"Wildfire Glossary for Restorers, Environmental Professionals, and Insurance Adjusters" 2023 Edition

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Author’s Notes to the Reader:

1. **Glossary and Definitions:**
   a. Terms and definitions in the “*Wildfire Glossary for Environmental Professionals, Adjusters, and Restorers*” (Glossary), is for professionals who are required to be knowledgeable about building fire and wildfire investigations, the science of fire and wildfire, the assessment of heat damage, smoke contamination, and particulate impaction. They are also expected to be trained in the means and methods of restoring buildings and contents back to a clean, smoke odor free, and environmentally safe condition for occupant use.
   b. Terms can be useful to some persons and not others, such as “absorption” that has a different meaning for building inspectors, restorers, occupational and industrial hygienists, and medical professionals.
   c. There are a number of terms that have cross-over meanings, such as a wildfire that resulted in a building to burn, where there is a greater amount of soot byproduct from burnt materials. This is in contrast to a wildfire that resulted in the building to be impacted by smoke, char, ash, and vegetative matter. In both examples, involving structural fire damage as compared to structural smoke impaction, the building assessment, environmental sampling, the request of the environmental professional to request specific laboratory analysis, and the interpretation of laboratory findings, are expected to produce different results.
   d. Recognizing a building fire causes “heat damage” to a building, or a wildfire that impacts a building with “organic materials and byproducts”, both situations can cause thermal loading involving increased heat that forces semi-volatile organic compounds (SVOCs), and polycyclic aromatic hydrocarbons (PAHs) in buildings components and systems. While this glossary discusses the mechanisms of thermal loading and thermal expansion, along with SVOCs and PAHs affecting buildings and contents, it does not provide a prescriptive approach to assessing, sampling, and analysis.
2. **Author:**
   a. The author is Patrick Moffett, the owner of Blue Sky Environmental Consulting, Inc., and the Building Restoration Institute, Inc., 1112 Montecito Street, Placentia, CA 92870. PatMoffett@att.net
3. **Author’s Background:**
   a. The Glossary is the result of the author’s 40 years using common industry terms. Recognizing there has not been many reliable industry glossaries, the author researched and refined internet and other glossary terms involving fires and wildfires.
   b. As a master fire and smoke odor remediation specialist, including an industrial hygienist, and an approved instructor in fire damage restoration, the author has inspected thousands of fire and wildfire damaged buildings.
4. **Glossary Current Edition’s Retail Value:**
   a. The retail electronic format value of this subscription is $49.50 (USD), where a printed edition is $95.50 (USD).
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(A)

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

Abatement in fire damaged structures – (1) The action of minimizing the presence and danger of hazardous material such as lead and asbestos, bacteria, and mold, by reducing their 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.

Ablated char in wildfire discussion – In the context of wildfires, "ablated char" refers to the charred remains of materials that have undergone ablation due to exposure to intense heat and flames. (Ablation refers to the process of erosion or removal of material by high temperatures, typically caused by direct contact with fire.) Education Notes: [1] When materials are subjected to the extreme heat of a wildfire, they can undergo chemical changes and physical transformations. Ablated char is the residual material left behind after the intense heat has caused the outer layers of the material to burn, char, or disintegrate. [2] The characteristics of ablated char can vary depending on the type of material and the severity of the fire. It often appears as a blackened or charred residue, with the original structure of the material significantly altered or destroyed. [3] Ablated char can be observed on various surfaces and materials, including vegetation, wood, fabrics, plastics, and other combustible substances. The presence of ablated char is an indication of the intensity of the fire and the level of exposure to heat. [4] In post-wildfire assessments, the extent of ablated char can provide insights into the severity of the wildfire's impact on the environment and structures. It can also help determine the potential for structural damage, as materials that have undergone ablation may have reduced strength, integrity, or functionality. [5] It is important to note that the presence of ablated char may necessitate thorough cleanup, removal, and potential restoration or rebuilding efforts, depending on the extent of the damage. Professional evaluation and guidance from experts in wildfire recovery and restoration are typically required to assess the effects of ablated char and develop appropriate remediation plans.

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 finish 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 char 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 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

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 these items to change, physically or chemically, as they take in humidity, 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

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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, such as 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 activated carbon is depleted or loaded with vapors.

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

ACBM – Asbestos-containing building material. . For more information go to: http://www.osha.gov/OshDoc/data_AsbestosFacts/asbestos-factsheet.pdf

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, mineral 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 sampling where analysis is performed in a laboratory using Fourier Transform Infrared Spectrometry (FTIR), Gas Chromatography/Mass Spectrometry (GC/MS) and High-Performance Liquid Chromatography (HPLC).

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 increased 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 / Acclimation – The ability of a person, material or even a chemical to become accustomed to a new climate or environment due to changes in environmental conditions.

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. They are very effective in scattering light. For more information go to: https://www.epa.gov/wildfire-smoke-course/why-wildfire-smoke-health-concern and http://www.euro.who.int/__data/assets/pdf_file/0019/123085/AQG2ndEd_7_3Particulate-matter.pdf?ua=1

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.

Accredited laboratory for wildfire particulate analysis – As of the printing of this Glossary, there are no known accreditations for laboratory analysis of wildfire particulate.

ACD – Air cleaning device, also known as an air filtering device (AFD).

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

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.

Acid cleaner – A chemical compound capable of breaking down smoke, char, and ash residue followed by rinsing and drying. For example, 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, 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 residue in wildfire particulate discussion – Wildfire particulate can contain acid residues, which are the byproducts of combustion and chemical reactions that occur during a fire. These acid residues are typically in the form of acidic gases or aerosols that are released into the air during the burning of vegetation, organic matter, and other combustible materials. (1) The presence of acid residues in wildfire particulate can result from the following processes: [1a] <u>Combustion of Organic Matter</u>: During a wildfire, organic matter such as vegetation, trees, and other plant materials burn. This combustion process releases gases and aerosols, including acidic compounds such as sulfur dioxide (SO_2) and nitrogen oxides (NOx), which can react with moisture in the air to form acids like sulfuric acid (H_2SO_4) and nitric acid (HNO_3). [1b] <u>Chemical Reactions</u>: The heat and intense energy generated during wildfire can initiate chemical reactions that produce acidic compounds. For example, the combustion of sulfur-containing materials can lead to the formation of sulfuric acid. Similarly, the reaction of nitrogen oxides with atmospheric moisture can result in the formation of nitric acid. [1c] <u>Long-Distance Transport</u>: Wildfire particulate, including the acid residues contained within it, can be carried over long distances by wind currents. This can result in the dispersion of acidic compounds and the potential for their deposition in areas far from the fire source. (2) The presence of acid residues in wildfire particulate can have various impacts, including: [2a] <u>Air Quality</u>: Acidic compounds in wildfire particulate can contribute to the deterioration of air quality, particularly in areas affected by the smoke plume. Inhalation of these particles can irritate the respiratory system and exacerbate respiratory conditions. [2b] <u>Environmental Effects</u>: Deposition of acid residues from wildfire particulate can have detrimental effects on ecosystems, including soil acidification, changes in water quality, and damage to vegetation. (3) It is important to discuss that the specific composition and concentration of acid residues in wildfire particulate can vary depending on factors such as the type of vegetation burned, the weather conditions during the fire, and the distance from the fire source. Monitoring and studying these residues can help researchers and authorities understand the environmental and health impacts of wildfires and develop appropriate mitigation strategies.

Acid smoke – (1) Fire residues that have low to high levels of acidity often cause 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 similar to the smell of wet cigarette or cigar ashes. Smoke smells consist of VOCs.

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 a 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.

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. For more information go to: http://www.osha.gov/SLTC/asbestos/ (See: Asbestos containing material)

ACR 2021 – The NADCA "*Standard for Assessment, Cleaning & Restoration of HVAC Systems*," 2021 Edition. For more information go to: https://nadca.com/store/acr-nadca-standard-2021-edition

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 like VOCs.

ACS (HVAC) – Air conveyance system.

ACS (human health) – Abnormal chemical sensitivity.

Action level (AL) – (1) Under OSHA regulations, a measured concentration of certain airborne contaminates or noise in the workplace requires immediate attention by testing exposure levels. (2) A term used by OSHA and NIOSH to express the level of a toxicant agent (toxic substance) which requires medical surveillance, usually set at one-half the PEL. (IICRC) Education Note: “Action levels” are different from “tolerance levels,” which are established for residues as a direct result of proper chemical usage. Meaning, the use of chemicals on the job, a response action level is set for inadvertent residues resulting from legal use or accidental contamination such as spills.

Action level, concentration of – (1) The concentration of a substance in air, soil, water, or other defined medium at which specified emergency countermeasures, 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) should be taken.

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 entering 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 Notes: [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. [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.

Activated carbon for IAQ – A processed carbon used in filter driers and are commonly used in air filters to clean the air.

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. (NIOSH)

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 – (1) An object’s current market value (current replacement value minus depreciation). (2) The replacement cost of property minus depreciation. (HUD)

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 sudden exposure to a significant high dose of a dangerous substance. (2) A worker having exposure to high concentrations of a substance or contamination 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.

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

Adaptation – The ability of a substance or environment to change or modify, based on temporary or a permanent change.

Adaptive sampling strategy – A sampling strategy that allows modification of sampling design and analysis to adapt to changing objectives or changing circumstances.

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 – Materials that are wet enough to require them to require professional drying.

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

Adhered substance (HVAC) – A material, such as mastic, that is not removable by direct contact vacuuming.

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.

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). For more information go to:
http://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. (3) 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. (4) 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, contents and wildfire – A wildfire content loss adjuster is a specialized type of insurance adjuster who specifically deals with claims related to property and personal belongings damaged or destroyed in wildfires. They play a crucial role in assessing the extent of damage, evaluating the value of the contents, and facilitating the claims process for individuals who have suffered losses due to wildfires. When a property is affected by a wildfire, homeowners or policyholders may file an insurance claim to seek compensation for the loss of their personal belongings, also known as contents. A wildfire content loss adjuster is assigned to these claims to investigate, document, and determine the value of the damaged or destroyed contents. The responsibilities of a wildfire content loss adjuster include: [1] Claim Investigation: The adjuster visits the affected property and assesses the extent of the content damage caused by the wildfire. They inspect the property, document the loss, and gather information from the policyholder regarding the affected items. [2] Inventory and Documentation: The adjuster creates a comprehensive inventory of the damaged or destroyed contents. They document the description, condition, age, and estimated value of each item. This may involve taking photographs, videos, or written records of the damaged property. [3] Valuation: Based on their expertise and knowledge of market values, the adjuster determines the fair market value or replacement cost of the damaged or destroyed contents. They consider factors such as depreciation, condition, and local market prices to arrive at a reasonable valuation. [4] Settlement Negotiation: The adjuster works with the policyholder to negotiate a fair settlement for the content loss. They communicate with the insurance company, advocating for the policyholder's interests and ensuring that they receive proper compensation based on the policy terms and coverage. [5] Documentation and Reporting: The adjuster prepares detailed reports and documentation supporting the content loss claim. This includes itemized lists of damaged or destroyed items, estimates of replacement or repair costs, and any other relevant information required by the insurance company. [6] Education and Experience: A wildfire content loss adjuster requires a deep understanding of insurance policies, valuation methods, and personal property appraisal. They must possess strong communication and negotiation skills to work effectively with policyholders, contractors, and other parties involved in the claims process. [7] Other Adjusters: In complex wildfire events with significant property damage, multiple adjusters may be involved, including contents adjusters, building or property adjusters, and possibly additional specialists depending on the specific circumstances of the claim. (See: Adjuster, wildfire)

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), provide problem analysis and negotiation that lead 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 of the insured, negotiating for or effecting the settlement of a claim involving loss or damage.

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.

Adjuster, wildfire (insurance) – An insurance professional who specializes in handling insurance claims related to property damage caused by wildfires. Their role is to assess the extent of the damage, determine the coverage provided by the insurance policy, and facilitate the claims process for policyholders affected by wildfires. When a homeowner or property owner experiences property damage due to a wildfire, they typically file an insurance claim with their insurance company to seek compensation for the losses. A wildfire insurance adjuster is assigned to these claims to investigate and evaluate the damage and work with the policyholder to ensure a fair and accurate settlement. The responsibilities of a wildfire insurance adjuster may include: [1] <u>Claim Investigation</u>: The adjuster visits the affected property to assess the damage caused by the wildfire. They inspect the property, document the extent of the damage, and gather relevant information from the policyholder. [2] <u>Coverage Evaluation</u>: The adjuster reviews the insurance policy to determine the coverage available for wildfire-related damages. They assess the policy terms, exclusions, deductibles, and limits to understand the scope of coverage applicable to the specific claim. [3] <u>Damage Assessment</u>: The adjuster evaluates the extent of the property damage caused by the wildfire. This may include assessing structural damage to buildings, damage to personal belongings or contents, and any other affected property elements. [4] <u>Cost Estimation</u>: Based on their assessment, the adjuster estimates the repair or replacement costs for the damaged property. They consider factors such as materials, labor, local market prices, and any additional expenses necessary to restore the property to its pre-loss condition. [5] <u>Settlement Negotiation</u>: The adjuster works with the policyholder to negotiate a fair and equitable settlement. They communicate with the insurance company, advocating for the policyholder’s interests and ensuring that they receive appropriate compensation for the wildfire-related damage covered under the policy. [6] Documentation and Reporting: The adjuster prepares detailed reports and documentation supporting the wildfire insurance claim. This includes itemized lists of damaged property, repair estimates, photographs or videos of the damage, and any other relevant information required by the insurance company. [7] Education and Experience: Wildfire insurance adjusters require a strong understanding of insurance policies, property valuation, and construction practices. They must have effective communication and negotiation skills to interact with policyholders, contractors, and other parties involved in the claims process. [8] Other Adjusters: In complex wildfire events with widespread damage, insurance companies may deploy teams of adjusters, including wildfire insurance adjusters, contents adjusters, building or property adjusters, and other specialists, to handle the volume and complexity of claims resulting from the wildfire.

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

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.

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 timetables and scheduling of workers to minimize exposures.

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.

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 – The process of exchanging contaminated air with either fresh or less contaminated air.

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.

Aerial firefighting – The use of aircraft, such as helicopters and air tankers, to drop water or fire retardant onto wildfires to assist in containment and extinguishment.

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 has the same terminal settling velocity as the particle in question. Operationally, the size of a particle is 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, such as in air. (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. 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.

Aerosol classes and subgroups – The type and group aerosols are classified. [1] Fumes: It 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 the air. In wildfires the most familiar form of fumes is smoke. [2] Smoke: Smoke is formed from the incomplete combustion of fuels. Its particles are generally smaller than 10 microns in size. [3] 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 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. [4] 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 the air. [5] 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).

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, $A_{l2}O_3$, SiO_2; 2) A result of contaminants, such as "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 are 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 particles. (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.

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 gases 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. 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 called air scrubbers.

Affected area – An area of a structure that has been impacted by primary or secondary damage.

Affected public – The people who are not employed at a building but through visiting, 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.

After the wildfire, where the home cannot be temporary occupied, identify the homeowner's immediate need items – After a wildfire, it is crucial to prioritize the identification and acquisition of immediate need items to ensure their safety and return to the customer. Here are several items to consider: [1] Complete Occupant Interview: Meet the customer and create a list of items they require, have them cleaned and deodorized and delivered to the customer's temporary location. [2] Documentation: [a] photo or video document each room in the home (using good lighting) while the restorer completes their initial investigation; documentation is to continue prior to touching or handling every item; [b] get a photo property release form signed, which protects the restorer or photographer from damage, financial or otherwise, where photos or videos will be used in documenting the conditions outside and inside the home, the location of contents, and personal items; in addition, it allows the restorer or photographer permission to use the documentation in reports. [3] Valuables and Records: [a] includes identifying the location of such items as rings, watches, wallets, collectibles, family photos, insurance, and medical records; [b] inform the customer, unless they are part of the identification process the restorer cannot be responsible for missing valuables and records; [c] in addition, their condition, even after cleaning, is only determined by the customer and not the restorer. [4] Medications and First Aid: [a] identify prescription and over the counter medications, surface clean and apply sanitizer on each container; [b] inform the customer that the restorer cannot guarantee the quality of medications, where they are to consult with their pharmacist or medical doctor. [5] Electronics: [a] electronics in this case include but are not limited to computers, tablets, cell phones, watches, and similar personal use items; [b] electronics that are smoke or ash impacted, should be cleaned and deodorized prior to delivery; [c] inform the customer that pre-existing conditions may not be corrected by cleaning, and the memory in electronics cannot be guaranteed it was not damaged. [6] Clothing and Bedding: Laundered and dry cleanable clothing and bedding must be washed, and smoke odor deodorized before delivery. [7] Artwork and Musical Instruments: [a] identify each piece's location, its condition before the fire, and value; [b] identify each piece's location and condition after the fire; [c] determine with the customer what artwork and musical instrument must be carefully removed and document where the insured wants them cleaned, deodorized, and stored.

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).

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 the insured and insurance company 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 in 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 (char, soot) – (1) A group of individual, sub-micron-sized particles (which individually cannot be resolved using light microscopy techniques), where when clustered together they form a larger biomass (subsequently greater than one micron in size and become visible to the naked eye).

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

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. The AIHA organization and its 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

AIHA's "*The ABCs of Wildfire Residue Contamination Testing: Post Assessment of the Indoor Environment*" – An article in the Synergist (AIHA's technical journal) where it addresses visible char and ash, and invisible odors containing s VOCs and PAHs. For more information go to: https://synergist.aiha.org/201711-wildfire-residue-contamination-testing

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 gases that constitute the atmosphere that we breathe. It is mainly composed of oxygen, nitrogen, and argon, which together contain the major gases 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. Education Notes: [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 Notes: [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 the outside surface where it also fulfills the code requirement for a weather barrier. [2] Depending on building construction, air barriers are beneath siding, facing the outside of the structure, where there have been instances where they trap 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 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 blasting (controlled blasts of air) can remove non-adhered 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. Education Note: Airborne particulate matter is emitted into the 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. Education Note: 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 the 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 processes commonly applied include particulate filtration, electrostatic precipitation, and gas sorption.

Air cleaning device (ACD) – Mechanical and electronic air cleaning devices 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 enters 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 is 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 Notes: [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. [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. (NADCA)

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 into a room or building.

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 conveyance system, about – The term ACS is believed to have been coined by the National Air Duct Cleaners Association (NADCA), for which the term ACS is synonymous with “HVAC” (heating, ventilation, air conditioning), since many homes and businesses do not have air conditioning incorporated into their air conveyance systems. An air conveyance system within a home or business provides for the circulation of air that may be ventilated, heated, or cooled, depending on the season of the year and occupant preference.

Air curtain (waterways) – An air curtain can be used to stop fish from entering polluted water. In a wildland fire, air curtains can capture fire retardants and debris.

Air curtain (fire damage 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. <u>Education Note</u>: 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 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 ducts that transfer 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*”, 2023)

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 or wildfire. 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 envelopes a building, where air returns, filters and mechanical systems bring wildfire gases, vapors, and particles into ducting.

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 Notes: [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). [2] EPA says: the air exchange rate is expressed in one of two ways: [a] the number of changes of outside air per unit of time air changes per hour (ACH); or [b] the rate at which a volume of outside air enters per unit of time - cubic feet per minute (cfm). [3] In response to the Coronavirus and wildfires, CDC and ASHRAE, on May 12, 2023, agree; the number of building air exchanges per hour should be 5, where ventilation filters have a minimum efficiency reporting value (MVER) of 13. https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html

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 through 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 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 back 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. (3) An exhaust or return ducting system that removes air from a room or building.

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

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 (EPA). (2) A large volume of air (often covering thousands of square kilometers) with temperature and humidity characteristics that vary a little horizontally. (NASA) (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 – (1) An air sample monitor that is placed in a single location and is not moved during one or more sampling events. (2) The measurement of pollutants and particulate matter in the air.

Air mover / Airmover – (1) Specialized fans that move air and promotes drying and evaporation. (2) Fans capable of moving aerosolized smoke, fumes, and particles from a contaminated space to outdoor air.

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

Air, outdoor – Air outside a building, where in a wildfire situation, it can be more contaminated with smoke, fumes, and particles than the indoor air. In other instances, indoor air is more contaminated than the outdoor air, where an exchange of indoor air with outdoor air will benefit breathing contaminated indoor air and may be capable of reducing pollutants in indoor air.

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.

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 – 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.

Air pollutant – (1) Any unwanted substance in air. (2) The presence of contaminants or pollutant substances in the 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)

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 from wildfire – (See: Airborne pollution from wildfire)

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

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 used respirators, and they 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-purifying powered respirators (PAPR) – An air-purifying respirator that uses a battery operated 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 most of the 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 Index (AQI) – EPA’s AQI is a yardstick that runs from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 or below represents good air quality, while an AQI value over 300 represents hazardous air quality. Education Note: For each pollutant an AQI value of 100 generally corresponds to an ambient air concentration that equals the level of the short-term national ambient air quality standard for protection of public health: [1] AQI values at or below 100 are generally thought of as satisfactory. [2] When AQI values are above 100, air quality is unhealthy: at first for certain sensitive groups of people, then for everyone as AQI values get higher. The AQI is divided into six categories. Each category corresponds to a different level of health concern. Each category also has a specific color. The color makes it easy for people to quickly determine whether air quality is reaching unhealthy levels in their communities. For more information go to: https://www.airnow.gov/aqi/aqi-basics/

Air Quality Index (AQI) Category for PM2.5	Level of Health Concern
0 to 50	**Good**
51to 100	**Moderate**
101 to 150	**Unhealthy for Sensitive Groups**
151 to 200	**Unhealthy**
201 to 300	**Very Unhealthy**
301 – to 500	**Hazardous**

Air Quality Related Values (AQRVs) – The values of air quality which includes 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 quality monitoring (environmental) – Continuous monitoring and assessment of air quality to identify and mitigate potential health risks associated with smoke, ash, and airborne contaminants.

Air quality testing (environmental) – Conducting tests to assess and monitor air quality in wildfire impacted communities.

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 an environment, which is compared to surrounding areas not considered impacted, including 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 to remove particulate materials and odors from the air. Air scrubbing is a way of cleaning the ambient air within a building. 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 an 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 lost skin, hair, spores, pollen, and other contaminants. (See: Air barrier)

Air-source – (1) Incoming air or the conditioned source of air to a space or building. (2) Air 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.

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 – The movement of air towards the fire and movement of hot, buoyant combustion products out of the compartment or structure.

Air track, direction – 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 – 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 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 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 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 in air. Airborne particles vary widely depending on location and time of year, and environmental influences that cause them to become airborne. <u>Education Note:</u> 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 the 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 bacteria, viruses, or fungus that is capable of causing disease. (NFPA)

Airborne pollution from wildfire – (1) Wildfires can release significant amounts of airborne pollution, which can have adverse effects on air quality and human health. The combustion of vegetation, trees, and other organic materials during a wildfire produces a complex mixture of pollutants that can be carried over long distances by wind currents. (2) It is important to follow guidance from local authorities during wildfire events and take appropriate measures to protect your health, such as staying indoors, using air purifiers or filters, and avoiding strenuous outdoor activities when air quality is poor. Education Notes: Here are several issues about airborne pollution caused by wildfires: [1] Particulate Matter (PM): Wildfires emit large amounts of particulate matter, which consists of microscopic particles suspended in the air. These particles can include ash, soot, and other combustion byproducts. PM can vary in size, with smaller particles ($PM_{2.5}$) being of particular concern due to their ability to penetrate deep into the respiratory system. [2] Gaseous Pollutants: Wildfires also release various gaseous pollutants, including carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), volatile organic compounds (VOCs), and hazardous air pollutants. These pollutants can have direct health impacts and contribute to the formation of secondary pollutants such as ozone and fine particulate matter. [3] Health Impacts: Exposure to airborne pollutants from wildfires can lead to a range of health effects, particularly for vulnerable populations such as children, the elderly, and individuals with pre-existing respiratory or cardiovascular conditions. Short-term effects may include respiratory irritation, exacerbation of asthma and other respiratory illnesses, cardiovascular effects, and increased susceptibility to respiratory infections. Long-term exposure to wildfire smoke has also been associated with chronic respiratory and cardiovascular diseases. [4] Regional and Global Impacts: Wildfire smoke can travel long distances, affecting air quality in regions far from the fire source. It can contribute to regional haze, reducing visibility and impacting ecosystems. Moreover, the release of greenhouse gases from wildfires, such as carbon dioxide (CO_2) and methane (CH_4), can contribute to climate change. [5] Air Quality Monitoring and Advisories: During wildfires, air quality monitoring systems are often in place to measure pollutant concentrations and provide real-time information on air quality conditions. Public health agencies may issue air quality advisories or warnings to inform individuals about the potential health risks and provide guidance on protective measures. [6] Mitigation and Prevention: Efforts to mitigate the impacts of airborne pollution from wildfires involve both firefighting activities to suppress and control fires and measures to reduce the occurrence and severity of wildfires through land management practices, fuel reduction programs, and public awareness campaigns.

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

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.

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.

ALA – American Lung Association. (See: American Lung Association)

ALA “*Protect Your Health During Wildfires*” – A pamphlet describing the harm of wildfire smoke that can cause debilitating lung and health effects. For more information go to: https://www.lung.org/getmedia/695663e2-bdb8-4a61-9322-02657f530b99/Protect-Your-Health-During-Wildfires-5-29-2020-(1).pdf

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. Alcohol 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. Alcohol 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. Alcohol also may be used in 60-90% concentration for disinfecting.

ALE – Additional living expenses. (1) In residential insurance policies, that portion of the insurance contract 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 (building fire; wildfire) – Char patterns formed on paint or burned wood remains, usually in the shape of blisters. Education Notes: [1] The splitting or cracking of paint film that resembles the lines, cracks and rectangles found on alligator skin. [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 surroundings encompass 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, such as 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.

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Ambient air conditions – The physical characteristics of the air environment (temperature, relative humidity, barometric pressure to chemicals and biologically derived agents).

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 gas, water, or soil that identify outdoor concentrations of chemicals or pollutants such as gases, particles, or organisms. 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.

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 Lung Association (ALA) – A non-profit association that provides information to the public, medical professionals, and health officials on a number of lung-related topics. For more information go to: https://www.lung.org (See: ALA)

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 Notes: [1] AB, a synthetic die, 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. [2] 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. [3] 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. [4] 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. [5] 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*", where they 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 *the 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 smoke odor to become noticeable, such as an increase in humidity or a change in temperature and air movement.

"*An Evaluation of DYI Air Filtration*" – A study completed at Underwriters Laboratories, Inc., showing how homemade air filtration systems work to reduce smoke and particulate matter in buildings. For more information go to: https://chemicalinsights.org/wp-content/uploads/2022/03/DIY-Box-Fan-Report-2021.pdf

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. (EMSL Analytical Inc.)

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.

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 / Vertical char indicators – Standing fuels that are burned at an angle that indicates the direction of fire spread.

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. 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)

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. 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 appropriately 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 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.

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.

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 settled or impacted smoke.

Area cleaning – The area cleaning of perimeter and secondary areas known or suspected of having settled smoke odor, smoke film, and chemicals.

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 / Simultaneous ignition – The ignition of several individual fires throughout an 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.

Area of influence / Zone of influence – The delineated area surrounding a base which can be reached first by the ground or air attack units assigned to the base.

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

Area source – 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.

Area source (wildfire) – (1) An "area source" for wildfire refers to a wildfire that originates from a specific area or location, as opposed to a point source wildfire that starts from a single identifiable point. (2) Area source wildfires typically involve a larger area of ignition and can spread across a wide expanse of land, often driven by factors such as wind, fuel availability, and weather conditions. Area source wildfires can vary in size, severity, and duration, ranging from relatively small fires that are contained quickly to large-scale wildfires that burn for extended periods, affecting vast landscapes. (3) Effective fire management practices, including early detection, rapid response, and collaboration between firefighting agencies, are crucial for minimizing the impacts of area source wildfires and protecting communities and resources. <u>Education Notes</u>: Several characteristics of area source involving wildfires: [1] <u>Ignition Area</u>: Area source wildfires can begin from various ignition points within a defined area. These ignition points can include natural causes like lightning strikes or human-caused factors such as campfires, discarded cigarettes, or equipment use. [2] <u>Spread and Growth</u>: Once ignited, area source wildfires can quickly spread and grow, driven by factors such as wind speed and direction, terrain, vegetation type, and moisture content. The fire can spread in multiple directions, often creating a larger fire perimeter compared to a point source wildfire. [3] <u>Fire Behavior</u>: Area source wildfires can exhibit complex fire behavior due to the larger area of involvement. The fire can produce intense heat, generate significant amounts of smoke, and create fire whirls or spot fires that can further expand the fire front. [4] <u>Fire Management Challenges</u>: Managing area source wildfires can present significant challenges for firefighting agencies. The larger fire front, extensive perimeter, and potential for multiple ignition points make containment efforts more complex. Firefighters may employ various strategies, including direct attack, indirect attack, and the creation of firebreaks to control and suppress the fire's spread. [5] <u>Impact on Resources and Communities</u>: Area source wildfires can have substantial impacts on natural resources, including vegetation, wildlife habitat, and water quality. They can also pose risks to human lives, property, and infrastructure, particularly when wildfires encroach upon populated areas or critical infrastructure. [6] <u>Fire Suppression and Rehabilitation</u>: Firefighters work to suppress area source wildfires using a combination of ground crews, aerial resources, and specialized equipment. After the fire is extinguished, rehabilitation efforts may be undertaken to mitigate erosion, restore vegetation, and reduce post-fire impacts on the ecosystem.

