously identified hazards. (IICRC S540 Standard) (3) A methodology used to examine all possible risks involved with a particular product or organism. (USEPA) Education Note: Risk assessment can be divided into four parts: 1) Identification of hazards; 2) Dose response (how much exposure causes particular problems (i.e. cancer, convulsions, death)); 3) Exposure assessment (determining how much exposure will be received by people during particular activities); and 4) Risk characterization (determining a probability that a risk will occur). (USEPA)

Risk communication – The exchange of information about health or environmental risks between risk assessors, risk managers, the general public, and other interest groups such as the news media.

Risk management / Risk assessment – (1) The process of evaluating alternative responses to risks and selecting among them. Risk management includes consideration of technical, scientific, social, economic, and political information. (IICRC S500 Standard, 2006) (2) Decision-making process involving considerations of political, social, economic, and engineering factors with relevant risk assessments relating to a potential hazard so as to develop, analyze, and compare regulatory options and to select the optimal regulatory response for safety from that hazard. (NIH) Education Note: Essentially risk management is the combination of three steps: 1) evaluation; 2) emission; and 3) exposure control (risk monitoring). (NIH) Risk management includes consideration of technical, scientific, social, economic, and political information.

Roof damage – Any portion of the roof including gutters, soffits, vents, shingles, skylights and appliances on the roof such as solar panels and air conditioning units that compromise the integrity of the roof.

Roof wrap long-term – A roof wrap that functions as a temporary roof protection system (e.g., two weeks to several months) before the roof wrap requires repair or replacement, or the roof is restored. Long-term roof wraps are used when a roofer cannot repair or replace a roof for some time or materials have not yet been delivered. The back ordering of roofing materials usually occurs when a windstorm, tornado or hurricane damages an entire community. Education Note: Each hole on the roof should be covered with 5/8-inch exterior grade plywood and fastened to the undamaged

sheathing with two-inch deck screws. Roof wraps should be rolled over the peak of the roof to the other side of the roof. Tarp edges should be secured with 1 x 3 thick wood strapping and secured to roof sheathing to anchor straps over the roof wrap. In a tiled roof, the edges of the tarp must be fastened to roof rakes and eaves. Long-term roof wraps should be constructed with virgin poly sheeting to prevent splitting, shrinkage, and becoming brittle from UV sunlight. Examples include: https://www.amazon.in/UltraTarp-Tarpaulin-Virgin-Treated-Blue/dp/B019OTWNLQ and https://dr-shrink.com/training/is-shrink-wrap-right-for-me/shrink-wrap-for-roofing-disaster-restoration-hurricane-repair/

Roof wrap / Shrink wrap – An engineered roofing protection system that protects a damaged roof for weeks and months until the roof can be repaired. Roof shrink wrapping involves covering an entire roof with 10 to 12 mil thick virgin polymer where edges of more than one sheet are heat-welded together. This type of roof wrap system provides a continuous membrane over the entire roof, soffits, and eaves. Shrink wrap materials are expected to pass ASTM D 1709 Dart Impact Strength and ASTM D 882 Tensile Strength. Education Note: The roof wrap system should have a high break strength as compared to tarps and other temporary roof covering materials.

Roof wrap, short term – A roof wrap that functions as a temporary roof protection system (e.g., 3 days to less than a month) before the roof wrap requires repair or replacement, or the roof is restored. Short-term roof wraps are constructed with super heavy-duty polyethylene tarps where the tarp is draped over the ridge of the roof and fastened at every grommet to the sheathing with a two-inch screw and a 1/2-inch fender washer.

Route of entry (water; weather) – A penetration in the outside envelope of a building, which allows vapors and gasses to enter or leave. Education Note: In water damage terms, a route of entry is any opening that allows rain, wind, relative humidity, and undesirable temperatures to penetrate.

Routes of exposure (entry) – The means by which toxic material may gain access to an organism, such as inhalation, ingestion and skin absorption, and intravenous, subcutaneous, and intramuscular administrations. (IICRC S500 Standard, 2006)

Routine cleaning, carpet – The routine textile floor covering cleaning which is performed daily, weekly, or more regularly, and includes regular vacuuming and timely spot cleaning. (IICRC S100 Standard)

RPP – Respiratory protection plan, which is an OSHA mandatory company respiratory protection plan.

Rubbing alcohol (cleaning and restoration industry) – Isopropyl alcohol and ethyl alcohol are used to clean certain items without damaging them. Education Note: Careful spot testing in an inconspicuous area of the piece must be done to ensure the cleaning process will not damage (usually pull color; remove unstable dyes) off the piece or further damage the piece because of its fragile condition.

Run or "Run of a fire" – The rapid advance of the head of a fire with a marked change in fire line

intensity and rate of spread from that noted before and after the advance.

Running – A rapidly spreading surface fire with a well-defined head.

Rust – (1) The reaction of iron and oxygen in the presence of water or moisture. (2) The reaction between iron and harmful chemicals.

Rust control inhibitors – A product like LPS-3 that forms a transparent film on a surface to inhibit corrosion. Other products of consideration include Rust-Oleum and CRC inhibitor sprays.

Rusting – The common generic term for corrosion caused by the oxidation of metals and alloys.

(S)

Salvage – The recovery of damaged building components and contents.

Safety hazard – Any hazard at a jobsite that cause exposure or injury to workers, occupants, and the public. As part of the JHA, safety hazards are to be identified, controlled, or removed, before other work tasks begin.

Safety zone (building fire; wildfire) – An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of a blowup in the vicinity.

Safety zone (mitigation; remediation) – The exclusion zone which is either outdoors or inside a fire damaged building, which is safe for workers to occupy without experiencing exposure to harmful materials, gases, and other safety issues.

Salvage rights – The rights of the insurer to recover and sell or otherwise dispose of insured property on which the insurer has paid a total loss.

Sampling, fire – A small fractional part of a material or a specified number of objects, which are selected for testing, inspection, specific observations, or characteristics.

Sampling for archive – The collection and preservation of evidence (materials; environmental conditions), which will be kept under controlled conditions for future analysis or study.

Sampling, soot – Surface, bulk or air sampling of particles carrying soot, which is the incomplete

combustion byproduct of a burnt material. Education Note: During analysis (e.g., PLM, SEM, EDX), the composition of soot often includes: 1) fibrous constituents, such as char particles, cellulose, synthetics, fiberglass, mineral wool; 2) non-fibrous constituents, such as inorganic mineral wool, dust, soil, and other opaque particles; and 3) combustion-like constituents, such as aciniform, representing soot-like fine particles, ash-like mineral residue particles, char including pyrolyzed plant matter. Also, often seen are microbiological particles including spores and spore parts, pollen, dander, skin cells, insect parts, flower parts, and other opaque biogenic debris. (See: "ASTM" for sampling methods)

Sanding – The debriding of a surface by abrasion.

Sanitation – The control of physical factors in the human environment that could harm development, health or survival. The process of bringing an environment to a state that will not harm human health.

Santa Ana wind phenomenon (wildfire management) – The type of wind near a large body of water and desert that is close to mountains; the drainage wind coming off a mountain or hillside where cooler offshore winds build up under the hotter air mass increasing air pressure. Education Note: As air becomes compressed it causes the air mass to warm and dry. High winds and low humidity help dry out vegetation that makes the wildfire more flammable.

SAR – Supplied air respirator.

SBS – Sick building syndrome.

SCBA – Self-contained breathing apparatus.

Scope of work – The written document that outlines the steps of cleanup, remediation, and restoration.

Sealants – Viscous materials that change from their liquid state to become a solid as it dries. Sealants are used to seal soot in a ventilation system or lock-down soot on building framing. "See soot set."

Sealer, soot – (1) Usually soot sealer is a clear, adhesive-like liquid sprayed into ducts to bond and immobilize loose soot or fire residues in place. Soot sealer prevents soot, lint, and dirt in air ducts from being blown back into home or building after cleaning. It is also used to keep air ducts cleaner and to prevent build-up of odors. (2) A pigmented lacquer, varnish or acrylic polymer that locks residue of soot to a surface. Soot sealer is designed to bond smoke, dust, pollen, or other fine particles to metal, wood, or other surface types when complete removal is impractical. Most soot sealer products can be brushed, sprayed, or fogged.

Secondary aerosols – Aerosol formed by the interaction of two or more gas molecules and/or primary aerosols.

Secondary damage – (1) Additional damage caused by the initial or primary cause of damage. (2) Damage arising out of primary damage. Examples include flood and water damage resulting in corrosion, rust, mold, musty odors, fire damage and odor penetration. (3) Damage to materials and/or

contents sustained from indirect or prolonged exposure to disaster contaminants, such as migrating or absorbed moisture or humidity, mildew growth, acid residue discoloration, etc.; in contrast to "primary damage." (ANSI/IICRC S-500 Standard) (See: Primary damage)

Secondary disaster – Disaster initiated by a primary disaster, such as a fire that was put out with water; a tsunami caused by an earthquake. Secondary disasters often cause more damage and problems than the primary disaster.

Secondary fire damage – (1) Building damage that arises out of primary damage, such as wildfire soot fallout that occurs continuously over the next few days or a gust of hillside wind occurring weeks later. (2) Damage to materials or contents sustained from indirect or prolonged exposure to disaster contaminates such as heat, moisture, humidity, smoke, and soot.

Secondary particles – Particles form in the atmosphere by a gas-to-particle conversion process.

Secondary particles – Particles form in the atmosphere by a gas-to-particle conversion process.

Secondary pollutant – Pollutants that are less hazardous or dangerous than the primary pollutant. Education Note: In some cases, secondary pollutants are precursors of the primary pollutant (e.g., fire damage buildings where chemical containers must be identified and removed). In other situations, the secondary pollutants (or multiple pollutants) are standalone hazards or contaminants that need to be mitigated after the primary pollutant is abated such as asbestos and lead-based paint, then smoke and soot residue.

Secured property – A property where all doors, windows and openings are locked or sealed using board-up, including other entry points such as a burnt roof.

Self-contained breathing apparatus (SCBA) – An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user; a respiratory protection device that consists of a supply (tank) or a means (air hose) of supplying respirable air or oxygen; or an oxygen generating material. Education Note: The SCBA system must be carried by the wearer.

Sensible heat – (1) Heat that raises the temperature of a material without changing its phase. (2) Heat energy that causes a rise or fall in the temperature of a gas, liquid or solid when added or removed from that material. Sensible heat changes the temperature by changing the speed at which the molecules move. (3) The amount of energy released or absorbed by water during a change in temperature. (4) The thermal energy that is absorbed by a substance during a change in temperature that occurs without a change in state. (IICRC S500 Standard, 2006) Education Note: Sensible heat is the energy associated with the temperature of water; meaning, sensible heat is greater in warmer water as compared to colder water. Warmed water and moisture at the surface of wet materials dries faster than surfaces having cooler water. Heated air and warm air movement carries sensible heat from the air to a wet surface and then back to the air. When wicking of moisture occurs air movement changes some of the sensible heat into latent heat. (See: Latent heat)

Sensible heat transfer – Movement of heat from one place to another as a consequence of conduction or convection or both. (Western Regional Climate Center)

Sensible load – Heating or cooling load required to meet air temperature requirement for comfort.

Sensible temperature – The sensation of temperature that the human body feels in contrast to the actual temperature of the environment as measured with a thermometer.

Sensible recovery efficiency (SRE) – In ventilation system testing, the net sensible energy recovered by the supply airstream as adjusted by electric consumption, case heat loss or heat gain, air leakage, airflow mass imbalance between the two airstreams and the energy used for defrost (when running the very low temperature test), as a percent of the potential sensible energy that could be recovered plus the exhaust fan energy. Education Note: The SRE value is used to predict and compare heating season performance of the HRV/ERV unit.

Sensitization – An allergic condition that usually effects the skin or lungs. Once exposure to a substance has caused a reaction, the individual may be sensitized to that substance and further exposure even at low levels may elicit an adverse reaction.

Sensitizer – (1) A substance that may cause no type of health reaction in a person during the initial exposure, but afterwards, further exposures will cause an allergenic response to the substance. (2) A substance which, on first exposure, causes little or no reaction in man or test animals, but which, with repeated exposure, may cause a marked response not necessarily limited to the contact site. Education Note: Skin sensitization is the most common form of sensitization in the industrial setting, although respiratory sensitization to a few chemicals is also known to occur. Examples of sensitizers include poison ivy, pollen, microorganism antigens, some isocyanates and epoxy resin hardeners, etc.

Settled carbonaceous soot particulate (SCP) – Carbonaceous soot particles formed by incomplete combustion that settle on surfaces. They are mainly elemental carbon formed by combusted organic materials (fossil fuels) including wood and vegetative matter. In building fires, SCP can include other organics' including but not limited to chemical resins, vinyl's, and plasticizers (polymers).

Settling rate (wildfire) – The rate in time that smoke, soot, and ash settles out of air onto a surface. When wind throughout the community is still, large char particles of incomplete combustion settle out of air first followed by ash, then finer soot particles in the PM_{10} range and harmful micro-fine respirable particles below the $PM_{2.5}$ range. Education Note: When gusts of wind or wildfire wind are present the settling rate formula outline above is no longer accurate or reliable. And the presence of wind causes soot and ash to be continuous where the settling velocity has too many variables.

Settling velocity – The terminal rate of fall of a particle through a fluid as induced by gravity or other external forces.

Shading (fire; wildfire damage) – The presence of an oily film, usually from heat or smoke, that causes a gradual color change across a surface over time.

Short term exposure limit (STEL) – ACGIH toxicity terminology that refers to exposures to a TLV for 5-15 minutes.

Sick building syndrome (SBS) – A term that refers to a series of health and comfort effects that are experienced by a substantial percentage of building occupants. Education Note: The onset and relief of these symptoms are associated with entering and leaving the building, and there is no specifically defined illness or etiology identified (as in building related illness). SBS symptoms include headaches, runny nose and allergy or asthma-like complaints, and/or odor, and taste complaints. Generally, sensory irritation dominates the syndrome.

Side-stream smoke / Environmental tobacco smoke (ETS) / Secondhand smoke – The cloud of small particles and gases that is given off from the end of a burning tobacco product (cigarette, pipe, cigar) between puffs and is not directly inhaled by the smoker. Education Note: This is the smoke that gives rise to passive inhalation on the part of bystanders.

Silica (SiO_2) – Silica is a naturally occurring material in minerals, flint and in some plants in crystalline phase. Silica is commonly used in industry where it is in synthetic form. Surface area, pore volume, pore size and particle size are independently controllable to some extent. The crystalline silica may be classified based on atmospheric pressure as: Quartz = 1143K; Tridymite 1143 - 1743K; and Cristobalite = 1743, over 1973K it forms amorphous vitreous silica glass.

Silica, Crystalline – Crystalline silica is a common mineral that is found in construction materials such as sand, stone, concrete, brick, and mortar. When workers cut, grind, drill, or crush materials that contain crystalline silica, very small dust particles are created. These tiny particles (known as "respirable" particles) can travel deep into workers' lungs and cause silicosis, an incurable and sometimes deadly lung disease. Respirable crystalline silica also causes lung cancer, other potentially debilitating respiratory diseases such as chronic obstructive pulmonary disease, and kidney disease. In most cases, these diseases occur after years of exposure to respirable crystalline silica. For more information go to: https://www.osha.gov/Publications/OSHA3681.pdf

Silica dust in fire and water damaged buildings (commentary) – Silica can be found almost anywhere on the planet, as particles ranging in sizes from large rocks to sand grains to microscopic. Silica dust can be found in fire damaged buildings, where even after the fire, it is easily aerosolized. Around 2001, at the time of the World Trade Center attack, where according to inhalation standards at the time, the permissible exposure limit (PEL) for respirable silica was higher than that for nuisance dust. According to the PEL Table Z-3 in 29 CFR 1910.1000 (2006 edition), the PEL for respirable silica was 10 milligrams per cubic meter of air (mg/m^3); and for respirable nuisance dust 5 mg/m^3. A disposable dust mask was considered adequate respiratory protection for most of the rescue and recovery workers. According to today's standards in 29 CFR 1926.1153, the action level for respirable silica is 25 micrograms per cubic meter ($\mu g/m^3$), which is calculated as an eight-hour time weighted average (TWA), while PEL for respirable nuisance dust is still 5 mg/m^3. Respirable silica is now recognized as a greater health hazard than it was in 2001. The levels of protection for workers in contaminated areas is greater now than in 2001. Air sampling and testing on construction

and demolition job sites has shown that wet cutting and drilling and the use of wet methods during demolition and debris handling suppress dust and reduce the levels of respirable silica dust to nearly zero. OSHA's silica regulations today will permit the use of disposable dust masks for some kinds of tasks for periods greater than four hours only if the drilling, cutting, or material handling are being done with enough water to suppress visible dust. Refer to Table 1 in OSHA's 29 CFR 1926.1153.

Silica work area containment – The amount of containment employers must install along with exhaust ventilation when workers are potentially exposed to silica. During demolition, mitigation and remediation, anytime there is a visible dust cloud, or dust can be detected in the nose or eyes are itching from dust in air, the air in the work area should be filtered through fresh air supply and exhaust ventilation and/or placed under an air scrubbing mode.

Silica is a respiratory hazard – The US OSHA's Respirable Crystalline Silica standard for construction requires employers to limit worker exposures to respirable crystalline silica and to take other steps to protect workers. Breathing silica deep into the lungs can cause silicosis. With silicosis, silica particles lodge in the lung tissue, causing scarring. The lungs become less flexible, making it difficult to breathe and do hard work. Once silicosis develops, the damage is permanent. There is no recovery. Breathing silica dust can also cause lung cancer and increase the chance of developing tuberculosis. Studies have shown that construction workers exposed to silica dust have an increased risk of silicosis and other lung diseases. For more information go to:
https://www.michigan.gov/documents/lara/lara_miosha_silica_construction_620606_7.pdf

Simsol – An insurance estimating software program that calculates labor and material costs, demolition and cleanup, repair, and restoration costs. For more information go to:
http://www.simsol.com

Size, smoke and fume – The size of smoke and fume particles suspended in air. (1) According to journals of science, smoke and fume suspended in air can range from 0.001 to 100 microns. (2) According to IICRC's FSRT (fire and smoke, restoration technician) technical information, most smoke and fumes produced by building fires are 0.5 microns to 7 microns in size; the particulate size of most combusted smoke particles is in the range or 0.1 to 4 microns in size.

Size-up (firefighting) – To evaluate a fire to determine a course of action for fire suppression.

Size-up (mitigation and remediation) – The initial assessment process required to determine courses of action, to eliminate safety hazards, support unsafe structures, provide workers with a safe work environment.

Smoke (building fire) – (1) The visible airborne product of incomplete combustion, consisting of suspended particles, gases, or solid and liquid aerosols. The airborne solid and liquid particles and gases evolved when the material undergoes pyrolysis or combustion together with the quantity of air that is entrained or otherwise mixed into the mass. ((NFPA 921, 2008, 3.3.148) (2) The visible solid, liquid, and gaseous byproducts of carbon-based combustion released in air, settles on surfaces,

becomes trapped in pores of building materials and contents; adsorbs into building voids. (3) Solid and liquid airborne particulates and gases that evolve when a material undergoes pyrolysis or combustion, together with the quantity of air that is entrained or otherwise mixed into the mass. (4) The airborne solid and liquid particles and gases that evolve when a material undergoes pyrolysis or combustion. Sampling detection chemical smoke is excluded from this definition. (5) An air suspension of particles, often originating from combustion or sublimation. (6) A colloid and comprises a collection of airborne solid and liquid particulates and gases emitted when a material undergoes combustion or pyrolysis, together with the quantity of air that is entrained or otherwise mixed into the mass.

Smoke (wildfire) – The incomplete combustion of carbonaceous materials in a wildfire including trees and chaparral vegetation. (1) Smoke consists of small organic particles of carbon, oily tar-like substances, liquid droplets, and gases such as CO, CO_2, VOCs, and PAHs, such as benzene, aldehydes (including formaldehyde) and acrolein. (2) The individual compounds present in smoke number in the thousands. Smoke composition depends on multiple factors, including the fuel type and moisture content, the fire temperature, wind conditions and other weather-related influences, whether the smoke is fresh or "aged," and other variables. (3) Different types of wood and vegetation are composed of varying amounts of cellulose, lignin, tannins and other polyphenols, oils, fats, resins, waxes, and starches, which produce different compounds when burned ("*Wildfire Smoke: A Guide for Public Health Officials*," 2019). https://www.airnow.gov/sites/default/files/2019-10/wildfire-smoke-guide-revised-2019.pdf

Smoke (wildfire) – A complex mixture of particles, liquids, and gaseous compounds, including polynuclear aromatic hydrocarbons (PAHs), organic acids, particulate matter (PM), semi-volatile and volatile organic compounds (VOCs) and the inorganic fraction of particles. Education Note: The types of particles, liquids and gaseous compounds released in smoke depend on the fuel type and the amount of fuel, among other factors. The fuel for a house fire or structure fire includes all the items burned in the building: carpet, carpet pad, paint, electronics, linens, clothing, synthetics, polymers, etc. The fuel for a wildfire is primarily plant material such as wood from trees and shrubs, as well as grasses (Kirsten Shaw, CSC).

Smoke, acid – Fire residues characterized by acidity that is capable of damaging, corroding and discoloring materials and finishes.

Smoke alarm (Smoke detector) – An electronic or electromechanical sensoring device that detects smoke before it detects heat. Education Note: The smoke alarm/detector issues an annoying audible loud noise (above 80db) when smoke is detected. Most alarms work by photoelectric optical detection and/or ionization; they can also work off a beam, aspirator, or laser. Smoke alarms can be battery operated or are installed directly into the building's electrical system. In commercial buildings and some newer homes, a smoke alarm signal is sent directly to the fire department or home security monitoring company.

Smoke and airborne particulates – The compounds present in soot in the form of particulates.

Particulate matter is the principal pollutant of concern from wildfire smoke for the relatively short-term exposures (hours to weeks) typically experienced by the public. Particulate matter is a generic term for particles suspended in the air, typically as a mixture of both solid particles and liquid droplets.

Smoke and fume size – The size of smoke and fume particles suspended in air. (1) According to journals of science, smoke and fume suspended in air can range from 0.001 to 100 microns. (2) According to IICRC's FSRT technical information, most smoke and fumes produced by building fires are 0.5 microns to 7 microns in size; the particulate size of most combusted smoke particles is in the range or 0.1 to 4 microns in size.

Smoke and soot and sulfur dioxide (SO_2**)** – In fire damaged buildings, SO_2 is important to identify because during combustion sulfur dioxide can convert to an aerosol that settles out of air with smoke and soot. On a damp surface, SO_2 can convert into acid droplets consisting primarily of sulfuric acid. SO_2 is a gas consisting of one sulfur and two oxygen atoms.

Smoke and soot cleanup – The process of removing nuisance and harmful soot, smoke odor and fire-related residue from buildings and contents after a fire. Education Note: Combustion may have occurred in the building or a nearby structure; or it may have been part of a wildfire. In either case, smoke and soot cleanup involves the removal of visible and micro-fine soot particulate, neutralizing smoke odor, and removing acids that can cause damage to finishes and contents, such as paint, urethane, appliances, tubs and showers, brass, aluminum, clothing, upholstery, draperies, plastic, mirrors, glass and crystal.

Smoke and soot contaminated polyurethane floor cleaning – The appropriate soot, smoke film-cleaning process for hardwood floors having a polyurethane finish. Education Note: 1) Check with the flooring manufacturer to ensure your recommendations and supplies are the same as theirs. When the manufacturer recommends a cleaning or a topcoat finish, follow manufacturer recommendations. 2) Remove contents and rugs off the floor. 3) Make sure the ceiling, walls, windows, and doors are in a clean state and the floor has already been HEPA vacuumed before final floor cleaning begins. 4) Detergent wash floor with a grease-cutting dish soap such as Dawn and clean warm water. 5) While it is important to not over saturate the floor (no standing water), the floor and sponge cleaning process must wet the floor sufficiently enough to remove smoke film, soot, and grime. 6) A second person is to follow the first cleaning person with freshwater rinsing. 7) When either the detergent washing or rinse water becomes cloudy or grey in color, it is time to change out the detergent and the warm rinse water and use a clean sponge mop. 8) This process is to be completed until the washing and rinse water is clear of color and floors are dry. 9) Per manufacturer instructions, apply appropriate topcoat finishes.

Smoke and soot damage, light – (1) The amount of carbon combustion and smoke residue is light. Light damage of soot and smoke film usually responds to HEPA vacuuming and general cleaning. (2) Water that has affected a material to a point the item can be easily cleaned and/or restored to where there is no or minimal damage.

Smoke and soot damage to contents, light – The amount of carbon combustion and smoke residue

on contents is light. Light damage of soot and smoke film is usually found on horizontal surfaces only; they usually respond to HEPA vacuuming and general cleaning.

Smoke and soot damage, moderate – Damage to a surface area or material that is damage somewhere between light and heavy. Education Note: Moderate damage in a wildfire may be described as soot contamination in an attic causing insulation to be removed and replaced; removal of soot by HEPA vacuuming followed by cleaning of contents and flooring; cleaning of ventilation systems because of the presence of soot; cleaning of contents, walls, floors and draperies because the windows were open at the time of loss.

Smoke and soot damage to buildings, heavy – A reference in the fire damage remediation industry to extensive smoke damage affecting a structure and structural components. Education Note: In some cases, heavy smoke and soot damage may not apply to physical material charring because a neighboring building was on fire; the burning of wildfire brush did not heat damage or char a building.

Smoke and soot damage to contents, heavy – The amount of carbon combustion and smoke residue along with extensive physical material damage (charring or heat damage) on contents or their finish. Education Note: Heavy damage typically includes heat damage and soot and smoke film on multiple sides of the content that must be individually inspected, controlled cleaned and deodorized and reevaluated for salvage or repair.

Smoke and soot duct cleaning – The process of removing fire residue and soot debris from the interior of supply and return air ducts.

Smoke and soot, mechanical cleaning – The removal of solid particles and smoke film through vacuuming and scrubbing.

Smoke and soot, re-entrainment of (wildfire soot management) – Building and content cleaning, situations where the building was just or recently cleaned, and smoke and soot outside has reenter the cleaned space. Education Note: Example of re-entrainment of smoke and soot include: 1) Wildfire affected land where air currents pickup soot and ash are deposited into cleaned and deodorized buildings; 2) A building underwent cleaning and deodorization but the ventilation system was not cleaned and deodorized before it was turned on.

Smoke and soot restorative cleaning – The application of procedures designed to remove damaging smoke and soot residues and odor and returning the surface or material back to its pre-loss condition.

Smoke barrier – A continuous membrane, either vertical or horizontal, such as a wall, floor, or ceiling assembly that is designed and constructed to restrict the movement of smoke. A smoke barrier might or might not have a fire resistance rating. Such barriers might have protected openings.

Smoke, chemicals – A complex mixture of particles, liquids, and gaseous compounds, including polynuclear aromatic hydrocarbons (PAHs), organic acids, particulate matter (PM), semi-volatile and volatile organic compounds (VOCs) and the inorganic fraction of particles. Education Note: The types

of particles, liquids and gaseous compounds released in smoke depend on the fuel type and the amount of fuel, among other factors. The fuel for a house fire or structure fire includes all the items burned in the building: carpet, carpet pad, paint, electronics, linens, clothing, synthetics, polymers, etc. The fuel for a wildfire is primarily plant material such as wood from trees and shrubs, as well as grasses. (See: Chemicals in smoke)

Smoke, chronic health effects from – "There is the potential for chronic health effects from exposure to the components of smoke. Long term exposure to ambient air containing fine particles has been associated with increases in cardiovascular disease and mortality in populations living in areas with higher fine particulate air pollution. Education Note: Frequent exposure to smoke for brief periods may also cause long-term health effects. Firefighters, who are exposed frequently to smoke, have been examined for long-term health effects (for example, cancer, lung disease, and cardiovascular disease) of repeated smoke exposures. The findings from these studies are not consistent or conclusive. Some studies show an increased frequency of these diseases among firefighters compared to similar male reference populations (e.g., male policemen, white males in the general population), while others do not." (DOH-NY State)

Smoke clearance – Surface testing and laboratory analysis confirming VOCs, PAHs and other substances are not elevated more than background; specific compounds are not present.

Smoke compartment – A space within a building enclosed by smoke barriers on all sides, including the top and bottom of the compartment (room).

Smoke concentration – The amount of combustion products found in a specified volume of air, commonly expressed as micrograms of emission per cubic meter of air.

Smoke condensate – The condensed residue of suspended vapors and liquid products of incomplete combustion.

Smoke damage – The physical damage that is caused from the smoke created by a fire but not the fire itself. Smoke damage is a type of damage that is typically insured under a homeowner's insurance policy or other policy that covers damage from fire.

Smoke damage (insurance) – Property damage that is caused by smoke. Property damage caused by smoke does not necessarily mean materials are/were in direct contact with the fire. Smoke damage takes many forms including visible soot, residue, and ash deposits; discoloration, baked-on residue, acid, and corrosion damage; invisible odor damage to building materials, furnishings, clothing, and other belongings.

Smoke damage (wildfire) – Property damage that is caused by smoke and the combustion byproducts that make up smoke that impacts the building, contents, and environment.

Smoke damage claim (insurance) – A claim by an insured made to their insurance carrier for building and/or property damage caused by smoke and the chemical byproducts of smoke.

Smoke damper (HVAC) – A listed device installed in ducts and air transfer openings that are designed to resist the passage of air and smoke. The device is installed to operate automatically, controlled by a smoke detection system, and where required is capable of being positioned manually from a remote command station.

Smoke density – A measure of the amount of smoke in each volume.

Smoke detector – A device that senses smoke or particles of combustion.

Smoke developed index (SDI) – A measure of the concentration of smoke a material emits as it burns. Like the Flame Spread Index, the SDI is based on an arbitrary scale in which asbestos-cement board has a value of 0, and red oak wood has 100.

Smoke dry-cleaning of clothing – The removal of smoke in garments through dry-cleaning. The process in removing smoke out of dry-cleanable clothing is completed using a petroleum-based Stoddard solvent or chlorinated perchloroethylene solvent method. Some restorers believe or have been taught, dry-cleanable fabric "deodorization" must take place before the dry-cleaning process to significantly reduce or eliminate smoke odor. Testing both methods (deodorization before or after dry-cleaning) seems to make no significant difference, however, when wet and dry-cleaned garments may still contain a light scent of smoke odor, placing them in an ozone deodorization chamber may help. What will help is: 1) remove all clothing bags off of garments; 2) remove wood, metal and fabric hangers; 3) aerating items outdoors on fresh wood hangers where there is sunlight, a light breeze, and the relative humidity is 60% or less; 4) HEPA vacuum loose smoke and soot off each garment; and as a side note, a) handle garments with clean white cotton gloves. Clean cotton gloves reduce smoke residue (acid-based smoke and soot) from being transferred from garment to garment; b) clean garments as quickly as possible (preferably within 24-hours after the fire took place) to avoid discoloration and permanent damage.

Smoke film – The chemical byproduct of burning materials, which leaves behind residues that sit on or absorb into porous substrates. This occurs in part because heat moves from a hotter source to a cooler source, where smoke molecules are attracted to cooler surfaces (IICRC), which is the transfer of energy from a higher temperature a lower temperature through conduction, convection and radiation. Education Note #1: Depending on combusted materials, smoke can contain carbon monoxide, methane, SVOCs, VOCs, formaldehyde, benzene, acetic acid, formic acid, toluene, oxides of nitrogen, sulfur dioxide, organic carbon, and even traces of heavy metals. (EPA study; IAQA; Michael Trinkley, Ph.D., Chicora Foundation) Education Note #2: Smoke composition is dependent upon several variables, including fuel type, moisture content of the fuel, fire temperature and weather-related influences. Smoke from a wildfire for example can travel great distances depending on weather fire wildfire conditions. Combustion during a wildfire produces smoke, is a mixture pf carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons, and other organic chemicals, including nitrogen oxides and trace minerals. ("*Wildfire Smoke: A Guide for Public Health Officials*," Revised 2019) https://www.airnow.gov/sites/default/files/2019-10/wildfire-smoke-guide-revised-2019.pdf

Smoke film, oily – A film on a surface consisting of an oily carbon-based residue. Besides having a yellow, brown, or black carbon film color, oily films can vary somewhat based on its physical properties including viscosity and thickness. Education Note: Traction and friction are the other physical measurements for determining oily film. In environmental science, scraping oily film can be collected and sent to a lab for GC/MS analysis to identify VOCs and PAHs.

Smoke from flaming combustion – A type of combustion which consists entirely of solid particles, most of which are formed in the gas phase because of either incomplete combustion or high temperature combustion in a low temperature environment.

Smoke generation – The gaseous waste byproducts of burning materials especially of organic origin made visible by the presence of small articles of combustion.

Smoke health effects – Eye and respiratory irritation and reduced lung function (Seltzer, J. M.D; Miller, M., M.D; Seltzer, D., M.A. *"Health Risks of Wildfires for Children – Acute Phase"* 2007).

Smoke impact assessment (environmental testing) – Sampling in the field and analysis in a lab that together provides valuable information about a smoke contaminated building.

Smoke impaction (wildfire) – The transference of smoke, soot, and chemical byproducts into a building through convection (heat transfer and mass particulate transfer by wind turbulence).

Smoke, incomplete combustion – The incomplete combustion of carbonaceous materials in a wildfire including trees and chaparral vegetation. (1) Smoke consists of very small organic particles of carbon, oily tar-like substances, liquid droplets, and gases such as CO, CO_2, VOCs and PAHs, such as benzene, aldehydes (including formaldehyde) and acrolein. (2) The individual compounds present in smoke number in the thousands. Smoke composition depends on multiple factors, including the fuel type and moisture content, the fire temperature, wind conditions and other weather-related influences, whether the smoke is fresh or "aged," and other variables. (3) Different types of wood and vegetation are composed of varying amounts of cellulose, lignin, tannins and other polyphenols, oils, fats, resins, waxes, and starches, which produce different compounds when burned.

Smoke inhalation – The taking in of air into the lungs containing fine and micro-fine particles, vapors, and gases in smoke. "Exposure to high levels of smoke should be avoided. Education Note: Individuals are advised to limit their physical exertion if exposure to high levels of smoke cannot be avoided. Individuals with cardiovascular or respiratory conditions (e.g., asthma), fetuses, infants, young children, and the elderly may be more vulnerable to the health effects of smoke exposure. Inhaling smoke for a short time can cause immediate (acute) effects. Smoke is irritating to the eyes, nose, and throat, and its odor may be nauseating. Studies have shown that some people exposed to heavy smoke have temporary changes in lung function, which makes breathing more difficult. Two of the major agents in smoke that can cause health effects are carbon monoxide gas and exceedingly small particles (fine particles, or $PM_{2.5}$). These particles are two and one half (2.5) microns or less in size (25,400 microns equal an inch) and individual particles are too small to be seen with the naked

eye. Inhaling carbon monoxide decreases the body's oxygen supply. This can cause headaches, reduce alertness, and aggravate a heart condition known as angina. Fine particles can travel deeply into the respiratory tract, reaching the lungs. Inhaling fine particles can cause a variety of health effects, including respiratory irritation and shortness of breath, and can worsen medical conditions such as asthma and heart disease. During increased physical exertion, cardiovascular effects can be worsened by exposure to carbon monoxide and particulate matter. Once exposure stops, symptoms from inhaling carbon monoxide or fine particles generally diminish but may last for a couple of days" (DOH-NY State).

Smoke odor – The perceived presence of odors by olfactory nerves that detect quantities of aerosolized combusted substances and gases.

Smoke odor and drycleaner requests – A statement to drycleaners who agree to dry-clean smoke contaminated articles of clothing and draperies. The request to the drycleaner is to: 1) clean garments separately, away from all other customer's goods; 2) clean smoke contaminated garments at the last wash-cycle of the day so there is no chance of cross-contamination; 3) use a deodorization charger (additive, a solvent-based deodorization compound) with the wash cycle; 4) inspect garments after cleaning and tag areas on garments that have smoke stain, discoloration of buttons, loss of elasticity on the lining and any other abnormality such as, the garment still has a smoke smell.

Smoke odor contamination – (1) The unintended presence or introduction of smoke, soot, ash and chemical byproducts into a building, material, or content. (2) The soiling of materials by organic and inorganic substances after combustion. (3) The presence of particles, chemicals and gases and other undesirable substances after a fire.

Smoke odor contamination, secondary – Underlying contamination by chemical residues and oxidation; cross-contamination by vapors and gases transferred from an affected air stream to non-affected air stream, such as the building's ventilation system.

Smoke odor counteractant – A chemical capable of adsorbing, paring, digesting, diffusing, oxidizing or neutralizing smoke odors.

Smoke odor neutralization with ozone – A process by which smoke odor is neutralized (oxidized) using gas-phase ozone treatments. After a building fire smoke odor may lessen with the introduction of ozone.

Smoke intrusion – Smoke from prescribed fire entering a designated area at unacceptable levels.

Smoke logging – The complete filling of a room, compartment or building with smoke. This may occur as the hot gas layer increases in depth from ceiling to floor, or because of cooling smoke becoming less buoyant and is sinking.

Smoke odor – The perceived presence of odors by olfactory nerves that detect quantities of aerosolized combusted substances and gases.

Smoke odor contamination – (1) The unintended presence or introduction of smoke, soot, ash and chemical byproducts into a building, material, or content. (2) The soiling of materials by organic and inorganic substances after combustion. (3) The presence of particles, chemicals and gases and other undesirable substances after a fire.

Smoke odor contamination, secondary – In smoke odor assessment and recognition, secondary smoke odor contamination includes underlying contamination by chemical residues and oxidation; cross-contamination by vapors and gases transferred from an affected air stream to non-affected air stream, such as the building's ventilation system.

Smoke odor counteractant – A chemical capable of adsorbing, paring, digesting, diffusing, oxidizing or neutralizing smoke odors.

Smoke pall (wildland fire; building fire) – Extensive, thick blanket of smoke spreading throughout the building, where smoke billows outwards horizontally from the fire.

Smoke particle health characteristics – The characteristics, sources, and potential health effects of particulate matter to human health. The size of particles inhaled affects their potential to cause health effects in humans. Education Note: Particles larger than 10 micrometers do not usually reach the lungs, but can irritate the eyes, nose, and throat. For purposes of comparison, a human hair is about 60 micrometers thick. Small particles with diameters less than or equal to 10 micrometers, also known as particle pollution or PM_{10}, can be inhaled deep into the lungs; exposure to the smallest particles can affect the lungs and heart. Particle pollution includes "coarse particles," also known as PM 10 – 2.5, with diameters from 2.5 to 10 micrometers and "fine particles," also known as $PM_{2.5}$, with diameters that are 2.5 micrometers and smaller.

Smoke particulate – A particle that is a product of incomplete combustion which is generated during both smoldering and flaming combustion, although the nature of particles and their mode of formation are quite different.

Smoke, pressurized – (1) Combustion products propelled by high heat, temperature differential, or vapor pressure which causes them to penetrate normally enclosed spaces including behind cabinets; ceiling and wall cavities, subflooring; pores of wood, plaster and gypsum. (2) Smoke and gases that increased in size due to heat which cause moving particles to penetrate porous materials and small spaces. Education Note #1: Pressurized smoke occurs when smoke and other gases from a fire increased in size due to fuel and heat. The heat is causing the moving particles to penetrate confined areas. Education Note #2: The properties of smoke can change due to changing conditions and gases present. For example, as temperatures rise, smoke can become more intense where pressurized smoke can penetrate small areas such as behind cabinets, and electrical and plumbing outlets.

Smoke plume – The gases, smoke, and debris that rise slowly from a fire while being carried along the ground because the buoyant forces are exceeded by those of the ambient surface wind.

Smoke residue – Combustion products that remain after the dissipation of smoke.

Smoke stain – A discoloration by the penetration of fire residues into a material or surface.