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

Art conservation management – The practice of maintaining and preserving works of art in their current condition without causing further damage. Education Notes: [1] In many cases, art conservation is maintaining and protecting art having no apparent damage or decay, where they look the same and they are in the condition they were in when made. [2] In other cases, older works of art require maintaining and preserving them in their current condition without causing further damage. [3] When conserving art impacted by wildfire smoke and particulate, it involves the inspection and assessment of the piece, which determines the safest and best methods of removing the contaminate. For information about art conservation go to: https://preserveart.org/education/what_is_conservation/ and https://www.metmuseum.org/-/media/files/learn/family-map-and-guides/museumkids/what-is-art-conservation.pdf

Art conservation and wildfire smoke – Wildfire smoke can pose significant challenges for art conservation due to its potential to deposit smoke film, char, ash, soot and other contaminants on artwork surfaces. Ash and smoke particles can be corrosive, damaging, and discoloring sensitive art materials. It is important to act as timely in addressing smoke damage to artworks, as prolonged exposure can exacerbate deterioration and complicate conservation efforts. By engaging professionals and following proper conservation practices, the chances for successful restoration and preservation of smoke-affected artworks can be maximized. Several considerations for art conservation in relation to wildfire smoke include: [1] Emergency Services: In some instances, the preservation of artwork immediately takes place after the wildfire or building fire is extinguished, and safe entry into the home, office building, or museum can be completed. [a] In residential and office building settings, emergency services are most often completed by a trained restorer rather than with an art conservator. [b] The restorer is to complete a job hazard analysis to ensure they can freely move throughout the building without causing harm to workers. [c] In consulting with the customer and determining artwork remains in immediate danger of becoming further damaged, extraordinary means to inventory, remove, wrap, and protect items is important. [d] When it becomes necessary to handle art of any type exposed to smoke, char, ash, soot, use disposable clean cotton gloves and change them as often as necessary. [2] Non-Emergency Occupant Interview: An interview with the customer is helpful in understanding the history, condition, and value of each piece. The interview may disclose how each piece is secured to a wall, shelf, or table. Artwork having historical significance or value may be connected to an alarm system, where motion sensors, and discrete micro-filming cameras are present. [3] Evaluation and Assessment: After exposure to wildfire particulate or smoke from a neighboring building fire, an assessment is completed identifying the extent smoke impaction, identify the types of contaminants present, and determine the appropriate conservation treatments. [4] Char, Ash, Soot and Particulate “Pre-Cleaning Considerations”: Removing smoke film and particles from artwork surfaces is a delicate process: [a] in wildfires having dry particulate and a minimum amount of smoke is present, consider if pre-cleaning is required, meaning, while the piece remains in place, is air washing, brushing, or vacuuming good choices to remove particulate that could otherwise be crushed into a frame or the piece if pre-cleaning was not completed; [b] in smoke filled buildings where there is a substantial amount of dry particulate, determine if it is best to pre-clean items before removing them, or taking them outside or to a “clean room;” [c] in situations where particulate contains wet smoke residue, often this is a result of burning synthetic materials producing oily soot, or the fire was extinguished by water either outside or inside the building, or both. In this situation, pre-cleaning may cause further damage to artwork. [5] Handling and Dismounting Wall Framed Paintings: Where possible, inspect each piece with the minimum of handling: [a] again, when it becomes necessary to handle art of any type exposed to smoke, char, ash, soot, use disposable clean cotton gloves and change them as often as necessary. [b] Before dismounting paintings, pre-stage a clean area paintings are to be placed. [c] Dismounting paintings begins by understanding how the piece is hung, and determining if it is held in place with brackets, a gallery rod, metal hanger, etc. [d] Inspecting how a piece is hung may require two people, where one is holding the piece on the bottom and side, where the other is determining how it is hung. [e] In most cases, carefully lifting the piece “straight up off hangers” will release it. [6] Stabilization and Protection: Until artwork can be safely removed from a moderate to heavy smoke and particulate contaminated building, or when there is high humidity present, or other chemicals were produced by the fire are present, or the building is unsafe, temporary mitigation measures to protect artwork is required. Examples include removing artwork to a “clean room,” or leaving them in place while air scrubbers and dehumidifiers are required as part of stabilization and protection process to prevent further damage. [7] Environmental Control: Controlling the environment in which artworks are stored or displayed is crucial for their long-term preservation. This includes maintaining stable temperature and humidity levels, implementing proper air filtration systems, and minimizing exposure to airborne pollutants, including residual smoke particles. [8] Documentation: Thorough documentation of the artwork’s condition before and after exposure to wildfire, before and after handling, and before and after cleaning is essential. Detailed records, including photographs and written descriptions, aid in tracking changes, informing conservation decisions, and documenting the restoration process. [9] Surface Cleaning and Deodorization: Depending on the specific materials and surfaces of the artwork, the type of smoke and particulate, conservators and restorers may use various cleaning methods such as air washing, dry vacuum cleaning, aqueous or solvent-based cleaning solutions to remove smoke films. However, wet or solvent-based cleaning methods must be carefully chosen to avoid any potential damage to the artwork. [10] Professional Assistance: Art conservation is a specialized field, and it is advisable to seek professional assistance from trained conservators with experience in handling smoke-impacted artwork. They possess the knowledge, skills, and appropriate materials to restore and preserve artwork affected by wildfire smoke safely and effectively.

Art packaging and storing after a wildfire – After a wildfire, it is crucial to properly package and store artworks to ensure their protection and minimize the risk of further damage. The specific packaging and storage methods may vary depending on the type, size, and condition of artwork. It is advisable to consult with a professional art conservator or an art storage expert who can provide personalized recommendations based on the specific needs of artworks. Several guidelines to consider: [1] Evaluation and Assessment: Before packaging and storing artworks, have them evaluated by a professional art conservator, restorer, or art storage expert. They can assess the extent of the fire and smoke damage, identify any structural or surface issues, and provide guidance on appropriate handling and storage methods. [2] Cleanliness: Ensure that the artworks are clean and free from residual soot, smoke particles, or other contaminants including smoke odor before short and long-term storage. [3] Handling: [a] when handling artworks, wear clean cotton gloves to prevent any transfer of oils, dirt, or residues from hands to the artworks or pressing in contaminants produced by the fire; [b] handle framed artworks by the frame or edges to avoid direct contact with delicate surfaces; [c] In handling small objects, do so by placing a hand under the item, where there should be less smoke and particulate residue; [d] when handling large stone or bronze statues, generally two people are required to lift and move them; [e] when handling crystal, China, and glass, including blown glass, careful consideration must be considered when dramatic changes in indoor temperature may have caused heat cracks and stresses that may not be immediately obvious. [4] Packaging Materials: Use archival-quality and acid-free packaging materials to protect the artworks: [a] these may include acid-free tissue paper, archival sleeves or envelopes, foam padding, bubble wrap, or custom-made crates; [b] avoid using materials that may contain chemicals or emit harmful gases, including paper having newsprint. [c] avoid shrink wrapping since shrink wrap tends to cling to the surface, resulting in damage to finishes and patina, and it may cause condensation inside the wrap. [5] Framed Artwork: For conservators, consider removing artwork from their frames when there is any suspicion of smoke or heat damage. Removal allows for closer inspection and potential conservation treatment. Keep track of the framing components for reassembly later. [6] Unframed Artworks: Unframed artwork, such as paintings on canvas or works on paper, should be carefully rolled or placed between acid-free tissue paper. Secure them with archival-quality bands or place them in archival sleeves or envelopes. Avoid rolling artwork tightly to prevent creasing or damage. [7] Climate-Controlled Storage: Ideally, store the packaged artworks in a climate-controlled environment with stable temperature and humidity levels. Extremes of temperature and humidity can cause irreversible damage to artworks. If climate control is not available, choose a cool, dry, and well-ventilated area that is protected from direct sunlight, pests, and moisture. [8] Vertical Storage: Whenever possible, store artworks vertically rather than stacking them flat to avoid pressure, warping, or damage. Use sturdy shelving or storage racks to provide adequate support. [9] Inventory and Documentation: Create a detailed inventory of all the artworks being stored, including photographs, descriptions, dimensions, and condition reports. This inventory will serve as a reference for insurance purposes and help monitor the condition of the artworks over time. [10] Professional Art Storage Facilities: When the scale or value of the artworks requires it, consider utilizing professional art storage facilities. These facilities are designed to provide optimal storage conditions, security, and specialized services for artwork preservation.

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

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 debris disposal – Proper disposal of ash and debris in compliance with local regulations.

Ash and debris removal safety concerns – The handling of ash and debris using protective clothing, gloves, boots, and eye protection. (CDC; EPA)

Ash and soot cleanup – (1) Cleaning up ash and soot residue left behind by the fire. (2) The proper handling and disposal of ash generated by wildfire, ensuring it does not pose a health or environmental risk.

Ash and soot nuisance – From a medical point of view, ash and soot has no known adverse effect on the lungs and does not produce significant organic disease or toxic effect when exposure is 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. For more information go to: 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 corrosion after a wildfire – Wildfire ash can potentially cause corrosion and damage to certain materials and surfaces. It is worth noting that the severity and extent of corrosion caused by wildfire ash can vary depending on factors such as the composition of the ash, duration of exposure, and specific environmental conditions. Taking prompt action to remove ash deposits and addressing any visible damage can help prevent further corrosion and protect the integrity of surfaces and materials. Here are some key points about wildfire ash corrosion: [1] Composition of Wildfire Ash: Wildfire ash is a mixture of various materials, including charred vegetation, burned debris, minerals, and other particles. It can contain acidic components, such as sulfur compounds, that have the potential to cause corrosion. [2] Corrosive Effects: Ash that is deposited on surfaces can react with moisture or humidity to form corrosive substances. These substances can corrode metals, degrade protective coatings, and damage certain materials over time. [3] Metal Corrosion: Metals exposed to wildfire ash, especially when combined with moisture or humidity, can experience corrosion. This can result in rusting, pitting, or tarnishing of the metal surfaces. Common examples include corroded metal roofs, outdoor furniture, and vehicles. [4] Electrical Equipment and Wiring: Wildfire ash settling on electrical equipment, wiring, and connections can lead to corrosion and electrical issues. Ash can create conductive paths, increase resistance, and potentially cause short circuits or equipment failure. [5] Concrete and Masonry: Over time, and especially when ash is combined with moisture, wildfire ash can affect concrete and masonry surfaces. Ash particles can penetrate porous materials, leading to staining, discoloration, and potential degradation of the surface. [6] Coatings and Finishes: Ash deposition on painted surfaces, including buildings and vehicles, can cause discoloration, dullness, or damage to protective coatings and finishes. [7] Preventive Measures: Taking proactive measures to minimize the effects of wildfire ash can help mitigate corrosion. These measures may include promptly removing ash deposits from surfaces, covering, or protecting vulnerable equipment, and using corrosion-resistant materials where possible. [8] Cleaning and Maintenance: After a wildfire, it is important to clean affected surfaces and materials properly. Use appropriate cleaning methods and products recommended by manufacturers or professionals to remove ash residues without causing further damage. [9] Professional Inspection: For extensive corrosion or damage caused by wildfire ash, it may be necessary to seek the expertise of professionals, such as licensed contractors, building inspectors, structural engineers, or corrosion specialists, to assess any presence of corrosion damage and recommend appropriate remedial actions.

Ash disposal – The proper and safe disposal of ash and debris generated by wildfires to minimize environmental contamination and health hazards.

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

Ash pitting after a wildfire – (1) Ash has the potential to cause pitting on certain surfaces. When a wildfire burns vegetation and organic matter, it produces ash that can contain various compounds, including acidic components. (2) The acidic nature of wildfire ash, when combined with moisture or humidity, can lead to corrosion and pitting on susceptible surfaces. (3) The severity of pitting caused by wildfire ash can vary depending on factors such as the composition of the ash, duration of exposure, environmental conditions, and the specific materials involved. Taking proactive steps to clean affected surfaces and implementing protective measures can help minimize the potential for pitting and preserve the integrity of the surfaces and structures. The following is a list of subjects on how wildfire ash can cause pitting: [1] <u>Composition of Wildfire Ash</u>: Wildfire ash is a mixture of charred organic material, minerals, and other particles. It can contain acidic compounds, such as sulfur compounds, that contribute to its corrosive properties. [2] <u>Acidic Reaction</u>: When wildfire ash comes into contact with moisture or humidity, the acidic compounds can react with the water vapor in the air, forming acidic solutions. These solutions can settle on surfaces and initiate corrosion processes. [3] <u>Corrosion and Pitting</u>: The acidic solutions from wildfire ash can corrode susceptible materials, including metals, concrete, masonry, and stone. Pitting occurs as a localized form of corrosion, resulting in small, deep cavities or pits on the surface of the material. [4] <u>Metal Surfaces</u>: Metals, such as steel, aluminum, copper, and iron, are particularly vulnerable to pitting caused by acidic wildfire ash. Acidic compounds can attack the metal surface, leading to localized corrosion and the formation of pits. [5] <u>Concrete and Masonry</u>: Wildfire ash can also affect concrete and masonry surfaces, such as buildings, infrastructure, and outdoor structures. The acidic components of the ash can penetrate the porous surface of these materials, causing corrosion, pitting, and potential structural degradation over time. [6] <u>Cleaning and Protection</u>: Promptly removing wildfire ash from surfaces and implementing protective measures can help minimize the risk of pitting and corrosion. Proper cleaning techniques using recommended products can help remove the ash without causing additional damage. Applying protective coatings or sealants to susceptible surfaces can provide an additional layer of defense against corrosion. [7] <u>Professional Assessment</u>: If pitting or corrosion due to wildfire ash is suspected, it is advisable to consult professionals, such as building inspectors, structural engineers, restoration contractors, electronics specialist, or corrosion control specialists. They can assess the extent of potential damage, provide recommendations for remediation, and suggest preventive measures for ongoing protection.

Ash sifting (firefighting) – The process of sifting through ash and debris left behind by a wildfire to remove any remaining embers or hotspots.

Ash sifting (salvage) – The process of sifting debris with a fine stainless steel woven net to remove potential valuables and other items in the remnants of a building.

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) https://rockymtnashrae.com/downloads/2011_Technical_Conference/wildfire_particulate_in_proximally_located_unburned_buildings_3_31_11_jz.pdf

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

ASHRAE's "*Planning Framework for Protecting Commercial Building Occupants from Smoke During Wildfire Events*" – This framework provides recommended heating, ventilation, and air conditioning (HVAC) and building measures to minimize occupant exposures and health impacts from smoke during and after a wildfire. For more information go to: https://www.ashrae.org/file%20library/technical%20resources/covid-19/guidance-for-commercial-building-occupants-from-smoke-during-wildfire-events.pdf

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.

Assemblage of information– 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, collection of wildfire particulate – (1) A wildfire particulate assemblage refers to the collection of various particles and substances that are released into the air during a wildfire. These particles can include a combination of organic matter, minerals, gases, and other components generated by the combustion of vegetation and other materials. The specific composition of the wildfire particulate assemblage can vary depending on factors such as the type of vegetation burned, the intensity and duration of the fire, weather conditions, and geographical location. (2) Understanding the composition and characteristics of wildfire particulate assemblages is important for assessing the environmental impacts of wildfires, including air quality, human health risks, and ecosystem effects. Scientists and researchers study these assemblages to gain insights into the chemical processes, atmospheric transport, and long-term implications of wildfire emissions. Education Notes: In wildfire field investigations professional inspectors should consider wildfire particulate assemblages containing: [1] Organic Matter: Wildfire particulate assemblages contain charred organic matter from vegetation, including plant debris, leaves, branches, and other biomasses. These organic particles can contribute to the formation of smoke and ash during the fire. [2] Ash and

Char: Ash particles are a common component of wildfire particulate assemblages. Ash is the residue left behind after the complete combustion of organic matter, and it can consist of minerals, charred particles, and other substances. Char particles are black carbonaceous substances that form during incomplete combustion, and it can be present in the particulate assemblage as well. [3] Gases: Wildfire particulate assemblages may include gases released during the fire, such as carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), semi-volatile organic compounds (SVOCs), and polycyclic aromatic hydrocarbons (PAHs). Shortly after the wildfire, (CO_2), (CO), (NOx), and (SO_2) gases should dissipate in days to a week or two. However, gases associated with carbonized char and organic matter have the ability to retain gases as detectible odors, including SVOCs and PAHs. [4] Mineral Particles: Wildfire particulate assemblages often contain minerals from the burned vegetation and the surrounding environment. These minerals can include elements such as calcium, magnesium, potassium, silica, iron, and others. The presence of mineral particles can have implications for the chemical properties and potential environmental impacts of the particulate matter. [5] Size and Composition: Wildfire particulate assemblages can consist of particles having varying sizes, ranging from large visible particles, such as charred debris and ash, to smaller particles that are suspended in the air and can be inhaled. The composition of the particulate matter can vary as well, with different proportions of organic matter, minerals, and gases.

Assemblage, wildfire particle analysis – 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, SVOCs and PAHs, and the biological signature of plant residue. (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 professional 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, 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 Notes: Risk assessment can be divided into four parts: [1] Identification of hazards; [2] Dose response (how much exposure causes particular problems, such as 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 of 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.

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 Standards that may relate to wildfire burned structures and wildfire smoke impacted structures – Wildland fires are capable of burning structures next to salvaged buildings. The combustion byproducts released from burning buildings are known to release chemicals and toxins that enter surviving structures. ASTM established standards and guidelines for sampling a number of situations, which some of them apply when sampling and testing wildland fire impacted buildings. Some of them include but not necessarily limited to:

- **ASTM D3686-20** ***"Standard Practice for Sampling Atmospheres to Collect Organic Compound Vapors (Activated Charcoal Tube Adsorption Method)."*** – This practice covers a method for the sampling of atmospheres to determine the presence of certain organic vapors by means of adsorption on activated charcoal using a charcoal tube and a small portable sampling pump worn by a worker. A list of some of the organic chemical vapors that can be sampled by this practice is provided in Annex A1. This list is presented as an information guide and should not be considered as absolute or complete. For more information go to: https://www.astm.org/d3686-20.html
- **ASTM D3687-19** ***"Standard Practice for Analysis of Organic Compound Vapors Collected by the Activated Charcoal Tube Adsorption Method."*** – The practice covers the applications of methods for the extraction and gas chromatographic determination of organic vapors that have been adsorbed from air in sampling tubes packed with activated charcoal. This practice is applicable for analysis of samples taken from workplace or other atmospheres provided that the contaminant adsorbs onto charcoal, that it can be adequately extracted from the charcoal, and that it can be analyzed by gas chromatography (GC). Other adsorbents and other extraction techniques are described in Practice D 6196. Organic compounds of multi-component samples may mutually interfere during analysis. For more information go to: https://www.astm.org/d3687-19.html
- **ASTM D4096-17** ***"Standard Test Method for Determination of Total Suspended Particulate Matter in the Atmosphere (High-Volume Sampler Method)."*** – Test method provides for sampling a large volume of atmospheres. This flow rate allows suspended particles having diameters of less than 100µm (stokes equivalent diameter) to be collected. For more information go to: https://webstore.ansi.org/Standards/ASTM/ASTMD409617
- **ASTM D4532-15** ***"Standard Test Method for Respirable Dust in Workplace Atmospheres Using Cyclone Samplers."*** **–** This test method provides details for the determination of respirable dust concentration defined in terms of international convention in a range from 0.5 to 10 mg/m^3 in workplace atmospheres. Specifics are given for sampling and analysis using any one of a number of commercially available cyclone samplers. The limitations of the test method are a minimum weight of 0.1 mg of dust on the filter, and a maximum loading of 0.3 mg/m^2 on the filter. The test method may be used at higher loadings if the flow rate can be

maintained constant. For more information go to: https://www.astm.org/d4532-15.html

- **ASTM D4840-99(2018)e1 "*Standard Guide for Sample Chain-of-Custody*."** – This guide contains a comprehensive discussion of potential requirements, in the analysis of water, 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. A sufficient chain-of-custody process, that is, one that provides sufficient evidence of sample integrity in a legal or regulatory setting, is situationally dependent. The procedures presented in this guide are generally considered sufficient to assure legal defensibility of sample integrity. In a given situation, less stringent measures may be adequate. It is the responsibility of the users of this guide to determine their exact needs. Legal counsel may be needed to make this determination. For more information go to: https://www.astm.org/d4840-99r18e01.html
- **ASTM D5111-12 (2020) *"Standard Guide for Choosing Locations and Sampling Methods to Monitor Atmospheric Deposition at Non-Urban Locations."* –** The guide consolidates into one document, citing criteria and sampling strategies used routinely in various North American atmospheric deposition monitoring programs. The guide leads the user through the steps of site selection, sampling frequency and sampling equipment selection, and presents quality assurance techniques and other considerations necessary to obtain a representative deposition sample for subsequent chemical analysis. For more information go to: https://www.astm.org/d5111-12r20.html
- **ASTM D5438-17 *"Standard Practice for Collection of Floor Dust for Chemical Analysis."*** – A practice that may be used to collect dust from carpeted or bare floor surfaces for gravimetric or chemical analysis. The collected sample is substantially unmodified by the sampling procedure. This practice provides for a reproducible dust removal rate from level loop and plush carpets, as well as bare floors. It has the ability to achieve relatively constant removal efficiency at different loadings of surface dust. This practice also provides for the efficient capture of semi-volatile organic chemicals associated with the dust. The test system can be fitted with special canisters downstream of the cyclone for the capture of specific semi-volatile organic chemicals that may volatilize from the dust particles during collection. For more information go to: https://www.astm.org/d5438-17.html
- **ASTM D5466-01 (2021) *"Standard Test Method for Determination of Volatile Organic Chemicals in Atmospheres (Canister Sampling Methodology)."* –** This test method describes a procedure for sampling and analysis of volatile organic compounds (VOCs) in ambient, indoor, or workplace atmospheres. The test method is based on the collection of air samples in stainless steel canisters with specially treated (passivated) interior surfaces. For sample analysis, a portion of the sample is subsequently removed from the canister and the collected VOCs are selectively concentrated by adsorption or condensation onto a trap, subsequently released by thermal desorption, separated by gas chromatography, and measured by a mass spectrometric detector or other detector(s). This test method describes procedures for sampling into canisters to final pressures both above and below atmospheric pressure (respectively referred to as pressurized and sub-atmospheric pressure sampling). This test

method is applicable to specific VOCs that have been tested and determined to be stable when stored in canisters. Numerous compounds, many of which are chlorinated VOCs, have been successfully tested for storage stability in pressurized canisters (1-4). Although not as extensive, documentation is also available demonstrating the stability of VOCs in sub-atmospheric pressure canisters. While initial studies were concentrated on non-polar VOCs, information on storage stability has been extended to many polar compounds as well. For more information go to: https://www.astm.org/d5466-21.html

- **ASTM D5527-00(2017)e1** ***"Standard Practices for Measuring Surface Wind and Temperature by Acoustic Means."*** **–** Sonic anemometer/thermometers are used to measure turbulent components of the atmosphere except for confined areas and very close to the ground. These practices apply to the use of these instruments for field measurement of the wind, sonic temperature, and atmospheric turbulence components. The quasi-instantaneous velocity component measurements are averaged over user-selected sampling times to define mean along- axis wind components, mean wind speed and direction, and the variances or covariances, or both, of individual components and component combinations. Covariances are used for eddy correlation studies and for computation of boundary layer heat and momentum fluxes. The sonic anemometer/ thermometer provides the data required to characterize the state of the turbulent atmospheric boundary layer. For more information go to: https://webstore.ansi.org/Standards/ASTM/ASTMD5527002017e1
- **ASTM D5755-09(2014)e1 "*Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy (TEM) for Asbestos Structure Number Surface Loading.*"** – This test method covers a procedure to (a) identify asbestos in dust and (b) provide an estimate of the surface loading of asbestos in the sampled dust reported as the number of asbestos structures per unit area of sampled surface. In a precision study of the method, ten laboratories analyzed chrysotile asbestos-containing World Trade Center dust that had been resuspended in a test room and collected off of non-asbestos floor tiles following the microvacuum cassette (microvac) collection procedures described in ASTM D5755. Each laboratory analyzed the same sample twice. The Inter-Laboratory Studies (ILS) Group of ASTM International performed the statistical examination of the data set and found a repeatability limit (r) of 61.80 and a reproducibility limit (R) of 239.30. The study data was also used to calculate coefficients of variation of 0.15 intra-laboratory and 0.6 inter-laboratory. For more information go to: https://www.astm.org/d5755-09r14e01.html
- **ASTM D6196-15e1** ***"Standard Practice for Selection of Sorbents, Sampling, and Thermal Desorption Analysis Procedures for Volatile Organic Compounds in Air."*** – This practice is recommended for use in measuring the concentration of VOCs in ambient, indoor, and workplace atmospheres. It may also be used for measuring emissions from materials in small or full scale environmental chambers for material emission testing or human exposure assessment. Such measurements in ambient air are of importance because of the known role of VOCs as ozone precursors, and in some cases (for example, benzene), as toxic pollutants in their own right. For more information go to: https://www.astm.org/d6196-15.html
- **ASTM D6480-19 "*Standard Test Method for Wipe Sampling of Surfaces, Indirect Preparation, and Analysis for Asbestos Structure Number Surface Loading by Transmission Electron Microscopy.*" –** [1] The test method covers a procedure to identify asbestos in samples wiped from surfaces and to provide an estimate of the concentration of

asbestos reported as the number of asbestos structures per unit area of sampled surface. The procedure outlined in this test method employs an indirect sample preparation technique. It is intended to disperse aggregated asbestos into fundamental fibrils, fiber bundles, clusters, or matrices. However, as with all indirect sample preparation techniques, the asbestos observed for quantification may not represent the physical form of the asbestos as sampled. More specifically, the procedure described neither creates nor destroys asbestos, but it may alter the physical form of the mineral fiber aggregates. [2] The test method describes the equipment and procedures necessary for wipe-sampling of surfaces for levels of asbestos structures. The sample is collected onto a particle-free wipe material (wipe) from the surface of a sampling area that may contain asbestos. [3] The collection efficiency of this wipe sampling technique is unknown and will vary among substrates. Properties influencing collection efficiency include surface texture, adhesiveness, and other factors. [4] The test method is generally applicable for an estimate of the surface loading of asbestos structures starting from approximately 1000 asbestos structures per square centimeter. [5] Asbestos identification by transmission electron microscopy (TEM) is based on morphology, electron diffraction (ED), and energy dispersive X-ray analysis (EDXA). [6] The test method allows determination of the type(s) of asbestos fibers present. [7] The test method cannot always discriminate between individual fibers of the asbestos and non-asbestos analogues of the same amphibole mineral. For more information go to: https://www.astm.org/d6480-19.html

- **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. For more information go to: https://www.astm.org/d6602-13r18.html
- **ASTM D6661-17** "***Standard Practice for Field Collection of Organic Compounds from Surfaces Using Wipe Sampling***" – [1] Wipe sampling is typically used by persons involved in hazardous waste site investigations to characterize the areal extent and the level of contamination on walls, floors, equipment, etc. [2] Wipe sampling is also used to determine compliance with regulations. There are many factors that contribute to variation in sampling results during wipe sampling, including the use of different pressures applied to the wipe, different kinds of wipes, different wiping patterns, the texture of the surface being wiped, and perhaps even the duration of wiping. The significance of this practice is that it standardizes wiping procedures to reduce sampling variability in the collection of samples from smooth, nonporous surfaces such as metal, glass, painted or sealed surfaces, tile, etc., in and around buildings and from pipes, tanks, decontaminated equipment, etc. [3] This practice addresses sampling of organic compounds (that is, PCBs, dioxins, many pesticides, and similar compounds) from smooth nonporous surfaces using a solvent-wetted wipe sampling method. Samples are collected in a manner that permits the solvent extraction of the organic

compound(s) of interest from the wipes and subsequent determination using a laboratory analysis technique such as gas chromatography with a suitable detector. This practice is, however, unsuitable for the collection of volatile organic compounds. For more information go to: https://www.astm.org/d6661-17.html

- **ASTM D6966-18 “*Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Determination of Metals*.” –** [1] This practice covers the collection of settled dust on surfaces using the wipe sampling method. These samples are collected in a manner that will permit subsequent extraction and determination of target metals in the wipes using laboratory analysis techniques such as atomic spectrometry. [2] This practice does not address the sampling design criteria (that is, sampling plan which includes the number and location of samples) that are used for clearance, hazard evaluation, risk assessment, and other purposes. To provide for valid conclusions, sufficient numbers of samples should be obtained as directed by a sampling plan, for example, in accordance with Guide D7659. [3] This practice contains notes that are explanatory and are not part of the mandatory requirements of this practice. For more information go to: https://www.astm.org/d6966-18.html
- **ASTM D7144 -21 *“Standard Practice for Collection of Surface Dust by Micro-vacuum Sampling for Subsequent Metals Determination”*** – Education Note: 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 in order to evaluate the potential for human exposure to toxic elements. This practice involves the use of sampling equipment to collect surface dust samples that may contain toxic metals and is intended for use by qualified technical professionals. The practice allows for the subsequent determination of collected metals concentrations on an area (loading) or mass concentration basis, or both.
- **ASTM D7297-21 *“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. 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. (See: EPA I-BEAM) For more information go to: https://www.astm.org/d7297-21.html
- **ASTM D7390-18 “*Standard Guide for Evaluating Asbestos in Dust on Surfaces by Comparison Between Two Environments*.” –** [1] There are multiple purposes for determining the loading of asbestos in dust on surfaces. Each particular purpose may require unique

sampling strategies, analytical methods, and procedures for data interpretation. [2] Procedures are provided to facilitate application of available methods for determining asbestos surface loadings and/or asbestos loadings in surface dust for comparison between two environments. At present, this guide addresses one application of the ASTM surface dust methods. [3] It is anticipated that additional areas will be added in the future. It is not intended that the discussion of one application should limit use of the methods in other areas. For more information go to: https://www.astm.org/d7390-18.html

- **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 is only 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 E1216-21 “*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 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 marginally remove adhering paint and coatings.
- **ASTM E1368-14** (updated 2018)***“Standard Practice for Visual Inspection of Asbestos Abatement Projects.”*** **–** This practice applies to response actions for all types of asbestos-containing materials, including surfacing materials, thermal systems insulation, and miscellaneous materials, whether friable or not, regardless of the quantities involved and the

reason for conducting the response action. For more information go to: https://www.astm.org/e1368-14.html and https://www.techstreet.com/standards/astm-e1363-18?product_id=2033287

- **ASTM E1370-21 “*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 the 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 the 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 E1527-21 *“Standard Practice for Phase 1 Environmental Site Assessments (ESA).”*** – On November 1, 2021, ASTM Committee on Environmental Assessment, Risk Management and Corrective Action (ASTM Committee E-50) approved a new standard for conducting Phase I Environmental Site Assessments (ESAs). The new standard, known makes significant modifications to the previous ASTM Phase I Standard Practice (E1527-13) that has been in use by environmental professionals (EPs) for the past eight years in performing Phase I ESAs of real property. The goal of an ASTM E1527 Phase I ESA is to identify the confirmed presence, likely presence, or a material threat of the presence of hazardous substances or petroleum products at a real property, also known as a “Recognized Environmental Condition” (REC). For more information go to: https://www.astm.org/e1527-21.html
- **ASTM E1727-20 *“Standard Practice for Field Collection of Soil Samples for Subsequent Lead Determination.”*** – This practice covers the collection of bare soil samples from areas around buildings and related structures using coring and scooping methods. The practice may not be suitable for collection of soil samples from areas that are paved or otherwise covered with grass, mulch, or the like. For more information go to: https://www.astm.org/e1727-

20.html

- **ASTM E1728-20 “*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. For more information go to: https://www.astm.org/e1728_e1728m-20.html
- **ASTM E2356-18 *“Standard Practice for Comprehensive Building Asbestos Surveys.”* –** Management of asbestos-containing materials in buildings and facilities requires knowledge of the location, type, quantity, and condition of the material. The completer and more accurate the information available, the more appropriate and cost-effective are the control measures used to reduce possible exposure to airborne asbestos fibers. This is true whether the asbestos-containing materials remain undisturbed and completely intact, are selectively removed for maintenance or prior to renovation, or are removed to the greatest extent feasible before demolishing the building or facility. For more information go to: https://www.astm.org/e2356-18.html
- **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: (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. (2) The ability to

collect suitable samples from nonporous surfaces using a sterile moistened swab will depend on the following factors: [a] swabbing procedure; [b] swab material; [c] sample composition; and [d] texture of the surface. These practices standardize suspicious powder collection and packaging procedures and swab sampling procedures in order 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: [1] 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). [2] 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. [3] Personnel should use the appropriate level of personal protective equipment (PPE) to mitigate hazards during collection and screening. [4] Personnel performing collection or screening under these practices shall be aware of evidence preservation and sampling procedures (NFPA 472 section 6.5). For more information go to: https://www.astm.org/e2458-17.html

- **ASTM E2600-15 *“Standard Guide for Vapor Encroachment on Property Involved in Real Estate Transactions.”* –** This guide is intended for use on a voluntary basis by parties who wish to conduct a Vapor Encroachment Screening (VES) on a parcel of real estate to determine if a VEC is identified for the TP (that is, the presence or likely presence of COC vapors in the subsurface of the TP caused by the release of vapors from contaminated soil and/or groundwater either on or near the TP as identified by the Tier 1 or Tier 2 procedures in this guide). The process defined in this guide is a screening process that requires information similar to information generally collected as part of Practice E1527 Phase I ESA as well as additional information described in subsection 5.3 and Section 8 of this guide. If a VEC is identified by this screening process, the user may conduct further investigation. This guide, however, defines a procedure for identifying in connection with a property involved in a real estate transaction whether a VEC exists, likely exists, cannot be ruled out, or can be ruled out because a VEC does not or is not likely to exist. The guide can be applied to property with existing structures, property with structures that will be substantially rehabilitated, property without existing structures but having planned structures (for example, property in development), or property without existing structures and with no planned structures (for example, undeveloped property with no planned development). For more information go to: https://www.astm.org/e2600-15.html

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 the 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.