Smoke stick / Smoke pencil / Smoke tube / Smoke puffer (environmental testing) **–** A vial that emits white smoke for testing the movement of air, air pathways. When activated, a smoke stick produces a continuous stream of smoke, about three to four times as much as from a cigarette, for about ten minutes. Education Note #1: Some manufacturers use potentially harmful chemicals to produce smoke. For example, when exposed to moisture in the air, titanium tetrachloride reacts to form smoke containing small quantities of hydrochloric acid, titanium oxychloride and titanium oxides. Education Note #2: Be aware of any health problems that small quantities of these chemicals may cause. Use smoke sticks only in well-ventilated areas. When working indoors, wear a respirator. Avoid inhaling smoke! Titanium tetrachloride is corrosive to some metals. Smoke sticks are also called smoke tubes, smoke pencils and a smoke puffer. (A smoke puffer is a reusable bulb dispenser containing titanium tetrachloride).

Smoke tags, webs, and swirls – Particles of carbon and other fire-related products which are the byproducts of incomplete combustion, which are more often produced in smoldering and petroleum burning fires. Education Note: Smoke tags, webs and swirls become link together to form strands or chains. At first, they are microscopic in size and configuration but as they become chained, they become visible, looking like a spider web. Smoke tags, chains, webs, and swirls are not created by spiders.

Smoke tracer (environmental testing) – White smoke that detects airflow patterns and air leakage (leak testing). In some applications, tracer smoke testing procedures are compliant with 2010 NFPA 72.

Smoke, types of – There are two types of smoke, corrosive smoke, and inert smoke. Corrosive smoke contains chlorides or sulfates which combine with water to form hydrochloric or sulfuric acids. Inert smoke is primarily carbon-based particles. Education Note: Carbon based smoke is like a fine dust without corrosive properties. In some situations, it can be cleaned off the surface of contents and appliances more easily, without harming or staining the substrate.

Smoke vent height – The level in the vicinity of the fire at which smoke ceases to rise and then moves horizontally with the wind at that level.

Smoke washing, commercial buildings (wildfire discussion) – The means and methods for removing smoke, soot, char, and ash from the interior and exterior. Education Note #1: Commercial buildings are managed by the owner, a property management company, and/or a building engineer. Together, they are materially interested parties (MIPS) the restoration contractor and insurance adjuster will communicate with and come to an agreement; what is required to return the building, its mechanical systems, environment and contents back to pre-wildfire impact conditions. Education Note #2: Depending on the level of smoke and particulate impaction (light, moderate, heavy, severe); parts of the structure or grounds are or are not heat damaged; building usage (e.g., school, medical clinic, office, shopping center); the immediate need to have the building brought back to pre-loss condition

and to reduce business loss interruption (BLI), the restorer must determine; can they respond with trained staff and the proper equipment to work day and night to return the exterior and interior back to pre-loss condition. Education Note #3: Commercial buildings generally have a higher insurance deductible than residential structures, such as $10,000.00 to $100,000.00. Depending on the level of wildfire impaction, and estimated costs to complete emergency services through restoration services is required. It is not unusual for the restorer to write in their agreement – an advance of funds to mobilize men and equipment; stage 24-hour security; provide housing for staff; project management and project oversight; hiring independent experts for testing asbestos, lead paint, smoke and particle impaction, completing indoor air quality studies, and independent verification of completed work; and a time and material auditor which oversees accounting, bookkeeping and jobsite billing. Education Note #4: Emergency wildfire and restoration services generally includes surface cleaning and deodorizing methods, including ventilation system cleaning and filter changes. Unless otherwise agreed, services do not include carpet and pad replacement, repainting, stone floor resurfacing and sealer or building repair. Education Note #5: When commercial buildings remain partially occupied, the level of wildfire impaction is light to moderate. Working around or with tenants must be negotiated in cooperation with the building owner or property manager. Generally, cleaning of common areas is completed during day-time hours, where cleaning and deodorizing tenant offices, spaces and stores is completed after hours. Education Note #6: Ventilation filters are changed at the beginning of the project and as often as necessary. Ventilation system cleaning is completed as close to the beginning of the project as possible and may require recleaning at the end of the project. When smoke odors remain in the building, it is an indication; the ventilation system may be a source, when outdoor air has poor air quality; areas within the building have not yet been cleaned. Education Note #7: Other than the building owner or property manager agreeing surfaces are clean at the completion of work, there should not be a warrantee of workmanship and deodorization, when the exterior continues to be impacted by the wildfire, including poor air quality; winds gusting and bring in additional smoke odor and particulate.

Smoke washing, residential and commercial exterior (wildfire) – The removal of smoke, soot, char and ash from the exterior of the building, grounds, trees and plants having 10-15 feet contact of the structure, vehicles and lawn furniture, using pressure washing, window washing and hand washing techniques. Education Note #1: Smoke washing the exterior starts by removing piles of ash and debris from around the property that can impact other cleanup and cleaning processes. Depending on complications and complexities at each wildfire project, smoke washing the exterior structure starts with hot water pressure washing, where the pressure washing system uses a detergent. (In some more difficult projects, scrubbing is required at the same time.) Education Note #2: The order of pressure washing includes starting at the roof (roof includes pitched, gabled and flat roofs including skylights); then rain gutters and downspouts, eaves, and soffits; washing siding, decks, porches, windows (remove window screens), doors and entryway; walkways, driveways, patios and if required, landscape. Education Note #3: Pressure washing must only be completed by authorized personnel who are trained to work off the ground, around electrical wiring, and wearing safety harnesses. For additional guidance on pressure washing and worker safety go to:
https://www.cdc.gov/disasters/pressurewashersafety.html and
https://www.dir.ca.gov/dosh/wildfire/worker-health-and-safety-during-fire-cleanup.html

Smoke washing, residential interior cleaning heavy (wildfire) – The removal of smoke, soot, char and ash from the interior including attics and crawlspaces, and ventilation systems; which first requires the separation of contents from affected rooms or building, that allows the structure to be vacuumed, wet cleaned and likely prepared for painting. Education Note #1: In a heavy residential wildfire impaction, changing ventilation system filters immediately is only a requirement when part of the building remains occupied. Generally, in a residential setting, the building is vacated, where the ventilation system is turned off, where the immediate need for filter replacement may be unnecessary. Education Note #2: Once the structure is absent of contents, investigate porous surfaces and pockets of odor, which can complicate or compromise the buildings cleaning and deodorization process. Some issues include carpet and pad, attic and crawlspace insulation, air gaps behind cabinets, build-in appliances that remain in place, kitchen, and bathroom exhaust vents. Education Note #3: Cleaning begins by HEPA vacuuming walls, flooring, and horizontal surfaces, followed by a mild detergent cleaning method (e.g., a more concentrate of Dawn Ultra; or degreaser, such as Simple Green). The successful deodorization of smoke odors depends on the type of chemicals capable of deodorizing, such as chlorine dioxide ClO_2), under positive pressure conditions, forcing sub-micron size gases into interstitial spaces; mechanical systems, such as ozone or hydroxyl, equipment must be staged where gases reach higher levels, using air movement at higher relative humidity. Education Note #4: In a heavy wildfire impact situation, once the above is completed, an assessment should be completed with all parties to evaluate successful cleaning and deodorization, and determine the next step in bring the building back to pre-loss conditions, which mare require painting and other forms of restoration. Education Note #5: Other than the building owner agreeing surfaces are clean at the completion of work, there should not be a warrantee of workmanship and deodorization, when the exterior continues to be impacted by the wildfire, including poor air quality; winds gusting and bring in additional smoke odor and particulate.

Smoke washing, residential interior cleaning light (wildfire) – The removal of smoke, soot, char, and ash from the surface of the interior and contents using vacuuming and wet cleaning methods. Education Note #1: The goal in smoke washing, is "dry vacuum" and "wet clean" the interior of smoke and particles, which is expected to bring back the interior to pre-loss condition. This can only be accomplished from a thorough inspection of the degree of wildfire impaction and discussing findings with the customer or their agent, including an insurance adjuster. Education Note #2: In a light wildfire impaction with no smoke odor or occupant health concerns that resulted from the wildfire; changing ventilation system filters followed by HEPA vacuuming walls, flooring and horizontal surfaces, followed by a mild detergent cleaning method (e.g., Dawn Ultra; Benefect Decon 30), may be all that is required to bring the interior back to pre-loss condition. Education Note #3: Other than the building owner agreeing surfaces are clean at the completion of work, there should not be a warrantee of workmanship and deodorization, when the exterior continues to be impacted by the wildfire, including poor air quality; winds gusting and bring in additional smoke odor and particulate.

Smoke washing, residential interior cleaning moderate (wildfire) – The removal of smoke, soot, char, and ash from the interior including attics and crawlspaces, ventilation systems and contents using vacuuming and wet cleaning methods. Education Note #1: In a moderate wildfire impaction with no smoke odor or occupant health concerns that resulted from the wildfire; changing ventilation system

filters followed by HEPA vacuuming walls, flooring and horizontal surfaces, followed by a mild detergent cleaning method (e.g., Dawn Ultra; Benefect Decon 30), may be all that is required to bring the interior back to pre-loss condition. Education Note #2: An assessment should be made for professional subcontract cleaning of draperies, Oriental rugs and carpet, bed mattresses, upholstered furniture, works of art and collectibles; removing and replacing attic and crawlspace insulation and the cleaning of attics; cleaning and deodorizing ventilation systems. Education Note #3: In a moderate wildfire impaction, where a lingering smoke odor is present and/or there are occupant health concerns resulting from the wildfire, using the above described methods supported with deodorization processes are expected to bring the indoor environment back to pre-loss condition. Education Note #4: Other than the building owner agreeing surfaces are clean at the completion of work, there should not be a warrantee of workmanship and deodorization, when the exterior continues to be impacted by the wildfire, including poor air quality; winds gusting and bring in additional smoke odor and particulate.

Smoke washing, residential interior contents cleaning heavy (wildfire) – The removal of smoke, soot, char, and ash from contents in affected rooms or building using multiple cleaning processes. Education Note #1: Contents, including furniture, appliances, clothing and personal items should be video documented (e.g., Matterport 3D), inventoried and removed from the premises and delivered to a contents cleaning company and then stored until the structure is brought back to pre-loss condition. Education Note #2: An assessment should be made of contents including the professional subcontract cleaning of draperies, Oriental rugs and carpet, bed mattresses, upholstered furniture, works of art and collectibles. Education Note #3: Recognize, some soft goods can be impacted with smoke odor (e.g., PAHs, VOCs) and surface smoke film containing tar, oil or grease which are imbedded on textile fibers, including leather, suede, cotton, silk, wool, and most synthetics (nylon and blends), they may not be successfully cleaned and deodorized, even with professional cleaning processes. Therefore, the customer and restorer must determine; is the cost to attempt in-plant cleaning and deodorization "cost effective" verses the cost to replace, restore or reupholster. Education Note #4: Items often considered for replacement in heavy smoke and particulate impact situations include carpet and pad; baby and children and adult bed mattresses and pillows; upholstered furniture that may not be cost effective to clean, deodorize and restore.

Smoke washing, residential interior contents cleaning light (wildfire) – The removal of smoke, soot, char, and ash from contents in affected rooms or building using dry vacuum and damp cleaning methods. Education Note #1: Contents, including furniture, appliances, clothing, and personal items should be video documented (e.g., Matterport 3D). This form of documentation benefits all parties that shows the amount of contents, placement, and condition. A review of documentation helps the restorer, homeowner, and insurance adjuster to inspect contents beforehand and after cleaning, to ensure they are back in their place and nothing is missing. Education Note #2: Surface cleaning includes HEPA vacuuming and surface wet wiping using a mild detergent.

Smoke washing, residential interior contents cleaning moderate (wildfire) – The removal of smoke, soot, char, and ash from contents in affected rooms or building using multiple cleaning processes. Education Note #1: Contents, including furniture, appliances, clothing and personal items should be video documented (e.g., Matterport 3D), inventoried, where a determination must be made

with the homeowner as to cleaning contents onsite with the building or removed offsite to a contents cleaning company, until the structure is brought back to pre-loss condition. Education Note #2: An assessment should be made of contents and their condition including the need for professional subcontract cleaning of draperies, Oriental rugs and carpet, bed mattresses, upholstered furniture, works of art and collectibles. Education Note #3: Depending on the level of wildfire impaction at windows, just inside the room, or throughout the interior, these factors can affect the decision on cleaning contents and how to clean. In addition, the customer and restorer must agree on cleaning methods and the expected outcome. In most situations, contents can be surface cleaned using professional dry vacuuming and wet cleaning processes. When an item may not respond to cleaning and deodorization, the customer should be made aware of this fact before attempts of cleaning and deodorization are made.

Smoke vacuuming, residential interior light (wildfire) – The removal of soot, char and ash particles that contain smoke which are settled on the surface of the interior and on contents. Education Note #1: The goal in smoke vacuuming, is "dry vacuum clean" the interior of particulate, where this process is expected to bring back the interior to pre-loss condition. This can only be accomplished from a thorough inspection of the degree of wildfire impaction and discussing findings with the customer or their agent, including an insurance adjuster. Education Note #2: In a light wildfire impaction with no smoke odor or occupant health concerns that resulted from the wildfire; changing ventilation system filters followed by HEPA vacuuming walls, flooring and horizontal surfaces, including contents, may be all that is required to bring the interior back to pre-loss condition. Education Note #3: In a light wildfire impaction, where a lingering smoke odor is present and/or there are occupant health concerns resulting from the wildfire, using the above described methods supported with deodorization processes are expected to bring the indoor environment back to pre-loss condition. Education Note #4: Other than the building owner agreeing surfaces are clean at the completion of work, there should not be a warrantee of workmanship and deodorization, when the exterior continues to be impacted by the wildfire, including poor air quality; winds gusting and bring in additional smoke odor and particulate.

Smoke zones – Hot and cold zones in a fire damaged building that show the demarcation between heated and heavy smoke layering at upper ceilings and walls, verses cooler thermal areas below that divide.

Smolder – (1) Combustion of the fuel is essentially complete where oxygen is available and smoldering continues, resulting in smoke generation. (2) A fire where either the fuel or temperature is insufficient to create flames. This type of heat fire can create a great deal of smoke and release more gases than a flaming fire.

Smoldering – A condition where materials burn slowly without a flame. (Fire can continue or exist in a suppressed state.) Smoldering also creates wet smoke residues whenever oxygen is depleted. Smoldering is like that obtained when any carbon-based material is heated to temperatures at which there is chemical degradation and evolution of volatiles. In plastic and sometimes electrical fires, volatiles mixed with cool ambient air tend to create a mist consisting of minute droplets of polymers and liquids having high boiling points.

Smoldering combustion, about – Smoldering combustion is a flameless form of combustion, deriving its heat from oxidations occurring on the surface of a solid fuel. Common examples are the initiation of fires on upholstered furniture by weak heat sources (e.g. a cigarette, a short-circuited wire), the persistent combustion of biomass behind the flaming front of wildland fires. Education Note: The fundamental difference between smoldering and flaming combustion is that smoldering occurs on the surface of the solid rather than in the gas phase. The characteristic temperature and heat released during smoldering are low compared to those in the flaming combustion (i.e., ~600°C vs. ~1500°C). Smolder propagates in a creeping fashion, around 0.1 mm/s, which is about ten times slower than flame spread over a solid. Despite its weak combustion characteristics, smoldering is a significant fire hazard. Smoldering emits toxic gases (e.g. carbon monoxide) at a higher yield than flaming fires and leaves behind a significant amount of solid residue. The emitted gases are flammable and could later-on be ignited in the gas-phase, triggering the transition to flaming combustion. Many materials can sustain a smoldering reaction, including coal, tobacco, decaying wood and sawdust, biomass fuels on the forest surface (duff) and subsurface (peat), cotton clothing and string, and polymeric foams (e.g. upholstery and bedding materials). The general features that characterize smoldering fuels are that they are porous, permeable to flow and formed by aggregates (particulates, grains, fibers or of cellular structure). These aggregates facilitate the surface reaction with oxygen by allowing gas flow through the fuel and providing large surface areas per volume. They also act as thermal insulation, reducing heat losses. The most studied materials to date are cellulose and polyurethane foam.

Smoldering fire – (1) Something that burns slowly without combustion. (2) A fire that has low heat without flame which produces smoke and soot behavior. (3) A fire burning without flame and barely spreading. (4) The slow, low-temperature, flameless form of combustion, sustained by the heat evolved when oxygen directly attacks the surface of a condensed-phase fuel. Education Note #1: Smoldering smoke and soot particles are larger in size as compared to a combustion fire that produces a more complete combustion of carbon residue. Education Note #2: The fundamental difference between smoldering and flaming combustion is that smoldering occurs on the surface of the solid rather than in the gas phase. Smoldering is a surface phenomenon but can propagate to the interior of a porous fuel if it is permeable to flow. The characteristics of temperature and heat released during smoldering are low compared to those in the flaming combustion, such as ~600°C (1,200°F) vs. ~1500°C (2,732°F). Smoldering propagates in a creeping fashion, around 0.1 mm/s, which is about ten times slower than flames spread over a solid. Despite its weak combustion characteristics, smoldering is a significant fire hazard. Smoldering emits toxic gases such as carbon monoxide at a higher yield than flaming fires and leaves behind a significant amount of solid residue. The emitted gases are flammable and could later be ignited in the gas phase, triggering the transition to flaming combustion.

SO_2 – Sulfur dioxide. (1) A corrosive gas produced by the burning of fuels, such as coal and oil that contain sulfur. It is also produced from sea spray, organic decomposition, and volcanic eruptions. When combined with water in the air, it produces corrosive sulfuric acid. (2) A colorless gas with a pungent, irritating odor and taste. It is highly soluble in water forming weakly acidic sulfuric acid. Education Note: When sulfur dioxide combines with the oxygen (O_2) in the air some sulfur trioxide (SO_3) is slowly formed. Sulfur trioxide rapidly combines with water to produce sulfuric acid. The lifespan of sulfur oxides in the atmosphere is from 4 to 10 days. Sulfur dioxide is used in many

industrial processes such as chemical preparation, refining, pulp-making and solvent extraction. Sulfur dioxide is also used in the preparation and preservation of food because it prevents bacterial growth and the browning of fruit. (See: Sulfur dioxide)

Soda blasting / Baking soda blasting – A process where sodium bicarbonate (baking soda) is applied against a surface in conjunction with compressed air for the removal of paint, rust, soot, smoke film or any other coating. Education Note: Unlike other media blasting, the soda blasting abrasive process is relatively gentle, and it can be used on most surfaces. Restorers typically use Arm & Hammer "ARMEX" or Natrium 260 Soda Blasting Media.

Sodium bicarbonate ($NaHCO_3$) – A mild alkaline compound commonly known as "baking soda." It is also used in fire extinguishers and some medicines.

Sodium bisulfate – A common ionic compound made from the combination of sodium, hydrogen, sulfur and oxygen ions. Although it is acidic and can be dangerous in high concentrations, sodium bisulfate is also an incredibly useful substance. Many of our common household products use sodium bisulfate as a key ingredient for cleaning and food preservation purposes.

Sodium bisulfite ($NaHSO_3$) / Sodium hydrogen sulfite / Sodium bicarbonate – A mild reducing agent used in color removal and spotting chemicals. Sodium bisulfite is made available in a ready-to-use liquid form or as a concentrate. It is manufactured by absorbing SO_2 in an alkaline solution. It is a clear, colorless to pale yellow solution having a pungent odor. As a reducing agent, it can furnish sulfur dioxide to an application where a liquid source would be ideal. Education Note: Sodium bisulfite is a corrosive liquid that is inherently slightly acidic (25% sodium bisulfite solution, pH = 5.0). Being it is slightly acidic; it has some common characteristics with other acids. All acids conduct electricity when in solution because ions can move freely. A 25% concentration of sodium bisulfite will also react with blue litmus paper turning it red. Sodium bisulfite applied in certain reactions involving other materials produces certain products. Sodium bisulfite when combined with an acid will react and produce sulfur dioxide gas, which is both poisonous and corrosive. An exothermic reaction will be created when sodium bisulfite meets strong oxidizing substances. Always try to determine if a substance is incompatible before allowing contact with sodium bisulfite. Even though sodium bisulfite provides a safer alternative to sulfur dioxide gas, the maintenance of good personal hygiene and housekeeping is always a necessity.