Atmospheric wildfire smoke and transport of wildfire particles – "Atmospheric wildfire smoke transport" refers to the movement of smoke particles generated by wildfires through the atmosphere. When wildfires burn, they release various pollutants, including smoke particles, gases, and aerosols, into the air. These smoke particles can be carried by atmospheric winds over long distances, affecting air quality and visibility in regions far from the fire source. Monitoring and forecasting systems, such as satellite imagery, weather models, and air quality monitoring networks, are used to track and predict the movement of wildfire smoke particles. This information helps inform public health advisories, emergency response efforts, and air quality management strategies to mitigate the impact of wildfire smoke on affected communities. Several key points regarding the transport of wildfire smoke particles include: [1] Wind Patterns: The movement of wildfire smoke particles depends on prevailing wind patterns and atmospheric conditions. Winds at different altitudes can carry smoke particles in various directions, dispersing them over large areas. [2] Dispersion and Dilution: As smoke particles are transported, they disperse and mix with the surrounding air. This dispersion and dilution process can lead to a decrease in the concentration of smoke particles over distance from the fire source. [3] Atmospheric Stability: The stability of the atmosphere plays a role in the transport and dispersal of smoke particles. Stable atmospheric conditions with limited vertical mixing can trap smoke near the surface, leading to poor air quality and reduced visibility in affected areas. [4] Elevation Effects: Smoke transport can be influenced by the topography and elevation of the affected region. Smoke particles can accumulate in valleys or lower-lying areas, while higher elevation areas may experience less direct impact. [5] Long-Distance Transport: In some cases, wildfire smoke particles can be transported over long distances, crossing state or even national borders. This can lead to the spread of smoke-related air pollution to areas far from the fire source. [6] Health Impacts: The transport of wildfire smoke particles can have significant health impacts. Fine particulate matter ($PM_{2.5}$) present in the smoke can be inhaled deep into the respiratory system, potentially causing respiratory irritation, exacerbating existing health conditions, and affecting overall air quality. For more information go to: https://ec.europa.eu/research-and-innovation/en/horizon-magazine/four-times-more-toxic-how-wildfire-smoke-ages-over-time and https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018JD029878 and https://ncar.ucar.edu/wildfires/smoke-air-quality and https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index/wildfire-smoke.html

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, char, and ash 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 char, ash, and vegetative matter. In some instances, a qualified restorer can determine the presence/absence of smoke odor and visible char, ash, and vegetative matter. In other instances, environmental professionals will complete an independent assessment and inspection, and when required, collect samples using tape lifts, microvacuum, and bulk materials 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 absorb 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 particulate contamination and deodorization (wildfire) – The degree of smoke odor and particulate contamination will determine how to mitigate smoke odor, 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.

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 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 – Indicates that replacement material will be provided as available; exact matching is not assured.

(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: [1] 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; [2] 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 controlled fire set intentionally along the inner edge of a fireline or containment line to consume fuel and create a barrier that stops or slows the spread of the main fire. Backfires are typically used to remove vegetation and reduce the intensity of the advancing fire. (3) 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.

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 microorganisms, 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 microorganisms; 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 is able to 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.

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 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, which is 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, 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.

Bank down and wildfire smoke explained – (1) The term “bank down” in the context of wildfire smoke refers to the process of smoke settling or accumulating in lower-lying areas, such as valleys or basins. When smoke from a wildfire is released into the atmosphere, it can interact with various atmospheric conditions, including temperature inversions, wind patterns, and topography, which can cause it to descend and become trapped in lower elevations. (2) During periods of smoke banking down, it is important to stay informed about air quality conditions through local authorities or air quality monitoring systems. Following recommended precautions, such as staying indoors, using air filtration systems, and avoiding strenuous outdoor activities, can help mitigate exposure to smoke and reduce associated health risks. (3) When wildfire smoke is heavy outdoors and migrates into buildings, it fills a building with smoke, char, ash, and vegetative matter. As the wildfire passes, the building cools, leaving behind a film of chemical residue on ceilings, walls, flooring, cabinets, and contents, where particulate tends to sell out on horizontal surfaces. <u>Education Notes</u>: Here are several discussion points about wildfire smoke and the phenomenon of “banking down”: [1] <u>Temperature Inversions</u>: Temperature inversions occur when warm air overlays cooler air near the surface. This inversion layer acts as a lid, preventing vertical mixing and trapping pollutants, including smoke, close to the ground. As a result, smoke can accumulate and become concentrated in valleys or basins. [2] <u>Wind Patterns</u>: Wind patterns play a significant role in the dispersion and movement of wildfire smoke. Under certain atmospheric conditions, such as weak or stagnant winds, smoke can be unable to disperse effectively, leading to its accumulation in localized areas. [3] <u>Topography</u>: The shape of the land, including mountains, valleys, and canyons, can influence how smoke moves and accumulates. Smoke tends to flow downhill and settle in lower-lying areas, where it can become trapped by topographic features. [4] <u>Health Impacts</u>: When smoke banks down in populated areas, it can have adverse effects on air quality and human health. High concentrations of fine particulate matter ($PM_{2.5}$) and other pollutants in the smoke can cause respiratory irritation, exacerbate existing respiratory conditions, and pose health risks, particularly for sensitive populations such as children, the elderly, and individuals with pre-existing respiratory or cardiovascular conditions. [5] <u>Visibility and Outdoor Activities</u>: Smoke banking down can reduce visibility, leading to hazy conditions and diminished air quality. It can also affect outdoor activities, including recreational pursuits, travel, and daily routines. Local authorities may issue air quality advisories or recommendations to limit outdoor exposure during periods of intense smoke and poor air quality. [7] <u>Duration and Dissipation</u>: The duration of smoke banking down can vary depending on weather patterns, fire behavior, and fire management efforts. Once weather conditions change, such as when winds increase or temperature inversions break, the smoke can disperse and move away from the affected areas. [8] <u>Impacted Buildings</u>: The presence of smoke in buildings can include volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), hazardous air pollutants (HAPs). It can also include particulate matter from microfine particles of soot, ash, and other combustion byproducts to larger visually noticeable particles.

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. 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: [1] 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. [2] Some problems may include heat damage, high moisture content, bubbling and flaking, swelling, and the presence of heavy soot across the surface. Surface preparation requires addressing each of these issues along with soot removal. [3] 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 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 analysis (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. <u>Education Note:</u> Black carbon soot is sub-micron particles formed through uncontrolled combustion of fossil fuels, biofuel, and biomass.

Black carbon and Carbon black soot – Environmental Microbiological Sampling Laboratory (EMSL) explains, there is no clear definition that differentiates between black carbon and carbon black soot. [1] It is believed the indoor air quality industry uses black carbon and soot terms interchangeably. However, there are some important differences between carbon black carbon and carbon black soot: [2] 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. [3] 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. [4] 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 number of residual hydrocarbons (low in carbon black, varying up to 20% in black carbon/soot). (EMSL) <u>For more information go to</u>: https://www.emsl.com/ProjectExperience.aspx?projectexperienceid=39#:~:text=Black%20carbon%2Fsoot%20is%20similar,produces%20the%20industrial%20carbon%20black.

Black carbon and Carbon black soot explained –Black carbon and carbon black soot are two different substances, although they both appear to be black in color. <u>Education Notes</u>: The following is a brief explanation of the differences between “carbon black” soot and “black carbon” soot: [1] <u>Composition and Origin involving Carbon Black Soot</u>: Carbon black is a fine powder composed primarily of elemental carbon. It is produced through the incomplete combustion or thermal decomposition of hydrocarbons, such as fossil fuels or natural gas. [1a] <u>Particle Size and Structure of Carbon Black Soot</u>: Carbon black particles are engineered and produced to have a controlled size and structure. They have a relatively uniform size distribution and a high surface area, which gives them unique properties for various applications, including pigments, reinforcing fillers in rubber, and conductive additives. [1b] <u>Environmental Impact and Worker Exposure related to Carbon Black Soot</u>: Carbon black may be classified as lampblack, channel black, furnace combustion black, and thermal black. Each form is produced by the partial combustion or thermal decomposition of liquid or gaseous hydrocarbons. It is composed of more than 85% elemental carbon in the form of near-spherical colloidal aggregates. The properties of carbon black commonly evaluated for control and classification purposes are usually based on particle size, surface area, structure, and surface chemistry. The most likely exposure to carbon black is black lung disease. [1c] <u>Carbon Black Soot</u>

Uses and Application: Carbon black has various industrial applications, including as a pigment in paints, inks, and plastics, as a reinforcing filler in tires and rubber products, and as a conductive agent in batteries and electronics. [2] Composition and Origin involving Black Carbon Soot: Black carbon soot is a type of particulate matter consisting of elemental carbon particles that are formed through the incomplete combustion of fossil fuels, biomass, or other organic materials. It is typically emitted from sources like diesel engines, biomass burning (e.g., wildfire, burnt buildings, and industrial processes. [2a] Particle Size and Structure of Black Carbon Soot: Black carbon soot particles vary in size and structure depending on the combustion process and source. They are typically smaller and more irregular in shape compared to carbon black particles. Black carbon soot particles can be primary particles emitted directly from the source or secondary particles formed through atmospheric processes and the combustion of wildfires and buildings. [2b] Environmental Impact and Worker Exposure to Black Carbon Soot: Black carbon soot is considered a major contributor to air pollution and climate change. It has a strong absorption of sunlight, leading to localized warming effects and reduced visibility. It plays a role in the formation of atmospheric aerosols and can have adverse health effects when inhaled. [2c] Black Carbon Soot Uses and Applications: There are no known uses and applications for black carbon soot. For more information go to: https://www.epa.gov/sites/default/files/2013-12/documents/black-carbon-fact-sheet_0.pdf and https://pubmed.ncbi.nlm.nih.gov/11331994/ and https://pubmed.ncbi.nlm.nih.gov/23850403/ and https://www.cdc.gov/niosh/npg/npgd0102.html and https://www.sciencedirect.com/science/article/pii/S2666821122000849 and https://www.osha.gov/sites/default/files/methods/osha-id196.pdf and https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5492873/ and https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8173457/ and https://ww2.arb.ca.gov/resources/documents/research-synthesis-17-01-how-california-giving-soot-boot and https://online-ams.aiha.org/amsssa/ecssashop.show_product_detail?p_mode=detail&p_product_serno=1558 and https://synergist.aiha.org/202208-fire-combustion-residues and https://synergist.aiha.org/201711-wildfire-residue-contamination-testing and https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5492873/

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 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.

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 caused 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.

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 negligent or unintentional acts or an insured.

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

Bronchial (medical) – The airways of the lung, below the larynx that lead to the alveolar region in 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 of 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 impact of a fire or wildfire that causes heat damage to building materials and finishes. (2) The direct impact 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. (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) The exterior surface of a building including walls, roof, and floor; also called the building shell. (LEED) (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 because 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 Notes: [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. [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 gases 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 scar – The area of land that has been burned by a wildfire, characterized by charred vegetation and altered soil conditions.

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 zone – The “wildfire burn zone” refers to the area that has been affected by a wildfire and has undergone burning or scorching of vegetation and other materials. It is the portion of land that has been directly impacted by the fire and where significant fire activity has occurred. Education Notes: [1] The size and extent of a wildfire burn zone can vary greatly depending on factors such as the size of the fire, the duration of the burn, weather conditions, and the type of vegetation in the area. Wildfire burn zones can range from small, localized areas to large expanses covering thousands of acres. [2] Within a burn zone, different levels of burn severity may be observed. This refers to the extent of damage inflicted on the vegetation and other elements within the zone. Burn severity can vary from low, where vegetation may survive with minimal damage, to high, where intense fire activity has resulted in complete or near-complete destruction of vegetation and significant impacts on the ecosystem. [3] After a wildfire, the burn zone undergoes a recovery and restoration process. Natural regeneration of vegetation, erosion control measures, and reestablishment of ecological processes are some of the steps taken to facilitate the recovery of the affected area. [4] It is important to discuss, entering a wildfire burn zone can be dangerous due to hazards such as unstable trees, weakened soil, down power lines, and potential for debris flows or landslides. Access to burn zones is typically restricted until they are deemed safe by fire management authorities and other relevant agencies.

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.

Burned area emergency response (BAER) – A rapid assessment and planning process conducted by land management agencies to identify immediate post-fire rehabilitation needs and implement appropriate actions.

Burned infrastructure assessment – Evaluation of the damage caused to infrastructure, including roads, bridges, power lines, and telecommunications networks, in fire-affected areas.

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 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.

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°C (176°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*”) (<u>See</u>: Temperatures in a building fire)

California “*Protection from Wildfire Smoke*” – A California Code of Regulations (CCR) for protecting the health of works who are working in or near wildfires, where they inhale wildfire smoke. This information is found under CCR Title 8, Article 107, §5141.1 “Protection from Wildfire Smoke.” The employer is to establish an air sampling program consistent with the Air Quality Index (AQI). This means, they should have a safety officer or an industrial hygienist that can monitor the AQI and determine the “*Level of Health Concern*” based on current environmental conditions. The employer is to use engineering controls to reduce worker exposures. <u>Education Note</u>: While the above information is for California workers, it also applies to all US workers involved in wildfire cleanup, either outside or inside a building where exposure concerns are present. <u>For more information go to</u>: https://www.dir.ca.gov/title8/5141_1.html

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.

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

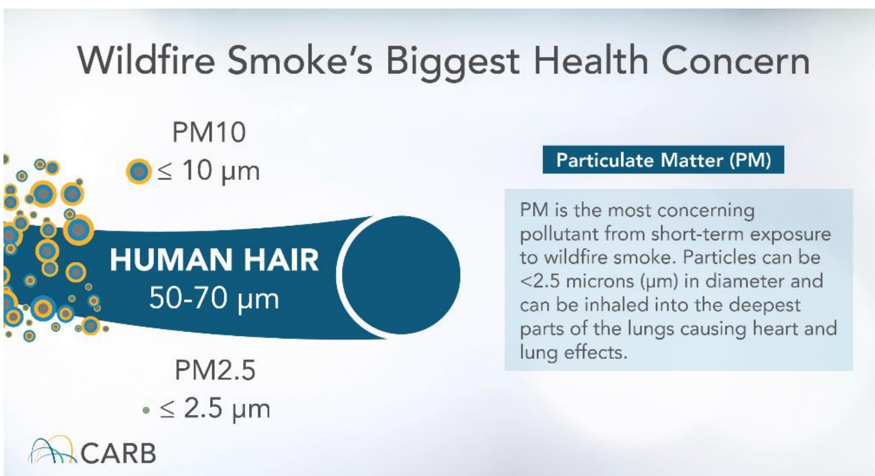
Canister, Summa – Sub atmospheric pressure canister. Summa canister sampling is performed without micro-metering valve for taking grab samples, especially in potentially toxic environments including fire damaged buildings. <u>Education Note:</u> With this configuration, a grab sample of ambient air is drawn into a pre-evacuated Summa passivated canister. The canister is placed at 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.

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.

CARB – The California Air Resources Board. CARB is a California government agency that is in the forefront of providing information about wildfire smoke affecting people and what individuals and companies should do. For more information go to: https://ww2.arb.ca.gov/

CARB "*Protecting Yourself from Wildfire Smoke*" – Information about air quality, wildfire smoke and wearing the proper respirator. For more information go to: https://ww2.arb.ca.gov/protecting-yourself-wildfire-smoke



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. (See: Black carbon and Carbon black soot explained)

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 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 is 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 is 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 Notes: [1] 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) [2] 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. The morphology of soot particles are like 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.

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.

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.

Catastrophic (CAT) wildfire loss – Is defined as "property damage that exceeds $25 million dollars". (III) [1] When responding to a community that experienced a catastrophic wildfire, the restorer should realize they will be exposing workers to potentially dangerous and hazardous conditions. [2] In many U.S. states, a responding restorer traveling inside a government declared catastrophe zone or area, traveling either from within the state or outside the state, the restorer shall be a licensed contractor with that state. [3] Recognizing, the restorer will be using their own funds for some time, the restorer should be properly funded, recognizing they will be financing travel and food, housing, equipment uses, and labor and materials. [4] Due to community housing limitations, the restorer may need to house workers in motorhomes and trailers, provide food and water, maintain the cleanliness of workers, and provide for their safety and health. [5] Generally, working in a wildfire catastrophe involves 7-days a week with minimal or no time off, where the workday can easily exceed 8-hours. [6] Due to limited or no community electrical power, restorers will need to bring their own power and maintain generators with fuel. [8] While operating, all portable generators should be kept outdoors to avoid causing carbon monoxide poisoning. [9] Vehicles and structures that are burnt can produce hazardous or dangerous conditions which may require specialized handling in moving or disposal. [10] When collecting trash and debris, the restorer may need to take it to a collection area or truck it to a disposal site. For more information go to: https://www.randrmagonline.com/articles/90103-catastrophe-cat-remediation-and-restoration-considerations and https://www.iii.org/article/spotlight-on-catastrophes-insurance-issues

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 an event, such as where 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. (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. Education Note: 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.

CBP – An acronym for combustion byproducts. Combustion by-products are produced when carbon-based fuels such as gas, oil, kerosene, wood, charcoal, or tobacco are burned resulting in both outdoor and indoor pollution. These compounds represent a large spectrum of chemicals being formed as a result of incomplete degradation of the fuel components, secondary reactions of degradation products and de novo formation of molecules from small fragments. For more information go to: https://www.epa.gov/indoor-air-quality-iaq/what-are-combustion-products and https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3944372/#:~:text=Combustion%20by%2Dproducts%20are%20produced,both%20outdoor%20and%20indoor%20pollution.

CBP Level I – The Combustion Byproduct Level I. Analysis by optical microscopy for presence of opaque particles associated with combustion byproducts, qualitative method following Level 1: ASTM D6602-13 (Mod); polarized light microscopy (PLM), stereomicroscopy, epi-reflected light microscopy (RLM). Sampling media may include alcohol wipes, tapelifts, or air samples. (EMSL Analytical, Inc.)

CBP Level II – The Combustion Byproduct Level II. Analysis by Optical Microscopy with (TEM) transmission electron microscopy confirmation, following semi quantitative method Level 2: ASTM D6602-13 (Mod); Polarized Light Microscopy (PLM), Stereomicroscopy, epi-Reflected Light Microscopy (RLM), Transmission Electron Microscopy/Energy Dispersive Spectroscopy (TEM/EDS). The sample collection media preferred includes alcohol wipes or air samples. (EMSL Analytical, Inc.)

CBP Level III – The Combustion Byproduct Level III. Analysis by optical microscopy, scanning electron microscopy with energy dispersive spectroscopy (SEM/EDS) or transmission electron microscopy with energy dispersive spectroscopy (TEM/EDS). Quantitative method following ASTM D6602-13 (Mod); Polarized Light Microscopy (PLM), Stereomicroscopy, epi-Reflected Light

Microscopy (RLM), (SEM/EDS) (TEM/EDX) and following ASTM D3849; ASTM D6602-13. Sampling media may include bulk samples, tape lifts, alcohol wipes, or air samples. (EMSL Analytical, Inc.)

CBP Level IV – The Combustion Byproduct Level IV. Analysis by optical microscopy, scanning electron microscopy with energy dispersive spectroscopy (SEM/EDS) or transmission electron microscopy with energy dispersive spectroscopy (TEM/EDS). Quantitative method following ASTM D6602-13 (Mod); Polarized Light Microscopy (PLM), Stereomicroscopy, epi-Reflected Light Microscopy (RLM), (SEM/EDS) (TEM/EDX) ASTM D3849, ASTM D6602-13 and pH measurement of bulk samples or wipes. Sample media include bulk or wipe only. (EMSL Analytical, Inc.)

CDC – The US Center for Disease Control and Prevention. CDC provides research about disease causing agents and their health effects on humans. For more information go to: https://www.epa.gov

CDC’s “*Chronic Conditions and Wildfire Smoke*” – A factsheet for people having any chronic health condition. For more information go to: https://www.cdc.gov/air/wildfire-smoke/chronic-conditions.htm#asthma

CDC’s “*Preparing for Wildfires*” – A factsheet on how to protect your home and family from impending exposures to a wildfire. It includes tips for gathering medication to having respirators available. For more information go to: https://www.cdc.gov/disasters/wildfires/beforefire.html

CDC’s “*Protect Yourself from Ash*” – A “Wildfire Smoke Factsheet” on how to protect yourself and others from exposure to wildfire ash. For more information go to: https://www.airnow.gov/sites/default/files/2021-06/protect-yourself-from-ash-factsheet.pdf

CDC’s “*Ready Wrigley Prepares for Wildfires and Smoke*” – A comic book for children on how to prepare for wildfires and understanding health effects. For more information go to: https://www.epa.gov/air-research/research-diy-air-cleaners-reduce-wildfire-smoke-indoors

CDC’s “*Stay Safe After a Wildfire*” – A factsheet in protecting yourself from the hazards of lingering smoke and other dangers. For more information go to: https://www.cdc.gov/disasters/wildfires/afterfire.html

CDC’s “*Stay Safe During a Wildfire*” – A factsheet about protecting yourself from smoke. For more information go to: https://www.cdc.gov/disasters/wildfires/duringfire.html

CDC’s “*Wildfire Smoke and Children*” – A factsheet about protecting children from exposure to smoke, and children who have preexisting health conditions. For more information go to: https://www.cdc.gov/air/wildfire-smoke/children.htm

CDC’s “*Wildfire Smoke and Pregnancy*” – A factsheet for women who are pregnant and must protect them self during a wildfire event. For more information go to: https://www.cdc.gov/air/wildfire-smoke/pregnancy.htm

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.

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. (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) / 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. (2) A document presented by the contractor to the customer or insured, stating the contractor has completed their work per the terms and conditions of 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 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.

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

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

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.

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 (COC) form (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.

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 millimeters 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 a 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. (2) A particulate larger than 1µm made by incomplete combustion which may not deagglomerate or disperse by ordinary techniques, may contain a 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 and ash removal – The cleaning and removal of char and ash which can accumulate on surfaces and structures affected by the fire.

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

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 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).

Char, wildfire – (1) Wildfire char refers to the carbon-rich residue or solid material that remains after vegetation or other organic matter burned during a wildfire. Char is the result of incomplete combustion, where the volatile components of the material have been burned off, leaving behind the carbonaceous residue. (2) Understanding wildfire char is important for assessing the ecological and environmental impacts of wildfires, as well as for informing land management practices and strategies for post-fire restoration and rehabilitation, including structures impacted by the wildfire. Education Notes: Factors affecting wildfire char includes: [1] Composition: Wildfire char primarily consists of carbon, with relatively low levels of other elements such as hydrogen, oxygen, and nitrogen. The exact composition can vary depending on the type of vegetation or organic material that was burned. [2] Physical Characteristics: Wildfire char is often black or dark brown in color and can have a porous or spongy texture. It is typically brittle and can break apart easily. [3] Carbon Sequestration: Charred vegetation and organic matter have the potential to store carbon for extended periods. While some of the carbon in the char may eventually be released back into the atmosphere through processes such as decomposition, a portion of it can remain sequestered in the charred material for a considerable time. [4] Ecological Role: Wildfire char can have both positive and negative ecological impacts. On one hand, it can provide a protective layer over the soil, helping to retain moisture and reduce erosion. It can also serve as a substrate for the colonization of new plant growth. On the other hand, excessive char accumulation can negatively impact soil fertility and hinder plant regeneration. [5] Wildfire Severity: The amount and extent of wildfire char can be influenced by factors such as fire intensity, duration, and the type of vegetation or organic material involved. More severe wildfires typically result in greater amounts of char due to the higher temperatures and longer burning periods. [6] Research and Monitoring: Scientists and researchers study wildfire char to understand fire behavior, post-fire effects on ecosystems, and carbon cycling. They analyze the composition and characteristics of char to assess its impact on soil fertility, vegetation regrowth, and long-term carbon storage. [7] Building Impact: Char, along with ash and vegetative matter contain chemical signatures that can affect the interior, insulation, ventilation system, furnishings, and contents.

Char, wildfire compounds and organic matter – Wildfire char is the carbon-rich residue left behind after vegetation or organic matter burns during a wildfire, can contain a variety of compounds. The specific composition of wildfire char can vary depending on factors such as the type of vegetation burned, fire intensity, and environmental conditions. Therefore, it is important to identify the exact composition of wildfire char that can vary widely depending on the specific conditions of the fire. Education Notes: [1] Here are some of the compounds commonly found in wildfire char: [1] Carbon: Wildfire char is primarily composed of carbon, which makes up a significant portion of its structure. [2] Polycyclic Aromatic Hydrocarbons (PAHs): PAHs are a group of organic compounds that are formed during the incomplete combustion of organic matter. They can be present in wildfire char and are known to have potential health and environmental impacts. [3] Charcoal: Charcoal is a form of carbon produced by the partial burning or pyrolysis of organic materials. It is a common component of wildfire char and has various uses, including as a soil amendment and in art or industrial applications. [4] Minerals: Wildfire char may contain minerals that were present in the burned vegetation or soil. These minerals can include calcium, magnesium, potassium, phosphorus, and trace elements such as iron, zinc, and manganese. [5] Ash: While ash is not technically a compound, it is often found alongside wildfire char. Ash consists of inorganic materials, such as minerals and trace elements, that remain after the complete combustion of organic matter. It can contribute to soil fertility and nutrient cycling. [6] Organic Matter: Wildfire char can contain organic compounds that survived the combustion process. These can include various types of carbon-based compounds, such as cellulose, lignin, and other plant-derived materials.

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.

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 appliances – Inspection and testing appliances by qualified technicians to confirm they are working correctly; are functioning properly.

Checking appliances after wildfire by homeowner – (1) After a wildfire, it is important for the homeowner to check appliances for potential damage and ensure they are safe to use. (2) It is crucial to prioritize safety and consult with professionals when assessing and using appliances after a wildfire. Following these steps can help ensure that your appliances are in working order and do not pose any risks to your safety or property. Education Notes: Here are some steps to follow when checking appliances after a wildfire: [1] Safety First: Before inspecting any appliances, ensure that the area is safe and free from any potential hazards. If you suspect gas leaks, electrical issues, or structural damage, contact the appropriate authorities and professionals to assess the situation. [2] Power Off: If you evacuated your home during the wildfire, the power to your appliances may have been shut off. Before turning on any appliances, make sure the power supply has been restored, and the electrical system has been inspected and declared safe by a qualified electrician. [3] Visual Inspection: Examine the exterior of each appliance for signs of fire damage, such as charring, melted components, or warping. Look for any visible wires, connections, or vents that may have been compromised. [4] Professional Assessment: It is advisable to have a qualified technician inspect your appliances, particularly those that were directly exposed to heat, smoke, or ash. They can perform a more detailed assessment and determine if any internal components or wiring have been affected. [5] Cleaning: Even if your appliances appear undamaged, they may have been exposed to smoke and ash, which can cause lingering odors or affect their performance. Clean the exterior surfaces of the appliances using appropriate cleaning methods and products recommended by the manufacturer. For more extensive cleaning, consult a professional appliance cleaner. [6] Air Intake and Filters: Check the air intake vents and filters of appliances, such as air conditioners, refrigerators, and dryers. These areas may have accumulated ash or debris during the wildfire. Clean or replace filters as necessary to ensure proper airflow. [7] Gas Appliances: If you have gas appliances, such as stoves, ovens, or water heaters, have a professional inspect the gas lines and connections for any damage or leaks before using them. Do not attempt to “turn on” the gas supply if you suspect a gas leak. [8] Documentation and Insurance: Before touching large and small appliances, take photographs of any visible damage to your appliances as evidence for insurance claims. Keep records of any professional assessments, repairs, or replacements conducted on appliances. (See: Cleaning appliances by professionals after a wildfire)

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 cartridge assembly – A respirator that uses a chemical cartridge to purify inhaled air of certain gases and vapors. This type of 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 of 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.