Sodium chloride (NaCl) – The chemical composition of salt, which is used for a variety of household and industrial purposes.

Sodium hypochlorite – Chlorine bleach (NaClO).

Sodium silicate - (1) A liquid used in asbestos encapsulation, concrete and mortar waterproofing, and high-temperature insulations. Sodium silicate is nontoxic when cured but caustic when wet. (2) A grey-white powder soluble in alkali and water, insoluble in alcohol and acid. Used to fireproof textiles, in petroleum refining and corrugated paperboard manufacture, and as an egg preservative. Also

referred to as liquid gas, silicate of soda, sodium metasilicate, soluble glass, and water glass.

Soft – A term describing the feel of an item.

Soft costs (estimating; insurance claims) – (1) Expenses incurred in a project that are not directly related to construction or remodeling in the strictest sense. Examples are loan, fees, surveys, legal fees, and professional fees. (2) Expense(s) necessary to business operations yet not directly related to a specific product or service sold. (3) Expenses occurred at a project, which includes daily use supplies.

Soft furnishings – Fabric-based upholstered furniture and draperies, area, and Oriental rugs. Soft furnishings include but are not limited to bed mattresses, leather and other upholstered items, and silk lampshades.

Soft goods – Any household item made from fabrics and other soft materials. Soft goods include but are not limited to leather, silk, cotton, wool, and synthetic fabrics.

Soiling – (1) The act of soiling something with a foreign substance. (2) To make something filthy or dirty. (3) The act of contaminating or polluting either intentionally or accidentally. (4) The presence of smoke and soot is a form of soiling.

Solvent – (1) A liquid, solid or gas that can dissolve another liquid, solid or gas. (2) A liquid substance that is capable of dissolving other substances. The most common solvent is water.

Solvent fogging / Thermal fogging – The application of petroleum-based chemicals as an insecticide or odor control agent. Solvent foggers produce a fine hot fog mist called thermal fog.

Soot / Sooty – A general term referring to impure carbon particles caused by hydrocarbon's incomplete combustion. Soot can be powdery, oily or tar-like depending on the type of combustion fuel.

Soot – (1) Fine black particles composed principally of carbon that is produced by incomplete combustion. (2) Fine particles (often black) formed from the incomplete combustion of fuels. Soot can be powdery, oily or tar-like depending on the type of fuel being burnt. (3) The unwanted byproduct from incomplete combustion or pyrolysis of carbon containing materials. (4) A submicron black powder generally produced as an unwanted byproduct of combustion or pyrolysis. It consists of various quantities of carbonaceous and inorganic solids in conjunction with absorbed or occluded organic tars and resins. (5) Impure carbon particles resulting from the incomplete combustion of the gas- phase combustion process. Morphology of soot particles are like carbon black, fine micron/submicron sized spheroids Education Note #1: Soot particles are geometrically complicated agglomerates of smaller particles; therefore, the meaning of size is not often straightforward. In the free-molecular and transition regimes, where the particle size is smaller than or comparable to the mean free path of the gas molecules (~65 nm for air at room temperature at one atmosphere of pressure), it has been shown that the particle mobility is proportional to the gas-accessible surface area of the particle. Education Note #2: The EDS spectrum of soot shows strong carbon concentrations with

few or no trace elements present ("*Wildfire Particulate in Proximally Located, Unburnt Buildings*." ASHRAE April 15, 2011, Technical Conference).

Soot (general information) – Soot is an agglomeration of impure carbon particles caused by hydrocarbon's incomplete combustion. Soot can be powdery, oily or tar-like depending on the type of combustion fuel. The particulate matter produced and deposited during or after combustion. Soot usually consists of finely divided particles, mainly carbon, produced by incomplete combustion of organic materials.

Soot agglomeration – (1) Particles of carbon that is impregnated with tar forming the incomplete combustion of carbonaceous material. (ASTM D1356) (2) A group of individual, sub-micron-sized soot particles (which individually cannot be resolved using light microscopy techniques) that have clustered together to form a larger soot particle (subsequently greater than one micron in size and visible during an optical microscope examination).

Soot and ash nuisance (medical) **–** Soot and ash that has no known adverse effect on the lungs and does not produce significant organic disease or toxic effect when exposures are kept under reasonable control.

Soot and smoke damage assessment of antiques – (1) A visual antique assessment process that inspects each surface for signs of heat damage, char, smoke, soot, and odor penetration. (2) A visual antique assessment process that evaluates each material and its condition and how it can be cleaned and deodorized or restored.

Soot and smoke removal cleaning process – Soot vacuuming and/or air washing followed by a mild alkaline detergent washing to neutralize, retard, or stop pitting and corrosion or discoloration of finishes.

Soot and smoke removal cleaning process – Soot vacuuming and/or air washing followed by a mild alkaline detergent washing to neutralize, retard, or stop pitting and corrosion or discoloration of finishes.

Soot, ash, char, and smoke analysis laboratory – A laboratory that tests and analyzes propagates of particulates coming from or derived by combustion or incomplete combustion. Education Note: In building science, the laboratory analysis is expected to prove a hypothesis involving particulate matter, smoke, and PAH's capable of affecting buildings, contents, and the indoor environment.

Soot, carbon – Impure carbon particles resulting from the incomplete combustion of the gas-phase combustion process. Morphology of soot particles are like carbon black, fine micron/submicron sized spheroids. Education Note: The EDS spectrum (Energy Dispersive Spectroscopy) of soot shows strong carbon concentrations with few or no trace elements present.
http://www.electrochemsci.org/papers/vol6/6062214.pdf

Soot, carbon black – A submicron black powder generally produced as an unwanted byproduct of

combustion or pyrolysis. It consists of various quantities of carbonaceous and inorganic solids in conjunction with absorbed or occluded organic tars and resins.

Soot, chemicals in – (See: Chemicals in soot)

Soot clearance (environmental testing) **–** Surface and air test analysis results confirming particles of soot are no longer present that can cause or contribute to material damage and corrosion or poor indoor air quality.

Soot clusters – A group or agglomeration of individual soot particles.

Soot, dry – Soot that has little moisture content and is not oily. Dry soot is often a byproduct of a wood burning fire.

Soot fallout, extensive (wildfire) **–** A person having average eyesight that can see soot and ash fallout covering most all horizontal and many vertical indoor surfaces; this typically represents an extensive wildfire soot fallout cleanup situation.

Soot fallout, heavy (wildfire) **–** A person having average eyesight that can see soot and ash fallout covering many horizontal and some vertical indoor surfaces; this typically represents a heavy wildfire soot fallout cleanup situation.

Soot fallout, light (wildfire) **–** A person having average eyesight that can see minute amounts (specks) of soot and ash fallout on some horizontal indoor surfaces; this typically represents a light wildfire soot fallout cleanup situation.

Soot fallout, moderate (wildfire) **–** A person having average eyesight that can see sporadic soot and ash fallout on many horizontal indoor surfaces; this typically represents a moderate wildfire soot fallout cleanup situation.

Soot fallout, nuisance (wildfire) **–** A person having average eyesight that can see minute amounts (specks) of soot and ash fallout on a few horizontal surfaces; this typically represents a nuisance wildfire soot fallout cleanup situation.

Soot fallout, positive/negative laboratory findings (wildfire analysis) **–** Laboratory results are either: 1) positive for the presence of soot and char fallout; or 2) the results are negative for the presence of soot and char fallout.

Soot ignition – The ignition of soot due to the presence of oxygen, unburnt particles/residue, and heat. Education Note: Ignition of soot arises at a flue, vent, boiler, or heater where soot deposits of combustible materials have a high temperature (higher than the flash point) at which they ignite by a spark or a flame. The main constituent of soot deposit is particulates, but some unburnt residues involve fuel and lubricating oils that contribute to combustion.

Soot morphology – (1) The analysis of the size, shape, weight, and fractional dimension of soot as a particulate or agglomeration. (2) The analysis of the soot's dynamic shape, fractal aggregates, total mass and black carbon content. (3) The analysis of the mass-mobility relationship of weight and mass of soot to remain suspended in air.

Soot, oily (sticky) **–** Oily soot that is a result of incomplete combustion involving: a plastics or petroleum-based fire, low heat smoldering fire, a puff back.

"*Soot Particles: A Procedural Guide for Containing and Removing Wildfire-Caused Soot in Buildings*" – An article on removing wildfire caused soot in buildings by Patrick Moffett.

Soot removal advice – Professional advice to building owners, managers and engineers that comes from restorers and reliable third-party resources.

Soot removal using dry sponge – A chemical sponging technique that removes loose "dry" soot particles that bonds them to the sponge.

Soot removal using dry vacuuming – The removal of soot particles using a vacuum (HEPA vacuum) and soft bristle nozzle attachment.

Soot residue – Particulates (e.g., combusted materials), chemicals (e.g., PAHs) and gases (e.g., VOCs) that remain after a fire and settles on surfaces; absorb into pores or adsorbed into the material's physical structure.

Soot sealer – (1) Usually a clear, adhesive-like liquid sprayed into ducts to bond and immobilize loose soot or fire residues in place. Education Note #1: Soot sealer prevents soot, lint, and dirt in air ducts from being blown back into home or building after cleaning. It is also used to keep air ducts cleaner and to prevent build-up of odors. (2) A pigmented lacquer, varnish or acrylic polymer that locks residue of soot to a surface. Education Note #2: Soot sealer is designed to bond smoke, dust, pollen, or other fine particles to metal, wood, or other surface types when complete removal is impractical. Most soot sealer products can be brushed, sprayed, or fogged.

Soot set / Soot sealer – A clear adhesive-like liquid that is sprayed into ducting to bond and immobilize loose soot or fire residues. Education Note: Soot sealers may not be recommended because over time the bonding agents tend to break down causing soot and fire residue to become part of the ventilation system's air stream.

Soot soiling – A general term in fire damage restoration for surface particulate produced by pyrolysis.

Soot sticky tape or tapelift – A soot sampling method for the collection of soot particulate on surfaces for laboratory analysis.

Soot tag – Soot webs. (See: Soot webs)

Soot tar balls, about (wildfire) – Soot tar balls are spherical, amorphous, carbonaceous particles in the smoke of biofuel and biomass in wildfires. The identification and characterization of the widespread particle type led to 25 studies that determined their compositions, hygroscopic properties, and complex refractive index, illustrating the utility of TEM-based categorization of particle types. Education Note: In a recent study, the focus was on the major forms of light-absorbing carbonaceous aerosol particles, which are commonly called soot and black carbon (BC). Soot tar balls are atmospheric in nature phenomena and may be found around smoke impacted buildings.

Soot webs – An irregular shape spiral design of soot particles agglomerated in corners of sooty or fire damaged buildings. Theories about how soot webs are created include: soot particles that cling to an already existing spider web; a fire that affects indoor spaces where the inside corners of rooms experience eddy effects (turbulence) resulting in chains of soot particles to cling together or with dust to form webs of soot. Education Note: Soot tags (soot webs) are ionized smoke residues that are often formed by the combustion of synthetic materials (plastics, carpet to urethane floor finishes). They tend to be black in color and they easily smudge when disturbed. Their removal is best done with paper towels that cause the soot tag or soot web to cling to it. The paper towel is then folded into itself and disposed. Spraying soot webs with a cleaner/ degreaser causes it to explode (disintegrate) making soot removal a more difficult task.

Soot, wet – Soot that has sufficient moisture in it to cause soot to cling together and smear when disturbed or cleaned.

SOP – Standard Operating Procedure. The procedure contractors use to operate their company; health and safety procedures; administrative and field procedures for completing work.

SOP manual – Standard operating procedures manual. An SOP manual establishes written procedure to be followed in carrying out a given operation or task in a given situation. Education Note: The term standard operating procedure or SOP is used in a variety of different contexts, such as construction, restoration, healthcare, education, or the military. The use of the term "Standard" implies the operating procedure is the only correct one that must be followed. When a restorer or remediation company refers to "their SOP manual," it is the correct one which employee's must follow unless site conditions (e.g., hazards, health, and safety considerations; codes and regulations) dictate otherwise. (See: Standard operating procedure)

SOP manual regulations - Government regulations that mandate all contractors and restorers must create and use an up to date standard operating procedures manual. The SOP teaches and instructs employees on each of their work tasks; proper use of PPE; proper use of equipment and chemicals. To see example of a guidance document go to: https://www.osha.gov/sites/default/files/2019-12/standard_operating_procedures.pdf To see an example of a technical manual go to: http://www.osha.gov/dts/osta/otm/otm_viii/otm_viii_1.html For developing a policy and procedures manual go to: https://www.osha.gov/OshDoc/Directive_pdf/ADM_04-00-001.pdf

SOP manual regulations, respiratory worker protection – Government regulations requiring

employers to provide a Standard Operating Procedure for any respirator related operation (29 CFR 1910.134).

Source containment – A containment that is constructed to remove a small area of contaminant whether that contaminant is mold, asbestos, lead-based paint, etc. Education Note: A source containment usually includes less than 10 square feet of contamination.

Source removal – The removal of the largest mass of a contaminant such as water and sewage, smoke, char, and soot.

Spalling – Chipping or pitting of concrete, masonry, and stone surfaces.

Spalling indicators – Craters or chips in the surface of concrete and stucco which indicates direction of fire spread.

Spark arrester – A device installed in a chimney, flue, or exhaust pipe to stop the emission of sparks and burning fragments.

Specific heat – (1) The heat required to raise a unit mass of a substance one-degree Kelvin. It is the heat capacity of a system per unit mass, such as the ratio of the heat absorbed (or released) to the corresponding temperature rise or fall. (2) The quantity of heat needed to raise the temperature of a mass of material as compared with the same amount of water. (3) The ratio of the amount of heat required to raise a unit mass of a material 1 degree, to that required to raise a unit mass of water 1 degree at some specified temperature.

Specific humidity – The weight of suspended moisture in air expressed in grains per pound (gpp) of dry air (14 cubic feet of dry air equals one pound). 1700 grains of water vapor equal one pound (1.043 pints) of water. As specific humidity changes, there is a corresponding change in vapor pressure.

Specification (construction) – (1) Detailed written instructions which, when clear and concise, explain each phase of work to be done. (2) A written document often accompanying architectural drawings, giving such details as scope of work, materials to be used, installation method, required performance, and quality of work for work under contract. (3) A detailed description of design criteria for piece of work.

Specifications (remediation) **–** The planned action based on a scope of work of remedying something, especially the reversal or stopping of damage to the environment, material, item or building.

Specifications (as in remodeling) **–** A written document describing a detailed description of alterations to be made to an existing structure such that on completion they will be better suited for current needs. This type of work may involve changing the use of interior space by repositioning and/or replacing cabinets, walls, the replacement of kitchen and bathroom fixtures, painting, or other such modifications. Remodeling projects generally incorporate new replacement materials. Education

Note: Generally, remodeling projects unlike restoration projects are not concerned with maintaining and preserving historic authenticity; bring property back to its pre-loss condition (as in a catastrophe or insurance loss).

Specification, design – A concise document defining technical requirements in sufficient detail to form the basis for a remediation plan, the creation of a product or completion of a process. The design specification indicates when appropriate, the procedure that determines whether the given requirements were completed satisfactory or not.

Specification, performance – A concise document that details the performance requirement for a service or product. The performance specification should include procedures and/or references for testing and certification of the service at job completion, product repair or manufacturing phase.

Specification, prescription – Traditional procedure used on building projects to describe by name products, equipment, or systems to be used.

Specifications – (1) Detailed, precise engineering instructions that include the kinds of materials to be used and the method of construction. (2) The written requirements for materials, systems and workmanship in the construction or restoration of a building. (RIA)

Spent material or item – (1) A material or item that experienced fire damage or impurities from smoke and odor and is damaged to a point it must be removed and replaced or taken out of service. (2) Any material or item that has been used as a result of contamination, it can no longer serve for the purpose intended; or is nonfunctional in the sense that it cannot continue to be used for its original purpose (EPA Memorandum 9441.1994(07)).

Spill – A small amount of liquid falling on a surface, which is usually cleaned up with towels or a mop.

Spill sock – A long cylindrical absorbent sock (4-foot or 8-foot) that is filled with super absorbent polypropylene to soak up spills fast and it can be wrung out and reused in some circumstances. Education Note #1: A general purpose absorbent sock can be used for everyday maintenance, repair, and general operations. It absorbs water-based fluids, oil, diesel, gas, coolants, cutting fluids, hydraulic fluids, vegetable oil, acetone, turpentine, ether, MEK, hexane, trichloroethylene, etc. Education Note #2: Spill socks are used in fire damages, where there can be a release of solvents. (See: Absorbent pillows and pads; Absorbent pillows and pads, hazmat; Berm; Oil Absorption; Spill sock, hazmat)

Spent material or item – (1) A material or item that experienced fire damage or impurities from smoke and odor and is damaged to a point it must be removed and replaced or taken out of service. (2) Any material or item that has been used as a result of contamination, it can no longer serve for the purpose intended; or is nonfunctional in the sense that it cannot continue to be used for its original purpose (EPA Memorandum 9441.1994(07)).

Splash goggles – Eye protection made of a non-corrosive material that fits snugly against the face and has indirect ventilation ports.

Spoilage – A condition after a fire where heat, moisture, smoke, and ash affect food, medical supplies and other sensitive items causing them to be disposed. Spoilage also occurs when electricity in a cooled building or refrigeration appliance is tuned off causing damage to a product or produce.

Spoliation – (1) The removal or destruction of an item or material from a fire that is relevant to investigating cause and origin. (2) The loss, destruction, or material alteration of an object or document that is evidence or potential evidence in a legal proceeding by one who has the responsibility for its preservation. (NFPA 3.3.144)

Sponge – (1) The ability to hold, absorb and retain. (2) A material that absorbs. (3) A material that wipes and cleans surfaces.

Sponge blasting, about – Sponge blasting systems are compatible in most situations where other types of blasting media can be applied. As with any blasting operation, airborne dust is always a safety and health concern. The key advantage to sponge blasting is the low/reduced generation of dust. The sponge blasting process can remove smoke, soot, and other contaminants. The sponge blasting system decontaminates by blasting with various grades of patented water-based urethane foam media using more than 100-psig air as the propellant. Education Note #1: In theory, once the sponge media collides with surface contaminants, exceedingly small sponges expand where this process creates a vacuum that then entraps smoke and soot while holding contaminants in the sponge. The waste is separated, and sponges are recycled for reuse in the system. Sponge blasting can remove a range of coatings from soot on wallpaper to high-performance protective coatings on steel and concrete surfaces. Sponge blasting adds speed and decreases dust in the removal of paint and coatings when compared with more traditional preparation methods. This technology offers the restorer the ability to remove individual layers of coatings with no damage to the surface beneath. Sponge blasting technology has become so advanced that it can remove finite layers of paint, grime, or other coverings without damage to the substrate beneath. This system is often used on historic buildings and homes and is the industry choice when precision is required. Sponge blasting is even safe for use around delicate control systems. Sponge blasting is able to: 1) Capture dust without the use of water; 2) Provide controllable for precise cleaning and depainting; 3) Allows for inspection and superior visibility during the process; 4) Is many times faster than hand wiping or use of power tools; 5) Can selectively strip coatings and remove contaminants; 6) Cleans and degreases without water, liquid detergents, or strong stripping agents; 7) Offers no chemical runoff pollution; 8) Exfoliates without ricochet damage. Education Note #2: Sponge blasting is said to be safe on: faux and painted surfaces, murals, wallpaper, hard metal alloys, soft metals, cast iron, carbon steel, copper, tin, bronze, granite and other types of natural stone including limestone and sandstone, terra-cotta, Mexican tile, brick, masonry block, concrete, most hardwoods, and fiberglass. Proper precautions should be taken to ensure that inhalation of dust and particulate matter is avoided. Additional protective measures should be taken when stripping lead chromate- or zinc chromate-based paints, as these compounds may be hazardous. Inhalation of lead and zinc compounds can irritate the respiratory tract, and some

compounds are known to be carcinogenic. Proper personal protective equipment should be used.

Sponge, cleaning – An act of wiping and cleaning. Sponges designed to clean (capture and retain) small particles and absorb liquids. Cleaning sponges can be rinsed out, washed, and reused multiple times.

Sponge, dry cleaning – A natural rubber sponge used for dry cleaning surfaces. Education Note: A dry cleaning sponge may be capable of removing stubborn marks from drywall and wallpaper without chemicals or abrasives. Dry cleaning sponge can remove soot off ceilings, walls and flat surfaces. Under normal household cleaning conditions, a dry-cleaning sponge may be able to surface clean a 12' x 20' wall surface. In fire damage restoration the cleanable square foot area is greatly reduced based on the amount of soot, wetness, and oily properties.

Sponge usage, dry cleaning – Besides being an excellent dry compound cleaning device involving soot cleanup, dry cleaning sponges can be used to remove household dust and particulates from lampshades, paintings, wallpaper, heat registers and grills, computers, antiques, fireplace, wood burning stove, projection screen, painted walls, books, acoustic ceiling tiles, etc.

Spontaneous combustion (Spontaneous heat) **–** (1) Unprompted combustion within a material by localized heat and not by an external ignition source. (2) A type of heat energy causing oil-soaked rags to burst into flames without the addition of external heating. (3) Combustion of a thermally isolated material initiated by an internal chemical or biological reaction producing enough heat to cause ignition. (3) Self-heating materials, those that exhibit spontaneous ignition or heat themselves to a temperature of 200°C (392°F) during a 24-hour test period.

Spontaneous heating – Process whereby a material increases in temperature without drawing heat from its surroundings.

Spontaneous ignition – The initiation of combustion of a material by an internal chemical or biological reaction that has produced sufficient heat to ignite a material. (NFPA 921, 2008, 3.3.159)

Spontaneous ignition temperature – (See: Auto-ignition temperature)

Spore – A dormant, usually unicellular, form from which fungi or bacteria germinate when appropriate growth conditions are present. Spores are bodies that permit survival of a microorganism during unfavorable growth conditions (food source, temperature, moisture). Education Note: Mold spores can cause allergic reactions or other health problems in sensitive persons.

Stable air mass – An air mass which has little vertical mixing.

Stack effect – (1) The overall upward movement of air inside a building that results from heated air rising and escaping through openings in the building super structure, thus causing an indoor pressure level lower than that in the soil gas beneath or surrounding the building foundation. (EPA) (2) Used air, as in a chimney or air duct, that moves upward because it is warmer than the surrounding

atmosphere. In larger buildings the stack effect can overpower the mechanical system and disrupt normal ventilation and circulation. (IICRC S500 Standard, 2006) (3) Pressure-driven airflow produced by convection as heated indoor air rises, creating a positive pressure area at the top of a building and negative pressure area at the bottom of a building. Stack effect can overpower the mechanical system and disrupt ventilation and circulation in the building.

Stack effect in a building fire – Stack effect in building fires occur when a heated area is drawn to a colder area, or an area having high oxygen content, such as upper floors entering stairwells, vents, chases, and shafts. This phenomenon involves hot smoke movement from a lower to upper floors through oxygenated passages. (Klote, Fothergill 1983; Council ... 1992) Stack effect is the phenomenon observed in cold weather when a tall building acts like a chimney, with air entering through openings in lower floors, flowing upward in the building, and leaving through openings in upper floors (Tamura 1994; Klote 1994; Evans, Klote 2003) Stack effect results from the difference in density between warm inside air and cold outside air (Barrett, Locklin 1969) The air flow pattern in the compartment where fire starts has significant influence on the fire behaviors and smoke movement. Chow (2003, 2010, 2011) reported that the duration of a fire depends on the fire load and available ventilation. If there is sufficient fuel in the compartment, a small fire, once ignited, will grow. Adding to that, a plenty of fresh air is sucked into the fire room by stack effect. Big fires might occur due to providing fresh air contributing to burning large amount of combustibles and causing severe damage. For More Information go to: https://energy.ces.ncsu.edu/stack-effect-defined/ and https://www.thefreelibrary.com/Experimental+study+on+influence+of+stack+effect+on+fire+in+the...-a0366863771 and https://link.springer.com/article/10.1007%2Fs12273-012-0062-y and https://www.nist.gov/el/fire-research-division-73300/fire-modeling-programs

Stain kill – A sealer designed to block the transmission of stains out of a material.

Stain retarder – A textile application which imparts some degree of protection against staining.

Stain sealer – A sealant such as a shellac-base product that locks stains in place.

Stain, smoke – A discoloration caused by the penetration of fire residues into a material or surface.

Standard of care – Practices that are common to reasonably prudent members of the trade who are recognized in the industry as qualified and competent.

Standard operating procedure (SOP) – (1) Complete reference document or an operations manual that provides the purpose, authorities, duration, and details for the preferred method of performing a single function or several interrelated functions in a uniform manner. (2) A procedure adopted for repetitive use when performing a specific measurement or sampling operation. (3) Written company procedures (instructions and directions) restorers and abatement contractors use to teach employees how day-to-day work activities are to be safely completed.

Static pressure – A condition in which an equal amount of air is supplied to and exhausted from a space.

Steam cleaning – The process where steam combined with detergents followed with vacuuming removes dirt, grime, soot and smoke from carpets and other fabrics; hard surfaces including wood and vinyl floors, marble, and granite.

Structure fire – Fire originating in and burning any or all parts of a building and other structures.

STEL – Short term exposure limit.

Sterilize – The use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.

Strength, dry – The strength of a material such as an adhesive that is determined immediately after drying under specified conditions or after a period of conditioning time.

Structure fire – Fire originating in and burning any part or the entire building, shelter or other structure.

Structural remediation – That portion of a remediation project that deals specifically with a building's structure and typically does not address a building's contents or HVAC components. (IICRC S520 Standard, 2015)

Stucco – Refers to an outside plaster finish made with Portland cement as its base.

Stud – A vertical wood framing member, also referred to as a wall stud, attached to the horizontal sole plate below and the top plate above. Education Note: Normally 2 X 4's or 2 X 6's, 8' long (sometimes 92 5/8"). One of a series of wood or metal vertical structural members placed as supporting elements in walls and partitions.

Stud framing – A building method that distributes structural loads to each of a series of relatively lightweight studs. Stud framing is in contrasts with post-and-beam.

Stud framing, fire damaged – Lumber that is discolored by smoke is usually considered acceptable after it has been cleaned of smoke and surface char and sealed. Education Note: Some building inspectors and structural engineers may allow up to 1/16" to a 1/4" char depth, on the assumption; char will not reduce the strength of framing, including other factors. Another rule of thumb, depending on building codes, is $1/10^{th}$ of the thickness of wood. (See: Fire damaged trusses)

Subcontractor – An independent company or individual who works for but is not an employee of a general contractor.

Subfloor – (1) The framing components of a floor to include the sill plate, floor joists, and deck sheeting over which a finish floor is to be laid. (2) The surface laid across floor joists and beneath the

finish flooring or "decking" material.

Sublimation – (1) Changing moisture, usually under vacuum pressure, directly from a frozen state to a vapor. (2) When a solid (ice) changes directly to a vapor without first going through a liquid (water) phase. Thoroughly understanding the concept of sublimation is a key building block to gaining knowledge of freeze drying. (See: Freeze drying)

Subrogation (insurance) – The insurer's right to recover payment for a loss it has paid to an insured from a negligent third party who caused the loss.

Subsidence – Downward or sinking motion of air in the atmosphere. Subsiding air warms due to compression. Air temperature increases and humidity decreases as air subsides. Subsidence results in a stable atmosphere inhibiting dispersion. Subsidence is generally associated with high atmospheric pressure.

Subsidence inversion – An inversion caused by subsiding air, often resulting in decreased atmospheric mixing conditions.

Substrate – A layer of material or substance below the surface. The substrate may refer to the backing system to which pile yarns are attached or inserted. Education Note: Generally, the term substrate refers to the subflooring material directly beneath an installed carpet and cushion.

Subtractive deodorization – The process by which fire and water residue is removed by cleaning, demolition, and the removal of affected items. Education Note: Subtractive deodorization is the preferred deodorization method of removing odor without introducing other odors into the damaged building. However, deodorization using chemicals is also an accepted option once the building has undergone subtractive deodorization cleanup.

Sudden and accidental (insurance) – Damaged sustained to property or persons from a sudden and accidental occurrence, such as a car crash, a burst pipe, or a fire, which can cause sudden and accidental property damage. Sudden & accidental insurance coverage is tied to a discovery and reporting period, and generally covers bodily injury and property damage caused by a pollution loss. If a claim comes in and is a gradual loss or is not discovered and reported in the time allowed under the policy form, there is no coverage in place. For more information go to: https://b-h-a.com/sudden-accidental-coverage/#:~:text=Sudden%20%26%20Accidental%20coverage%20is%20tied,is%20no%20coverage%20in%20place

Sudden and accidental pollution – The release of a pollutant by an accidental occurrence. Example includes asbestos in a building that is released by an earthquake, tornado, storm, fire, or water damage.

Sulfate – Solid or liquid particulate matter composed of sulfuric acid [H_2SO_4], ammonium bisulfate [NH_4HSO_4], or ammonium sulfate [$(NH_4)_2SO_4$]. Atmospheric sulfate aerosols are often formed from the atmospheric oxidation of sulfur dioxide.

Sulfur dioxide (**SO_2**) – (1) A gas consisting of one sulfur and two oxygen atoms. In fire damaged buildings, SO_2 is important to identify because during combustion sulfur dioxide can convert to an aerosol that settles out of air with smoke and soot. On a damp surface, SO_2 can convert into acid droplets consisting primarily of sulfuric acid. (2) High concentrations of sulfur dioxide affect breathing and may aggravate existing respiratory and cardiovascular disease. Sensitive populations include asthmatics, individuals with bronchitis or emphysema, children, and the elderly. Education Note: Sulfur dioxide is also a primary contributor to acid rain, which causes acidification of lakes and streams and can damage trees, crops, historic buildings, and statues. In addition, sulfur compounds in the air contribute to visibility impairment in large parts of the country. This is especially noticeable in national parks. Sulfur dioxide is released primarily from burning fuels that contain sulfur (such as coal, oil, and diesel fuel). Stationary sources such as coal- and oil-fired power plants, steel mills, refineries, pulp and paper mills, and nonferrous smelters are the largest releasers. (3) A heavy, toxic, pungent gas that is used in making sulfuric acid, in bleaching and as a preservative. It is a by-product produced by accelerating the activity of sodium hydrosulfite (reducer, stripper) with acid. (See: SO_2)

Sulfur dioxide cleaning – The use of detergent cleaners to remove smoke caused acid-based residues on surfaces.

Surface area-to-volume ratio (wildfire; fire forensics) **–** (1) The ratio between the surface areas of an object, such as a fuel particle, to its volume. (2) The ratio between the surface areas of an object, such as a fuel particle, to its volume. Education Note: The smaller the particle, the more quickly it can become wet, dry out, or become heated to combustion temperature during a fire.

Surface comparison testing (remediation and restoration) **–** An appearance comparison test (evaluation, appraisal, estimate) that measures one surface against another. Education Note: Surface comparison testing may measure cleaning efficiency and appearance after cleaning and drying.

Surface contaminant – Any foreign substance that is on or adhered to a surface.

Surface dust – Settled particulate matter containing pollen, hair, dander, mites, skin cells, organic material and other solid particles usually having a diameter less than 20 to 500 micrometers.

Surface fire (building) **–** A fire that burnt or singes the top layer of materials, and finishes.

Surface fire (wildland fire) **–** A fire that burns loose debris on the surface which includes dead branches, leaves, and low-growth vegetation.

Surface fire – Fire that burns loose debris on the surface which includes dead branches, leaves, and low-growth vegetation.

Surface fuels (wildfire) – Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branch wood, downed logs, and stumps interspersed with or partially replacing the litter.

Surface layer (wildland fire) **–** The concentration of air pollution that extends from the ground to an elevation where the top edge of a pollution layer is visible.

Surface layer, smoke impaction (building fire) **–** A concentrate of smoke that extends from the floor to an elevation, where the top edge of a smoke impacted boundary layer is visible.

Surface sample – A sample taken from the surface of a material suspected of being contaminated. Types of surface samples include swabs, vacuum cassette, and tape samples.

Surface vacuuming – The process of vacuuming loose particulate off floors, walls, and ceiling; cabinets and counters; appliances and finishes; and soft goods such as draperies, upholstery, and contents.

Surface wind – A wind measurement taken above the surface, customarily a distance of 20 feet above the average vegetative surface to minimize the distorting effects of local obstacles and terrain.

Surface wipe – A streak test collected from a given surface that is intended to identify carbon black, soot and other naturally occurring environmental particulates.

Surface wipe cleaning – The process of cleaning a surface with a wipe, such as a natural or a synthetic sponge, Terry cloth towel, microfiber cloth, cotton rag, paper towel; static and antistatic cleaning materials.

Surfactant – A surface active agent; any wetting agent. A formulation which, when added to water in proper amounts, will materially reduce the surface tension of the water and increase penetration and spreading abilities of the water.

Supervisor, remediation – An individual trained to supervise work being conducted by remediation workers.

Supplied-air respirator (SAR) – An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user. Education Note: SAR is also known as "airline respirator."

Suppressant – An agent, such as water or foam, used to extinguish the flaming and glowing phases of combustion when direction applied to burning fuels.

Suppression – All the work of extinguishing or containing a fire, beginning with its discovery.

Surcharge property damage – Damage to the property due to fire, flood, earthquake, hurricane, tornado, or other natural disaster. This includes mortgages insured on or after January 1, 1977 due to mortgagee failure to inspect or take reasonable action to preserve and protect vacant or abandoned properties. (HUD)

Suspended soot particulate (SSP) – Tiny pieces of solid matter associated with fires that are commonly carbonaceous particles formed by incomplete combustion. Subtypes of particles include suspended particulate matter (SPM), respirable suspended particles (RSP), fine particulate matter (FPM), ultrafine particulate matter (UPM) and soot. Generally, SPM are 10 microns in size or larger, RSP are 10 microns in size or less, FPM are 2.5 microns in size or less, and UPM are less than one micron in size or less. Education Note: The smaller and lighter a particle is, the longer it will stay in air. Larger particles (greater than 10 micrometers in diameter) tend to settle to the surface by gravity in a matter of hours whereas smaller particles (less than 1 micron) can stay in air for days and weeks; they tend to become airborne from disturbance such as air movement or cleaning. Also, as subset of UPM is "Ns-Soot" that are even finer nanosphere particles such as graphite having a diameter less than 100 nm. "Ns-Soot: A Material-Based Term for Strongly Light-Absorbing Carbonaceous Particles." Aerosol Sci Tech. 48(7), 6-2014

SVS – Steam vapor system. The process of using high-pressure, low-moisture dry steam vapor cleaning process that cleans dirty and/or contaminated surfaces. Education Note: Generally, commercial steam cleaners sanitize and deodorize surfaces without chemicals. Commercial vapor steam cleaners use an internal boiler to heat water under pressure, which causes the steam produced to be extremely dry (e.g., 4~7% moisture), hot (220°F at the point of contact) and very fine (down to a particulate size of .0006 microns).

Swirl smoke tags – Particles of carbon and other fire-related products which are the byproducts of complete or incomplete combustion. Education Note: Smoke tags, webs and swirls become link together to form strands or chains. At first, they are microscopic in size and configuration but as they become chained, they become visible, looking like a spider web. Smoke tags, chains, webs and swirls are not created by spiders.

(T)

T-Rating (building fire rating) **–** The time for the temperature of the unexposed surface of the firestop system or any penetrating item to rise 325°F above its initial temperature as determined by ASTM E-814 and UL 1479.

T&G, tongue and groove – A joint made by a tongue (a rib on one edge of a board) that fits into a corresponding groove in the edge of another board to make a tight flush joint. Typically, the subfloor plywood is T&G.

Tag, soot – Soot webs.

Target humidity – A variable, average humidity for rapid, balanced, efficient, cost-effective drying. Generally, an average target humidity for structural drying is around 40-45% RH or 40 gpp.

Tape sample – (1) The use of sticky tape to collect (pull-off) loose particulates from a surface. (2) A sample collected by applying and peeling away a transparent piece of tape on a surface area suspected to be contaminated with mold, soot, asbestos, lead-based paint, dust, etc. During this process, the presence of the surface sampled adheres to the surface of the tape. The sample collected can then be processed and analyzed by the laboratory.

Tape sampling / Tape-lift sampling – (1) A field sampling method that collects loose surface debris onto clear Scotch tape that is held in place by a clean microscope slide. (2) A composite collection method where the tape is put onto more than one area within a grid. Education Note: An example of composite surface soils collection is soot and ash from a 2-square inch area.

Tape sampling, type of – Scotch-brand clear transparent tape #600 or a comparable brand of clear transparent tape used to pull-off surface debris such as dust, pollen, dander, mold growth, mold spores, asbestos, lead paint, char and soot.

Technician – An employee who demonstrates the proper knowledge, training, and experience to work in fire damaged or smoke impacted buildings.

Technician, certified – An employee who has journeyman experience and passed courses in fire damage restoration, such as IICRC's Fire & Smoke Restoration Technician course (FSRT), and RIA's Fire Loss Specialist (FLS).

Technically exhaustive inspection – a technically exhaustive home inspection is a comprehensive and detailed investigation and examination of a home or establishment, which includes or involves dismantling, use of advanced techniques, measurements, special instruments, calculations, testing, research, and technical analysis. This also requires specialized knowledge and training.

Technically exhaustive testing – A series of tests in combination with other tests having various values to prove a hypothesis.

TEM analysis (laboratory) – The transmission electron microscopy (TEM) testing and method is an evaluation of the morphology of the particles present in the sample to determine primarily if their morphology is consistent with the unique grape cluster, or acinoform, morphology of carbon black and soot. Education Note: Using ASTM D6602, it designates TEM analysis as the mandatory evaluation technique for black carbon/soot. Examination of the samples using light microscopy should be used only as a screening/presumptive method. The same ASTM D6602 method mentions using Scanning Electron Microscopy (SEM) as ancillary method for black carbon/soot and carbon black analysis. But similar to polarized light microscopy (PLM), the PLM method should be used only for screening purposes or for supporting the TEM data. SEM is used to further characterize the morphology of particles where its data supports the TEM data.

Temperature, adiabatic (fire forensics) – The flame temperature of a burning material at a constant

pressure that loses no heat.

Temperature, ambient (fire forensics) – The temperature of the air that surrounds a building or a material.

Temperature, autoignition (fire forensics) – The autoignition temperature or kindling point of a substance is the lowest temperature at which it will spontaneously ignite in a normal atmosphere without an external source of ignition, such as a flame or spark. Education Note: The autoignition temperature is required to supply the activation energy needed for combustion. The temperature at which a chemical will ignite decreases as the pressure increases or oxygen concentration increases. It is usually applied to a combustible fuel mixture. There are several temperatures at which wood spontaneously combusts, which is around 660°F. However, the type and age of the wood including porosity (density), hardness and extended exposures to lower temperatures will affect spontaneous combustion.

Temperature, heat drying – A process whereby heated air relies on high temperatures to dry wet surfaces rapidly. Education Note: The heat drying process is terminated when the average surface moisture content (MC) reaches the desired final MC. However, in lower-temperature heat drying, the objective is to control the relative humidity (RH) rather than the temperature of air (with the aid of vapor pressure), in order for all layers and the core of wet materials to reach the predetermined equilibrium moisture content (EMC). The goal in low-temperature heat drying is to dry similar and unlike materials within controlled parameters to help avoid secondary damage.

Temperature in a building fire (fire forensics) – The typical temperature a material becomes during a fire through radiant heat. Hot gas layer 600-1,000°C/1,112-1,832°F; Floor temperature >180°C/356°F; Glowing smoldering combustion to 600°C/1,112°F; Flashover >600°C/1,112°F.

Temperature, ignition (fire forensics) – The minimum temperature to initiate or cause self-sustained combustion in the absence of any source of ignition. The ignition temperature is higher than the flashpoint.