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 Notes: [1] The types of particles, liquids and gaseous compounds released in smoke depend on the fuel type and the amount of fuel, among other factors. Fuel in a house fire or structure the fire includes all the items burned in the building: carpet, carpet pad, paint, electronics, linens, clothing, synthetics, polymers, etc. [2] Fuels in a wildfire are primarily plant materials, such as wood from trees and shrubs, as well as grass. While burnt compounds in wildfires sound less of a health hazard and cleanup of char, ash, and vegetative matter, however, there is a considerable amount of data supporting otherwise. (See: Chemicals in wildfire smoke)

Chemicals in smoke, about – Smoke consists of gases and airborne particles produced because of combustion or burning. The specific chemicals depend on the fuel used to produce the fire. Here is a look at some of the principal chemicals produced from wood smoke. Education Notes: [1] 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. [2] 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 Notes: [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. [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 in wildfire smoke and health hazards – Wildfire smoke contains a complex mixture of gases and particles, including a wide range of chemicals. The specific composition of wildfire smoke can vary depending on factors such as the type of vegetation burning, the temperature of the fire, and the distance from the source. It is important to note that the concentrations and specific chemical composition of wildfire smoke can vary depending on many factors, including the distance from the fire and meteorological conditions. Exposure to these chemicals in wildfire smoke can have adverse health effects, particularly for vulnerable populations such as individuals with respiratory conditions, the elderly, and children. It is recommended to follow local air quality advisories and take precautions to minimize exposure during wildfire events. Education Notes: Here are some of the chemicals commonly found in wildfire smoke: [1] Particulate Matter (PM): Wildfire smoke contains fine particles, often referred to as $PM_{2.5}$ (particles having a diameter of 2.5 micrometers or smaller). These particles can penetrate deep into the respiratory system and may contain various organic and inorganic compounds. [2] Carbon Monoxide (CO): CO is a colorless and odorless gas produced during incomplete combustion of carbon-based materials. It can be harmful when inhaled in high concentrations, as it reduces the oxygen-carrying capacity of the blood. [3] Volatile Organic Compounds (VOCs): VOCs are a group of chemicals that can vaporize at room temperature and contribute to the odor of smoke. Examples of VOCs found in wildfire smoke include benzene, formaldehyde, acrolein, and toluene. These chemicals can have short- and long-term health effects, including respiratory irritation and potential carcinogenic properties. [4] Polycyclic Aromatic Hydrocarbons (PAHs): PAHs are a group of chemicals formed during the incomplete burning of organic materials. They can adhere to the surfaces of particles in smoke and have been associated with potential health risks, including respiratory and cardiovascular effects, and some PAHs are known to be carcinogenic. [5] Nitrogen Oxides (NOx): Nitrogen oxides are formed during high-temperature combustion processes. They contribute to the formation of ground-level ozone and can have respiratory health effects. [6] Sulfur Dioxide (SO_2): SO_2 is a gas produced when sulfur-containing materials, such as vegetation, burn. It can cause respiratory irritation and contribute to the formation of secondary particulate matter. [7] Formaldehyde: Formaldehyde is a volatile organic compound that can be released during burning processes. It has been associated with respiratory irritation and potential carcinogenic effects. [8] Ammonia: Ammonia can be released during the combustion of organic materials. It can contribute to respiratory irritation and the formation of particulate matter.

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 toxins.

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 Conditions and Wildfire Smoke*” – A factsheet by CDC for people having any chronic type of health condition. For more information go to: https://www.cdc.gov/air/wildfire-smoke/chronic-conditions.htm#asthma

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)

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 effects 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 Notes: [1] 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. [2] 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, resulting in 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)

CIRES – Cooperative Institute for Research In Environmental Sciences. CIRES is more than 800 scientists who work to understand the dynamic Earth system, including people’s relationship with the planet. CIRES is a partnership of the National Oceanic and Atmospheric Administration (NOAA) and the University of Colorado Boulder, and our areas of expertise include weather and climate including impacts to wildfire and water, changes at Earth’s poles, air quality and atmospheric chemistry, water resources, solid Earth sciences and more. CIRES has been facilitating collaboration between CU Boulder and NOAA since 1967. We support NOAA’s mission by furthering Earth system and other environmental research that crosscuts traditional scientific fields. CIRES helps strengthen the scientific foundation upon which NOAA’s environmental intelligence services depend, and our partnership with the agency allows coordinated studies on a scale that could not be undertaken by the university or NOAA alone. For more information go to: https://cires.colorado.edu/about

CIRES – **“*How to Mitigate Post-Fire Smoke Impacts in Your Home*”** – CIRES Boulder scientists provide facts on wildfire-related indoor air quality and tips on how to mitigate wildfire smoke. In the aftermath of the destructive Marshall Fire, CU Boulder, CIRES and CDPHE experts have compiled a resource of post-wildfire indoor air quality facts and solutions to mitigate smoke impacts in your home or business. For more information go to: https://cires.colorado.edu/news/how-mitigate-post-fire-smoke-impacts-your-home

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

Claimant (insurance) – An individual or corporation asserting their 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 of 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. http://vista.cira.colostate.edu/Improve/

Class-A fires – (1) Fires caused by ordinary combustion. (2) Fires that consume 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 is able to 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 involving 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 in order 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.

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 to prepare 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.)

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.

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

Cleaning and Cleanup Checklist – (See: Cleanup and Cleaning Checklist)

Cleaning and deodorizing gas or diesel operated autos and trucks impacted by wildfire smoke and ash – Cleaning autos and trucks impacted by wildfire smoke is important to remove smoke film, char, soot, and ash, and smoke odors from both the interior and exterior of the vehicle. If you are unsure about the cleaning process or if the vehicle has suffered significant smoke damage, consider taking it to a professional auto detailing service. They have the expertise, equipment, and specialized cleaning products to effectively clean and restore vehicles impacted by wildfire smoke. [1] Car Washing and Detailing: [a] when cleaning the exterior, consider going to a car wash drive through or go to a shop that does handwashing and detailing; [b] notify them the vehicle is impacted with smoke where they should increase their personal protective equipment when cleaning the interior. [2] Engine Washing: Professional engine cleaning is preferred over the homeowner cleaning their own engine due to sensitive electronic components. [3] Interior Cleaning: [a] begin by vacuuming the interior to remove loose debris and ash. Use a vacuum with a brush attachment to clean seats, carpets, floor mats, and other surfaces. Wipe down hard surfaces, such as the dashboard, door panels, and center console, with a mild detergent or automotive interior cleaner. Avoid using harsh chemicals that may damage the materials. Clean fabric upholstery and carpets with a specialized automotive fabric cleaner. Test the cleaner on a small, inconspicuous area first to ensure it does not cause discoloration or damage; [b] for leather upholstery, use a leather cleaner and conditioner to clean and restore the leather’s appearance and texture. [4] Air Vent Cleaning: [a] clean the vehicle’s air vents by using a soft brush or compressed air to dislodge any soot or debris that may have accumulated, followed by vacuuming vents afterward to remove dislodged particles; [b] replace air filters, as they may have captured smoke particles. [5] Hidden Odor Pockets: [a] most smoke odor should have been eliminated by thorough surface cleaning. [b] when smoke odors persist, the most probable sources are under the dash, on concealed airbags, inside and behind headliners, car seats, and carpet; [c] the trunk and motor are other possible sources; [d] in situations where smoke odor significantly remains, another source is the metal framework. [6] Odor Elimination Concerns: [a] opening a container of vinegar or a box of baking soda, and placing them in the car is an option, but their success in eliminating persistent smoke odor is doubtful; [b] another option is using ozone machines, where ozone molecules bond with smoke molecules, and helps to neutralize them; [c] a concern in using gas-phase ozone generators, the ozone generated can damage some finishes, age leather, and degrade rubber gaskets, sealers, and wiring; [d] other concerns, ozone is known to cause adverse health effects in humans. (EPA). [7] Odor Elimination: While ozone and hydroxyl odor neutralization equipment are viable options, it is believed, a safer and faster odor control and odor neutralization process is using chlorine dioxide (ClO_2) gas. Chlorine dioxide targets negatively charged smoke odor molecules and bonds with them during the odor neutralizing process.

Cleaning and deodorizing EL lithium-ion battery autos and trucks impacted by wildfire smoke and ash, Hazards in – Cleaning EL (Electric Lithium-ion) battery autos and trucks impacted by wildfire smoke and ash requires special considerations due to the potential hazards associated with lithium-ion batteries. Always prioritize safety and exercise caution when cleaning electric vehicles impacted by wildfire smoke and ash. When the owner has safety concerns or they are unsure about the cleaning process, it is recommended to consult with the vehicle manufacturer, an authorized service center, or a qualified technician who specializes in electric vehicles. The are a few safety considerations to consider before and during the automobile cleaning process: [1] Safety Precautions: [a] prioritize personal safety by wearing appropriate personal protective equipment (PPE), including gloves, safety glasses, and a respiratory mask to protect against hazardous materials. [b] make sure the vehicle is turned off and is disconnected from the power source before starting any cleaning procedures; [c] recognize smoke and ash is corrosive and can damage electric, battery, and electronic components and systems. [2] Consult Manufacturer Guidelines: Consult the vehicle manufacturer’s guidelines or owner’s manual for specific instructions on cleaning and maintenance of the battery and associated components. These guidelines will provide important information and precautions specific to your vehicle model. [3] Avoid Water Contact with Battery Components: [a] prevent water or cleaning solutions from coming into direct contact with the battery pack, electrical connectors, or any exposed wiring; [b] water can damage electrical components and lead to short circuits or other safety hazards; [c] focus on cleaning the exterior surfaces of the vehicle and avoid spraying water directly into areas around the battery.[4] Professional Inspection: [a] after a wildfire, it is advisable to have the vehicle inspected by a qualified technician or an authorized service center experienced in electric vehicles. They can assess the condition of the battery and associated components to ensure they were not damaged during the wildfire; [b] have the service center clean the exterior and interior. [4] Fire Damage Assessment: [a] when the vehicle was directly exposed to heat or it sustained any type of fire damage, it is important to have the vehicle towed to a service center, where the battery and electrical components are thoroughly inspected by professionals; [b] the exposure to heat or the presence of fire damage can lead to hidden internal damage or compromised the vehicles safety features. [5] Battery

Thermal Runaway: In rare cases where a lithium-ion battery is damaged, there is a risk of thermal runaway, which can result in fire or explosion. If you suspect any damage to the battery or experience unusual behavior or warning signs, such as overheating, smoking, or swelling, evacuate the area and contact emergency services.

Cleaning and inspecting Jacuzzis and swimming pools after wildfire by professionals and homeowners – Inspecting and cleaning swimming pools after a wildfire is crucial to remove ash, debris, and potential contaminants. Remember, the severity of the wildfire and its proximity to the pool can impact the extent of the cleanup. [1] Pool Maintenance Service: [a] When the pool is under professional maintenance, have the professional complete inspection for electrical hazards caused by burnt wiring and components, including motors that overheat from blockage. [b] The amount of debris and ash can clog filters, where the mechanical system requires purging and changing filters. [c] Heavy debris (e.g., leaves, branches), char, and ash tends to settle on the sides and bottom of the pool, where vacuuming debris should be completed using a separate vacuum system rather than the pools system that is not designed for this purpose. [d] It is not unusual to find rodents, animals, and birds using pool water for drinking and bathing. Sometimes, they die and are found floating, or they are in the bottom of the pool or Jacuzzi, where they must be removed. [e] Wildfire ash is corrosive, where it can damage pool finishes, tile, and plaster. Pressure washing the pool followed by detergent cleaning can only be done when the pool is emptied. [f] Depending on local regulations, pool and Jacuzzi water “may not” be allowed to flow down streets into storm drains leading to a lake, stream, river, or ocean. [g] Once the pool is emptied and cleaned, further inspection is required to look for corrosion, pitting, loss of finish, etc. [h] In light to moderate wildfire char and ash fallout situations, cleaning the pool and mechanical system, and returning them back to pre-wildfire conditions may require the deck and pool to be cleaned and the water tested multiple times. [2] Homeowner Maintenance: [a] *Safety Precautions*: Before inspecting or cleaning the pool, ensure your personal safety by wearing appropriate protective gear, including gloves, goggles, and a dust mask or respirator. [b] *Assess the Situation*: Evaluate the condition of the pool and the surrounding area. Look for signs of ash, debris, and potential damage caused by wildfire, such as fallen branches or structural issues. [c] *Remove Debris*: Use a pool skimmer or net to carefully remove any large debris, such as leaves, branches, or charred materials, from the surface of the pool. Dispose of the collected debris properly. [d] *Clean or Replace Pool Filter*: Check the pool’s filtration system and clean or replace the filter if necessary. The filter may have captured fine particles, soot, or ash from the wildfire. [f] *Test the Water*: Use a pool water testing kit or take a water sample to a professional pool supply store for analysis. Test the water for pH levels, chlorine levels, and any potential contaminants that may have entered the pool during the wildfire. [g] *Balance the Water Chemistry*: Adjust the water chemistry based on the testing results. Follow the guidance provided by the testing kit or consult a pool professional for the appropriate measures to balance pH levels, chlorine, and other chemical parameters. [h] *Shock Treatment*: Consider administering a shock treatment to the pool water to address any potential bacteria or contaminants that may have entered during the wildfire. Follow the instructions on the pool shock treatment product for dosage and application. [i] *Run the Pool Pump and Circulation System*: Ensure that the pool pump and circulation system are in proper working condition. Run the system for an extended period to help filter and circulate the water, aiding in the removal of any remaining contaminants. [j] *Backwash the Pool Filter*: If the pool has a backwash function, backwash the filter to remove accumulated debris, soot, and ash. Follow the manufacturer’s instructions for proper backwashing procedures. [k] *Skim and Vacuum*: Regularly skim the pool surface and use a pool vacuum to remove any remaining debris or sediment that may have settled at the bottom of the pool. Pay extra attention to corners, steps, and other hard-to-reach areas. [l] *Monitor Water Clarity and Quality*: Continuously monitor the water clarity and quality in the days and weeks following the cleanup. Regularly test the water and make necessary adjustments to ensure it remains safe and balanced. [m] *Seek Professional Assistance*: If you are unsure about the condition of your pool or need help with the inspection and cleaning process, consider consulting a professional pool service company. They can provide expertise and guidance tailored to your specific situation.

Cleaning and inspecting roof and decks after wildfire by professionals and homeowners – Cleaning and inspecting roofing after a wildfire is crucial to assess any damage caused by the fire and ensure the integrity of the roof and its components. Remember, wildfire impacts on roofs can vary depending on factors such as the proximity of the fire, the intensity of the heat, high winds, and the type of roofing materials. If in doubt or if the damage appears severe, consult professionals with expertise in wildfire-affected roofing for guidance and assistance. [1] Professional Roof Inspection: [a] After a community wildfire, quality reliable roofers may be hard to find. Interview only state licensed general contractors specializing in roofing or hire a state licensed roofer to complete inspection. [b] Professional roofing inspection requires having physical access to the roof on all sides. [c] Inspection includes but is not limited to inspecting for loose and missing tiles, shakes, slate, shingles, rolled and metal roofing, and damage to flashings, eaves, valleys, ridges, gutters, exhaust stacks, chimneys, rakes, soffits, vents, and hips. When qualified, the roofer is to inspect solar panels. [d] If the roof is not damaged or deteriorated by the fire and fallout debris, cleaning the roof and decks can begin by removing visible debris followed by pressure washing using water that does not get under tiles, shakes, slate, and shingles. When necessary, use a detergent additive in pressure washing along with brush scrubbing surfaces followed by freshwater rinsing. [e] Depending on local regulations, roof pressuring water "may not" be allowed to flow down streets into storm drains leading to a lake, stream, river, or ocean. [f] As an added precaution, as pressure washing is completed, inspect the attic and interior for signs of leaks. When possible, use a thermal imaging camera for inspection. [g] When roof and deck damage is discovered, the roofer is to check for structural damage and make recommendations for repair.[2] Homeowner Inspection: [a] *Safety Precautions*: Before accessing the roof, prioritize your safety by wearing appropriate personal protective equipment (PPE), such as gloves, safety glasses, and sturdy footwear. Ensure the roof is structurally sound before stepping on it. Exterior Inspection: Conduct a visual inspection of the roof from the ground, if possible, to look for any visible signs of damage, such as missing or damaged shingles, charred areas, or structural issues. Use binoculars to get a closer view if needed. [b] *Clear Debris*: Remove any debris, such as leaves, branches, or charred materials, from the roof surface. Use a roof rake, broom, or blower to carefully clear the debris, being mindful not to damage the roof materials. [c] *Soot and Ash Removal*: If there is a significant amount of soot or ash on the roof, consider hiring a professional roofing contractor with experience in post-wildfire cleaning. They can use specialized equipment, such as pressure washers or non-abrasive cleaning solutions, to safely remove the contaminants without causing damage. [d] *Gutters and Downspouts*: Clear gutters and downspouts of any debris, ash, or vegetation that may have accumulated. Ensure they are functioning properly to prevent water damage during rainfall. [e] *Interior Inspection*: If accessible, inspect the attic or the underside of the roof from inside the building. Look for any signs of smoke or fire damage, such as discoloration, charred wood, or unusual odors. Inspect insulation for damage and consider replacing it if necessary. [f] *Check for Structural Damage*: Look for signs of structural damage, such as sagging, warping, or weakened areas. If you suspect significant damage, consult a professional roofing contractor or structural engineer to assess the structural integrity of the roof. [g] Assess Shingles and Roofing Materials: Inspect the shingles or other roofing materials for signs of damage, including cracking, blistering, curling, or charring. Check for missing or loose shingles that may need to be replaced. [h] *Chimneys and Vents*: Examine chimneys, vents, and flashing for any damage or displacement. Ensure they are securely attached and properly sealed to prevent water leaks. [i] *Document Damage*: Take photographs or videos of any damage you observe during the inspection. This documentation can be useful for insurance claims and future reference. [j] *Professional Assessment*: If you are uncertain about the condition of your roof or suspect significant damage, it is advisable to contact a professional roofing contractor or a qualified building inspector. They can provide a more detailed assessment, identify potential hidden damage, and offer appropriate repair or replacement recommendations.

Cleaning and restoring works of art after a wildfire – (1) The cleaning and restoration of works of art after a wildfire often requires specialized expertise and care to preserve their cultural, historical, and monetary value. Depending on value, condition, and collectability, especially signed works of art of a living artist, special care is required to clean, conserve, or restore a piece. (2) For advice, it is recommended for the homeowner, cleaning company or insurance adjuster to engage professional art conservators who specialize in post-disaster recovery. Education Notes: Includes are several concerns involving the cleaning and restoring works of art after a wildfire: [1] Assessment and Documentation: Professional art conservators will conduct a detailed assessment of each artwork, documenting the extent of damage, pre-existing conditions, and unique characteristics. This information helps in developing a tailored conservation plan for each artwork. [2] Safety Precautions: Conservators prioritize their safety and the safety of the artworks during the cleaning and restoration process. They will wear appropriate personal protective equipment (PPE) to prevent contamination and employ environmentally controlled workspaces to minimize further damage. [3] Surface Smoke, Char, and Ash Removal: Smoke, char and ash can settle on artworks, leaving behind residues that can cause discoloration and damage. Conservators may be able to carefully remove these contaminants using gentle and non-abrasive techniques without affecting the value of the piece. They may employ specialized cleaning agents, brushes, sponges, or vacuuming methods depending on the artwork's medium and vulnerability. [4] Visual Artists Rights Act of 1990 (VARA): [a] The VARA (17 U.S.C. §106A) involves artwork by a living artist that becomes damaged. VARA protects an artist's "moral" rights in his/her work of art beyond traditional property law. In other words, even after a piece of art is sold, the artist retains certain rights to make sure that the artwork is not impermissibly modified. VARA provides the author of a "work of visual art" the right to "prevent any intentional distortion, mutilation, or other modification of that work which would be prejudicial to his or her honor or reputation, and any intentional distortion, mutilation, or modification of that work is a violation of that right." That right remains for the life of the artist. [b] Some states, such as California, have similar statutes (see, e.g., Cal. Civ. Code §987). When a work of art by a living artist is damaged, VARA may come into play. If the damage itself was intentional, then the person who damaged it may be liable under VARA. More important in the insurance context, however, is that the restoration of the piece can also implicate VARA. The work very well may be able to be restored, but the restoration may itself be an impermissible "modification" if it is performed with "gross negligence." Though this has not been heavily litigated, at least one court has held that attempted repair without the artist's permission states a claim for violation of VARA. (Flack v. Friends of Queen Catherine, Inc., 139 F.Supp.2d 526 (S.D.N.Y. 2001). Because of this, it is important that when restoring art by a still-living artist, the insurer make a good faith effort to get the artist to approve the restoration plan, if not perform the restoration him/herself. [c] VARA’s interaction with insurance has not been frequently litigated, and thus there is little legal guidance on an insurer’s potential liability under VARA, but there are several potential issues that could give rise to liability. The first is an insurer’s direct liability to the artist if it undertakes restoration which violates VARA. The second is potential liability to the insured for breach of contract or bad faith. If the artwork is restored without input from the artist, then it is possible that the artist can denounce the work in its entirety, rendering the piece virtually worthless. Although this issue has yet to be litigated, it is conceivable that this could lead to bad faith claims against the insurer. Once again, in the case of damaged art by a living artist, we recommend that insurers consult not just with restoration experts, but with the artist him/herself, prior to restoration in order to avoid potential VARA and bad faith claims. [5] Surface Cleaning: Conservators will clean the surfaces of artworks using suitable methods specific to the medium, such as paintings, sculptures, ceramics, or textiles. They may employ dry cleaning, solvent cleaning, or aqueous-based cleaning techniques, ensuring that the cleaning agents and methods are compatible with the artwork’s materials. [6] Consolidation and Repair: If the artwork has suffered structural damage, conservators will perform necessary repairs and consolidation. This may involve stabilizing loose or damaged elements, reattaching detached parts, or repairing surface cracks or tears. They will use appropriate conservation-grade materials and techniques to ensure the artwork's stability. [7] Color and Finish Restoration: In cases where the artwork’s color or finish has been compromised, conservators may employ color-matching techniques or retouching methods to restore the original appearance. These processes are conducted with utmost care and expertise to ensure a seamless and harmonious result. [8] Documentation and Photography: Throughout the cleaning and restoration process, conservators will document each stage, including before and after photographs, detailed notes, and condition reports. This documentation serves as a valuable record for future reference, conservation, and appraisal purposes. [9] Environmental Control and Storage: After cleaning and restoration, conservators may recommend appropriate storage conditions to protect the artworks from potential environmental risks. This may include climate-controlled environments, UV-filtering glazing, or archival storage materials to prevent future damage. [10] Consultation and Guidance: Professional conservators provide valuable guidance on ongoing care and maintenance of restored artworks. They can advise on display methods, protective measures, and conservation practices to ensure the longevity and preservation of the artworks. [11] Closing Remarks: Cleaning and restoring works of art after a wildfire requires specialized knowledge and skills. By engaging professional art conservators, the homeowner can ensure that the process is carried out with utmost care, expertise, and adherence to ethical standards, helping to preserve and safeguard their assets.

Cleaning antiques by professionals after a wildfire – (1) Cleaning antiques after a wildfire requires delicate and specialized care to preserve their value and integrity. Hiring professionals experienced in handling and restoring antiques is highly recommended. (2) It is crucial to entrust the cleaning and restoration of antiques after wildfire impact to professionals with expertise in handling and preserving these valuable items. Their knowledge of antique materials, finishes, and restoration techniques ensures that your antiques receive the specialized care they require, helping you retain their historical and monetary value. Education Notes: Several considerations for professional antique cleaning services after a wildfire: [1] Assessment and Documentation: Professional antique cleaners will assess the condition of each antique, documenting any pre-existing damage or unique characteristics.

This helps in tailoring the cleaning approach and tracking the progress of restoration. [2] Safety Precautions: Professionals will take utmost care to protect delicate antique surfaces and minimize further damage. They will use gloves, masks, and other appropriate protective gear to ensure their safety and prevent any cross-contamination. [3] Cleaning Techniques: Professional antique cleaners employ gentle and non-abrasive cleaning techniques specific to each antique's material, age, and condition. They may utilize methods such as dry cleaning, vacuuming, surface wiping, or solvent cleaning, depending on the antique’s requirements. [4] Char and Ash Removal: Soot and ash can settle on antique surfaces, leaving stains and potentially damaging finishes. Professionals will carefully remove these contaminants using specialized brushes, soft cloths, or gentle vacuum attachments. They will avoid using excessive pressure or harsh cleaning agents that can harm delicate surfaces. [5] Cleaning Finishes: Antiques often feature unique finishes, such as varnishes, shellac, wax, or patinas. Professionals will ensure that cleaning methods and products are compatible with these finishes to avoid stripping or damaging them. They may use mild cleaning solutions specifically formulated for antique restoration. [6] Upholstery and Fabric Cleaning: If the antique has upholstered areas or fabric components, professionals will use appropriate techniques to clean and restore them. This may include dry cleaning, spot cleaning, or specialized fabric restoration methods, ensuring the upholstery is free from char, ash, and odors. [7] Restoration and Repair: In cases where antiques have sustained damage from the wildfire, professionals may provide restoration and repair services. This can involve repairing damaged veneer, refinishing surfaces, reupholstering, or reconstructing missing parts to restore the antique’s original appearance. [8] Protection and Preservation: After cleaning, professionals may apply protective coatings, waxes, or polishes to safeguard antique surfaces and enhance their longevity. This helps preserve the antique’s integrity and shields it from future damage. [9] Climate-Controlled Storage: If your property is undergoing restoration or repairs, professionals may offer secure and climate-controlled storage options to protect your antiques until they can be safely returned to their original location.

Cleaning appliances by professionals after a wildfire – Trained and certified appliance professionals who clean and when required, restore appliances that were exposed to wildfire smoke, char, ash, and organic matter. (1) Wildfires can cause significant damage and leave behind residue, char, and ash that can affect the performance, safety, and longevity of appliances. (2) After a wildfire, hiring professionals to inspect and clean large and small appliances the homeowner can be ensured the cleaning process is thorough, safe, and effective, and it may extend the life of the appliance. They can address potential damage, remove residue, and restore the appliances to a functional and safe state, minimizing the risk of further malfunctioning issues (e.g., corrosion, electrical shock, fire, reduced life expectancy), and ensuring appliances are ready for use. (3) During or after a wildfire, where appliances that had their power turned-off for days or weeks, such as refrigerators and freezers, where food thawed, even though they may be frozen, food is spoiled and should be disposed. As the appliance warms, bacteria, and mold growth occurs, leaving behind noxious odors in plastic, caulking, and rubber seals. Education Notes: Several considerations when hiring professionals to clean appliances after a wildfire: [1] Safety Assessment: Before initiating any cleaning or restoration work, it is important to conduct a safety assessment of the affected appliances. This includes checking for any visible damage, electrical issues, or gas leaks. If there are safety concerns, it is crucial to consult with appropriate professionals, such as electricians or gas technicians, to address these issues before proceeding with the cleaning process. [2] Professional Expertise: [a] Some appliance repair shops may say that they can handle all types and manufacturers of appliances. These shops may not be the correct appliance cleaning company or repair facility for processing all small and large appliances. [b] When appliances are fairly new and are under manufacturer warrantee, consult with the manufacturer or the store they were purchased at. [c] Hiring professionals with experience in post-wildfire appliance cleaning is highly recommended for surface cleaning, but again, they may not be the right professional to mechanically clean parts and assemblies. [d] Bottom line, the homeowner wants a company that possess the knowledge, certifications, tools, and expertise to properly assess appliance contamination and damage, determine the appropriate cleaning methods, and ensure the appliances are restored to a safe and functional condition. [3] Thorough Inspection: Professional cleaners are expected to conduct a thorough inspection of each appliance to identify areas that require cleaning and repair. They will assess the extent of soot, ash, or residue accumulation, both externally and internally, to develop a tailored cleaning plan for each type of appliance. [4] Specialized Cleaning Techniques: Professional cleaners employ specialized cleaning techniques and products that are effective in removing soot, ash, and residue without causing further damage to the appliances. They will use appropriate tools, equipment, and cleaning agents suited for specific appliance types and materials. [5] Ventilation and Duct Cleaning: Appliances with ventilation systems, such as HVAC units, may require professional cleaning of the ductwork and filters or require their replacement. This ensures that any residual soot or contaminants are removed from the system, promoting clean and healthy airflow. [6] Restoration of Electrical Components: In some cases, the electrical components of appliances may have been exposed to char and ash, potentially affecting the appliance functionality. Professionals can assess these components, clean, or replace them if necessary, and ensure that electrical connections are secure and safe. [7] Odor Elimination: Wildfire smoke can leave behind persistent odors in appliances. Professionals can use odor elimination techniques, such as using chemical treatments or specialized deodorizers, to neutralize or remove unpleasant odors from the appliances, including sanitizing and disinfecting them. [8] Documentation and Insurance: It is important to keep adequate records of the professional cleaning process, including photographs of the pre-cleaning condition, necessary repairs, and replacement parts. These records can be useful for insurance claims and as evidence of the restoration work completed. If you are filing an insurance claim, some insurers want their adjusters to inspect appliances before cleaning and repairing.

Cleaning ash, char, vegetative matter, and the smoke removal process – A vacuuming 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, char, ash, vegetative matter and smoke vacuuming or air washing followed by using a mild alkaline detergent washing helps neutralize, retard, or stop pitting and corrosion or the discoloration of finishes. (See: Cleaning up wildfire ash after a wildfire)

Cleaning ash, char, vegetative matter, and addressing smoke-related issues after a wildfire (homeowner discussion points) – It is important to note that the severity of the fire, the types of materials burned, and the specific conditions may vary, so adapting the cleaning process accordingly is essential. For significant damage or persistent issues, consider consulting professional restoration and cleaning services that specialize in wildfire cleanup. [1] Safety Precautions: Before starting the cleanup, ensure you have appropriate personal protective equipment (PPE) such as gloves, goggles, a dust mask or respirator, and sturdy footwear. Additionally, be cautious of any structural damage or hazards in the area. [2] Assess the Damage: Survey the affected area to determine the extent of the damage and identify areas that require immediate attention. This may include indoor spaces, outdoor surfaces, and items that have been exposed to smoke, soot, or ash. [3] Indoor Cleaning: [a] Ventilation: Open windows and doors to improve airflow and ventilation while cleaning. Use fans and dehumidifiers to aid in drying out the space. [b] Air Filtration: Consider using air purifiers or high-efficiency particulate air (HEPA) filters to help remove smoke particles from the indoor air. [c] Surfaces: Wipe down hard surfaces (countertops, tables, etc.) with a dry cloth or sponge to remove loose debris. Follow up with a damp cloth or sponge using mild detergent to clean and remove soot or residue. Rinse and dry the surfaces afterward. [d] Carpets and Upholstery: Vacuum carpets, upholstery, and drapes using a vacuum cleaner with a HEPA filter. Consider professional deep cleaning for heavily soiled or smoke-damaged items. [e] Clothing and Fabrics: Launder clothing, linens, and other machine-washable fabrics using the guidelines mentioned earlier for cleaning clothing after a wildfire. [f] HVAC Systems: Have your heating, ventilation, and air conditioning (HVAC) systems inspected and cleaned by professionals to remove any smoke or soot residue. [4] Outdoor Cleaning: [a] Ash Removal: Wearing protective clothing, gloves, respirator, and eye protection, use a broom, rake, or shovel to carefully sweep or gather loose ash, debris, and vegetative matter from outdoor surfaces. Wetting down the ash with water can help minimize the release of airborne particles. [b] Pressure Washing: Consider pressure washing outdoor surfaces, such as decks, patios, and sidewalks, to remove stubborn residue. Use mild detergent and follow safety guidelines for pressure washing. [c] Vegetation Cleanup: Remove any charred or damaged vegetation carefully. Consult with local authorities or experts regarding proper disposal methods for vegetative debris. [d] Gutters and Downspouts: Clear gutters and downspouts of ash, debris, and leaves to ensure proper drainage. [e] Landscaping: Consult with experts or landscapers to evaluate and address any damage to trees, plants, or irrigation systems caused by wildfire. [5] Smoke Odor Removal: [a] Natural Ventilation: Allow fresh air to circulate by opening windows and doors to help dissipate smoke odor. [b] Cleaning and Deodorizing: Use specialized smoke odor neutralizers or consult professionals for effective deodorizing treatments for carpets, upholstery, and other items that retain smoke odor. [c] Air Fresheners: Consider using temporary odor-absorbing products or natural remedies like activated charcoal in ventilation filters and fans to reduce lingering smoke odors. (See: EPA's Wildfire "DIY Air Cleaner to Reduce Smoke Indoors") (See: Cleaning up wildfire ash after a wildfire)

Cleaning attic and crawlspace installation impacted by wildfire discussion points – When considering replacing attic insulation impacted by wildfire smoke or carbonaceous particles, it is important to prioritize safety and take appropriate steps to ensure thorough cleaning and proper installation. Education Notes: Here are some key considerations: [1] Safety Precautions: [a] Wear personal protective equipment (PPE) such as gloves, masks (N95 or equivalent), goggles, and protective clothing to protect yourself from potential contaminants, including fine particles and residue from wildfire smoke. [b] Ensure proper ventilation by opening windows and using fans to help remove airborne particles during the cleaning process. [c] When smoke damage is noticeable or when service personnel have respiratory issues, increase the level of respiratory protection, or hire professionals experienced in handling attic and crawlspace insulation removal. [2] Assessment and Removal: [a] Once it is determined the attic or crawlspace insulation is measurably impacted by wildfire smoke, char, ash, or particulate, determine how it can be safely removed between rafters, walls, and ceiling joists, or subfloor framing. [b] Vacuum or bag remove insulation that is safely removed from the building. [c] Vacuum the remaining loose debris, ash, or soot from surfaces, beams, and corners. Consider using a HEPA-filtered vacuum cleaner to capture fine particles. [d] Wipe down hard surfaces, such as exposed beams, walls, and attic subfloors, using a damp cloth or sponge to remove any remaining residue. [4] Attic Air Checks and Sealing: When it is required to remove and replace attic insulation, it may also require the replacement of attic ventilation ducting. Depending on building codes, before installing new insulation or ducting or afterwards, check for air leaks or gaps in the attic spaces ventilation duct leaks and seal them. Use appropriate materials such as caulk, spray foam, or weatherstripping to seal openings around pipes, ducts, electrical penetrations, and vents. In ventilation duct runs, using heat resistant metal foil tape may be required. (e.g., AF 099 UL 181A-P/B-FX Listed/Printed Aluminum Foil Tape) [5] Selecting New Insulation: [a] Your home may have older types of attic or crawlspace insulation that do not meet current building codes. [b] Choose replacement insulation that meets current building codes that are suitable for your climate. Common options include fiberglass batts, blown-in fiberglass, or cellulose insulation. Consider consulting with insulation professionals or energy auditors to determine the most appropriate insulation type and R-value for your specific attic space. [6] Installation: Follow manufacturer guidelines and installation instructions when installing new insulation. Ensure proper coverage and even distribution throughout the attic space, taking care to avoid compressing the insulation or blocking vents. When the homeowner is not assured about the installation process or prefer professional assistance, consider hiring insulation contractors experienced in wildfire damage restoration. [7] Post-Installation Cleaning and Replacement Inspection Verification: Once new insulation and/or ducting is installed, perform a final visual confirmation confirming all debris and dust removal and replacement of ventilation duct was completed according to the agreement.

Cleaning attic insulation impacted by wildfire – The removal of visible soot and char off the surface of insulating materials sufficient to achieve an appearance acceptance. Education Notes: [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. [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 which may not be possible. [3] It is not unheard of to hear about a cleaning technician mixing (turning) blown-in insulation over so that it has a general soot-free appearance. At that point finding carbonized char particles is like looking for a needle in the haystack.

Cleaning and deodorizing unfinished attics after exposure to wildfire smoke, char, and ash – This process first requires careful attention to safety and thorough cleaning to remove any residual ash, soot, or potential contaminants. Remember, attic cleaning after a wildfire can be a complex task. While this process can be done by a homeowner or building maintenance staff, it is best done by professionals trained and experienced in fire damage restoration and odor neutralization. Several considerations when cleaning attics: [1] Safety Precautions: [a] Attic insulation removal, cleaning and deodorizing is a minimum of a 3-person job. [b] Wear appropriate personal protective equipment (PPE) such as gloves, goggles, and an N95 respirator to protect against airborne particles. [c] Ensure the attic is structurally safe before entering. Assess for any structural damage or weakened areas. [d] Turn off the electricity to the attic to prevent any electrical hazards, especially to heat damaged wiring, current wiring not protected by covers or wire nuts, or older wiring that was abandoned but remains live. [e] Bring in alternate power (e.g., LED stringer lights) to completely light the attic for safe entry and completing work. [f] Have a fire extinguisher and a first aid kit nearby in case of any unforeseen fire risks or treating injuries. [g] Bring in fresh air and exhaust dirty air. [h] Saw cut strong ¾-inch or greater thickness plywood planks (approximately 24-inches in width and 18-inches in length) and place them across ceiling joists for kneeling while doing attic insulation removal. [i] Remove boxes and contents in the attic. Recognize they may contain a lot of dust, where their removal from the attic must be worked out ahead of time where they will be stored and cleaned. [2] Remove Debris: [a] Start by bagging and removing large debris (e.g., insulation, animal and rodent carcasses), identifying any charred framing, heat damaged to the attic, and damage to an attic ventilation system and ducting. Use caution and be mindful of potential hazards like sharp objects or unstable structures. [b] Place the debris in sealed bags or containers for proper disposal. Label them as fire-related waste. [3] Dry Cleaning: Use a HEPA vacuum with a clean HEPA filter to remove loose char, ash and the remaining insulation from surfaces. [4] Damp Wipe Horizontal Surfaces: [a] With a clean cloth with a mild detergent solution or use specialized smoke/soot cleaner recommended for attic cleaning. [2] Wipe down all surfaces, including walls, beams, insulation, and any exposed surfaces. Pay attention to corners, crevices, and hard-to-reach areas. [c] Replace dirty clothes often with clean clothes or rinse them often to prevent spreading soot and contaminants. [5] HVAC System Cleaning: [a] When the attic has ducts or an HVAC system, it is important to have them professionally inspected and cleaned. [b] Contact HVAC specialists to assess and clean the system thoroughly to remove any contaminants that may have entered during the fire, or when smoke, char, and ash came into the attic. [6] Odor Control: [a] Use odor-neutralizing products or techniques to mitigate any lingering smoke odors in the attic. [b] Consider using professional-grade ozone generators or air purifiers to help eliminate odors and improve air quality. [7] Post-Cleaning Assessment: [a] After cleaning, inspect the attic again to ensure no residue or debris remains. [b] Conduct air quality monitoring to ensure the attic is free from harmful particles and contaminants. [8] Professional Assistance: For hazardous waste cleanup (e.g., asbestos in or on ducting and HVAC systems, and certain types of blown-in insulation), it is necessary to seek professional assistance from a state licensed abatement contractor.

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

Cleaning carpets and Oriental rugs after a wildfire by homeowners – Cleaning carpets and Oriental rugs after a wildfire requires careful attention to remove char, ash, smoke film, and smoke odor, while at the same time protecting your health. [1] Here are several guidelines to consider for rugs: [A] Safety Precautions: [a1] Before handling rugs, wear gloves, goggles, a dust mask or respirator to protect yourself from contaminants. [a2] Carefully roll up rugs and remove them outdoors to fresh air. [a3] Based on their weight, removing rugs may require more than one person to complete this task safely. [B] Equipment: Hand carpet beater, shop vacuum, HEPA vacuum, banister or railing, plastic sheeting or clean painter’s cloth. [C] Dusting: [c1] Small rugs can be shaken, removing char particles other organic matter, and ash. [c2] Easily manageable larger rugs requires placement over a railing or banister. [c3] Using a hand beater remove char, organic matter and ash, and aerosolize it to downstream air. [c4] Larger rugs need to be unfolded on a clean surface (generally, plastic sheeting or a clean painter’s cloth), where shop or HEPA vacuuming is complete. (Do not use the house carpet vacuum, since debris can clog filters, smoke can contaminate the vacuum, ash can harm vacuum parts, and using it in the house can cause particulate debris and smoke to be released from the vacuum). [D] Washing: [d1] Synthetic and many Oriental-style rugs can be hand washed. However, read labeled instructions or call a rug specialist before wet washing and smoke washing rugs. [2] Here are several guidelines to consider for indoor wall-to-wall carpet: [A] Safety Precautions: [a1] Before cleaning indoor carpet wear gloves, goggles, a dust mask or respirator to protect yourself from contaminants. [B] Ventilate the Area: Open windows and doors to create good airflow and ventilation while cleaning carpets. On a warm outdoor day having outdoor relative humidity lower than 60%, this helps dissipate smoke odors and facilitating the cleaning's drying process. [C] Remove Loose Soot and Debris: Do not use your house vacuum, instead, use a vacuum cleaner with a brush attachment or a high-efficiency particulate air (HEPA) filter to gently vacuum the carpets, removing loose soot, ash, and debris. Pay attention to all carpeted areas, including corners, edges, and underneath furniture. [D] Pre-Treat Stains: If there are visible stains on the carpets, such as near doors and windows, pre-treat them before cleaning. Use a mild detergent mixed with water or a specialized carpet stain remover. Follow the product instructions and perform a cleaning test on a small, inconspicuous area to ensure the cleaning test does not cause discoloration or damage to fibers. [E] Steam Cleaning or Hot Water Extraction: Consider using a steam cleaner or a carpet cleaning machine with hot water extraction to deep clean the carpets. Follow the manufacturer's instructions for proper usage and dilution of cleaning solutions. [F] Drying: After cleaning, allow the carpets to dry completely. Use fans, dehumidifiers, or open windows to expedite the drying process. Avoid walking on the carpets until they are fully dry to prevent new soiling or damage. [G] Professional Assistance: [g1] When possible, consult with professional carpet cleaning services experienced in post-wildfire cleanup. They have specialized equipment and expertise to handle more challenging situations. [g2] Depending on the severity of the fire and the condition of carpets, it may be necessary to replace them entirely. Consult with professionals to assess the extent of the damage and determine the best course of action.

Cleaning char, ash, vegetative matter, and the smoke removal process – A vacuuming 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, char, ash, vegetative matter and smoke vacuuming or air washing followed by using a mild alkaline detergent washing helps neutralize, retard, or stop pitting and corrosion or the discoloration of finishes.

Cleaning children's toys after a wildfire by professionals – Hiring professionals experienced in toy cleaning and restoration is recommended. Professional toy cleaning after a wildfire provides peace of mind, knowing that the toys are properly cleaned, disinfected, and safe for children to play with. The expertise and specialized techniques used by professionals ensure that children's toys are restored to a clean and hygienic condition, minimizing any potential health risks associated with wildfire residue. Education Notes: In the following are several considerations leading to the professional cleaning of toys after a wildfire: [1] Description: Children's toys include but are not limited to hard and soft toys, dolls, Teddy bears and other stuffed animals, play toys such as trucks, balls, learning games and their boxes. [2] Discussion: [a] Depending on the degree or level of wildfire impacting the interior of homes, the cleaning recommendation contained herein may be reasonable and appropriate. [b] However, depending on the age of the child and any health condition (immunity, allergy, chemical sensitivity), and the type of wildfire impact (e.g., buildings that combusted near the home impacting your home with fumes, vapors, chemicals, and particulate matter), toys may need to be disposed. [c] Depending on the cost of toys versus the cost to clean and disinfect them by professionals, some toys are not cost effective to clean, where they should be inventoried, photographed, and boxed for replacement. [d] In cases where insurance coverage will pay for replacement, boxed toys should be delivered to the insurance adjuster or their specialist. [3] Assessment and Documentation: Professional toy cleaners will assess the condition of each toy, documenting any visible damage or potential safety concerns. This helps in tailoring the cleaning approach and ensuring the safety of the children. [4] Safety Precautions: Professionals will prioritize the safety of children and themselves during the cleaning process. They will use gloves, masks, and other appropriate protective gear to minimize exposure to contaminants and potentially harmful substances. [5] Cleaning Techniques: Professional toy cleaners employ safe and effective cleaning techniques suitable for different types of toys. They will choose methods that are appropriate for the toy's material, age, and condition. This may include dry cleaning, wet cleaning, or a combination of both. [6] Smoke, Char and Ash Removal: Smoke, char and ash can adhere to toys, potentially leaving behind harmful residues. Professionals will carefully remove these contaminants using non-toxic cleaning agents, gentle brushes, and soft cloths. They will ensure that all surfaces, crevices, and components are thoroughly cleaned. [7] Disinfection: In addition to removing visible contaminants, professional cleaners may use child-safe disinfectants to eliminate any potential pathogens or bacteria that could have been introduced during the wildfire. This helps ensure the toys are hygienically clean and safe for children to play with. [8] Stuffed Animals and Soft Toys: If there are stuffed animals or soft toys that have been affected by wildfire, professional cleaners will employ specialized techniques to clean and sanitize them. This may include spot cleaning, gentle laundering, or dry cleaning methods, depending on the toy's material and construction. [9] Battery-Operated Toys: Battery-operated toys may require additional attention due to the potential for damage from soot or ash infiltration. Professional cleaners will carefully clean the toy's exterior and inspect the battery compartment to ensure it is free from contaminants. If necessary, they will replace batteries or provide recommendations for battery replacement. [10] Safety Checks: Professionals will conduct thorough safety checks on each toy to ensure there are no hidden damage or hazards. They will inspect for loose parts, compromised mechanisms, or other issues that could pose a risk to children. Damaged toys may be flagged for repair or disposal, depending on the extent of the damage. [11] Packaging and Storage: After cleaning, professionals may carefully package and store the toys to protect them from further contamination or damage during the restoration process or while repairs are being made to your property. This ensures that the toys remain clean and safe until they can be returned to the children.

Cleaning clothing after a wildfire by a homeowner – Clothing exposed to wildfire ash and smoke requires careful handling to ensure proper removal of contaminants and minimize potential health risks. If you have concerns about the safety or efficacy of cleaning clothing after a wildfire, it is advisable to consult professionals or contact relevant authorities for specific guidance based on your circumstances. Several guidelines for homeowners cleaning clothing after a wildfire: [1] Personal Protection: Before handling any clothing, put on gloves and a dust mask or respirator to protect yourself from potential harmful particles. [2] Personal Safety: During the cleaning process, continue wearing personal protective equipment, including gloves and a dust mask or respirator, to avoid direct contact with ash particles and potential irritants. [3] Shake Off Excess Ash: Take the clothing outside to fresh air. Using a breeze that is moving away from you, gently shake off as much loose ash as possible. Avoid vigorous shaking, as it may release ash particles where they can be breathed. [4] Pre-Treatment: Before washing, pre-treat heavily soiled or stained areas on the clothing. Apply a pre-wash stain remover or a solution of mild detergent and water directly to the affected areas. Follow the instructions provided by the manufacturer. [5] Washing Machine: Wash the clothing separately from other items in a washing machine. Use the gentle or delicate cycle and select cold water. Avoid hot water, as it can set any remaining stains or odors. [6] Laundry Detergent: Use a mild, fragrance-free detergent that is suitable for sensitive skin. Avoid using fabric softeners or bleach, as they may cause further irritation or damage to the clothing. [7] Extra Rinse Cycle: Consider adding an extra rinse cycle to ensure thorough removal of ash particles and detergent residues. This can help minimize any potential skin irritation or sensitivity. [8] Drying: After washing, air-dry the clothing outdoors, if possible, to allow any remaining ash particles to disperse. If using a dryer, select a low heat setting to prevent potential damage to the fabric. [9] Inspect and Repeat if Necessary: After drying, inspect the clothing for any remaining stains or odors. If needed, repeat the washing process or consider professional cleaning services for stubborn stains or persistent odors. [10] Professional Cleaning: For valuable or delicate items, consider consulting a professional cleaner with experience in handling fire-damaged clothing. They can provide specialized cleaning techniques and advice tailored to the specific fabrics and materials.

Cleaning clothing, tapestries, and drapery fabrics after a wildfire by the homeowner – Cleaning fabrics and textiles after a wildfire is essential to remove soot, ash, and smoke odors. The severity of smoke impaction, and char, soot, and ash damage, and the type of fabric or textile will determine the effectiveness of cleaning and deodorizing. When the homeowner is uncertain or dealing with valuable or sentimental items, it is best to consult professional fabric cleaners and restorers (IICRC Certified) for personalized advice and assistance. Cleaning guidelines include [1] Safety Precautions: Before cleaning, ensure safety is maintained by wearing appropriate personal protective equipment (PPE) such as gloves, safety goggles, and a respiratory mask. [2] Shake or Vacuum: [a] when possible, remove clothing, tapestries, and draperies outdoors, and placed them on a clean table, where they can be shaken or vacuumed in fresh air; [b] when fabrics are to be cleaned indoors, open windows and doors for ventilation to minimize exposure to lingering smoke odor and airborne particulate, where contents are vacuumed and not shaken. [3] Read Fabric Care Labels: Check care labels on the fabric for any specific cleaning instructions or limitations and follow those instructions whenever applicable. [4] Dry Cleaning: For delicate fabrics or those labeled as "dry clean only," take them to a professional dry cleaner experienced in handling smoke-damaged garments. Inform the cleaner about the fire exposure to ensure appropriate treatment. [5] Machine Washing: [a] for machine-washable fabrics, sort the items according to color, fabric type, and level of smoke and particle contamination, and wash similar items together; [b] pre-treat heavily soiled areas with a stain remover or a mixture of mild detergent and water; [c] use a gentle cycle with cold water and a mild detergent, while avoid using bleach and harsh chemicals; [d] add a cup of white vinegar to the rinse cycle to help eliminate smoke odors, where alternatively, use a specialized odor-neutralizing product designed for laundry; [e] once washed, thoroughly inspect items for any remaining stains or odors before drying. [6] Hand Washing: Delicate fabrics or items with intricate details may require hand washing. [a] fill a clean basin or sink with cold water and a mild detergent suitable for handwashing; [b] gently agitate the fabric in the water and rub any soiled areas using your hands, and avoid excessive wringing or twisting, as it may damage the fabric; [c] rinse the fabric thoroughly under cold water until the water runs clear; [d] remove excess water by gently pressing the fabric between clean towels and then air dry. [7] Smoke Odor Removal: Fabrics can retain smoke odors even after washing, where they may require additional treatments. [a] hanging the items outdoors in a well-ventilated area for some time can help freshen them up; [b] sprinkle baking soda over the fabric and let it sit for a few hours or overnight to absorb odors, then, shake off the baking soda followed by vacuuming; [c] when the odor persists, consider using specialized odor-eliminating sprays or products designed for fabrics, however, test them on a small, inconspicuous area first to ensure they do not cause discoloration or damage.

Cleaning contents on-site after a wildfire by professionals – The cleaning of contents may include on-location (on-site) cleaning using dry vacuuming, dry air washing, appropriate cleaners and solvents, and portable cleaning equipment. (1) Cleaning contents on-site after a wildfire by professionals is a crucial step in the restoration process to remove char, ash, and smoke residue. (2) Professional on-site content cleaning after a wildfire is essential to salvage and restore your belongings. By engaging professionals who specialize in post-wildfire content cleaning, you can ensure that the cleaning process is thorough, safe, and effective, helping you recover and preserve valued possessions. These are several considerations for professional on-site content cleaning after a wildfire: [1] <u>Assessment and Inventory</u>: Professional cleaners will conduct a thorough assessment and inventory of your belongings to determine the extent of damage and prioritize the cleaning process. They will categorize items based on their material, level of contamination, and fragility. [2] <u>Safety Precautions</u>: Professionals will take necessary safety precautions before initiating the cleaning process. This includes wearing personal protective equipment (PPE) such as gloves, masks, and coveralls to protect themselves from potential hazards like ash, soot, or chemical residues. [3] <u>Content Cleaning Techniques</u>: Professional cleaners utilize a range of cleaning techniques tailored to different types of materials and items. These may include dry cleaning methods, wet cleaning, foam cleaning, immersion cleaning, or specialized restoration techniques such as hydroxyl and ozone deodorization treatments and ultrasonic cleaning. [4] <u>Surface Cleaning</u>: Items with hard, non-porous surfaces like glass, metal, or plastic can be cleaned using appropriate cleaning agents, microfiber cloths, or brushes. Professional cleaners will carefully remove soot, ash, and residue from these surfaces without causing damage. [5] <u>Soft Goods Cleaning</u>: Soft goods such as clothing, linens, upholstery, and curtains require specialized cleaning methods. Professionals will use appropriate techniques, such as dry cleaning, wet cleaning, or laundering, depending on the fabric type and level of contamination. They may also employ deodorizing treatments to eliminate smoke odors. [6] <u>Electronics and Appliances Cleaning</u>: Professional cleaners have the expertise to clean and restore electronics and appliances that may have been affected by soot or ash. They will follow specialized techniques and use appropriate cleaning agents to safely remove contaminants from sensitive electronic components and ensure their functionality. [7] <u>Document Restoration</u>: If you have important documents, photographs, or other paper-based items that have been damaged by the wildfire, professional cleaners can provide document restoration services. This may include freeze-drying, cleaning, deodorizing, and preservation techniques to salvage and restore the documents. [8] <u>Deodorization</u>: Wildfire smoke can leave persistent odors on items. Professional cleaners employ deodorization techniques, such as ozone treatment or thermal fogging, to neutralize and eliminate odors, ensuring your belongings are fresh and free from smoke smells. [9] <u>Packaging and Storage</u>: After cleaning, professionals may carefully package and store cleaned items to protect them during the building’s restoration process and while repairs are being completed. Removing contents help prevent recontamination and ensures their safety until they can be returned.

Cleaning electronics after a wildfire by homeowners – Cleaning electronics after a wildfire requires special care and attention due to the sensitive nature of electronic components. It is highly recommended to seek professional assistance or consult with experts in electronics cleaning to ensure safe and effective restoration. Other than cleaning the surface of electronics, removing cases and parts should only be completed by professionals to avoid shock, fire, explosion (e.g., Li batteries), loss of software and computer data. Remember, the priority is always “safety”. If you are unsure or uncomfortable with cleaning electronics yourself, it is best to consult professionals who have the expertise and experience in handling post-wildfire electronics cleaning. They can ensure the proper restoration of your devices while minimizing the risk of further damage. Education Notes: Included next are several considerations before and during cleaning of electronics after a wildfire: [1] Safety Precautions: [a] Before handling any electronics, ensure the power is disconnected, and all devices are turned off. [b] Some appliances may have backup batteries that can still cause shock or explosion when they have contact with cleaning chemicals, and acid-based ash. [c] Wear appropriate protective gear, such as gloves and masks, to protect yourself from potential hazards like exposure to ash and chemical cleaners. [d] Electronics near wildfire heat (such as at a window or an outside wall, or any part of a burnt structure) where temperatures may have exceeded manufacturer specifications, or reached temperatures close to or above 120ºF, they may need to be replaced. [2] Professional Assessment: [a] Consult with professionals who specialize in electronics cleaning and restoration. They have the expertise and knowledge to evaluate the extent of damage and provide guidance on the best cleaning methods for specific devices. They may advise the homeowner that they can clean certain electronics themselves, or they should only be cleaned by a professional. [b] Inspection of each appliance should be done in an open space, on a table where the room has good lighting and ventilation, and electronics can be viewed on different sides. [3] Avoid Homeowner DIY Cleaning: [a] A homeowner who mixes chemicals or purchases electronic cleaning supplies and attempts to clean electronics without having prior knowledge and equipment can cause further damage to their electronics. [b] Many chemicals, including some electronic cleaning chemicals having contact with even microfine amounts of ash they may damage finishes, plastics, and screens. [c] Electronics of all types are delicate and sensitive to moisture, chemicals, and static electricity. [d] Professional cleaners use specialized chemicals, tools, and techniques to safely clean and restore electronic devices. [4] Dry Surface Cleaning: Dry vacuum or air brush cleaning methods are typically preferred for electronics. This involves gently removing loose debris, dust, char, and ash using specialized brushes, compressed air, or vacuum cleaners having appropriate attachments that do not carry a static charge back to electronics. [5] Surface Damp Cloth Cleaning: [a] Again, make sure all electronics are unplugged before cleaning. [b] Use surface cleaning solutions recommended by professionals that are specifically formulated for electronics. [c] Apply the solution to a soft cloth or lint-free microfiber cloth and gently wipe the surfaces of the device, being careful not to apply excessive pressure or allow any liquids to enter the device. [d] When surface cleaning a computer printer, follow manufacturer recommendations. If you do not have the cleaning instruction booklet, search the internet for it and follow it. [e] Clean all exterior surfaces first before opening drawers and doors on the printer. Make sure printer paper is removed, disposing the upper unused sheet of paper. [f] Remove ink tanks and if there is char and ash around ink tanks, consider replacing them. [6] Internal Cleaning: For more extensive cleaning needs, it is recommended to have professionals disassemble the electronics and clean internal components using specialized techniques, such as ultrasonic or dry-cleaning methods. These cleaning processes remove char and ash, and other forms of residue that may have entered the device and it allows for a more detailed inspection. [7] Cleaning Connectors and Ports: Pay attention to connectors and ports as they can be susceptible to contamination. Use compressed air or specialized cleaning tools to remove debris or ash from connectors and ports. Avoid using liquids that may cause damage or corrosion. [8] Post Cleaning Inspection: [a] After cleaning, it is important to have the electronics inspected and tested by professionals to ensure they are functioning properly and safely. They can identify any underlying damage or issues that require further attention or repair. [b] Any appliance having electronic parts or switches should be inspected, cleaned, and tested by professionals. [9] Testing: Once electronics are cleaned and repaired where they are determined to be acceptable, turning on the device is the final step to ensure it is operating correctly. [10] Warrantee: [a] Some manufacturers will void their product warrantee when the product was in a wildfire, even though the building was only smoke impacted as compared to burnt. [b] The warrantee then shifts to the professional repair or cleaning company who may warrantee their cleaning or the replacement of parts for up to 90 days. [11] Electronic Data: Whether the electronic is a table clock, radio, stereo equipment, printer, monitor, to a computer, professional service repair and cleaning companies are seldom responsible for the loss of software and data. [12] Specialty Electronics: [a] The group of specialty electronics involve the operation and function of the building including but not limited to smoke and carbon monoxide sensors and alarms, security systems with cameras, security gates, electronic doorbells, garage door sensors, solar panels, antennas and dishes, lawn sprinkler timers, perimeter property lights, etc. [b] These specialty electronic components and systems are highly sensitive to exposure to smoke, char, and ash, where they can fail to function correctly right after a wildfire or failure may occur months later. [c] Seldom will an electronics specialist handle all of these systems unless they are installed by them. Usually, a number of electronic specialists are required to inspect, clean, or replace each type of system. [13] Existing Service Maintenance Programs: The homeowner may be covered (insured) separately from their homeowner’s policy by their service maintenance program that covers solar, security camera, security gate, etc., for fire, wind, snow, ice, storm damage. [14] Purchasing Extended Maintenance Policy: [a] The homeowner should first consult with their insurance agent and determine if they already have replacement cost value (RCV) coverage for the “specialty electronics” mentioned herein; [b] whether it is less expensive to purchase an endorsement or rider for “specialty electronics;” [c] or it may be better to consult with each electronic system and purchase their extended maintenance policy, such as solar, security cameras, security gates. [15] Closing Remarks: [a] Unlike standard voltage 110v/120v powered electronics, low voltage electronics can be more susceptible to smoke and ash that cause corrosion to electronics and electrical components. [b] The cost to inspect, clean, test, and repair some low voltage systems outweighs the cost to replace. [c] In consulting with various professionals about carbon monoxide and smoke alarm’s purpose is to sense heat and smoke, and carbon monoxide, they recommend replacing all CO and smoke alarms in a house that was moderately to heavily impacted by wildfire smoke.

Cleaning electronics after a wildfire by a specialist – Cleaning electronics after a wildfire is a delicate process that is best handled by a specialist or professional with experience in electronic restoration. It is important to recognize electronics can be sensitive to heat, even though heat exposure was limited in time, and to smoke, even though smoke impaction was for a short time. Attempting to clean or restore electronics without proper expertise can lead to further damage, failure of the product to perform properly, or they may become a safety risk. Engaging a specialist in electronic restoration after a wildfire ensures a thorough and professional approach to cleaning and restoring electronics (e.g., computers and TVs, small and large appliances). Several considerations include: [1] Find a Qualified Specialist: Search for a restoration company or specialist that specifically offers electronic restoration services. They should have expertise in cleaning and restoring electronics affected by fire and smoke damage. Seek recommendations from insurance adjusters, local fire departments, or trusted sources who have experience with fire damage restoration. [2] Prompt Assessment and Evaluation: Contact the specialist as soon as possible to schedule an assessment of the electronic items. The sooner the evaluation takes place, the better the chance of successful restoration. The specialist will evaluate the extent of the damage and determine the appropriate cleaning techniques and restoration processes. [3] Professional Cleaning Techniques: [a] a specialist will utilize specialized equipment and cleaning methods designed for electronics to ensure effective and safe restoration; [b] they will use non-conductive cleaning solutions and techniques that do not harm sensitive electronic components[[c] care will be taken to prevent further damage during the cleaning process, such as avoiding the use of excessive moisture or harsh chemicals that may corrode or damage the electronics. [4] Disassembly and Cleaning: [a] in some cases, the specialist may need to disassemble the electronics to thoroughly clean all components and internal parts; [b] they will clean each part using appropriate techniques, including dry cleaning methods, gentle brushing, or controlled washing processes. [5] Drying and Decontamination: [a] after cleaning, the electronics will be carefully dried using specialized equipment to remove any remaining moisture and prevent further damage; [b] decontamination procedures may be performed to eliminate residual smoke particles or contaminants that could impact the functionality and longevity of the electronics. [6] Testing and Quality Assurance: [a] once the cleaning and restoration process is complete, the specialist will conduct thorough testing to ensure the electronics are functioning properly; [b] they will verify that all components are in working order and address any issues that may have arisen during the restoration process. [7] Compliance with Safety Standards: [a] a reputable specialist will adhere to safety standards and guidelines throughout the restoration process to minimize the risk of electrical hazards; [b] they will prioritize the safety of both the electronics and the individuals handling them.