Temperature inversion (fire forensics) – (1) A weather condition in which warm air sits atop cooler air, promoting inversion stagnation and increased concentrations of air pollutants. (2) A condition of a layer of atmosphere in which temperature increases with altitude. A temperature inversion layer is stable when pollutants tend to migrate through it at a slower rate.

Temperature of building materials, ignition (fire forensics) – The temperature at which a material ignites. Wood slowly chars 120°-150°C/248-302°F; Decayed wood ignites 150°C/302°F; Ignition temperature of various woods is 190-260°C/374-500°F; ABS pipe melts at 88-125°C/190-257°F and ignites at 416°C/780°F.

Temperature of contents, ignition (fire forensics) – Paper yellows 150°C/302°F; Paper ignites 218-246°C/424-475°F; Leather ignites 212°C/414°F; Acrylics melt at 91-125°C/195-257°F and ignites at 560°C/1,040°F; Cellulosic materials melt at 49-121°C/120- 250°F and ignites at 475-540°C/887-

1,004°F; Nylons melt at 160-275°C/320-527°F and ignites at 476-532°C/888-990°F; polyester melt at 220-268°C/428-514°F and ignites 432-488°C/810-910°F; Wool does not melt but ignites at 228-230°C/442-446°F; Cotton does not melt but ignites at 250°C/482°F.

Temperature of a fire (fire forensics) – On a small scale, temperature is defined as the average energy of microscopic motions (e.g., change in position, vibration, and rotation) of a single particle in the system. On a large scale, temperature is the unique physical property that determines the direction of heat flow between two objects placed in thermal contact. If no heat occurs, the two objects have the same temperature: otherwise, heat flows from the hotter object to the cooler object.

Temperatures in a building fire (fire forensics) – Temperatures from burning materials begins around 350°F, and increases as pyrolysis occurs, where common indoor house fire temperatures at the heat source can exceed 1,800°F. (Amit Varma Purdue Univ; HUD "*Effects of Fire on Structural Systems*") In most building fires, heat temperatures can reach 1,200°F.

Temperatures impacting drywall after a building fire (discussion) – Drywall (gypsum board) responds to temperature and humidity every day. In colder climates, temperatures may vary from 32°F to 68°F, where in hot climates, temperatures may exceed 120°F. In both climates, one may not see signs of expansion, contraction, or distortion when drywall can acclimate. When a fire occurs, acclimation does not occur, where the surrounding components in contact with drywall expand with heated gases very fast at different rates, including paint, wallpaper, plaster, cabinets, nails and screws, insulation and supporting building materials. Source references for this discussion including "*Thermal and Mechanical Properties of Gypsum Boards and their Influences on Fire Resistance of Gypsum Board Based Systems*;" "*Drywall Thermal Properties Exposed to High Temperatures and Fire Condition*;" "*Mechanical Properties of Gypsum Board at Elevated Temperatures*;" "*Measurement of Thermal Properties of Gypsum Board at Elevated Temperatures;*" "*Thermal Properties and Microstructure of Gypsum Board and its Dehydration Products: A Theoretical and Experimental Investigation*." Conclusion: The type of drywall and conditions in impacted rooms are unknown, including heating and cooling temperatures, and the length of time of drywall was exposed to heat, where this information can affect the outcome of whether drywall is stable and can be restored. However, when drywall and finishes on drywall experience blistering, scorching, cracking and swelling at joints, there is a change in shape or color, nail-pops are apparent, or there is endothermic and/or exothermic reaction, where drywall should be replaced. (Endothermic reactions [a reaction that drywall absorbs energy from its surrounding in the form of heat] occur at 125°C (257°F) to 225°C (437°F), where exothermic reactions [a reaction that releases energy from the system in the form of heat] occur above 400°C (752°F)). Other factors that may determine whether drywall should remain or not includes thermal impaction behind ceilings and walls; outlets and lights; the degree of smoke impaction in porous materials.

Tempered – Strengthened. Tempered glass will not shatter nor create shards but will "pelletize" like an automobile window. Required in tub and shower enclosures and locations, entry door glass and sidelight glass, and in a window when the windowsill is less than 16" to the floor.

Temporary repairs – (1) Any reasonable repair which protects the property from further damage. (2) The use of equipment and supplies that secures or mitigates property damage or supports a structure until rebuilding activities begin. (3) A property restoration reference to structural or content related work for purposes of securing property, mitigating damage, or supporting rebuilding activity.

Tertiary – (1) In the practice of remediation, the order or ranking which certain work tasks are performed to lessen or remove contamination. (2) The tree steps in remediation that involves source removal, cleaning, and disinfection. (3) Primary sources is the original source (main source) that causes contamination or materials that contribute to a hazard; secondary sources are materials or substances less likely to be the main contaminant source; tertiary is any influencing factor that allows contamination or a substance to exist or remain.

Tertiary treatment, fire damage restoration – The three main work tasks in fire damage restoration is the: identification and elimination of hazards that can affect occupants and workers; the containment and control of damaged materials; the reduction of smoke odor in occupied spaces including sealing off ventilation systems from contaminated areas. Education Note: Secondary tertiary treatments include but are not limited to: consulting with the customer and respond to their immediate needs; assessment and document the extent of damage; clean and deodorize HVAC systems still in use that remain smoke and soot contaminated; implement corrosion control methods; inventory control of contents and appliances; determine whether contents can be cleaned and deodorized onsite or they must be packed out; remove damage at is source.

Test area cleaning – A process by which a small area of a surface or material can be test cleaned without causing any appreciable damage to that area. Education Note: On sensitive materials and items, test area cleaning begins with the removal of loose soot and ash, followed by Q-Tip and cotton ball or cotton pad testing. In order, this small but ideal control test method provides valuable information how the surface responds first to water (preferably distilled or deionized water when testing contents and sensitive materials and surfaces); non-aggressive cleaning methods using foam cleaners and liquid detergents; more aggressive cleaning by either increasing the concentration of the liquid cleaning or increased agitation. Unless the surface is non-permeable and is scratch resistant, the use of scouring and abrasive cleaners is discouraged. However, when the surface is a painted wall or molding, a follow up scouring cleaning process may provide the best results for removing surface stains and chemical residues before repainting. Finally, test area cleaning may require the use of various kinds of cleaning agents including ammoniated and non-ammoniated cleaners; cleaners with low and high surfactantcy; cleaners that are less abrasive and more abrasive.

Testing, surface comparison (remediation; restoration) **–** An appearance comparison test (evaluation, appraisal, estimate) that measures one surface against another. Education Note: Surface comparison testing may measure cleaning efficiency and appearance after cleaning and drying.

Tetrahedron – The elements required to start a fire. Tree elements must be present for the fire to occur which produces a chemical chain reaction of heat, oxygen, and fuel. Together, this process is referred to as "fire tetrahedron."

Theft / Vandalism damage – Damages caused by thieves and/ or vandals such as stolen copper plumbing supply lines, graffiti, holes in walls caused during the theft of electrical wiring or plumbing, broken/ kicked in doors, broken windows, stolen electrical wiring, etc. Some companies prefer that you separate these 2; therefore, theft damage involves some type of theft and vandalism damage is simply damage without any visible theft. (HUD)

Thermal conductivity – The intrinsic ability of a material to transfer or conduct heat. It is one of the three methods of heat transfer, where the other two are convection and radiation. Heat transfer processes can be quantified in terms of appropriate rate equations. The rate equation in a heat transfer mode is based on Fourier's law of heat conduction. Education Note: Thermal conductivity occurs through molecular agitation and contact and does not result in the bulk movement of the solid itself. Heat moves along a temperature gradient, from an area of high temperature and high molecular energy to an area with a lower temperature and lower molecular energy. This transfer will continue until thermal equilibrium is reached. The rate at which heat is transferred is dependent upon the magnitude of the temperature gradient, and the specific thermal characteristics of the material.

Thermal contraction/expansion – Dimensional changes in building materials caused by dramatic fluctuations in heat.

Thermal decomposition – A chemical reaction in which a heated compound breaks up into at least two other compounds.

Thermal degradation – Processes whereby the action of heat or elevated temperature on an item causes a deterioration of one or more if its properties. Properties may be physical heat damage where a material degrades.

Thermal desorption – The use of heat to increase volatility of a contaminant such as aldehydes (formaldehyde). Thermal desorption is not combustion; it neither produces incineration nor is it designed to destroy organic materials.

Thermal expansion – (1) The proportional increase in length, volume, or superficial area of a body with a rise in temperature. (2) The expansion of a material when subjected to heat. All materials expand and contract to some extent with changes in temperature. Education Note: The Thermal Coefficient of Linear Expansion is expressed in "Inches per Inch per Degree Fahrenheit." Example: gypsum board has a coefficient of (9.0 x 10-6 in. per in. per °F). This means that with an increase in temperature of 50°F, a gypsum board wall 100 feet in length will have a linear expansion of .54" or an excess of 1/2". The expansion characteristics of some other building materials are more pronounced; a 50°F temperature increase would produce expansion in a 100-foot length of approximately 3/4" in aluminum, 3/8" in steel and 1/2" in concrete.

Thermal fogger – A machine that produces high temperatures to create large quantities of fog without degrading the active ingredient. Education Note: Thermal foggers create an exceptionally large quantity of very small droplets, very quickly. This process makes the machine ideal for fogging large

indoor open spaces. Thermal fog is visible, helping the operator to monitor the dispersion of fog and ensure thoroughness of application. (See: Ultra-low volume fogger) Thermal foggers include product names Electro-Gen and Thermo-Gen available through distributors like Jon-Don.

Thermal fogging – (1) Machines that produced heated air and evaporated oil-based solvents in air. In fire damage restoration, thermal foggers are designed to disperse an odor counteractant by a machine that ignites a combustible solvent where its particles are dispersed as fine molecules of a dry fog. (2) The use of high temperatures through a fogging machine to produce a chemical fog without degrading the active ingredient. Thermal foggers can be adjusted to produce extremely small chemical droplets. Education Note: In fire damage restoration thermal foggers are used to assist with deodorization of air, pores of materials and surface contaminants.

Thermal heat capacity – A measurable physical quantity that characterizes the amount of heat that is required to change a body's temperature by a given amount.

Thermal inertia – The product of thermal conductivity, density, and specific heat capacity. For example, when a material is exposed to heat flux, the rate of increase of surface temperature depends strongly on the value of the thermal inertia of the materials. Education Note: The surface temperature of a material having as lower thermal inertia rises relatively quickly when heated, where a material having a high thermal inertia cool rapidly.

Thermal runaway – In a ventilation-controlled fire, the point at which heat release rate exceeds energy loss through convection of hot gases is through ventilation openings. Thermal runaway results in increasing compartment temperature which may lead to ventilation induction flashover.

Thermal shock – (1) The stress built up by sudden and appreciable changes in temperature. (2) The stress built up by sudden and measurable temperature changes that result in damage of a structural component or in different parts of the same component due to a thermal gradient.

Thermal thickness solid behavior – The point in a fire, where there is negligible temperature rise on one face of a solid white heat flux as compared to the other. This behavior depends on the exposure time, the level of heat flux, and the material and its properties (e.g., fire-rated drywall).

Thermohygrometer / Thermo-hygrometer – An instrument that measures the temperature and percentage of humidity (water vapor) in air. Education Note: Thermohygrometers are wireless/cordless portable handheld and surface placement units. They also can be wired or remote sensing fix station units that monitor many areas of a building or environment at the same time. More advanced thermohygrometers provide fast measurement response time with better accuracy; full psychometric calculations including GPP and dewpoint; double as a surface detection moisture meter and some include pin probes.

Threshold limit value (TLV) – Airborne concentration (ppm) of a material to which *nearly* all persons can be exposed day after day without adverse health effects.

Thermoplastic material – Solid material which is softened by increasing temperatures and hardened by decreasing temperatures.

Thermophoresis – (Phoresis is a suffix that means migration, while thermos in Greek means heat). In a fire, thermophoresis is a force network of warmer suspended particles and gases migrating towards cooler surfaces.

Third party administrator (TPA) (insurance) – Independent companies that contract with insurers to provide administrative services, such as claim handling, hiring contractors, estimating, negotiating services and payment.

Thorough cleaning – As the name suggests, a thorough cleaning removes fine dust, dirt, and residue. Usually a thorough cleaning is followed with a protective finish such as a wax or urethane or a fabric protection.

Thunder – The sound due to rapidly expanding gases along the channel of a lightning discharge. Education Note: Rarely is thunder heard beyond 30 km. Sound velocity is proportional to the square root of temperature. Temperature typically decreases with height. Thus, thunder sound will be deflected upward. Thunder audibility also is influenced by humidity, wind velocity and wind shear, temperature inversions, terrain features, clouds, etc. Thunder contains a roughly cylindrical initial pressure shock wave at the lightning channel more than 10 atmospheres. The shock wave decays to a sound wave rapidly, within meters. When heard about 1 km (about 1,000 yards) from a lightning strike, generally thunder will rumble with several loud claps sometimes being reported.

Tight buildings (IAQ) **–** Buildings that are designed to let in minimal infiltration air to reduce heating and cooling energy costs. Education Note: In actuality, buildings typically exhibit leakage that is on the same order as required ventilation; however, this leakage is not well distributed and limits on infiltration cannot serve as a substitute for proper ventilation.

Tight-fitting facepiece – A respiratory inlet covering that forms a complete seal with the face.

Tightly fitted (building fire-rating) **–** Penetrating items that are cast in place in buildings of noncombustible construction or have "zero" annular space in buildings of combustible construction. Education Note: In applying "tightly fitted" to a construction project, the builder/contractor should ensure that the integrity of the fire separation is such that it prevents the passage of smoke and hot gases to the unexposed side of the fire separation.

Time is of the essence (emergency response) **–** A term used to express the need for haste in action or response, such as removing water, drying wet materials, removing sewage, stopping corrosion.

Timelag (building fire; wildfire) – The time needed under specified conditions for a fuel particle to lose about 63 percent of the difference between its initial moisture content and its equilibrium moisture content. Education Note: If conditions remain unchanged, a fuel will reach 95 percent of its equilibrium moisture content after four timelag periods.

Tips on Smoke Removal and Cleanup (FEMA) – The Federal Emergency Management Agency (FEMA) provides wildfire smoke remediation guidelines in a pamphlet titled "*Tips From State And FEMA On Smoke Removal And Fire Cleanup*" (available on-line http://www.fema.gov/news/newsrelease.fema?id=4046 and https://www.fema.gov/news-release/2003/07/25/tips-smoke-removal-and-fire-cleanup The FEMA document outlines cleaning and remediation actions homeowners should undertake following a wildfire to reduce smoke and ash contamination of their properties. The course of actions specified by FEMA includes: 1) Pressure wash, scrub or disinfect all exterior surfaces including walls, walks, drives, decks, windows, screens, etc. 2) Wash and disinfect all interior walls and hard surfaces with mild soap or other appropriate cleaning solutions or products and rinse thoroughly. Do not forget inside cabinets, drawers and closets; 3) Launder or dry clean all clothing; 4) Wash, dust or otherwise clean all household items including knick-knacks. 5) Disinfect and deodorize all carpets, window coverings, upholstered furniture and mattresses with steam or other appropriate equipment. 6) Upholstery, fabric window treatments, etc., can be spray-treated with deodorizing products available at most supermarkets, but do not use odor masking sprays. 7) Have heating, ventilating and air-conditioning units and all ductwork professionally cleaned to remove soot, ash, and smoke residue. Change filters when you first return to the premises and at least once a month for the first year. 8) If aerial fire retardant or firefighting foam residue is present on the house and/or automobiles, use a mild detergent and brush to scrub and dilute the dried residue and flush it from surfaces, followed by rinsing with clean water. A follow-up with pressure washing may be beneficial but will not replace scrubbing to remove residue. 9) Ash and soot residue on the ground and vegetation in the vicinity will continue to generate smoke odors and airborne particles when distributed by air movement. Until the ash and soot are diluted and absorbed by the environment, indoor mechanical air filtration may help minimize the uncomfortable and potentially health-threatening impact of these pollutants. Education Note: A precaution not provided in the FEMA pamphlet is that cleaning actions should be performed in a way to minimize the re-entrainment of particles. Cleaning methods that should be avoided include vacuuming, dry dusting, sweeping, and vigorous wiping that will aerosolize smoke particulates from surfaces. In addition, cleaning of the interior of electronic components, such as computers, stereos, and televisions; as well as refrigerator condenser coils and fan or other appliances that would attract particulates should also be performed (Kristen Shaw, CSC).

TLV – Threshold limit value. TLV reflects the level of exposure that a typical worker can experience without an unreasonable risk of disease or injury.

Topical dry treatment (soot) **-** The process of removing loose dry soot with a chemical sponge or a HEPA vacuum.

Total loss – (1) Any loss in which a property, after a fire event, that cannot be returned to its original value. (2) The condition of an automobile or other property when damage is so extensive that repair costs would exceed the value of the vehicle or property (III). (3) The condition of a structure or an object that is not economically feasible to repair. This level is set when cost to repair already exceeds 80 percent of the actual value. (4) Damage to structural components or contents whose repair costs exceed their value. (5) The complete destruction of property beyond reasonable repair; losses that

exceed policy limits. (6) An article or structure damage so severe that it cannot be repaired; are not cost effective to repair; repair will exceed its value. (7) Situations where damaged materials no longer meet code or materials are damaged beyond salvage value.

Total suspended particulates (TSP) – (1) Total particulate matter in a sample of ambient air. (2) A regulatory measure of the mass concentration of particulate matter (PM) in community air. Education Note #1: The chemical complexity of airborne particles requires that the composition and sources of many primary and secondary components be considered. Major components of suspended fine particles are SO4 = H+, NO3−, NH4+, organic compounds, trace elements (including metals that volatize at combustion temperatures), elemental carbon, and water. In a wildfire, normal airborne components along with burnt combustion and its chemical byproducts and oxides combine and become a dangerous mixture of air to breathe. Education Note #2: Particles suspended in air or are falling out through the atmosphere. They generally range in size (diameter) from 0.1 to 100 micrometers.

Toxic products of combustion – The by-products of a combustion reaction that endanger life or the environment (e.g., carbon monoxide, hydrogen cyanide, hydrogen sulfide, sulfur dioxide, hydrochloric acid, nitrogen oxides).

Toxic smoke analysis using FTIR – Fourier transform infrared (FTIR) spectrometers are an advanced analysis method for identifying gases in smoke. FTIR offers an opportunity to set up a calibration and prediction method for each gas showing a characteristic spectral band in the infrared region of the spectrum. The determination of toxic components from fire gases is difficult because the environment is hot, reactions are often temperature dependent, and a lot of soot may be produced. FTIR gas analysis of smoke gases is an applicable and reliable method for the determination of toxic components in combustion gases related to fire test conditions. J. Fire Sciences 09/2002 https://journals.sagepub.com/doi/abs/10.1177/0734904102020005484 and https://emsl.com/Services.aspx?action=show&TopServiceCategoryID=8&serviceid=906

Toxic substance – Any substance that can cause acute or chronic injury to the human body, or which is suspected of being able to cause diseases or injury under some conditions.

Toxicity – (1) The sum adverse effects resulting from exposure to a material, generally through the mouth, skin, or respiratory tract. (2) A relative property of a chemical agent and refers to a harmful effect on some biologic mechanism and the conditions under which this effect occurs.

Toxin – A poisonous substance produced by microorganism cells, particularly bacteria and fungi.

Transition – Fuel which is partially consumed by combustion while flaming continues in portions of the fuel resulting in initiation of smoldering and smoke generation.

Trisodium phosphate (TSP) – A cleaning agent that removes smoke and soot without harming many finishes. Education Note: TSP was widely used up to the 1970s and 80s where it was found to be an ecological disposal problem. TSP today is made with TSP substitutes such as sodium carbonate that is

friendly to the environment as far as disposal is concerned. TSP is commonly used with mineral spirits to cut smoke film on ceramic tile and other hard surface materials affected by hydrocarbon residues including painted walls, ceilings, and trim. During cleaning TSP breaks the gloss of latex and oil-based paint; and scrubbing helps to open the pores of drywall and plaster, providing a method of removing adsorbed smoke odor molecules. TSP should not be used on metal and metal finishes because it can contribute to corrosion. On sensitive finishes consider using baking soda; plastics including fiberglass and white appliances consider using phosphoric acid; a mild alkaline cleaner considers using a product with D'limone; and sensitive-soft finishes consider using foaming cleaners. (See: Baking soda; Phosphoric acid; D'limone; Cleaning, foam)

Turbidity – A condition that reduces atmospheric transparency to radiation, especially light. The degree of cloudiness, or haziness, caused by the presence of aerosols, gases, and dust.