Cleaning extensive char and ash contamination – 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 exterior building after a wildfire – The removal of damaging smoke and soot particles and residues from the outside surface of buildings and surrounding land. Education Note: [1] 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 the water temperature at the nozzle is extremely hot (above 140°F). [2] Cold water washing by using water in a garden hose or with a detergent will work to some degree, where scrubbing with brush works better. [3] Be careful in using high pressure water because it can enter cracks or cause cracks to develop, especially around doors and windows. (See: Cleaning landscape after a wildfire)

Cleaning exterior contents after a wildfire requires careful attention to remove soot, ash, and other debris by homeowners – The removal of damaging particles and residues from the outside surface of contents, appliances furniture, and fixtures. Remember to be cautious when cleaning exterior contents, especially if there are electrical components, fragile items, or materials that may react adversely to certain cleaning methods. When in doubt, seek expert advice to ensure the appropriate cleaning approach and to safeguard the integrity of the items. Several guidelines include: [1] Complete a Safety Assessment: Evaluate the safety of the area before beginning the cleanup. Look out for any structural damage, unstable structures, or hazards that may pose a risk. If in doubt, consult with professionals or relevant authorities. [2] Use Personal Protective Equipment (PPE): Before starting the cleanup process, make sure to wear appropriate PPE, including gloves, goggles, a dust mask or respirator, and sturdy footwear. [3] Remove Debris: Start by removing any large debris, such as charred items, fallen branches, or damaged outdoor furniture. Clear the area to create a safe and accessible space for cleaning. [4] Dry Cleaning: Use a broom, brush, or dry cloth to gently remove loose soot, ash, and debris from the exterior contents. Avoid applying excessive pressure, as it may embed the particles further. [5] Wet Cleaning: For items that can tolerate water and cleaning solutions, consider using a hose or pressure washer on a low setting to rinse off remaining residue. Work systematically from the top down to prevent streaking or recontamination. [6] Cleaning Solutions: Depending on the nature of the material being cleaned, you may use mild detergent mixed with water or specialized cleaning products recommended for outdoor surfaces. Follow the instructions provided by the manufacturer and conduct a patch test on a small, inconspicuous area first. [7] Scrubbing and Wiping: Use a soft brush or sponge to gently scrub the surfaces, focusing on areas with stubborn stains or soot. Wipe the surfaces with a clean cloth or sponge to remove the cleaning solution and rinse frequently. [8] Rinse Thoroughly: After cleaning, rinse the exterior contents with water to remove any remaining cleaning solution or residue. Pay attention to details, crevices, and hard-to-reach areas where soot or debris may accumulate. [9] Drying: Allow the cleaned items to air dry thoroughly before moving or using them. Consider placing them in a well-ventilated area with good airflow to expedite the drying process. [10] Additional Treatment: For specific materials or surfaces that require specialized care, such as outdoor fabrics, metal, or wood, consult professionals or follow manufacturer recommendations for cleaning and restoration. [11] Professional Assistance: In cases of extensive damage or valuable outdoor contents, it may be beneficial to consult with professional cleaning or restoration services experienced in post-wildfire cleanup.

Cleaning fabrics – The inspection and determination of 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 foam solutions – A spray foam cleaning method. Spray cleaning foams are intended to suspend loose and sometimes imbedded smoke and soot without damaging the substrate. Education Notes: [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. [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): [a] 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. [b] 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 an item, content, upholstery or building back to a state of cleanliness without supplemental procedures such as base sealers, paint, and finishes.

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

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 homes impacted by wildfire – Cleaning homes and contents impacted by wildfires is a crucial step in the recovery process to ensure the safety and well-being of occupants and their living environment. [1] Discussion: [a] At a minimum, it is advisable to consult with cleaning, restoration, and deodorization professionals, along with insurance adjusters who are experienced in wildfire damage restoration. [b] When a homeowner is left to decide on the best means and methods of what "they can do" to protect their property versus "allowing others to complete the same or similar cleaning and restoration services," they cannot be clearly defined in this description for which we apologize. [c] There are too many variables that require further discussion on a case-by-case basis that cannot be covered in this Glossary. Included as a minimum recommendation are steps to follow when cleaning homes impacted by wildfires: [2] Safety Precautions: Before entering the home, ensure that it is structurally safe and free from any hazards. Assess the stability of the building, including walls, floors, and ceilings, and address any immediate safety concerns. [2] PPE: Wear appropriate personal protective equipment such as gloves, masks, goggles, and protective clothing to protect yourself from potential contaminants, soot, ash, or hazardous materials. [3] Ventilation: [a] Open windows and doors to improve ventilation and allow fresh air to circulate throughout the house. [b] Use fans and air purifiers to help remove airborne particles and improve indoor air quality and change the home supply HVAC filters using a MERV rating of 13 or above. [4] Smoke, Char, Ash, and Other Organic Material Removal: Remove loose ash and soot from surfaces using vacuum cleaners with HEPA filters or damp cloths. Avoid dry sweeping or dusting, as it may cause particles to become airborne and spread. Pay attention to hard-to-reach areas, such as vents, ducts, and behind appliances, where ash and soot may accumulate. [5] Cleaning Surfaces: Clean all surfaces, including walls, ceilings, floors, countertops, and furniture, using appropriate cleaning agents and methods suitable for the specific materials. Follow manufacturer guidelines and use non-toxic, environmentally friendly products whenever possible. Use mild detergents, soapy water, or specialized cleaning solutions to remove residue and stains. Test cleaning products on a small, inconspicuous area first to ensure compatibility and avoid further damage. [6] HVAC Systems: Clean or replace HVAC filters, as they may have captured ash and soot particles. Consider professional inspection and cleaning of the HVAC system to ensure it operates efficiently and to prevent the spread of contaminants using MERV 11 at a minimum but preferrable MERV 13 or greater (depending on HVAC manufacturer recommendations). [7] Carpets and Upholstery: Professionally clean carpets and upholstery to remove soot, ash, and any lingering odors. Vacuum thoroughly to remove loose debris before cleaning. [8] Personal Belongings: Clean and disinfect personal belongings, including clothing, bedding, curtains, and other textiles, following the manufacturer's instructions or consulting with professional cleaners if necessary. For items with sentimental or high-value importance, consider consulting with specialized restoration services to ensure appropriate cleaning and restoration methods. [9] Air Quality Testing: If you have concerns about indoor air quality or potential contaminants, consider engaging professionals to conduct air quality testing to assess the presence of harmful particles or volatile organic compounds (VOCs). They can provide recommendations on remediation measures if needed. [10] Ongoing Maintenance: Keep up with regular cleaning and maintenance routines to prevent the accumulation of dust and debris, especially in areas prone to soot or ash buildup. Monitor indoor air quality and consider installing high-efficiency air filters or purifiers to maintain clean and healthy indoor environments throughout your community that was impacted by wildfire smoke, and particulate fallout.

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 HVAC systems after a wildfire – Cleaning HVAC (heating, ventilation, and air conditioning) systems after a wildfire is crucial to remove smoke as a chemical film, and particles containing char, as, soot, dust, and other debris that may have entered the system. Cleaning HVAC systems after a wildfire can be complex, where it is crucial to prioritize job tasks. Professional HVAC technicians have the expertise and specialized equipment to properly clean and inspect the system, ensuring it operates efficiently and safely after wildfire exposure. Professionals are to follow industry guidelines and standards, such as NADCA ACR Standard, 2021 edition: "*Assessment, Cleaning & Restoration of HVAC Systems*." General professional cleaning and deodorization guidelines for cleaning HVAC systems after a wildfire include: [1] Communities Continuing to have Smoke and Particulate Impaction: [a] when buildings remain occupied, or the indoor conditions require stabilizing as quickly as possible, remove heavy debris and any accumulation of ash that impacts air condition systems; [b] remove and replace ventilation filters with MERV 11 to 13, and increase air exchanges to a minimum of 5 ACH/h, as recommended by ASHRAE and EPA; [c] consult with the customer to ensure the above two measures were adequate, if not, consider installing indoor air scrubbers with activated charcoal and HEPA filters which is expected to increase occupant comfort. [2] Outdoor Smoke and Particulate is No Longer an Indoor Concern: [a] in occupied residential buildings, change ventilation filters at the beginning of the cleaning project and if required, again at the end of cleaning; [b] in occupied commercial buildings, change ventilation filters at the beginning of the cleaning project and again at the end of cleaning. [3] Inspection: Inspect the HVAC system, including outdoor units, air vents, ductwork, and filters, for ash and other debris, or damage. Take notes of all areas that may require special attention during cleaning or professional inspection. [4] Outdoor and Indoor (attics; garages) Mechanical System Cleaning: [a] remove any visible debris, such as ash, branches or leaves, from the outdoor unit using a soft brush or vacuum cleaner with a brush attachment. [b] for outdoor units, carefully clean the outdoor unit's fins, fans, and coils using compressed air followed by low-pressure water hose washing with a detergent to remove finer particles while avoiding using high-pressure water or excessive force that may damage the unit. [c] indoor units require controlled air washing and/or HEPA vacuuming, followed by detergent handwashing the exterior and interior (e.g., housing, plenum, the motor's exterior, supply and air return), while avoiding wetting electrical and electronic components. [5] Air Vents and Registers: Remove and clean air vents and registers using a soft brush or vacuum cleaner with a brush attachment. Wipe them and the inside with a damp detergent cloth or sponge to remove any remaining smoke film or particles. [6] Ductwork Cleaning and Deodorization: Smoke wash and particulate cleaning of ductwork is best done by professional HVAC technicians having the necessary equipment and expertise. [7] Insulated Mechanical Systems and Ductwork: Fire smoke clings to, absorbed into, and impacts HVAC system insulation and ductwork having interior linings. When the HVAC technician cannot guarantee insulation and interior ductwork lining cleaning and deodorization, consider removing and replacing insulation and ductwork. [7] Professional Mechanical System Inspection: Smoke film, char, ash, and soot can harm and corrode circuitry and electronic parts days, weeks, and months after the fire. Have a professional HVAC technician inspect the entire system for damage, malfunction, or contamination that may have occurred due to the fire. [8] Potential Complications: [a] the success of HVAC system cleaning and deodorization requires identifying smoke, char, ash and other particulate contamination near or at the air intake, such as insulation in the garage or attic, or the garage or attic itself remains impacted by smoke; [b] once HVAC systems are cleaned and deodorized, entrainment of contaminates can occur a second or third time from high winds bring with it smoke and ash. [9] Indoor Air Quality: [a] after HVAC system cleaning and deodorization, monitor the indoor air quality for persistent smoke odor or visible signs of soot particle fallout occurring on surfaces that may be coming through registers; [b] in commercial buildings, the presence of smoke odor or visible signs of particulate may be isolated to one system rather than the entire system, where further investigation is required by maintenance staff and the cleaning company.

Cleaning landscape after a wildfire – (1) Cleaning the landscape after a wildfire is an important step in the recovery process to restore the natural environment and promote regrowth. It is important to note that post-wildfire landscape recovery is a gradual process that may take time. Monitoring the landscape, adjusting restoration efforts as needed, and practicing ongoing maintenance are crucial to the long-term recovery and resilience of the ecosystem. (2) This discussion is more focused on removing wildfire debris after a wildfire. Here are several concerns when cleaning landscape (yards, driveways, etc.) after a wildfire: [1] Safety Precautions: [a] Before starting any cleanup efforts, it is crucial to prioritize safety. Ensure that the area is secure and free from any potential hazards, such as unstable trees, falling branches or damaged structures including falling roof tiles, ground hotspots and hidden hazards. [b] Wear appropriate personal protective equipment (PPE) such as gloves, masks, and sturdy footwear to protect against potential contaminants. [2] Debris Removal: Begin by removing any large debris, such as fallen trees, branches, or burned vegetation. This can be done using appropriate tools like chainsaws, axes, or heavy-duty equipment, depending on the scale of the cleanup. Be cautious of unstable or hazardous conditions during the removal process. [3] Char and Ash Cleanup: Wildfires leave behind a layer of ash and soot on the landscape. Use rakes, shovels, or brooms to gently sweep or collect the ash and soot. Dispose of it properly in designated waste containers or follow local guidelines for disposal. Avoid spreading the ash or soot into the air to minimize health risks. [4] Ground Assessment: After a wildfire, the ground may be affected by heat, ash, and loss of organic matter, such as burnt trees and shrubbery that leaves holes or soft spots on the surface of the ground. It is advisable to conduct a soil assessment to determine its condition and nutrient content. Consult with local agricultural extension services or soil experts for guidance on soil testing and appropriate remediation measures. [5] Erosion Control: [a] Wildfires can leave the soil exposed and vulnerable to erosion. Implement erosion control measures, such as applying erosion control blankets or installing erosion control barriers like straw wattles or silt fences. These measures help stabilize the soil, prevent erosion, and promote regrowth. [b] Weeks or months after the wildfire, rain will cause additional erosion, where some of the remaining valuable soil will leave the property and leave behind trenches and gullies that further destabilizes the ground. [6] Replanting and Restoration: Once the landscape is cleared and stabilized, consider replanting native vegetation to aid in the recovery process. Consult with local forestry or environmental agencies for guidance on suitable plant species and restoration techniques. This helps restore biodiversity, prevent soil erosion, and promote the regeneration of the ecosystem. [7] Irrigation and Water Management: [a] After a wildfire, the water-holding capacity of the soil may have been compromised, and the garden, lawn, and irrigation systems may have burnt. [b] While the homeowner may want to begin using their water system, a landscape professional must evaluate its function and need for repair. [8] Professional Assistance: Depending on the scale of the wildfire’s impact and the complexity of the landscape, you may consider seeking professional assistance from landscape restoration or environmental remediation companies. These professionals have the expertise, equipment, and resources to effectively restore the landscape and mitigate potential environmental hazards. [9] Insurance: Some homeowner’s policies have coverage for the loss of trees and foliage, including ground stabilization and the replacement of landscape, sprinkler systems, and irrigation.

Cleaning methods for textiles after a wildfire by homeowners – 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. Cleaning textiles after a wildfire requires special care to remove char, soot, ash, and smoke odors without causing further damage. Remember that cleaning methods may vary depending on the type of fabric and the extent of the damage. When in doubt, seek professional advice or assistance to ensure the best outcome for your textiles. Several methods to consider: [1] Safety Precautions: Before handling any textiles, put on gloves, goggles, a dust mask or respirator, and protective clothing to minimize exposure to contaminants. [2] Assessment: Evaluate the condition of the textiles and classify them based on their material type, fragility, and level of soot or ash accumulation. Some textiles may require professional cleaning or restoration. [3] Shake and Vacuum: Take the textiles outdoors and gently shake them to remove loose soot and debris. Use a vacuum cleaner with a brush attachment or a high-efficiency particulate air (HEPA) filter to carefully vacuum both sides of the textiles. This step helps remove fine particles without rubbing or spreading them deeper into the fabric. [4] Spot Test: Perform a spot test on an inconspicuous area of the textile to ensure that the cleaning method and solutions do not cause discoloration or damage. Follow the instructions provided by the textile manufacturer or consult a professional cleaner if uncertain. [5] Dry Cleaning: For delicate or valuable textiles, consider seeking professional dry cleaning services. Inform the dry cleaner about the items’ exposure to fire and smoke to ensure they use appropriate cleaning techniques. [6] Machine Washing: [a] Sort and Separate: Group textiles by color, fabric type, and level of soiling. Separate heavily soiled items from lightly soiled ones to prevent cross-contamination. [b] Pre-Treatment: Apply a pre-wash stain remover or a mixture of mild detergent and water directly to any visible stains. Allow it to sit for a short period as recommended by the product instructions. [c] Washing Machine: Place the textiles in the washing machine, following the care instructions on the garment labels. Use the gentle cycle and cool water to minimize the risk of setting stains or damaging the fabric. Avoid overloading the machine to ensure thorough cleaning. [d] Mild Detergent: Use a mild, fragrance-free detergent suitable for delicate fabrics. Avoid bleach or harsh chemicals that could further damage the textiles. [e] Odor Removal: To address smoke odor, consider adding a cup of vinegar or a specialized odor-neutralizing product to the washing machine during the rinse cycle. This can help eliminate lingering odors. [7] Air Drying: After washing, air-dry the textiles outdoors, if possible, in a shaded area away from direct sunlight. Hang or lay them flat on clean surfaces to prevent stretching. Ensure adequate airflow to aid in the drying process. Avoid using a clothes dryer, as high heat can set stains and shrink certain fabrics. Note, machine drying (clothes dryer) may adsorb residual smoke odors, resulting in cross-contaminating other clothing. [8] Inspect and Repeat Cleaning if Necessary: Once dry, inspect the textiles for any remaining stains, soot, or odors. If needed, repeat the cleaning process or consider professional cleaning services for stubborn stains or persistent odors. [9] Professional Restoration: For valuable or irreplaceable textiles or those with extensive damage, consult a professional cleaner or restoration specialist experienced in dealing with fire and smoke damage.

Cleaning musical instruments after a wildfire: Guidance for Homeowners and Musicians – Cleaning musical instruments that were exposed to a wildfire, it is important to remove any smoke residues, char, ash, soot, and other contaminants that settled on the instrument’s surface or inside. Regardless of the instrument type, it is important to exercise caution and seek professional assistance when needed. When instruments are in a case, smoke from the wildfire can still impact the instrument and its case. If you are unsure about the cleaning process or if the instrument suffered significant damage from the wildfire, it is advisable to consult a professional instrument technician or music store specializing in instrument maintenance and repair. They can provide guidance tailored to your specific instrument and ensure its proper cleaning and restoration. Included are several guidelines for cleaning different types of musical instruments: [1] Inspection: [a] inspect the surroundings of the instrument and determine if it has the smell of smoke odor, or if there is particulate residue at or near the instrument, it is does, then, likely it is affected; [b] even when wildfire smoke and particles are noticeable only near doors and windows, wildfire smoke is a gas that can be detected many distances away from windows, as well as micro-fine particles can travel throughout a room, even though they are unnoticeable to the human eye; [c] wildfire smoke and particles can damage cases, and they can damage finishes, corrode metal, and change the color of keys and plastics. [2] General Cleaning Practices for Instruments having a Wood Finish: [a] Unless it is a grand piano or organ, take instruments outdoors to a non-wildfire impacted area and place them on a clean table covered with a clean bath towel; [b] when the case or musician instrument’s finish can be scratched, use a new camel hair paint brush (e.g., 2 to 4 inches wide) and brush off loose particles. If you do not have a camel hair paint brush, use a soft dry cloth that has previously been washed numerous times and dry wipe using the least amount of hand pressure; [c] follow the normal cleaning practices you have commonly used to wet clean instruments, however, if you have not wet cleaned the instrument before, find cleaning instructions or contact a music shop or a “luthier,” that understands cleaning and wood conditioning products that restore moisture and prevents drying and cracking; [d] take apart instrument parts and use a solution the manufacturer recommends. [3] General Cleaning Practices for Grand Pianos and Organs: [a] when the instrument’s finish can be scratched, use a new camel hair paint brush (e.g., 2 to 4 inches wide) and brush off loose particles. If you do not have a camel hair paint brush, use a soft dry cloth that has previously been washed numerous times and dry wipe using the least amount of hand pressure; [c] follow the normal cleaning practices you have commonly used in the past to wet clean and polish the instrument’s exterior; [d] open the lid and with a HEPA vacuum, remove char, ash, and other debris; [e] be careful touching and vacuuming strings, turning pins, hammers, and the soundboard; [f] when the instrument is an organ, only exterior cleaning is recommended by the homeowner or musician, where interior cleaning should only be completed by a specialist. [4] <u>General Cleaning Practices for Drums and Cymbals</u>: [a] drums parts and cymbals can be damaged by smoke film, ash, and soot that must be removed as quickly as possible after the fire. [b] for drums, remove the drumheads and clean them separately following the manufacturer's instructions. Wipe down drum shells with a soft cloth and mild detergent cleaning solution; [c] clean cymbals with a specialized cymbal cleaner or a mixture of mild soap and water. Avoid abrasive cleaners or excessive scrubbing to prevent damage to the cymbal's surface. [5] <u>General Cleaning Practices for Guitars and Violins</u>: [a] use a soft, dry cloth to gently wipe down the instrument's surface, removing any loose particles or debris; [b] for light smoke, char, and soot residue, you can use a soft cloth slightly dampened with clean water and wipe the instrument's body and neck; [c] clean the fretboard using a specialized fretboard cleaner or lemon oil. Apply a small amount of cleaner or oil to a clean, lint-free cloth, and carefully wipe the fretboard, following the wood grain; [d] clean strings with a soft cloth or a string cleaning solution specifically designed for musical instrument strings; apply the solution to a cloth and gently run it along each string to remove smoke film or corrosion; after cleaning, wipe strings dry with a soft cloth to prevent moisture buildup. [6] <u>Humidity and Pollution Control Stabilization</u>: Whether instruments have been cleaned or not, the environment they are in should be humidity controlled where the sweet spot of humidity is between 40 to 60 % rH, and pollutants in air do not contain smoke, and particles containing char, ash, soot, and other fire-related debris.

Cleaning smoke film, char, ash, and organic materials removal process – Vacuuming followed by a using a mild alkaline detergent washing process to neutralize, retard, or stop pitting and corrosion or discoloration of finishes. <u>Education Note:</u> Initially on building material surfaces, soot vacuuming or air washing followed by a mild alkaline detergent washing helps neutralize, retard, or stop pitting and corrosion or the discoloration of finishes.

Cleaning solar panels after a wildfire – It is important to remove smoke film, char particles, ash, soot, and other debris that may have accumulated on the surface of the panel and roof as quickly as possible. When the building's owner has concerns or they are unsure about the cleaning specialists recommended cleaning process, consult the solar panel installer, service provider, or manufacturer for further advice. Several safety and cleaning issues include: [1] <u>Safety Precautions</u>: [a] before cleaning, ensure solar panels power is turned off and panels are disconnected from the power source, which is intended to avoid electrical hazards during the cleaning process; [b] wear appropriate personal protective equipment (PPE), such as gloves and safety glasses, to protect yourself when having contact with solar panels; [b] in pitched roofing involving inspection and cleaning, make sure there is sufficient tie downs and safety gear, and a fall-protection plan is in place. (29 CFR 1926.500-503) [2] <u>Visual, Camera, and Drone Inspection</u>: [a] inspect and photo document the roof for burns, missing tiles, etc.; [b] inspect the solar panels for any visible signs of broken or melted panels, char, ash, soot, and debris. [3] <u>Damage Assessment</u>: [a] when solar panels were exposed to intense heat or fire, it is advisable to have them inspected by a professional to ensure there is no damage to them or a reduction in performance; [b] check your solar panel warrantee or service policy, and the homeowner's insurance policy, since there may be coverage for breakage, fire damage, and repair; [c] when the roof is heat damaged, or high wildfire wind damaged roofing or it dislodged solar panel roof connections, repairing or replacing the roof may be required. [4] Gentle Cleaning Methods: [a] start by rinsing solar panels with a gentle stream of water to remove loose particles and dust; [b] pooled roof water may be an indicator drains are clogged, where they should be cleaned before proceeding with cleaning panels; [c] use a soft, non-abrasive sponge, cloth or spray rig with soft bristle brushes that gently clean panel glass and all sides of the panel; [d] avoid using abrasive materials or harsh chemicals that can scratch or damage the panels; [e] rinse thoroughly with clean water afterwards. [5] Drying: Allow solar panels to air dry after cleaning. Make sure they are completely dry before reconnecting them to the power source. [6] Regular Maintenance Agreement: If there is not a maintenance agreement in place, consider purchasing a regular maintenance schedule for solar panels, including periodic cleaning, to ensure optimal performance and efficiency. After a wildfire, and sometimes months afterwards, wind and inversion layers can increase the amount of pollutants in the air that cause panels to become dirtier faster.

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

Cleaning sponge, chemical – A type of manufacturer made rubberized sponge designed to capture soot and other particulate from surfaces. Education Notes: [1] Chemical cleaning sponges are not ideal to clean surfaces containing grease or oil, or fires that produce a greasy residue. [2] In wildfire impacted surfaces HEPA vacuuming loose particulate matter is preferred over the use of chemical cleaning sponges. Then, when required, a mild detergent cleaning of surfaces will be necessary.

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 system – A textile floor covering cleaning system is the implementation of principles, procedures, and methods used to achieve a desired level of cleaning.

Cleaning up wildfire ash after a wildfire – The cleanup of wildfire ash after a wildfire event requires careful consideration and appropriate measures to ensure safety and minimize health risks. The severity of the wildfire, the composition of the ash, and the presence of hazardous materials can vary. If you have concerns about the safety or extent of the cleanup, consider consulting professionals or contacting relevant authorities for guidance specific to your situation. Examples of proper cleanup starts with: [1] Follow Health Guidelines: Pay attention to any health advisories or guidelines issued by local health departments or environmental agencies regarding the cleanup and potential health risks associated with wildfire ash. [2] Wait for Official Clearance: Depending on the severity of the wildfire and the presence of hazardous materials, authorities may issue evacuation orders or advisories. It is important to wait for official clearance from local authorities before returning to the affected area and initiating cleanup activities. [3] Personal Protective Equipment (PPE): Before starting any cleanup activities, it is essential to wear proper PPE to protect yourself. This typically includes a dust mask or respirator, gloves, long-sleeved clothing, and eye protection. [4] Prevent

Airborne Dust: Take steps to minimize the generation of airborne dust during the cleanup process. Wetting down the ash with water or using a light misting of water can help keep the ash particles from becoming airborne. Avoid using leaf blowers or any activities that can disperse the ash into the air. [5] Protect Indoor Spaces: Close all windows and doors of your home or any other structures to prevent ash from entering. Seal off any air vents or other openings to minimize ash infiltration. Consider using weatherstripping or temporary seals for better protection. Follow EPA and CDC guidelines on "*Creating a Clean Air Space in Your Home*," and "*DIY Air Cleaner to Reduce Smoke Indoors*." [6] Remove Ash Safely: Use a gentle sweeping motion with a broom or a soft-bristle brush to gather the ash from surfaces. Avoid using vacuum cleaners or dry sweeping as they can stir up ash particles and worsen air quality. Place the collected ash in sturdy garbage bags for disposal. [7] Dispose of Ash Properly: Contact local authorities or waste management agencies to understand the proper disposal methods for ash. They may provide specific guidelines or designated disposal sites for ash from wildfires. [8] Clean Outdoor Areas: If there is a significant amount of ash in outdoor areas such as patios, decks, or play areas, gently hose down the surfaces to remove the ash. Be cautious not to create muddy runoff that can impact the environment. [9] Cleaning Contaminated Items: If personal belongings, such as clothing or textiles, have been directly exposed to ash and are contaminated, follow the manufacturer's instructions for cleaning or consider professional cleaning services. Avoid shaking items to prevent ash particles from becoming airborne.

Cleaning upholstered furniture after a wildfire by homeowners – (1) Cleaning upholstered furniture after a wildfire requires careful attention and proper techniques to effectively remove char, ash, and other residues while ensuring the safety of the fabric. (2) It is recommended to consult with professional upholstery cleaners who has experience in post-wildfire furniture restoration. (3) It is important to act promptly in cleaning upholstery after a wildfire to prevent further damage and minimize the risk of permanent staining or odor absorption. (4) Hiring professional upholstery cleaners with experience in post-wildfire restoration ensures that the cleaning process is carried out effectively and safely, preserving the integrity and appearance of the upholstery. These are several considerations when cleaning upholstery after a wildfire: [1] Description: [a] Upholstered furniture is a broad term for furniture having a fabric that covers a frame. It can include lawn, patio, garden, swimming pool, and interior furniture. [b] Upholstered fabrics are generally woven, but they also include canvas and leather. [c] The cleaning of upholstered furniture includes cleaning upholstery along with all exposed parts such as wood, plastic, metal, glass, or a combination of materials and finishes. [2] Professional Assessment: Consult with professional upholstery cleaners who can assess the condition of the upholstery and recommend the most appropriate cleaning and restorative methods. In other words, they can determine the fabric type, extent of damage (e.g., burns, stains, smoke, chemical residue), and the best approach to achieve effective restoration. [3] Safety Precautions: [a] Before cleaning, ensure the building is well-ventilated, and it has new house filters, following CDC, EPA, NIOSH recommendations for homeowners after experiencing a wildfire. [b] Wear gloves, masks, and protective clothing to minimize exposure to potentially harmful particles or chemicals. [4] Pre-Cleaning Inspection: [a] Inspect upholstery including canvas and leather furniture for heat damage, scorching, discoloration, color fading, burn marks, rips, and tears. [b] When possible, when touching or lifting furniture, wear cotton gloves rather than wearing latex or rubber gloves. [c] Avoid touching fabrics with your hands, including clean hands, because by carefully pressing your hand on some upholstery, the homeowner or others can leave handprints behind because their skin oil or residue from the wildfire can indent into the fabric. [d] Pre-existing conditions such as natural aging and use, wear marks, stains, rips, and tears must be identified since they can affect the cleanability and restorability of the furniture. [5] Vacuum and Air Wash Cleaning: [a] Dry cleaning methods is the first step in cleaning upholstery after a wildfire. [b] When possible, dry vacuum and air wash clean upholstered furniture outdoors in shaded sunlight where any wind movement faces away from the house. [c] Vacuuming includes using specialized attachments that will not scratch furniture, leather, or snag the weave. [d] Air washing involves using pressurized air that blows across the fabric, loosening and removing particulate into the air. [6] Dry Cleanable Fabrics: When the label says to “dry clean only,” do not attempt to clean those upholstered items by yourself. Hire a professional dry cleaning company to estimate cleaning, deodorization, and sanitizing costs, along with completing an inventory, photo documentation, remove, and take them to a dry cleaning plant. [7] Gentle Cleaning Solutions: [a] Read the manufacturer’s upholstery cleaning instructions and follow them. [b] The recommended cleaning solution is a mild dishwashing detergent containing Dawn Ultra. [c] That said, upholstery should only be cleaned by first using a test area , where the solution is placed on a soft cloth, where the soft cloth is lightly blotted on the upholstery. The goal is to determine the effectiveness of the cleaning solution, and whether there is a positive change in color. [d] The homeowner should inspect the bottom side of furniture (or cushion) to identify an unexposed area not affected by the wildfire and use it as a guide to identify the original color of the material. [e] Avoid using harsh or abrasive cleaners that can damage or discolor upholstery. Test any cleaning solution on a small, inconspicuous area first to ensure compatibility with the fabric. [8] Spot Cleaning: [a] For localized areas having stains or wildfire residue, spot cleaning may be necessary. [b] However, spot cleaning can “set in” the cleaning results of the localized cleaning process when spot cleaning is all that was completed. [c] Spot cleaning should be completed with a thorough wet cleaning of the upholstered furniture. [d] Depending on the purpose of spot cleaning, specialized cleaning solutions must match the type of spot. If the cleaning solution and type of spot is not matched, the spot can become worse, it becomes set, or the fabric can permanently change color. [9] Steam Cleaning: Steam cleaning is a common method for deep cleaning upholstery. However, professional cleaners have the equipment and expertise to perform steam cleaning safely and effectively. This process helps remove embedded particles, odors, and contaminants from the fabric. [10] Odor Neutralization: Wildfire smoke can leave lingering odors in upholstery. Spraying a chemical like Febreze may help to neutralize surface smoke odor, but it is not effective in removing smoke odors in foam, batting, and raw wood framing. Professional cleaners can use specialized deodorizing techniques or products designed for upholstery to help eliminate or reduce smoke and chemical odors. For more information go to: https://iicrc.org/s300/

Cleaning upholstered furniture after a wildfire by professionals – (1) Professional upholstery cleaning after a wildfire is highly recommended to ensure thorough restoration and removal of soot, ash, and other contaminants. (2) Hiring professional upholstery cleaners after a wildfire ensures that your upholstery is cleaned effectively, safely, and with appropriate methods and products specific to your fabric. They have the expertise, experience, and specialized equipment to restore your upholstery to its pre-wildfire condition, helping to eliminate soot, ash, odors, and potential health hazards. (3) The upholstery cleaning processes listed below assume upholstery can be cleaned onsite rather than in a cleaning plant. This may be true for light wildfire impaction, but moderate to severe wildfire impaction often requires upholstery to be removed to a cleaning plant. Education Notes: Included are several professional upholstery cleaning considerations: [1] Assessment and Evaluation: Professional upholstery cleaners will assess the condition of the upholstery, including the type of fabric, level of soot and ash contamination, and any visible damage. They will determine the most appropriate cleaning methods and products based on this evaluation. [2] Pre-cleaning Preparations: Before beginning the cleaning process, professionals will take necessary precautions to protect the surrounding areas and prevent further damage. They may use plastic covers or tarps to safeguard nearby furniture or flooring. [3] Dry Soil Removal: Professional cleaners will start by thoroughly vacuuming the upholstery using specialized tools and equipment. This helps remove loose debris, soot, and ash from the surface and crevices of the fabric. [4] Testing and Spot Treatment: Professionals will perform spot tests on a small, inconspicuous area of the upholstery to ensure that the cleaning products and techniques are compatible with the fabric. They will then treat any visible stains or heavily soiled areas using appropriate cleaning agents and techniques. [5] Cleaning Methods: Professional upholstery cleaners employ various cleaning methods depending on the fabric type, level of contamination, and specific requirements. Common techniques include steam cleaning, hot water extraction, dry cleaning, or low-moisture cleaning. They will choose the method that is most suitable for your upholstery. [6] Specialized Cleaning Products: Professional cleaners use specialized upholstery cleaning products that are effective in removing char, ash, and odors without causing damage to the fabric. These products are designed to safely lift and remove contaminants from the upholstery fibers. [7] Deodorizing and Odor Removal: Wildfire smoke can leave lingering odors in upholstery. Professional cleaners have access to specialized deodorizing techniques and products that can effectively neutralize or eliminate these odors, leaving your upholstery fresh and odor-free. [8] Drying and Finishing: After the cleaning process, professionals will ensure proper drying of the upholstery. They may use specialized equipment to speed up the drying process and prevent moisture-related issues. Once dry, they will inspect the upholstery to ensure that it meets their high standards of cleanliness. [9] Post-Cleaning Inspection: A final inspection is conducted to ensure that the upholstery has been thoroughly cleaned and restored. If any areas require additional attention, the professionals will address them accordingly. For more information go to: https://iicrc.org/s300/

Cleaning upholstery having moderate to extensive char, ash, and organic matter impaction – 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. For more information go to: https://iicrc.org/s300/

Cleaning upholstery having smoke odor – (1) Professional processes to remove trapped smoke odor in upholstery framing, foam, batting, and surface textiles. (2) A process that incorporates different cleaning and deodorizing methods to clean upholstery. For more information go to: https://iicrc.org/s300/

Cleaning upholstery, inspection before – [1] The inspection and determination of how upholstery (e.g., fabric and leather chairs, ottomans, couches) must be cleaned. [2] 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. For more information go to: https://iicrc.org/s300/

Cleaning upholstery using a spray – A water spray device or rig that washes off smoke, soot, and other debris. Education Note: [1] Read manufacturer's instructions before spraying water or other solvents on upholstery. [2] When upholstery labeling does not provide information on cleaning, test clean a piece of upholstery as outlined in IICRC "*S300 Standard for Professional Upholstery Cleaning*." For more information go to: https://iicrc.org/s300/

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

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

Cleaning using first a test area – A process by which a small area of a surface or material or finish can be test cleaned without causing any appreciable damage to that area.