Turnkey – A term used when the subcontractor provides all materials (and labor) for a job.

Turpentine – A petroleum, volatile oil used as a thinner in paints and as a solvent in varnishes.

TWA – Time Weighted Average. ACGIH exposure terminology, referring to the average air concentration of contaminants during a sampling period (e.g., 8 hours per day/40 hours per week).

Type I Construction – Construction in which the structural members are noncombustible (formerly referred to as fire resistive).

Type II Construction – Construction in which the structural elements are entirely of noncombustible or limited combustible materials permitted by the code and protected to have some degree of fire resistance (formerly referred to as noncombustible).

Type III Construction – Construction which all or part of the interior structural elements may be of combustible materials or any other material permitted by the building code being applied (formerly referred to as exterior protected combustible or ordinary construction).

Type IV Construction – Construction in which structural members i.e. columns, beams, arches, floors, and roofs, are basically of unprotected wood (solid or laminated) with large cross-sectional areas (formerly referred to as heavy timber).

Type V Construction – Construction which the structural members are entirely of wood or any other material permitted by the code being applied (formerly referred to as wood frame).

Type I to V, building – A U.S. classification system to categorize the fire resistance of a structure. Classifications include: Type I - resistive, Type II - non-combustible, Type III - ordinary, Type IV - heavy timber, and Type V - frame construction or made entirely of wood.

Types of smoke – There are two types of smoke: 1) corrosive smoke; and 2) inert smoke. Corrosive smoke contains chlorides or sulfates which combine with water to form hydrochloric or sulfuric acids.

Inert smoke is primarily carbon-based particles. Education Note: Carbon based smoke is like a fine dust without corrosive properties. In some situations, it can be cleaned off the surface of contents and appliances more easily, without harming or staining the substrate.

(U)

UEL – The upper explosive (safety) limit of a vapor or gas. The highest concentration (highest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc, or flame) is present. At higher concentrations, the mixture is too "rich" to burn.

UL (Underwriters' Laboratories) – An independent testing agency that checks electrical devices and other components for possible safety hazards.

Ultra-fine particles – Particles suspended in air that are smaller than 0.1 micrometers in size (PM 0.1). Ultrafine particles are formed by nucleation, which is the initial stage in which gas becomes a particle. Ultra-fine particles can grow up to a size of 1µm either through condensation, when additional gas condensates on the particles, or through coagulation, when two or more particles combine to form a larger particle.

Ultra-low volume fogger (ULV fogger) – A machine manufactured to disperse liquids in extremely fine droplets (5-15-micron particles) to produce an almost dry mist. ULV foggers are "cold foggers" as compared to "thermal foggers." The ULF fogger generates fog (fine mist) droplets by using a high volume of air at a low pressure. The machine can produce droplets of a more precise size because the absence of a large number of very small droplets limits the penetration of the fog into highly obstructed areas or porous materials. (See: Thermal fogger) ULV foggers include products such as the Flex-A-Lite available through distributors like Jon-Don.

Ultraviolet (UV) light – Light at the violet end of the light spectrum that is normally not visible to the human eye. UV light waves are shorter than visible light waves and longer than X-rays. In some situations, UV light emitting cameras can identify hidden damage, including damage to double pane windows that lost their gas because of a fire.

Ultrasonic – Sound that is beyond the upper limit of perception by the human ear, relating to sound waves having a frequency of more than 20,000 Hz.

Ultrasonic cleaning – (1) Removal of residues by an immersion process in which electronically induced cavitation enhances the effectiveness of the solvent or detergent. (2) The process of cleaning objects with ultrasound waves of water along with detergents to agitate and remove contamination.

Ultrasonic fogging – A machine that produces ultrasonic sound waves to breakup water into millions

of individual water droplets that are broadcasted into the air as a thick fog. Education Note: Ultrasonic foggers are most often used as cold foggers but unlike most cold foggers that produce 5 to 15 to 15 to 30-micron size particles, ultrasonic foggers can produce ultra-fine fog at 2 to 10 microns in size. Fog an ultrasonic fogger produces are not created through a boiling process and does not involve heat of any kind. Because of this, fog that is produced is cold and slightly wet.

Ultrasonic frequency (UF) – The frequency at which an ultrasonic sensor operates.

Ultrasonics – Solution cleaning machines utilizing sound waves from 20 kHz to over 100 KHz.

ULV fogger – Ultra low volume fogger. (1) An electromechanical device that is used to distribute and regulate the dispersal of disinfectants and fragrances. (2) A ULV atomizer of water-based deodorants that produces a mist in an 8 to 15-micron size. The ULV is used for fogging moisture sensitive fabrics or surfaces.

Umbrella policy (insurance) – Excess liability coverage above the limits of basic liability insurance policy such as the owners, landlords, and tenant's liability policy. The umbrella policy fills gaps in coverage under basic liability policies.

Umpire (insurance) – An umpire is a neutral third-party selected by the two opposing appraisers for a property appraisal who resolves any differences between the two appraisers.

Unacceptable risk – (1) Any risk at a fire damaged structure which can or does compromise the health and welfare of workers, occupants, and the public. (2) The level of risk as determined by the risk management process which cannot be mitigated to an acceptable safe level.

Uncertainty (remediation; restoration) **–** A lack of assessment knowledge about certain factors affecting a loss which reduces the confidence in conclusions drawn from the assessment or study.

Uncontrolled fire – Any fire which threatens to destroy life, property, or natural resources, and

Undercoat – A coating applied prior to the finishing or topcoats of a paint job. It may be the first of two or the second of three coats. Sometimes called the Prime coat.

Underlayment – A ¼" material placed over the subfloor plywood sheeting and under finish coverings, such as vinyl flooring, to provide a smooth, even surface. Also, a secondary roofing layer that is waterproof or water-resistant, installed on the roof deck and beneath shingles or another roof-finishing layer.

Underwriter – An insurance company employee who evaluates applicants for insurance, selects those that are acceptable to the insurer, prices coverage, and determines policy terms and conditions.

Underwriters Laboratory (UL) – An organization that tests manufactured products for safety and either approves or disapproves them for their intended use with authorization to use the label "UL

approved."

Universal precautions – An approach to infection control to treat all human blood and human body fluids as if they were known to be infectious for HIV, HBV, and other bloodborne pathogens. (IICRC S540 Standard)

Unsalvageable – Materials or contents that are beyond the possibility of cost-effective restoration and their current state of condition causes them to have no apparent market value.

Unsalvageable – Materials or contents that are beyond the possibility of cost-effective restoration and their current state of condition causes them to have no apparent market value.

USEPA – United States Environmental Protection Agency. (See: EPA)

Unstable reactive – A chemical that, in the pure state or as produced or transported, will vigorously polymerize, decompose, condense, or become self-reactive under conditions of shock, pressure, or temperature.

Upper respiratory tract – The structures that conduct air into the lungs, including the nasal cavity, mouth, pharynx, and larynx.

UV – Ultraviolet; Ultraviolet light.

(V)

Vacuum freeze drying – The removal of ice or other frozen solvents from a material through the process of sublimation and the removal of bound water molecules through the process of desorption. For more information go to: https://www.spscientific.com/freeze-drying-lyophilization-basics/ (See: Freeze drying; Sublimation)

Vacuuming – The act of removing soils or moisture from a textile by means of mechanical suction combined with airflow.

Valuation – An inspection carried out for the benefit of the mortgage lender to ascertain if a property is a good security for a loan.

Vapor – (1) The gaseous form of a solid or liquid substance formed as it evaporates at atmospheric temperature and pressure. (2) The gas-phase of a substance, particularly those that are normally liquids or solids at ordinary temperature.

Vapor barrier – (1) A building product installed on exterior walls and ceilings under the drywall and

on the warm side of the insulation. It is used to retard the movement of water vapor into walls and prevent condensation within them. Normally, polyethylene plastic sheeting is used. (2) Materials or coatings through which moisture cannot easily pass (perm factor of one or less). Vapor barriers may exist in the form of plastic sheeting, vinyl floor coverings, floor finishes (e.g., polyurethane), or even paint.

Vapor density – The ratio of the average molecular weight of a given volume of gas or vapor to the average molecule weight of an equal volume of air at the same temperature and pressure. (NFPA 921, 2008,3.3.155)

Vapor diffusion – The movement of moisture in the vapor state through a material. Vapor diffusion is a function of the vapor permeability of a material and the driving force or water vapor pressure differential acting across the material.

Vapor pressure – (1) The pressure exerted by a saturated vapor above its own liquid in a closed container. When quality control tests are performed on products, the test temperature is usually 100°F/38°C and the vapor pressure is expressed as pounds per square inch (psig or psia); but vapor pressures reported on MSDS forms are in millimeters of mercury (mmHg) at 68°F /20°C) unless stated otherwise. (2) The pressure exerted by the molecules of a liquid on surrounding surfaces, expressed in inches of mercury ("Hg). Moisture is absorbed by and moves through materials to equalize vapor pressure. (3) The pressure (measured in pounds per square inch absolute - psia) exerted by a vapor. Education Note #1: When a vapor is kept in confinement over its liquid so that the vapor can accumulate above the liquid (the temperature being held constant), the vapor pressure approaches a fixed limit called the maximum (or saturated) vapor pressure, dependent only on the temperature and the liquid. Education Note #2: To promote rapid drying of a surface, surrounding vapor pressure must be reduced through drying or dehumidification of the air.

Vapor steam cleaning, fire damage structure – The process of using a steam vapor system (SVS) to clean sensitive finishes including but not limited to: woodwork, moldings, windows, chandeliers, sconces, casements, cabinetry, medallions, flooring, tubs and showers, grout, textured walls and ceilings, to piano molding.

Vapors – The gaseous form of substances that are normally in the solid or liquid state (at room temperature and pressure). The vapor can be changed back to the solid or liquid state either by increasing the pressure or decreasing the temperature alone. Vapors also diffuse. Evaporation is the process by which a liquid is changed into the vapor state and mixed with the surrounding air. Solvents with low boiling points will volatilize readily. Examples include benzene, methyl alcohol, mercury, and toluene. Education Note: Vapors can be changed back into the solid or liquid state through pressurization or temperature drops. Solvents with low boiling points are called volatile and easily changes to the vapor state.

Vehicle fire – A fire that originates or consumes a car, truck, boat or mobile unit.

Vegetative ash (wildfire) – The light grey/white powder left over after vegetation is burned. In contrast using microscopy analysis, PLM ash is not opaque; rather it is light colored with birefringence due to the presence of calcium crystals. The original plant structure is often still present although faint and wispy. The EDS spectrum of ash shows calcium with moderate carbon concentrations.

Vegetative char (wildfire) **–** Char that is composed of vegetative material which is partially carbonized by incomplete combustion. Education Note: Using PLM analysis these opaque particles maintain most of the original plant's morphology, often elongated with holes from xylem structures. The EDS spectrum of char shows high concentrations of carbon, lower concentrations of oxygen and trace amounts of other elements.

Vent – (1) A pipe or duct which allows the flow of air and gasses to the outside. Also, another word for the moving glass part of a window sash, i.e. window vent. (2) An opening for the passage of, or dissipation of, fluids, such as gases, fumes, smoke, and the like. (NFPA 3.3.159)

Ventilation – (1) The air exchange from one area to another, usually from inside to out. Circulating fresh air to replace contaminated air. (2) Air entering a building through open windows or doors or drawn by fans from inside or outside the built environment.

Ventilation controlled fire – A fire in which the heat release rate or growth is controlled by the amount of air available to the fire.

Ventilation in firefighting – The circulation of air in any space by natural wind or convection or by fans blowing air into or exhausted out of a building. The firefighting operation for removing smoke and heat from as structure involves opening windows and doors or making holes in the roof.

Ventilation rate (building) – (1) The rate at which outside air enters and leaves a building. (2) The rate which air is delivered and processed throughout a building. Education Note: The ventilation rate is expressed in one of two ways: the number of changes of outside air per unit of time (air exchanges per hour, or "ACH"), or the rate at which a volume of outside air enters per unit of time (cubic feet per minute, or "cfm").

Ventilation rate (medical) – The amount of air inhaled in a specified time period (e.g., per minute, per hour, per day, etc.); also called breathing rate and inhalation rate.

Venting – (1) The escape of smoke and heat through openings in a building. (2) The release of enclosed smoke and heat from a structure by creating openings in it, as by hacking a hole in the roof, to allow free passage of air.

Virtual estimating (insurance; restoration) **–** The process of estimating a loss remotely from a different location.

Virtual estimator (insurance; restoration) **–** A person having estimating training and experience, usually in construction, remediation and restoration, who remotely, from an off-site location, estimates

a loss by seeing still photographs, video and/or a panographic tour of the damage. Education Note: Virtual estimating can include a real-time tour of a loss through a cell phone, tablet, or a video Wi-Fi device, where they capture the entire tour in the cloud for download and reference.

Virtual project manager (insurance; restoration) **–** A person who can manage a project from an off-site location. The project manager is aware of all the daily work activities and can interface with managers and supervisors on a moment's notice. Education Note: The virtual manager can see and comment on all work activities.

Virtual temperature – An adjustment applied to the real air temperature to account for a reduction in air density due to the presence of water vapor (Western Regional Climate Center).

Virtual tour – A still or video documentation of a building. Often a virtual tour is taken at the time of sale to show the structure to prospective buyers. In damage assessment and appraisal, such as an event involving a water or fire loss, a virtual tour details the extent of damage or contamination throughout the structure. Education Note: In today's virtual tours, still pictures are stitched together so they can be shown in detail, including closeup pictures that can identify scratches, dents, stains, soot, etc.

Visqueen – Generally, a 4 mil or 6 mil roll of plastic (polyurethane) sheeting.

Visual air quality – Air quality evaluated in terms of pollutant particles and gases that affect how well one can see through the atmosphere.

Visual inspection – Any visual inspection or evaluation process that provides a visual account of something. (1) A hands-on inspection process that assesses general conditions as well as damaging conditions affecting a building or material. (2) The inspection of a loss without the aid or benefit of measuring instruments or testing equipment.

Visual inspection (contamination) **–** The process of: 1) Evaluating a structure for the presence of contaminated material prior to beginning remediation work; 2) Looking for conditions that, if not corrected during the project, can lead to incomplete removal of the contaminated material or non-completion of the project; and 3) Examining the work area for evidence that the project has been completed successfully. Education Note: The visual investigation is without the use of instruments.

Visual inspection (damage) – (1) A hands-on inspection process that assesses general conditions as well as damaging conditions affecting a building or material. (2) The inspection of a loss with or without the aid or benefit of measuring instruments and testing equipment.

Visual inspection (exploratory) **–** A hands-on inspection process that assesses the potential or suspected building or material damage through dismantling or just assessing the condition damaged materials are in.

Visual inspection for clearance testing (lead paint) **–** The visual examination of a residential dwelling or a child-occupied facility following abatement to determine whether the abatement has

been successfully completed or not.

Visual inspection for risk assessment (lead paint) **–** The visual examination of a residential dwelling or a child-occupied facility to determine the existence of deteriorated lead-based paint or other potential sources of lead-based paint hazards.

Visualization fogging – Dry-ice CO_2 foggers used in semiconductor clean room that follow specific guidelines for airflow, pattern, and turbulence visualization. Also, visualization foggers can use DI water or CO_2 in compliance with USP 797 pharmaceutical in-situ airflow analysis. Education Note: Visualization foggers create a non-contaminating fog, leaving no residue behind as fog evaporates. The fog enters the airflow at exceptionally low velocity; thus, it does not create its own turbulence. When turbulence is required, a different model of machine needs to be used. Visualization foggers are the only foggers suitable for use in Class 1 to a Class 8 cleanrooms for airflow & turbulence visualization, flow balancing and contaminant transport studies around process tools.

VOC – Volatile organic compound. Any organic (carbon-containing) compound that evaporates readily to the atmosphere at room temperature. VOCs are found in wildfire smoke and the settled smoke indoors where it can cause health problems in some persons. VOCs are often described as an odor given off by fire residue.

Volatile – (1) A substance that evaporates readily. (2) Property of a substance that allows it to transition to gas phase from a liquid or solid phase. (3) A solid or liquid that readily is changeable into a vapor at a low temperature.

Volatile matter – Those products, exclusive of moisture, given off by a material as gas or vapor. Volatile matter is determined by heating, such as a piece of coal to 950°C (1742°F) under carefully controlled conditions, and measuring the weight loss, excluding weight of moisture driven off at 105°C (221°F).

Volatile organic compound (VOC) – Any organic compound that enters a gas phase; especially that which adversely affects air quality in a built environment. Typically, gas phase VOCs are generated by paints, stains, adhesives, dyes, solvents, caulks, cleaners, pesticides, building materials or office machines. Education Note: Over 900 different gas phase VOCs have been identified in indoor air; the health effects of some are known, for others they are unknown. In sufficient quantities, these health effects range from sensory irritation (eye, nose, and throat irritation), to headaches, dizziness, and visual disorders, to neurotoxicity (memory impairment), hepatotoxicity and even carcinogenic effects. At present, not much is known about what health effects occur at the levels of gas phase VOCs typically found in public and commercial buildings.

Volatility – (1) The tendency or ability of a fluid to change into the vapor state. Fluids with a well-known tendency to vaporize rapidly are called volatile liquids. Examples are alcohol and gasoline. (2) The tendency or ability of a substance including liquids to vaporize. Such liquids as alcohol and gasoline, because of their well-known tendency to evaporate rapidly, are called volatile liquids. (3)

Measure of a liquid's tendency to evaporate at room conditions.

(W)

Walk-through survey, initial (fire damage; smoke odor contamination) **–** The initial assessment to ensure the building is safe for workers and occupants to enter. Once completed to where there are no health and safety issues, the initial walk-through continues with documenting the origin of the loss and damage.

Wall washing (wet cleaning) **–** (1) The process of cleaning a wall using a wet solution. Education Note: The wall washing process begins at the bottom of the wall where the process continues to the top of the wall. If one begins to wash a wall from the top, excess water streaks down the wall that can adsorb into painted finishes causing permanent stains (streaking). (2) In lighting, the practice of illuminating vertical surfaces, such as walls. Wall-washer luminaries are designed to illuminate vertical surfaces.

Warping – The deformation of a surface from its original or intended shape caused by sharp temperature increases and/or changes in moisture content.

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Warranty (restoration; repair; remodeling; reconstruction) – In construction there are two general types of warranties; one is provided by the manufacturer of a product such as roofing material or an appliance installed on a roof; where the second is a warranty for labor. Education Note: For example, a roofing contract may include a 20-year material warranty and a 5-year labor warranty. Many new homebuilders provide a one-year warranty. Any major issue found during the first year should be communicated to the builder immediately. Small items can be saved up and presented to the builder for correction periodically through the first year after closing.

Warrantee and Service Contracts (insurance) – An insurance policy providing repair or replacement service or indemnification for such service for the operational failure of covered property. Examples include homeowner warranty, electronic devices warranty, etc.

Washout – The process by which particles are flushed from air by air scrubbing, flushing of particles and residues off a material or item by water or cleaning solvent.

Waste hauler – A contractor that removes spent or damaged materials for disposal.

Water damage – The destructive effects of water or moisture on buildings and personal property.

Water damage from fires – Water that enters buildings as a process of putting out a fire. Water damage from fires includes standing water, free-unbound water, trapped-unbound water, saturated water, high indoor rH, and water having contact with smoke that contributes to oxidation. Education Note: Water coming from fire sprinklers to firemen's suppression of the fire represents a "Special Situation," since water can also contain asbestos, lead paint, chemicals, and other hazardous materials.