Cleaning using 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 Notes: [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.

Cleaning using surface wiping – The process of cleaning a surface with a wipe (e.g., natural, and synthetic sponge, Terry cloth towel, microfiber cloth, cotton rag, paper towel; static and antistatic cleaning materials.

Cleaning wildfire residue in schools and commercial buildings – (See: "*Wildfires and Indoor Air Quality in Schools and Commercial Buildings*")

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 a wet sponge – The application of a wet sponge to clean off dust, dirt, soot, char, ash, 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.

Cleaning with air – A cleaning process by which air movement aids in the removal of pollutants from indoor air. Education Notes: [1] University of Florida and the University of Wisconsin's Disaster Handbook provides valuable information involving the management of fire damaged buildings. [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 does not 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 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 with forced air pressure – A cleaning process that uses dry compressed air to force settled and airborne matter off of a material and out of the airstream. This process is also called air sparging.

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 solubilization 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, 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 the 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 of 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. [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): [a] 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. [b] 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, 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 methods.

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

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

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 buildings. 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. For more information go to: https://www.metmuseum.org/blogs/in-season/2014/laser-cleaning-for-stone-conservation#:~:text=Stone%20surfaces%20are%20usually%20cleaned%20with%20Q-switched%20Nd%3AYAG,is%20largely%20incapable%20of%20affecting%20the%20stone%20surface.

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, 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 need 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 Notes: [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 Notes: [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 cleans 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. [3] 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.

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 Notes: [1] Restorative cleaning often requires 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 return 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.

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 (structural fire) – Soot vacuuming or air washing followed by a using 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 or air washing followed by a mild alkaline detergent washing helps 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 (e.g., spots, stains, discoloration).

Cleaning, sponge – An act of wiping and cleaning. Sponges are 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 sponge, chemical – A type of manufacturer made rubberized sponge designed to capture soot and other particulate from surfaces. Education Notes: [1] Chemical cleaning sponges are not ideal to clean surfaces containing grease or oil, or fires that produce a greasy residue. [2] In wildfire impacted surfaces HEPA vacuuming loose particulate matter is preferred over the use of chemical cleaning sponges. Then, when required, a mild detergent cleaning of surfaces will be necessary.

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

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 the 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, surface wipe – The process of cleaning a surface with a wipe (e.g., natural, and synthetic sponge, Terry cloth towel, microfiber cloth, cotton rag, paper towel; static and antistatic cleaning materials.

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 Notes: [1] 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. [2] 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. Education Notes: [1] When light or nuisance soot deposits are present, HEPA vacuuming may be all that is necessary to clean upholstery. [2] However, even when light or nuisance soot consists of wet soot or oily soot, professional cleaning is generally recommended. [3] 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 of 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 -500-watt lamps. Also, 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, char, ash, 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. (See: Cleaning sponge, chemical)

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.

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

Cleanup and Cleaning Checklist for “*Heat Damaged Property and Smoke, Char and Ash Impacted Structures*”– The priority checklist for completing a job hazard analysis (JHA) and risk assessment leading to identifying safety hazards and securing the property, identifying hazardous materials, hazardous waste, and the removal process. Once hazardous materials are removed, begin and complete cleaning and deodorization of the exterior and interior. [1] Worker Protection: [a] Air quality monitoring. [b] PPE and respiratory protection. [c] Heat stress monitoring. [d] Worker first aid. [e] Worker decontamination procedures. [2] Exterior: [a] Utility check (gas, electrical). [b] Hazardous materials assessment. [c] Hazardous materials handling. [d] Hazardous material disposal. [e] Biohazard cleanup (e.g., dead animals and rodents). [f] Safety investigation (e.g., solar panel, roof damage and falling tiles, shattered glass, burnt structure). [g] Management and disposal of non-hazardous waste. [h] Heavy debris removal. [i] Ash removal. [j] Asbestos abatement. [k] Lead paint abatement. [l] Gutter cleaning. [m] Pressure washing (e.g., roof, solar panels, skylights, soffits, siding). [n] Window, door, and deck cleaning. [3] Interior Structure: [a] Indoor air quality assessment. [b] Air and surface testing. [c] Friable asbestos particle abatement. [e] Lead paint abatement. [f] Ash removal. [h] Chimney cleaning. [i] Attic and crawlspace insulation removal. [j] Attic and crawlspace cleaning and deodorization. [k] HVAC system cleaning, duct cleaning and deodorization. [l] Hard surface HEPA vacuuming and wet cleaning (e.g., ceilings, walls, cabinets, vanities, doors, windows, skylights, ceiling fans, light fixtures, and chandeliers). [m] Final odor neutralization process. [4] Interior Contents: [a] drapery wet and dry cleaning. [b] Upholstery cleaning and deodorization (e.g., couches, chairs, lamp shades, fabric blinds, bed mattresses). [c] Soft fabric cleaning and deodorization (e.g., dry cleaning and wet cleaning of clothing, shoes, boots, blankets, personal items. [d] Hard surface cleaning (detergent damp wipe cleaning to aggressive detergent wet washing of electronics, tables, chairs, lights, antiques, and personal items). [e] Valuables and collectibles (e.g., antiques, artwork, musical instruments, collectibles, historical, and sentimental items). [f] Disinfection (e.g., dishware, cookware, silverware, baby and children’s toys, etc.)

Cleanup Checklist for “*Hazardous Materials Identification and Hazardous Waste Removal*”– The priority checklist for completing a job hazard analysis (JHA) and risk assessment leading to identifying safety hazards and securing the property, identifying hazardous materials, hazardous waste, and the removal process. When assessing known or potential wildfire hazardous waste, it is important to follow proper protocols for handling, containment, and disposal. Here is a checklist of 50 items to consider when managing wildfire hazardous waste: [1] Identify and categorize the hazardous waste based on its nature and potential risks. [2] Obtain necessary permits and certifications for handling hazardous waste. [3] Ensure that all personnel involved in handling hazardous waste are properly trained and equipped. [4] Establish designated areas for the temporary storage and containment of hazardous waste. [5] Clearly label and mark containers used for storing hazardous waste with appropriate warning signs. [6] Use leak-proof containers that are compatible with the hazardous waste being stored. [7] Have appropriate spill response kits readily available in case of accidental releases. [8] Implement spill prevention measures, such as secondary containment systems. [9] Segregate different types of hazardous waste to prevent cross-contamination. [10] Keep an inventory log of the hazardous waste, including types, quantities, and storage locations. [11] Conduct regular inspections of the storage areas to ensure compliance and identify potential issues. [12] Safely package and transport hazardous waste using approved containers and vehicles. [13] Clearly label vehicles transporting hazardous waste with appropriate hazardous materials placards. [14] Ensure that transportation personnel have the necessary training and permits. [15] Comply with all local, state, and federal regulations regarding the transportation of hazardous waste. [16] Maintain proper documentation, such as manifests and shipping papers, during transportation. [17] Coordinate with authorized hazardous waste disposal facilities for proper disposal. [18] Verify that the disposal facility has the necessary permits and is compliant with regulations. [19] Provide the disposal facility with accurate information about the hazardous waste being disposed of. [20] Ensure that hazardous waste is stored at the disposal facility in accordance with regulations. [21] Maintain records and receipts of hazardous waste disposal for documentation purposes. [22] Keep copies of all permits, certifications, and relevant paperwork related to hazardous waste management. [23] Conduct regular training and awareness programs for employees regarding hazardous waste management. [24] Develop emergency response plans and procedures for hazardous waste spills or accidents. [25] Have appropriate personal protective equipment (PPE) available for personnel handling hazardous waste.

[26] Provide training on the proper use of PPE and ensure its availability and maintenance. [27] Establish procedures for decontamination of personnel and equipment after handling hazardous waste. [28] Implement measures to prevent the release of hazardous waste into the environment. [29] Monitor air quality and implement appropriate measures to control emissions during handling and storage. [30] Properly manage and dispose of contaminated materials, such as absorbents or protective clothing. [31] Identify and address any hazardous waste that may be generated during cleanup activities. [32] Properly handle and dispose of hazardous waste containers that are damaged or deteriorated. [33] Keep a record of any spills, leaks, or releases of hazardous waste and report them as required. [34] Train employees on the proper identification of hazardous waste and the use of hazard communication systems. [35] Secure hazardous waste storage areas to prevent unauthorized access or tampering. [36] Regularly inspect and maintain hazardous waste storage containers and facilities. [37] Implement measures to prevent ignition sources and control fire hazards in hazardous waste storage areas. [38] Properly document and manage the disposal of hazardous waste generated during firefighting activities. [39] Identify and address any hazardous waste generated from damaged or destroyed structures. [40] Properly handle and dispose of hazardous waste associated with fire-damaged vehicles or machinery. [41] Implement measures to prevent the contamination of soil and water sources by hazardous waste. [42] Follow guidelines for the safe handling and disposal of hazardous waste contaminated with asbestos. [43] Properly manage and dispose of hazardous waste contaminated with heavy metals, such as lead or mercury. [44] Identify and address any hazardous waste associated with burned or damaged electronic equipment. [45] Properly manage and dispose of hazardous waste associated with burned or damaged batteries. [46] Ensure that hazardous waste containers are tightly sealed and secured to prevent leaks or spills. [47] Comply with regulations for the proper disposal of hazardous waste that may be considered infectious or biohazardous. [48] Properly manage and dispose of hazardous waste generated from the cleanup of fire suppression agents or foam. [49] Monitor and test the pH levels of hazardous waste to ensure proper handling and disposal. [50] Regularly review and update hazardous waste management procedures and practices based on regulatory changes and best practices.

Cleanup Guidelines for wildfire– The Federal Emergency Management Agency (FEMA) and other government agencies provide wildfire smoke cleanup guidelines. Many state, county, city, and local jurisdiction guidelines are similar to federal guidelines (e.g., FEMA, USDA, CDC, NIOSH, OSHA). Through various links such as 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 and https://community.fema.gov/ProtectiveActions/s/topic/0TOt0000000GzxwGAC/disaster-clean-up and https://community.fema.gov/ProtectiveActions/s/article/Wildfire-Debris-Removal-Food and https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation/emergencies/fires-and-food-safety and https://www.cdc.gov/disasters/wildfires/index.html and https://www.ready.gov/wildfires and https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/wildfire.html and https://www.airnow.gov/sites/default/files/2021-06/reduce-your-smoke-exposure.pdf and https://www.cdc.gov/disasters/wildfires/afterfire.html Government documents outline cleaning and remediation actions homeowners should undertake following a wildfire to reduce smoke and ash contamination of their properties. The courses of action specified by various agencies and private industries (e.g., American Red Cross) include but are not limited to: [1] Personal Protective Equipment: Wear a protective respirator, such as an N95 mask. Wear protective clothing, including a long sleeved shirt, long pants, work gloves, and sturdy, thick-soled shoes during clean up. These will protect you from further injury from broken glass, exposed nails, or other objects. Do not attempt to remove heavy debris by yourself. [2] Exterior Surfaces: Pressure wash, scrub or disinfect all exterior surfaces including walls, walks, drives, decks, windows, screens, etc. [3] Food: Discard food exposed to heat, smoke, or soot, where when in doubt, throw it out. When refrigerator and freezer power is off where food thaws, they should be disposed. [4] Interior Walls: 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; [5] Clothing: Launder or dry clean all clothing; [6] Wash, dust or otherwise clean all household items including knick-knacks. [7] Flooring: Disinfect and deodorize all carpets, window coverings, upholstered furniture and mattresses with steam or other appropriate equipment. [8] Upholstery: Upholstery, fabric window treatments, etc., can be spray-treated with deodorizing products available at most supermarkets, but do not use odor masking sprays. [9] HVAC: 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 or at least once a month for the first year. [10] Chemical Retardant: When 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. [11] Landscape: 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 Notes: [a] A precaution not provided in pamphlets and articles are the cleaning actions that should be performed in a way to minimize the re-entrainment of particles, such as wind that occurs weeks after a wildfire; [b] cleaning methods that should be avoided include vacuuming, dry dusting, sweeping, and vigorous wiping that will aerosolize char, ash, and vegetative particulates from surfaces; [c] cleaning of the interior of electronic components, such as computers, stereos, and televisions, as well as refrigerator condenser coils and fans, and other appliances that attracted wildfire particulates. (See: Levels of cleaning)

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)

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.

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 appliances 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 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 testing of char and ash – Surface and air test analysis results confirming particles of char, ash, and other particulate matter are no longer present that can cause or contribute to material damage and corrosion or poor indoor air quality.

Clearance, asbestos – An accepted method of air sampling used upon completion of final cleaning, during completion of final cleaning, at an asbestos abatement project. <u>Education Note:</u> 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, 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.

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. (<u>See:</u> Carbon monoxide)

CO_2 – Carbon dioxide. (<u>See:</u> 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 soil. 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.

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 pores, cracks, and crevasses where smoke and soot remains.

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

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. <u>Education Note:</u> Virtually any object may be considered collectible if a 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, which is also known as 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 on the basis of 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, the 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. (4) 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 Notes: [1] Combustion generally emits fire effluent accompanied by flames and/or glowing. (ISO 13943) [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 byproducts (building fire investigative testing) – A process in fire investigation and investigative testing to determine the presence of fire residues (char, black carbon/soot, and ash). The results are often used to determine the extent of property damage caused by smoke at locations (residential, industrial, or wilderness) to address sourcing, liability, and assist with remediation of contaminants. Testing can be done after a fire event to determine what areas might have been impacted, or the testing can be used during or after cleaning or remediation to guide professionals in their remediation efforts. Depending on the analysis requested and the type of equipment available, the laboratory can provide a number of testing services for combustion by products, from simple presence or absence analysis through potential sourcing analysis using advanced chemical and microscopic techniques, which include but are not limited to, polarized light microscopy (PLM), epi-reflected light microscopy (RLM), scanning electron microscopy (SEM), transmission electron microscopy (TEM), etc. (EMSL Analytical, Inc.)

Combustion byproducts sampling, field – The onsite investigation process which leads the hypothesis to confirm; laboratory sampling and analysis is required. Sampling may include but is not limited to, bulk material, dry swab, wet swab having different media such as IPA, tapelift (tape lift), micro-vacuum into a filter cassette, air sampling into a filter media, carbon absorption tube, Summa cannister and Tedlar bag.

Combustion byproducts testing, laboratory – Analytical methods in the lab, where the combustion byproduct uses simple or sophisticated means for analysis based on a level, such as CBP Level 1, 2, 3 and 4. (See: CBP Level I; CBP Level II; CBP Level III; CBP Level IV)

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 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.

Community outreach – Engagement and communication activities aimed at providing information, resources, and support to affected communities during and after a wildfire event.

Community Outreach and Education – Providing information and educational resources to affected communities regarding cleanup, restoration, and fire prevention.

Community resources and support – Government agencies, nonprofit (American Red Cross; local churches, schools) that provides assistance, resources, and support services to affected communities, including information, counseling, relief funds, and access to relevant support networks.

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.

Composition of wildfire smoke – Smoke from combustion of natural biomass is a complex mixture of particulate matter, carbon dioxide, water vapor, carbon monoxide, hydrocarbons and other organic chemicals, nitrogen oxides, and trace minerals. The individual compounds present in smoke number in the thousands. Most research on wildland fire emissions has centered on natural biomass fuels—the vegetative materials comprised of trees, needles, leaves, branches, litter, duff, stumps, grasses, shrubs, and downed trees. Education Note: Wildfires may also move into the wildland-urban interface (WUI) burning homes and structures in the process and thus consuming manmade materials in addition to natural fuels. More research is needed to understand potential health impacts of breathing this complex mix of natural and manmade material emissions. (*Wildfire Smoke: A Guide for Public Health Officials*, 2019) For more information go to: https://www.usfa.fema.gov/wui/

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.

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. 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.

Confined workspaces – Education Notes: [1] “Confined workspaces” are also known as “confined spaces”, are areas that have limited access or exit points and are not designed for continuous human occupancy. [2] These spaces typically have restricted openings for entry and exit and may pose potential hazards to workers due to their size, configuration, or the substances or conditions within them. Examples include but are not limited to working in attic and crawlspaces. [3] It is important for employers and project supervisors to comply with applicable regulations and standards related to confined spaces and to regularly review and update safety procedures to ensure worker well-being in these environments. Here are several key characteristics and considerations related to working in confined spaces: [a] Definition: Confined spaces are defined by specific criteria, which may vary depending on regulatory standards in different jurisdictions. Generally, a confined space is an enclosed or partially enclosed space that is not designed for regular occupation, has limited means of entry or exit, and may have potentially hazardous conditions. [b] Examples: Confined spaces can include tanks, vessels, tunnels, crawl spaces, ducts, pipelines, storage bins, and other similar structures. These spaces can be found in various industries, such as construction, manufacturing, utilities, and maintenance. [c] Hazards: Confined workspaces can present various hazards to workers, including poor ventilation, limited visibility, restricted movement, extreme temperatures, toxic gases, vapors, or chemicals, engulfment or entrapment risks, and potential for falls or collapsing structures. [d] Risk Assessment: Employers are responsible for assessing the risks associated with confined spaces in the workplace. This involves identifying potential hazards, evaluating their severity and likelihood, and implementing appropriate control measures to mitigate the risks. [e] Entry Procedures: Entry into confined spaces often requires specific procedures to ensure worker safety. This may involve obtaining permits, implementing lockout/tagout procedures, providing proper ventilation and lighting, utilizing personal protective equipment (PPE), and establishing effective communication systems. [f] Training and Competency: Workers involved in confined space operations should receive proper training on hazard recognition, safe work practices, emergency procedures, and the proper use of equipment. Competency in confined space entry and rescue procedures is crucial for ensuring worker safety. [g] Rescue and Emergency Response: Adequate provisions for emergency response and rescue operations must be in place before workers enter confined spaces. This includes having trained personnel, appropriate rescue equipment, and well-defined emergency procedures in case of an incident or worker injury.

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.

Conflicts - Limitations, complexities, or complications that result in a disagreement between the parties involved as to how the remediation is to be performed.

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. (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 guarantee paint will not be affected by temperature and humidity, bonding strength to sublayers, and the age and condition of paint to alter its appearance to heat. These are some of the factors that can cause paint to lift off a surface.

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. <u>Education Note</u>: Fire, heat, and smoke travel inside wood-framed 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. The ability of a fire to travel throughout a building is most often observed at the source of a fire, heat damage, smoke, and thermal pressures, on the surface of ceilings and walls.

Consultant – An expert in a particular field of 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 contaminated 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. (5) Any engineering control used to minimize cross-contamination from affected to unaffected areas. (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.

Containment and disposal of hazardous waste – The proper containment and disposal of hazardous waste materials generated during cleanup pursuant to federal, jurisdictional, state, and local regulations.

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. (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 may have affected the 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 smoke, soot, ash, char and chemical residue caused by fire or wildfire.

Contaminated by smoke – Materials and finishes that are impacted by chemicals, VOCs, PAHs, and other substances that make up smoke.

Contaminated by ash and char – (1) The presence of wildfire particulate matter in a building which may be capable of causing damage to materials and finishes. (2) Contents including upholstery, electronics and electrical that can experience damage from exposure to ash and char.

Contaminated soil remediation – The remediation of soil that is contaminated by wildfire-related residual chemicals and pollutants.

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. (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.

Contamination by 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.

Contamination from medium amount of smoke and soot – The categorization of an average amount of smoke and soot deposits as compared to light and heavy smoke and soot deposits.

Content – Any personal item in or outside the building including but not necessarily limited to clothing, appliances, furniture, dishware, food, electronics, antiques, musical instruments, works-of-art, and collectibles.

Content aggressive cleaning – A multi-step process on hard furniture for removing smoke, soot, char, ash, and vegetative matter. Education Notes: [1] Aggressive content cleaning generally begins with dry vacuuming to remove loose particulate followed by one or more attempts of wet cleaning using a degreaser rather than a mild detergent. [2] Multiple wet cleaning attempts are required when surfaces continue to identify on cleaning cloths and cleaning rinse water that a discoloration consistent with smoke residue exists. [3] Aggressive cleaning often requires all sides of the content to be cleaned, including inside and outside. [4] Items such as dishware and other hard surface items may be best cleaned in a dishwasher, where small electronics are best cleaned in an ultrasonic cleaning bath. [5] Large appliances are expected to be surface washed by field or shop cleaning technicians, where electronic components may need to be cleaned by certified appliance specialists. [6] Musical instruments, antiques, works-of-art, and collectibles for example should be evaluated by specialists.

Content assessment – A thorough inspection of item(s), determining age, condition, and effects from being damaged or contaminated by heat, smoke, soot, char, and ash; other matter brought into the building by neighboring burnt structures, such as lead, mercury, asbestos, along with toxins and carcinogens.

Content cleaning – The removal of smoke and particulate brought in from a wildfire or wildland fire. The prescribed cleaning process is based on the type of item, its condition and its impact by wildfire residue. Content cleaning generally involves vacuuming, wiping and/or a thorough immersion cleaning, or a combination of cleaning steps.

Content cleaning children’s toys, discussion about – [1] Hard toys that can be safely placed in a dishwasher or ultrasonic cleaner should be salvageable, as long as they can be disinfected before use. [2] Soft toys that can be placed in a clothes washing machine may be considered acceptable. [3] Games and other children’s toys made of soft plastic, rubber, cardboard, and paper, may be considered total loss since the cost of cleaning and disinfecting them may be outweighed by the replacement cost.

Content cleaning clothing and draperies – The type and degree of cleaning clothing and draperies, and other soft goods may vary depending on the relationship of the building to the wildfire, and the level of smoke and particulate impact. Education Notes: [1] Generally, washable clothing and draperies can be cleaned in a washing machine. However, smaller washing machines may not be able to clean draperies, quilts, comforters, etc. In addition, washable draperies requiring flat pressing and pleating should be completed by dry cleaning specialists. [2] Generally, dry cleanable items and items requiring pressing should be completed by wash-and-wear and dry cleaning plants. [3] Heavily smoke impacted clothing and draperies may not adequately become clean, since smoke may be capable of staining fabrics, cause loss of color and finish, may case dye bleeding, and smoke remains in the material.

Content damp cleaning – The process of using a clean cloth (cotton or microfiber) placed in a light detergent solution (e.g., Dawn Ultra), and wrung out, where it is applied across a surface to remove smoke film and particles. Education Notes: [1] The number of clean damp cleaning cloths required to clean the surface of contents is partially dependent on the degree (level) of smoke and particulate. The more obvious the debris the more cleaning is required. [2] However, in a light smoke impaction level, where there is a minimum amount of smoke and debris, the indicator for cleaning is based on test sampling a random number of surfaces and surface types.

Content dry vacuum cleaning – Dry vacuum cleaning to remove loose soot, char, ash and vegetative matter. Dry vacuum cleaning works well on most furniture (hard and soft upholstered), antiques, artwork, paintings and photographs covered with glass. Education Note: While dry vacuuming can be completed on most furniture, extraordinary measures must be considered when handling and attempting dry vacuum cleaning of sensitive draperies, lampshades, paintings, and collectibles.

Content handling – A term in computer estimating programs that describe a process where contents were picked handled, manipulated, and moved to another location in the building, a storage facility, or cleaning plant. (See: Content manipulation; Content moving; Content packaging)

Content inventory – An itemized list of contents that: were damaged; must be moved; are missing because of the wildfire; or they have to be moved to allow for building cleaning, refinishing, or repair.

Content itemization – An inventory of contents and amount.

Content lost its warrantee – After consulting with the store where the content was purchased or discussion with the manufacturer, or there is a need for service, it is disclosed or identified, the content is impacted by fire (heat), smoke, or ash, where the content to lost its warrantee. Education Note: [1] Common loss of warrantee include kitchen and bathroom appliances, small and large electronics including computers and TVs, or contents having a service maintenance policy. [2] Depending on their condition and exposure to the fire, loss of warrantee may include windows, doors, bed mattresses and box springs.

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. (See: Contents manipulation)

Content moving – The content pickup and removal process. Wildfire impacted contents may need to be: [1] moved to a non-smoke impacted part of a building; [2] taken away to a storage facility; [3] removed to a cleaning and deodorization plant.

Content packaging / Content packing – The careful wrapping and placement of items in a box or other storage container.

Content replacement – The replacement of a content because of burning embers, heat damage from high temperatures, smoke staining, smoke impaction to linings, fillers and foam, or ash impaction that caused corrosion. Education Note: [1] Some contents are replaced due to pre-loss condition, where cleaning can further damage them, such as sun faded draperies and upholstered lawn furniture. [2]

Contents that are not cost effective or capable of being surface cleaned, smoke odor deodorized, and restored.

Content restoration – The cleaning, sanitizing, repair, and other services such as refinishing to bring contents back to a pre-fire loss condition.

Content salvaging – The rescue of contents that are almost ready to be discarded or abandoned. Education Notes: [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. [4] Accepting the content in its current form because it cannot be replaced.

Content smoke staining discussion – Smoke staining from a wildfire refers to the discoloration or staining of surfaces caused by the deposition of smoke particles during a wildfire event. When a wildfire burns, it releases smoke that contains a mixture of fine particulate matter, ash, and other combustion byproducts. These smoke particles can travel long distances, be carried by wind currents, and settle onto various surfaces. The deposition of smoke particles can result in visible staining on different objects such as buildings, vehicles, outdoor furniture, and vegetation. The staining appears as a discoloration, typically dark or black in color, and can vary in intensity depending on factors such as the proximity to the fire, duration of exposure, and concentration of smoke. The components of smoke, such as soot and ash particles, can be sticky and adhere to surfaces. This can make smoke staining difficult to remove without proper cleaning techniques. In addition to discoloration, smoke staining may also have an accompanying odor. Smoke staining is a common consequence of wildfires, especially in areas near active fire fronts or those affected by heavy smoke plumes. It can occur both indoors and outdoors, affecting both man-made structures and natural elements. Smoke staining is primarily a cosmetic issue and does not pose significant health risks in itself. However, it serves as a visual reminder of the impact of wildfires and can be an indication of the presence of other harmful substances in the environment, such as pollutants or chemicals released during the fire. If smoke staining occurs indoors, it is advisable to follow appropriate cleaning procedures recommended by professionals or experts. This may involve using specialized cleaning products or techniques to remove the smoke residue effectively. Outdoor surfaces can be cleaned through power washing or scrubbing, depending on the material and extent of staining. It is important to consider safety precautions and follow local guidelines when dealing with smoke staining or any other wildfire-related aftermath.

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.