Water fogging – The use of water-based chemicals to control or disinfect microorganisms; contain, mask, pair (paring) to deodorize odors.

Web, soot – An irregular shape spiral design of soot particles agglomerated in corners of sooty or fire damaged buildings. Theories about how soot webs are created include: soot particles that cling to an already existing spider web; a fire that affects indoor spaces where the inside corners of rooms experience eddy effects (turbulence) resulting in chains of soot particles to cling together or with dust to form webs of soot. Education Note: Soot tags (soot webs) are ionized smoke residues that are often formed by the combustion of synthetic materials (plastics, carpet to urethane floor finishes). They tend to be black in color and they easily smudge when disturbed. Their removal is best done with paper towels that cause the soot tag or soot web to cling to it. The paper towel is then folded into itself and disposed. Spraying soot webs with a cleaner/ degreaser causes it to explode (disintegrate) making soot removal a more difficult task.

Wet cleaning – (1) A process of cleaning a surface or material on the "wet side". (2) Water mixed with a cleaning agent that removes dust, dirt, and grime. Education Note: Wet cleaning can be aggressive where abrasive cleaners are used or fine cleaning with non-abrasive cleaners.

Wet fog – Aerosolized droplets of water or solvents as a mist or fog. Education Note: Wet fogging is an odor control and odor paring process by which a chemical fog is broadcast throughout the building or area. A wet fog mist consists of large molecules is usually 30-60 microns in size; a wet fog is usually 20-30 microns in size; a dry fog is usually 10-15 microns in size. There is a super-fine category called ultrasonic fog that is atomized at 2-10 microns. (See: Wet fogging)

Wet fog stability – The ability of a fog or mist to remain airborne. The stability of a fog varies widely depending on the liquid (composition, vapor pressure, surface tension and density), particle size distribution, droplet density, air currents, sunlight, and air temperature and condensation surfaces.

Wet fogging – A process of fogging water and oil-based chemicals in air. High pressure sprays deliver a wide range of particle sizes, depending on liquid pressure and nozzle opening. For fog output, typical liquid pressures are 500 - 1,500 psi, and orifices are 0.005 of an inch or smaller. Spray nozzles that fog fine droplets require high grade filtration to protect against nozzle plugging. Education Note #1: Wet fogging is an odor control and odor paring process by which a chemical fog is broadcast throughout the building or area. A wet fog mist consists of large molecules is usually 30-60 microns in size; a wet fog is usually 20-30 microns in size; a dry fog is usually 10-15 microns in size. There is a super-fine category called ultrasonic fog that is atomized at 2-10 microns. Education Note #2: A wet fogging application is better for dampening, particulate settling (dust control) and humidification.

Wet smoke – Airborne combustion byproducts containing high liquid components that are in the form of aerosols. Wet smoke conditions can be generated by smoldering oxygen starved fires, where the fire residues are sticky (tacky), they penetrate deep into pores, and they have a strong lingering odor. Education Note: The wet misting spray created by firemen to shutdown oxygen in a fire can increase the moisture content in smoke and soot causing it to break apart or agglomerate. However, calling this type of situation wet smoke damage does not fit the wet smoke definition.

Wet smoke residue – The residue formed when a fire smolders, penetrating the structure, and leaving a pungent odor.

Wet soot – Soot that has sufficient moisture in it to cause soot to cling together and smear when disturbed or cleaned.

Wet sponge – A synthetically made sponge. We sponge are designed to be soaked in water and cleaning detergents that together, lightly scrub a surface (e.g., dishes, glassware, plastics, silverware, pots and pans, kitchen counters), and not cause harm to the surface. (See: Chemical sponge; Cleaning, wet sponge; Dry sponge)

Wet sponge cleaning (remediation; restoration) **–** The application of a wet sponge to clean off dust, dirt, soot, and oils. Unlike chemical sponges that have small pores and are intended to be used dry, wet sponges have large pores and work best when they are damp or wet. Education Note: In soot cleanup situations, damp cleaning a test area is preferred over an aggressive wet cleaning process. Damp cleaning will control surface moisture and wetness, and any water runoff that may occur which can harm a surface if they are not stopped. In most all situations, lightly HEPA vacuum loose soot first then begin cleaning the surface using a test area as an example of what you would expect to achieve if you cleaned the entire wall, floor, ceiling, or a cabinet surface.

Wet steam cleaning – Steam, usually very low-pressure, that contains water droplets in suspension where the application wand, upholstery head or wall washing system produces less than 1 gallon of water (wet steam) per minute. Wet steam can saturate the materials' surface for a few seconds which allows contaminates to soften and suspend, followed immediately by extraction.

Wildfire – Any wildland fire that requires a suppression response. A controlled burn may be declared a wildfire if part of it escapes from the control line or if weather conditions deteriorate and become unacceptable, as described in the burning plan.

"*Wildfire Glossary of Environmental, Insurance and Restoration Terms and Definitions*" 2014, a glossary published by Patrick Moffett, where this glossary supersedes that glossary.

Wildfire hazardous waste – The State of California Department of Toxic Substances Control determined buildings constructed before 1978 that burned in wildfires are likely to release hazardous lead-based paint; buildings constructed before 1980 are likely to release hazardous asbestos materials.

"***Wildfire Particulate in Proximally Located, Unburnt Buildings***" – (1) An ASHRAE April 15, 2011,

Technical Conference which speaks about impure carbon particles resulting from the incomplete combustion of the gas-phase combustion process. Morphology of soot particles are similar to carbon black, fine micron/submicron sized spheroids. The EDS spectrum of soot shows strong carbon concentrations with few or no trace elements present. (2) A PowerPoint presentation at the ASHRAE Spring Technical Conference which can be found at: https://rockymtnashrae.com/downloads/2011_Technical_Conference/wildfire_particulate_in_proximally_located_unburned_buildings_3_31_11_jz.pdf

Wildfire particulate matter, about – Another component of smoke, which is categorized as particulate matter that can be composed of any of the combustion by-products, including PAHs, organic debris, and inorganic residues. Numerous air pollution studies have shown that small increases in the concentrations of particulate matter are associated with notable increases in respiratory and cardiovascular disease mortality. The association between increased respirable particulate matter and childhood asthma and other respiratory diseases is also well established. Education Note: Particulate matter small enough to be inhaled is segregated by size: particles up to 10 micrometers (µm) in diameter (PM_{10}), which the EPA considers "inhalable coarse particles;" and particles smaller than 2.5 µm in diameter ($PM_{2.5}$), called "fine particulates." If inhaled, the larger PM_{10} deposit in the upper respiratory tract, while smaller $PM_{2.5}$ travel deeper into the lungs and generally are retained within the lungs. The EPA National Ambient Air Quality Standards (NAAQS) for particulate matter was first issued in 1971, and then revised in 1987 and 1997. In September 2006, the EPA again tightened the PM standards. The revised 2006 standards tighten the 24-hour fine particle standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and retained the current annual fine particle standard at 15 $\mu g/m^3$. Particulate matter is also categorized as "ultra-fine particles." Fine particles are less than $_{2.5}$ µm in diameter, while ultra-fine particles are only 0.15 to 0.4 µm in diameter. (By comparison, the period at the end of this sentence is about 500 µm in diameter.) Most ultra-fine particles are too small to be removed by HEPA filters, which can remove 99 percent of filtered particles that are larger than 0.3 µm in diameter. The majority of particulate matter produced in a wildfire is in the ultra-fine particle size range. The majority of wildfire smoke particulates are in the fine particulate category. These wildfire smoke respirable particulates can contain organic materials that may have significant long-term health effects, such as PAHs, aldehydes, VOCs, and organic acids. The toxicity of particulates retained in the lungs varies with chemical composition. Chemical changes of smoke particulates may occur in the form of chemical reactions with other aerosols. Particles may stick together or break apart, changing the size distribution over time. Research has confirmed that fine particles outdoors will infiltrate indoors, even with all the windows and doors closed. Some studies have found that as much as 70 to 100 percent of the fine particles outdoors will infiltrate indoors. Many commercial buildings and schools mechanically draw outdoor air into the buildings. Usually, the outdoor air is filtered before it is supplied to the occupants. However, standard HVAC air filters will not remove most of the ultra-fine wildfire smoke particles. Also, many schools that rely on portable buildings for classrooms bring in outdoor air by installing continuous exhaust fans. Unfiltered outdoor air is brought indoors by keeping the classrooms under negative pressure. When heavy concentrations of tiny wildfire smoke particles enter a home, school or other building, the particles can eventually settle out of the air to deposit on horizontal surfaces, or plate out on vertical surfaces, penetrate upholstery, drapes, and insulation; or electrostatically adhere to electronic components or other

charged surfaces, as well as impact on surfaces in the path of air currents. Settled respirable particulate matter can be re-entrained into the air by even small disturbances. Research shows that large wildfires produce more than 36 tons of particulate matter per minute, which is 2,160 tons of particulate matter per hour. Under some conditions, wildfires can produce 30 times that amount of particulate matter. (Kirsten Shaw, CSC)

Wildfire primary and secondary particles – "Primary particles" are directly released into the atmosphere by the wildfire combustion processes and turbulent wind. "Secondary particles" are those that form in the atmosphere from other gaseous pollutants from incomplete combustion, particularly sulfur dioxide, nitrogen oxides, ammonia, and volatile organic compounds.

Wildlife refuge – An area designated for the protection of wild animals, within which hunting, and fishing are either prohibited or strictly controlled.

Wildfire safety concerns – The concerns of an employer and project supervisor in protecting workers who have exposure to smoke, soot, char, and ash, including chemicals and toxins. Wildfire smoke and cleanup presents hazards that employers and workers in affected regions must understand. Smoke from wildfires contains chemicals, gases and fine particles that can harm health. Hazards continue even after fires have been extinguished and cleanup work begins. Proper protective equipment and training is required for worker safety in wildfire regions. For more information go to: https://www.dir.ca.gov/dosh/worker-health-and-safety-in-wildfire-regions.html

"*Wildfire Smoke: A Guide for Public Health Officials*" – A public health paper written by various experts. Education Note: From their paper, they determined: smoke is a complex mixture of carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons and other organic chemicals, nitrogen oxides, and trace minerals. The individual compounds present in smoke number in the thousands. Smoke composition depends on multiple factors, including the fuel type and moisture content, the fire temperature, wind conditions and other weather-related influences, whether the smoke is fresh or "aged," and other variables. Different types of wood and vegetation are composed of varying amounts of cellulose, lignin, tannins and other polyphenols, oils, fats, resins, waxes, and starches, which produce different compounds when burned. The latest version is 2019, which is found at https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf

"*Wildfire Smoke and Public Health Risk: Evidence Review*" – A March 31, 2014 paper published by the BC (British Columbia) Centre for Disease Control involving the study of smoke components and their health effects. http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/WFSG_EvidenceReview_WildfireSmoke_FINAL_v3_edstrs.pdf

Wildfire smoke deposition assessment – A visual and sensory assessment and documentation of smoke odor and smoke residue in buildings. A wildfire smoke assessment identifies pockets of smoke odor that entrains throughout a structure and contents or is isolated to specific parts of the building. The wildfire smoke deposition assessment process is often part of a more comprehensive scientific

examination, which includes the collection of soot and ash particles for laboratory analysis.

Wildfire surface layer – The concentration of air pollution that extends from the ground to an elevation where the top edge of a pollution layer is visible.

Wildfire wind shear – Winds generated by atmosphere, heat and turbulent forces causing a dramatic change in wind speed and direction. Education Note: Wind shear makes for choppy wind conditions causing erratic gusts (across and up and down and in layers simultaneously) between 5-20 mph and can increase from 5 to 100 mph for short periods. The fundamental dynamics through which a forest fire and the atmosphere interact to yield different convective regimes is still not well understood. However, through dimensional modeling (Advanced Regional Prediction System (ARPS)), science is attempting to understand the impact of the environmental wind profile based on intensity and spatial scale. ARPS modeling is attempting to investigate surface buoyancy parameters and advection parameters. The goal is to model the degree to which the environmental wind advects updrafts away from the fire; upstream surface wind and mixed layer wind speeds that become independent from each other.

Wildland fire – Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildfire wind effects (weather) – Naturally occurring wind increases the supply of oxygen in air. With heated air and thermal pressures, heated wind causes the wildfire to burn more rapidly and intensely. It also removes the surface fuel moisture content (ground covering, soil, minerals, and biological makeup), including plants, which increases a rapid rate of drying. Education Note: Therefore, heated wind influences the rate of spread and intensity of the fire by removing moisture from all organic materials.

Wildfire wind effects (buildings) – The action of wildfire wind impacting buildings based on design, construction, location, direction (angle to the wildfire), slope and grade (topography), and permeance (leakage). In designing future buildings for wind shear and fenestration protection review https://www.astm.org/Standards/E1886.htm Education Note: The windward wall is subjected to an inward pressure, while the leeward wall and the two sidewalls have an outward pressure, or suction. The flat roof has an upward pressure, with the maximum amount occurring at the windward edge. Pressures are caused by the movement of a massive air around and over the structure. A short, wide building will cause the major volume of air to move over the roof, with corresponding less air movement around the sides. A tall, narrow building, on the other hand, will cause a major volume of air to follow the path of least resistance around the building, with less movement over the top. The velocity of air movements is the primary cause of pressures impacting a building. The effect of wind pressure and suctions modifies the natural air movement within a building.

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WHO – The World Health Organization. https://www.who.int/

Wind driven smoke and soot (wildland fires) **–** A condition where the force of heat and wind are driven towards buildings.

Wipe, char and soot – A small piece of uncolored, non-fragranced cellulosic or synthetic material used to collect combustion particles (char, soot, etc.) from a surface. Examples would be a cotton ball or pad.

Wipe, surface (fabric cloth; paper cloth; sponge) **–** A material that is compatible with the surfacing material and contaminate that removes incomplete combusted particulate, soot, and ash off a surface.

Wipe, surface – A streak test collected from a given surface that is intended to identify carbon black, soot and other naturally occurring environmental particulates.

Wipers (wipes) **–** Absorbent cloths from a variety of materials used for removing soils and liquids off surfaces. Education Note: Wipes are paper towels for cleaning up small spills, cotton towels and micro-fiber wipes for cleaning up larger spills, and sponges.

Wipes, fire detection – (1) Small pieces of uncolored, non-fragranced cellulosic or synthetic material used to collect combustion particles from surfaces. (2) Manufactured wipes which are usually made of cotton that are either dry or are wet with deionized water or isopropyl alcohol (IPA), where with even hand pressure, are wiped across a surface to collect particulate and chemical residue.

Work authorization – A form which, when properly executed, allows an individual or company to work on the premises or property of another, often under the terms of the owner's insurance policy.

Worker – An employee who has basic skill sets and safety training that performs tasks under the

direction of a technician, worksite superintendent, or supervisor.

Worker's compensation insurance – The contractor's insurance against the legal liability of any employer for the death of, disablement of, or injury to an employee.

World Health Organization (WHO) – The directing and coordinating authority for health within the United Nations system. Education Note: WHO is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.

(X)

Xactimate – An insurance estimating software program that calculates labor and material costs, demolition and cleanup, repair, and restoration costs. For more information go to: http://www.xactware.com

XRD (laboratory) – X-ray Diffraction. An analysis method for assessing diesel fumes obtained from crude oil.

XRF (field analysis; laboratory) – X-ray Florescence. XRF is a field-application scientific X-ray emitting detection instrument that identifies the presence of lead-based paint and lead substances in a material or on its finish. XRF analysis is important in wildfire cleaning and restoration when building materials manufactured or constructed before 1978 must be removed or disturbed. XRF analysis is also important in identifying the fallout of burnt nearby buildings, ensuring their char particles are not a source of lead-based paint particles.

(Y)

Yellowing and discoloration – The development of yellowing can be a result of thermally induced heat caused or from material contact with smoke and soot residue. Yellowing is often caused by nitrogen dioxide (NO_2) in smoke and soot. For more information about nitrogen dioxide as a chemical compound in wildfire emissions go to:
https://www.fs.fed.us/rm/pubs_other/rmrs_2009_urbanski_s001.pdf

Bulletin 202, Updated September 2020
"Wildfire Glossary for Environmental Professionals, Adjusters and Restorers, © 2020"

(Z)

Z-flap door – A doorway closure designed to minimize airflow between two areas. Education Note: A Z-flap can be constructed while erecting containment by overlapping polyethylene plastic sheeting over the doorway as the room is wrapped.

Zone maps – Areas defined by government agencies as having low, moderate, high, and severe wildfire hazards or hot zones. An example is found at: https://www.sccgov.org/sites/dpd/DocsForms/Documents/Fire_Hazard_Zone_Fact_Sheet.pdf When building a home in a wildfire area (zone), Google current local and government wildfire zones which may impact the building, its construction, and insurance coverage. An example is FEMA's Home Builder's Guide to Construction in Wildfire Zones: https://www.fema.gov/media-library-data/20130726-1728-25045-1351/home_builders_guide_to_construction_in_wildfire_zones.pdf

Zoning – (1) The process of separating damaged parts of a building into different work tasks. (2) The process of separating smoke and soot cleanable parts of a building into manageable sections. Zoning in this situation begins at the most affected area or rooms, working towards less contaminated areas or rooms.

About the Author Patrick Moffett:

1. Patrick is a senior environmental/industrial hygienist, a California registered environmental assessor (retired), a California licensed general contractor, an industry certified master restorer, and an IICRC approved instructor in Fire and Smoke Restoration Technician (FSRT) training.
2. Since 2015, Patrick is employed by Blue Sky Environmental Consulting, Inc. (BSEC), and before that, 20 years with Environmental Management & Engineering, Inc. (EME).
3. Patrick has over 30 years of experience assessing fire and wildfire damaged properties:
   - Completing environmental assessment and testing of hazardous chemicals and waste along with interpreting state and federal regulations that apply to mitigate damage.
   - Consulting with state and local agencies including EPA, Fish and Game, Air Quality Management District, California Department of Toxic Substance Control, fire marshals, forensic specialists, health departments, abatement, and remediation contractors.

- Designing scope of work plans for removing smoke, soot and ash that affects buildings and contents followed by clearing restorers work and the building.
- Documentation using digital photography, macro photography and micro photography.
- Documentation using aerial drones outside and inside unsafe buildings or buildings having hazardous chemical conditions.
- Documentation using Matterport 3D photography and imaging.
- Documentation using video and drone FLIR cameras.
- Completing environmental testing leading to clearance and closure of fire damaged structures and wildfire impacted buildings, and occupant health concerns.
- Providing expert testimony in mediation, arbitration, and court.
- Writing technical articles and teaching industry professionals and adjusters about methods and procedures required to cleanup fire and wildfire caused damage and contamination, such as
    - *Soot Particles: A Procedural Guide for Containing and Removing Wildfire-Caused Soot in Buildings.*
    - *Containment and Removal of Fire Retardants Settled on Buildings, Contents and Land.*
    - *Dilemmas Associated with the Clean-up of Wildfire Smoke and Soot in Buildings.*

4. Patrick participates and provides technical advice on various fire-related standard development committees and taskforces, such as:
    - 2019 – Standards committee developing:
        - "*Fire and Smoke Damage Restoration*" (IICRC 700)
        - "*Scope of Work in Fire and Smoke Damage Environment*" (IICRC 710)
        - "*Restoration of Fire and Smoke Damaged Personal Contents*" (S740)
        - "*Restoration of Structures and Items Damaged by Wildfire Smoke*" (IICRC 760)
        - Committee developing the "*Fire Loss Specialist*" course and certification (RIA)
    - 2018 – Committee that developed the "*Technical Guide for Wildfire Impaction Assessment for the OEHS Professional*" (AIHA)
        - Certification taskforce "*Contents Loss Specialist*" (RIA)
    - 2017 – Committee that developed "*Standards for Restoration of Buildings Impacted by Combustible Particles*," (ASHRAE/IAQA/RIA)
        - Committee that developed "*Fire and Smoke Damage Certification Program*" (IAQA/ACAC)
    - 2014-2018 – Certification taskforce "*Fire Damage Restoration*" (IICRC)

For Patrick's biography involving fire damage or a complete CV, contact Patrick as PatMoffett@att.net