Contents adjuster, about –A contents adjuster, also known as a personal property or contents claims adjuster, is a professional who works for an insurance company or an independent adjusting firm. Their primary responsibility is to evaluate and assess the value of personal property or contents that have been damaged, lost, or stolen in an insurance claim. When an insured individual experiences a covered event such as a fire, flood, burglary, or natural disaster, they may file an insurance claim to seek reimbursement for the damage or loss of their personal belongings. This is where a contents adjuster comes into play. They are tasked with investigating the claim, documenting the extent of the damage, and determining the value of the affected items. The specific duties of a content's adjuster may include: [1] Claim Investigation: The adjuster visits the location where the loss occurred, inspects the damaged property, and interviews the policyholder or other relevant parties to gather information about the claim. [2] Documentation and Inventory: The adjuster creates a detailed inventory of the damaged or lost items, documenting their description, condition, age, and value. This may involve photographing or video recording the items and gathering any supporting documentation, such as receipts or appraisals. [3] Valuation: Using their expertise and knowledge of market values, the adjuster determines the fair market value or replacement cost of the damaged or lost items. They consider factors such as depreciation, condition, and comparable prices in the local market. [4] Negotiation and Settlement: Based on their assessment, the adjuster works with the policyholder to reach a settlement agreement. They may negotiate on behalf of the insurance company to ensure a fair and accurate reimbursement for the content's loss. The adjuster also provides guidance on the claim process and helps the policyholder understand their coverage and policy limits. [5] Documentation and Reporting: The contents adjuster prepares detailed reports and documentation to support the claim settlement. This includes itemized lists of damaged or lost items, estimates of repair or replacement costs, and other relevant information required by the insurance company. Contents adjusters need to have a solid understanding of insurance policies, valuation methods, and personal property appraisal. They must also possess strong communication and negotiation skills to work effectively with policyholders, contractors, and other parties involved in the claims process. [6] Other Adjusters: The contents adjuster's primarily focus on evaluating and settling claims related to personal property or contents. For claims involving structural damage or other aspects of property insurance, separate adjusters specializing in those areas, such as property or building adjusters, may be involved in the claims process.

Contents adjuster, wildfire – A wildfire content loss adjuster is a specialized type of insurance adjuster who specifically deals with claims related to property and personal belongings damaged or destroyed in wildfires. They play a crucial role in assessing the extent of damage, evaluating the value of the contents, and facilitating the claims process for individuals who have suffered losses due to wildfires. When a property is affected by a wildfire, homeowners or policyholders may file an insurance claim to seek compensation for the loss of their personal belongings, also known as contents. A wildfire content loss adjuster is assigned to these claims to investigate, document, and determine the value of the damaged or destroyed contents. The responsibilities of a wildfire content loss adjuster include: [1] Claim Investigation: The adjuster visits the affected property and assesses the extent of the content damage caused by the wildfire. They inspect the property, document the loss, and gather information from the policyholder regarding the affected items. [2] Inventory and Documentation: The adjuster creates a comprehensive inventory of the damaged or destroyed contents. They document the description, condition, age, and estimated value of each item. This may involve taking photographs, videos, or written records of the damaged property. [3] Valuation: Based on their expertise and knowledge of market values, the adjuster determines the fair market value or replacement cost of the damaged or destroyed contents. They consider factors such as depreciation, condition, and local market prices to arrive at a reasonable valuation. [4] Settlement Negotiation: The adjuster works with the policyholder to negotiate a fair settlement for the content loss. They communicate with the insurance company, advocating for the policyholder's interests and ensuring that they receive proper compensation based on the policy terms and coverage. [5] Documentation and Reporting: The adjuster prepares detailed reports and documentation supporting the content loss claim. This includes itemized lists of damaged or destroyed items, estimates of replacement or repair costs, and any other relevant information required by the insurance company. [6] Education and Experience: A wildfire content loss adjuster requires a deep understanding of insurance policies, valuation methods, and personal property appraisal. They must possess strong communication and negotiation skills to work effectively with policyholders, contractors, and other parties involved in the claims process. [7] Other Adjusters: In complex wildfire events with significant property damage, multiple adjusters may be involved, including contents adjusters, building or property adjusters, and possibly additional specialists depending on the specific circumstances of the claim. (See: Wildfire loss adjuster)

Contents cleaning – The cleaning, decontamination, and restoration of personal belongings, furniture, and other items affected by smoke, char, ash, or water damage resulting from firefighting efforts.

Contents damaged by fire – (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 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 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. (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 Notes: [1] 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). [2] Natural convection is caused by expansion of the liquid or gas when heated. [3] Expansion reduces the density of the medium, causing it to rise above the cooler, “denser” portions of the medium. [4] Gravity heating systems are examples of the profitable use of natural convection. The air that is heated by a furnace becomes less dense (consequently lighter) and rises, distributing heat to the various areas of the house without any type of blower. [5] 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.

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.

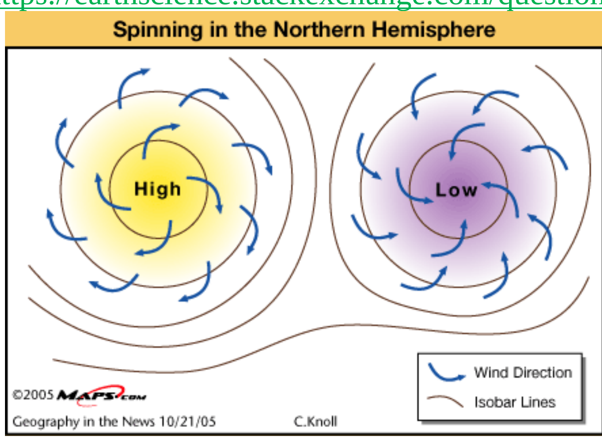
Convection heat transfer – The transfer of heat from one place to another by the movement of fluids (e.g., hydronic heating). Although often discussed as a distinct method of heat transfer, convective heat transfer involves the combined processes of conduction (heat diffusion) and heat transfer by bulk 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.

Coriolis effect / Coriolis force – An apparent force due to the rotation of the earth that causes a deflection of air to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. This force maximizes at the poles and is essentially zero at the equator. Education Notes: [1] The amount of deflection the air makes is directly related to both the speed at which the air is moving and its latitude. Therefore, slowly blowing winds will be deflected only a small amount, while stronger winds will be deflected more. [2] Likewise, winds blowing closer to the poles will be deflected more than winds at the same speed closer to the equator. [3] The Coriolis force or the Coriolis effect was first described by Gaspard-Gustave Coriolis, a French scientist, in 1835. [4] As seen from a fixed point in space, such a parcel would be moving in a straight line. This apparent force on the motion of a fluid (in this case, air) is called the Coriolis effect. [5] As a result of the Coriolis effect, air tends to rotate counterclockwise around large-scale low-pressure systems and clockwise around large-scale high-pressure systems. For more information about Coriolis effect in wildfire and tornadoes go to: https://www.mdpi.com/2571-6255/1/1/6 and https://earthscience.stackexchange.com/questions/3189/how-does-a-fire-tornado-form



Coriolis effect in a wildfire – Wildfires are primarily driven by factors such as fuel availability, weather conditions (including wind speed and direction), and topography. The ignition source and the local environment play significant roles in the initiation and spread of wildfires. The Coriolis effect becomes more noticeable in large-scale weather systems, such as hurricanes, cyclones, and large-scale atmospheric circulation patterns. It influences the direction of movement of these systems by causing a deflection of air masses or fluid currents as they move across the Earth’s surface. In the context of wildfires, the Coriolis effect is generally not a dominant factor. The primary drivers of wildfire behavior are local weather conditions, such as wind speed, humidity, temperature, and fuel moisture content. Wind plays a crucial role in spreading wildfires by carrying burning embers, heat, and combustion gases to unburned areas, but its influence is mainly determined by local topography and atmospheric conditions. Wind patterns can be influenced by large-scale atmospheric circulation systems, which are influenced by the Coriolis effect. However, the direct impact of the Coriolis effect on the behavior or spread of individual wildfires is typically negligible compared to other factors specific to the local fire environment.

Corrosion – (1) Action or the effect of eating away gradually. Corrosion results through oxidation caused by acids or alkali (acid induced corrosion by smoke, soot, char, and ash). (2) The result of chemical reaction between a metal and its environment, such as air, water, and impurities in same.

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.

Crazing – Fine cracking of glass, usually from heat of fire. Education Note: As the temperature of glass increases, the only type of breaking that is likely to be observed is explosive cracking, giving an appearance similar to a mechanical fracture with radial cracks. Typically, cracks or broken inner panes of a multi-pane window are readily evident. Crazing (tightly spaced random cracks) occurs when water is applied to the surface of heated glass. The wetting of heated glass should be avoided, as it may create an unplanned ventilation opening. For more information go to: https://www.interfire.org/features/glass_breakage.asp

Creeping fire – (1) Fire burning with a low flame and spreading slowly. (2) A fire spreading slowly over the ground, generally with a low flame.

"*Creating a Clean Air Space in Your Home*" – Advice from CARB about protecting yourself and family from breathing in harmful particles in wildfire smoke. For more information go to: https://ww2.arb.ca.gov/protecting-yourself-wildfire-smoke

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.

Criteria pollutants – Pollutants deemed most harmful to public health and welfare and that can be monitored effectively. They include carbon monoxide (CO), lead (Pb), nitrogen oxides (Nox), sulfur dioxide (SO_2), ozone (O_3), particulate matter (PM) of aerodynamic diameter less than or equal to 10 micrometers (PM_{10}) and particulate matter of aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$).

Critical burnout time – The total time a fuel can burn and continue to feed energy to the base of a forward-traveling convection column.

Cross-contamination – (1) The spread of contaminants from an affected area to an unaffected area. (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.

Crown fire (wildfire) **–** (1) A fire that spreads across the tops of trees or shrubs more or less independently of a surface fire. (2) A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. (3) A wildfire that spreads through the upper branches and foliage of trees, often characterized by intense heat and rapid movement. Education Notes: [1] Crown fires are sometimes classed as running (independent or active) or dependent (passive) to distinguish the degree of independence from the surface fire. [2] Crown fires are often driven by strong winds and can result in significant tree mortality and long-lasting ecological impacts.

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.

Cultural resource protection – Efforts to identify, protect, and preserve cultural and historical resources that may have been affected or damaged by wildfires.

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 – The ambient, building and content conditions they currently are in.

(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 damage 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) related 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 cleanup, decontamination, and remediation.

Damage, collateral from remediation (insurance) – Unintended damage sustained by non-affected building materials or contents during 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 of a material that sustained direct heat damage or a direct impact from heat such as smoke and soot; water and moisture; corrosion. <u>Education Note:</u> 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. <u>Education Note:</u> 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., sunlight, fading, smoke and fumes, acids); or from an event such as a fire or water. <u>Education Note:</u> 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. <u>Education Note:</u> 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 (building fire) – Damage that consumes most if not all the building or item; or it has compromised the material’s structural integrity or its environmental state. <u>Education Note:</u> 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 – (<u>See</u>: 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. (<u>See</u>: 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. <u>Education Note:</u> 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. (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. <u>Education Note:</u> 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, 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. <u>Education Note:</u> In building fires, light damage may be a result of 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. (<u>See</u>: Light damage)

Damage, medium – (<u>See</u>: Damage, moderate)

Damage, moderate (building fire) – The amount of carbon combustion and smoke residue along with some physical material damage (charring or heat damage) to building materials and/or finishes. <u>Education Note:</u> 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 (building fire) – Damage to a surface area or material that is damaged 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 to 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 (building fire) Building damage that arises out of primary damage, such as smoke impaction inside walls and ceilings, attics, and crawlspaces. (2) Damage to materials or contents sustained from indirect or prolonged exposure to disaster contaminates such as heat, moisture, humidity, and smoke. Examples of secondary damage can include absorbed moisture or humidity, microbial growth, and acid residue discoloration. (See: Primary damage)

Damage, secondary (wildfire) Building damage that arises out of primary damage, such as wildfire char and ash fallout that occurs continuously over the next few days or a gust of hillside wind occurring weeks later. Another example is damage resulting from the cleanup of neighboring burnt buildings. (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 previously 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 (heat damage, smoke, char, ash, 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.

Debris – The building material waste after demolition and unwanted waste after a fire.

Debris burning fire (fire suppression) – A fire spreading from any fire originally ignited to clear land or burn rubbish, garbage, crop stubble, or meadows (excluding incendiary fires).

Debris burning fire (prescribed fire) – A fire used to dispose of scattered, piled, or windrowed dead woody fuel, generally in the absence of a merchantable overstory. Its purpose is to reduce unsightly fuel concentrations or consume unwanted natural fuels to facilitate subsequent resource management or land use actions on the area.

Debris removal – (1) Removal of burnt debris and charred materials from the affected area. (2) The removal and disposal of unusable items and materials that does not have any redeeming salvage value. (3) The process of clearing and removing burned materials, such as vegetation, structures, and debris, from the fire-affected area. (4) The removal of fire-damaged debris, including damaged structures, vehicles, and other materials, from fire-affected areas.

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, 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 by removing the contaminate. [1] Workers exposed to a contaminated are decontaminated by washing with soap and water, or in more severe situations, additional workers help remove PPE of a contaminated person. [2] Buildings that are decontaminated by a series of cleaning, deodorizing, and remediation processes.

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 the surface.

Decontamination – (1) The removal of toxic, allergenic, or dangerous substances from a building or its contents. (2) The systematic removal of toxic, allergenic, or dangerous substances from a building or its contents. (3) Cleaning and decontaminating surfaces and objects affected by fire or hazardous substances.

Decontamination / Decon / D-con – (1) The cleaning and decontaminating surfaces and objects affected by fire or hazardous substances. (2) 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. (3) The process by which the unsanitary water and sewage cleanup and remediation process occurs. (4) 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. (5) The removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects. (6) 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 of PPE – The removal of harmful substance off worker’s PPE before they doff their PPE.

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. 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. (See: Depreciation)

Deep cleaning – A restorative (corrective) carpet or upholstery cleaning process that removes embedded dirt, spots, and odors. Restorative cleaning utilizes a 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.

Deep-seated fire – (1) A fire burning far below the surface in duff, mulch, peat, or other combustibles as contrasted with a surface fire. (2) A fire that has gained headway and built up heat in a structure so as to require greater cooling for extinguishment.

Dehumidification – The process of reducing the moisture content of air.

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.

Deflagration – (1) Chemical decomposition by burning material in which the reaction is less than sonic velocity, for example, low explosives. (2) A burning with great heat and intense light. (3) 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. (4) A combustion wave propagating at subsonic velocity relative to the unburned gas immediately ahead of the flame, such as the burning velocity, where "U," is smaller than the speed of sound and "C," in the unburned gas. (5) Propagation of a combustion zone at a velocity that is less than the speed of sound in the unreacted 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, 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 grease 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 immediate attention by a conservator or restorer to prevent further damage or loss.

Degree of damage, marked (conservation management) – Works of art are marked as to damage which is readily identifiable, 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 and 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 of 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., sunlight, 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. (2) The process of removing moisture from the air.

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.

Demolition and deconstruction – Demolishing and deconstructing fire-damaged structures that are beyond repair or pose safety risks.

Deodorant – A chemical or gas that covers, modifies, removes, or destroys odor causing agents.

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 perspective, 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. For a free article download go to: http://scrt.org/free-reports/doc_view/146- odor-neutralization-assessment-and-control

Deodorization and odor control – Removing or neutralizing unpleasant odors left behind by smoke and fire.

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. Education Note: There are four principles for effective, permanent deodorization: [1] 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] IICRC: Fire and Smoke Restoration Technician (FSRT) course [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.

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 odors 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.

Depressurization – A condition that occurs when air pressure inside a structure is lower than air pressure outside.

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. (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 fire, 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.

Dewpoint – 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 it is 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;” such as a bactericide, fungicide, and virucide.

Disinfectant-detergent – A chemical product that is formulated with cleaning agents and germicides, selected for soil removal, such as 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 would 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.

Drones used in wildfire documentation – When it comes to documenting catastrophic wildfire losses, drones that are equipped with high-resolution cameras and advanced imaging capabilities, can be valuable tools for capturing detailed exterior documentation of damage caused by the wildfire. Education Notes: [1] Under ideal conditions the drone can document damage to the property’s landscape including trees and shrubbery, damage to roofing, siding, windows, doors, and detached buildings. [2] When the structure is unsafe, where it was partially burnt, the drone can be flown indoors where it documents interior conditions. [3] Many insurers rely on drones to document the conditions in entire communities down to a single structure.

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 must evaporate volatile ingredients in order 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. (2) Air devoid of water vapor and pollutants. Education Notes: [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. [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 Notes: [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. [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 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 Notes: [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. [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 lose 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 the ability to dissolve oils, greases, etc.

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, char, soot, and chemical 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.

(2) A reasonable approximation of conditions prior to the moisture intrusion, or by comparing moisture content conditions in unaffected areas of the building. (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. (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 amount 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 solvent foggers – Specialized smoke odor counteractant machine and chemical that produces 0.5 to 2 micron in size particles to pair and help neutralize smoke.

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 – 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: [1] Turn off and unplug the lamp to avoid unnecessary shock; [2] Dry vacuuming can be completed by one person where the lamp is normally positioned. [3] It is recommended to place a dry, soft cotton towel around the lamp, to capture falling dust, and avoid scratching finishes. [4] Do not touch the dirty silk fabric with your hands; only hold the shade by the expose metal frame top; [5] The success of the dry-vacuum cleaning process greatly depends on the age and condition of the lamp shade and silk fabric. [6] 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. [7] When possible, use a HEPA vacuum to remove dust, skin cells, dander, allergens, and mold spores. [8] 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. [9] 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 of 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.

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 the moisture intrusion, or if contents require special handling, specialized drying chambers can be created to process contents outside the affected area.

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, 2013 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 windowsills 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.

Ecological recovery – The natural or assisted regeneration and re–establishment of plant and animal communities in fire-affected ecosystems.

Ecological monitoring – Ongoing monitoring and assessment of post-fire ecosystems to track ecological recovery, species recolonization, and ecosystem resilience.

Ecosystem – An area where energy, nutrients, water, and other biological and geological influences, including all living organisms, work together and influence one another.

Ecosystem recovery – Assessing the ecological impact of wildfire and implementing measures to promote the recovery of the ecosystem.

Eddy effect (air movement; air circulation) – (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 air 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. <u>Education Note:</u> 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 vehicle 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, and dispose of the vehicle’s components. 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 hazards caused by wildfire – Wildfires can pose significant electrical hazards due to the destruction they cause to electrical infrastructure and the increased risk of downed power lines. In the event of a wildfire, prioritize personal safety and follow evacuation orders and guidelines from local authorities. Avoid contact with any electrical equipment or power lines that may have been affected by the fire. Report any electrical hazards to the appropriate authorities or utility companies to ensure proper assessment and mitigation. Even when the building’s power is on when the homeowner or commercial building maintenance staff return to the building, this does not necessarily mean all appliances, motors, and electrical systems are operating correctly. After a wildfire, it is always advisable to consult licensed electricians and professionals having expertise in handling electrical systems to ensure the safety and integrity of the electrical infrastructure. Here are several common electrical hazards associated with wildfires: [1] Downed Power Lines: Wildfires can cause power lines to fall due to heat, burning trees, or structural damage. These downed power lines can remain energized and pose a severe electrical hazard. It is crucial to stay away from any fallen power lines and immediately report them to the local utility company. [2] Power Outages: Wildfires can result in power outages as a safety measure or due to damage to electrical infrastructure. When power is restored, there may be surges or fluctuations that can damage appliances and electronics. It is advisable to unplug sensitive devices during power outages and wait for stable power before reconnecting them. [3] Structural Damage: Wildfires can damage electrical systems within buildings, leading to exposed wires, melted cables, or compromised electrical panels. Avoid touching any exposed or damaged electrical components and have a qualified electrician assess and repair the system before restoring power. [4] Smoke Film, Char, and Ash: Smoke, char and ash generated by wildfires can infiltrate electrical equipment, such as outlets, switches, and circuit breakers. These contaminants can compromise the functionality of electrical components and increase the risk of short circuits or electrical fires, days, weeks and months later. It is essential to have a professional inspect and clean the electrical system to remove smoke residue and ensure their safe operation. [5] Reenergized Motors and Electrical System Hazards: Motors, electrical systems, and appliances generally turn them self-back on when power is restored. However: [a] older motors may have frozen up, where power causes them to heat and smolder; [b] other systems may be on timers, where resetting timers is important followed by ensuring they work correctly; [c] swimming pool filtration motors can become overloaded with debris causing them to smolder or cause a fire; [d] timers and electrical wiring for lawn sprinklers burn and melt, causing electrical hazards and fire; [e] security gate systems and security cameras may be near the burn area where wiring and systems become melted; [f] refrigeration systems requiring clean air may have their coils and motors clogged with smoke and debris. As a secondary hazard, food in refrigerators and freezers may refroze, where its product is spoiled and is tainted. [5] Generator Use: During power outages caused by wildfires, some individuals may resort to using generators for temporary electricity supply. Improper installation or operation of generators can lead to electrical hazards, including electric shock, carbon monoxide poisoning, or fire. Follow the manufacturer's instructions and safety guidelines when using generators and consider having a licensed electrician install a transfer switch to safely connect the generator to the home’s electrical system. [6] Re-entry Safety: When returning to an area affected by wildfires, it is crucial to follow the instructions and guidelines provided by local authorities and utility companies. These guidelines often include precautions for electrical safety, such as inspecting the electrical systems before re-energizing them, reporting any visible damage or hazards, and avoiding water-damaged electrical equipment.

Electrical smolder – A condition caused by heat originating in an electrical device or wire. Electrical smolder odors are very distinct as 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 will challenge the moisture impacted materials to reach a state of equilibrium over time.

Ember shower – A barrage of burning embers carried by wind from a wildfire, capable of igniting new fires at a distance.

Ember wash – Glowing embers that smolder in ash after a wildfire. Education Note: Embers radiate a substantial amount of heat long after the fire has quelled or has been extinguished, and if not put out, they can rekindle a fire that is thought to be completely extinguished and can pose additional fire hazards.

Ember washing – Once the fire is out, the removal of burnt char particles that settled on the property. Generally, ember washing is combined with the complete removal of wildfire debris and washing of exterior contents and structure.

Emotional support services – Provision of counseling, mental health support, and resources to individuals and communities affected by wildfires, addressing the emotional and psychological impacts of the disaster.

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 services, fire damage restoration 12 steps – Complete the necessary steps to protect life and property. Generally this follows but may not be limited to: [1] ensure occupants are safe and have been removed from dangerous conditions; [2] get a valid contract signed; [3] complete a risk assessment, which ensures the building is safe for workers to enter; [4] when the building is not safe to enter, such as it is not structurally sound, potential explosive gases may be present, a toxic environment may exist, where there is an increase in worker awareness, training and PPE, provide appropriate supervision, training and equipment before entering; [5] secure the building, including emergency board-up, fencing, and roof-wrap; [6] document building and work conditions using video, still photos and 3-D tours; [7] document the condition of total loss, potentially salvageable and salvageable personal possessions; [8] preserve potential causes of the fire to prevent spoliation of evidence; [9] identify, box, and remove customer requested documents, valuables, collectibles and immediate need items; [10] corrosion control items that can be further damaged by smoke, soot and ash; [11] have immediate need items such as clothing, computers and other valuables removed as quickly as possible followed by cleaning, deodorization and restoration, where they are quickly delivered to the customer for use; [12] when electric power is burnt or turned off, but power is required to protect or maintain favorable conditions in the fire damaged building, provide temporary power.

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 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 sampling of fire damage in buildings – The value of sample data is dependent on the quality of, and reliability of, the collection method and sampling procedure used. There are a few commonly used methods for the sampling of combustion by-products, including Tape Lifts, Wipes, MicroVac, and Air. Each method has its own advantages and disadvantages. Below is a brief summary of the sampling methods provided by Eurofins Laboratory:

Sampling Method	Advantages	Disadvantages
Tape Lifts	Good collection efficiency for particles with typical dust loading; Defined sample area for analysis;	Low collection efficiency for rough surfaces; Extremely fine particles (e.g., soot) can be obscured by the tape adhesive;

	Maintains particle integrity during collection; Little to no damage to captured particles	TEM confirmation of soot cannot be applied; Limited sampling area per tape lift
Wet Wipes	Able to sample relatively large area; Efficient for relatively smooth nonporous surfaces with low or heavy loading; Can be used for TEM soot confirmation analysis and chemical analysis (e.g., PAHs)	Not appropriate for porous surface; Physical separation of particles collected as agglomerates often results; Liquid agents may degrade or solubilize the particles; Can remove finishes (e.g., paint), affecting analytical results
Microvac	Easy sample preparation in the lab; Effective for collecting particles from porous and uneven surfaces; Permits the confirmatory identification of soot by TEM; Permits chemical analysis of collected material	Ineffective for collecting particles from relative smooth, nonporous surfaces with low loading; Does not preserve positions of particles on the original surface; Can induce damage to delicate structures or agglomerates such as char and ash
Air	Easy sample preparation in the lab; Can determine if combustion-by-products is airborne; Can have direct respiratory health implication; Can be used for soot confirmation by TEM	Limited to airborne particles only; Can be significantly reduced if sampling is done after extensive period from the fire damage

Environmental analysis of burnt structures affecting neighboring buildings, and structures impacted by wildfire smoke and particulate – Using tapelifts and other sampling methods, a qualified laboratory can provide the sampling specialist with a number of analysis methods. Not included in sampling and laboratory analysis of wildfire residue includes heavy metals, such as mercury, lead, zinc, manganese. (New Analysis Shows Spikes of Metal Contaminates in 2018 Camp Fire Wildfire Smoke). Below is a brief Table of several laboratory analysis methods provided by Eurofins Laboratory.

Fire Source	Recommended Test Method
Wildfires - initial inspection and post cleanup verification	PLM, Corrosivity; Anion panels
Wildfires - structural impact assessments	PLM, Corrosivity; Anion panel; Chloride
Structural fires	PLM, Corrosivity; TEM/SEM confirmation; Chloride
Disaster fires	PLM, Corrosivity; Anion panel; Chloride
Smoke impact from nearby fire (wildfire or structure fire)	TO-13A; TO-15
Forensic investigation of fire origin	Assemblage

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.

Environmental determination (testing) – It should only be used to resolve a dispute or provide confirmation. While resolving disputes and providing confirmation can be one aspect of environmental testing, it serves a broader purpose in assessing environmental conditions, identifying risks, ensuring compliance, and informing decision-making related to environmental protection and management. Education Notes: [1] Environmental determination testing, also known as environmental testing or environmental analysis, is a process of assessing and analyzing the environmental conditions and contaminants present in a specific area or property. [2] While environmental testing can be used to resolve disputes or provide confirmation in certain cases, it serves a broader purpose beyond dispute resolution. [3] Here are several key points to consider: [a] Environmental Assessment: Environmental testing is often conducted as part of an environmental assessment or due diligence process. It helps identify potential environmental hazards, contaminants, or risks associated with a property or area. This information is crucial for making informed decisions regarding property transactions, development projects, or regulatory compliance. [b] Compliance and Regulatory Requirements: Environmental testing may be required by regulatory agencies as part of compliance with environmental laws and regulations. For example, certain industries or businesses may need to conduct regular testing to ensure they meet environmental standards and mitigate any potential harm to the environment or human health, such as asbestos, lead and mercury. [c] Risk Management: Environmental testing helps assess the level of risk posed by contaminants or pollutants present in the environment. This information is valuable for risk management purposes, allowing stakeholders to implement appropriate mitigation measures or remediation strategies to protect human health and the environment. [d] Site Remediation: In cases where environmental contamination is discovered after a wildfire, environmental testing provides essential data for designing and implementing site and building remediation plans. Testing helps identify the extent of contamination, select appropriate remediation techniques, and monitor the effectiveness of remediation efforts. [e] Health and Safety: Environmental testing can play a vital role in assessing potential health risks associated with exposure to environmental contaminants. This information can be used to develop appropriate safety measures, such as personal protective equipment (PPE) requirements or exposure limits, to safeguard workers or inhabitants of an area. [f] Research and Monitoring: Environmental testing is often used for research and monitoring purposes to better understand environmental trends, identify emerging contaminants, or assess the effectiveness of environmental protection measures.

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.

EPA’s “*Research on DIY Air Cleaners to Reduce Wildfire Smoke Indoors*” – A study showing the use of homemade air filtration devices and its benefits. For more information go to: https://www.epa.gov/air-research/research-diy-air-cleaners-reduce-wildfire-smoke-indoors and https://www.epa.gov/air-quality/wildfires-and-smoke (See: EPA’s “Research on DIY Air Cleaners to Reduce Wildfire Smoke Indoors;” “Evidence on the Use of Indoor Air Filtration as an Intervention for Wildfire Smoke Pollutant Exposure A Summary for Health Departments”)

EPA’s “*Fire or Smoke Event Plan: Wildfire Smoke and Your Patient’s Health*” – Smoke levels can change throughout the day, where the hospital or patient care facility should be prepared to take immediate action to protect patients and staff. For more information go to: https://www.epa.gov/wildfire-smoke-course/fire-or-smoke-event-plan

EPA’s “*From Wildfire Smoke to PFAS: Innovative EPA Scientists Address Longstanding Research Gaps*” – EPA scientists are at the forefront of cutting-edge research, addressing a wide range of firefighter, environmental, and public health issues. For more information go to: https://www.epa.gov/sciencematters/wildfire-smoke-pfas-innovative-epa-scientists-address-longstanding-research-gaps

EPA’s “*The Right Respirator and Proper Fit During Wildfires*” – A pamphlet about the right and wrong type of respirator and its use during a wildfire. For more information go to: https://www.airnow.gov/sites/default/files/2020-02/the-right-respirator-and%20proper-fit-508.pdf

EPA’s “*Wildfire Smoke and Indoor Air Quality: How to Create a Clean Room at Home*” – An EPA “You-Tube video” describing how to create a clean and smoke free area within the house. For more information go to: https://www.airnow.gov/wildfire-smoke-guide-publications/

EPA’s *Wildfires and Indoor Air Quality (IAQ)* – An EPA report outlining what a homeowner can do to improve their indoor air quality when smoke impacts their community. For more information go to: https://www.epa.gov/indoor-air-quality-iaq/wildfires-and-indoor-air-quality-iaq and https://www.ashrae.org/file%20library/about/government%20affairs/public%20policy%20resources/ashrae_rfi-response_iaq_epa-hq-oar-2022-0794_12-05-2022.pdf…and https://ww2.arb.ca.gov/resources/fact-sheets/air-cleaning-devices-home

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 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.

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) 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: 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 (mitigation) – 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.

Erosion control – (1) Implementing measures, such as hydroseeding, mulching, or erosion control blankets, to prevent soil erosion and promote vegetation regrowth in fire-affected areas. (2) Implementing erosion control measures to prevent soil erosion and minimize post-fire damage. (3) Measures taken to prevent or minimize soil erosion in areas affected by wildfires, such as the use of erosion control mats, straw wattles, or reseeding with native vegetation. (See: Hydroseeding; Replanting, Seeding; Temporary erosion control measures)

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.

“*Evidence on the Use of Indoor Air Filtration as an Intervention for Wildfire Smoke Pollutant Exposure A Summary for Health Departments*” – This technical document summarizes the available peer-reviewed literature about the effectiveness of air filtration as an intervention to decrease exposure to wildfire smoke and protect health when sheltering indoors. It describes the different types of air filtering technology and metrics for measuring air quality and summarizes the literature on their effectiveness in protecting against the harmful air pollutants in wildfire smoke. Relevant federal and state resources for local health professionals are listed. The review illustrates that proper air filtration is an effective method of reducing certain wildfire smoke pollutants indoors and potentially limiting the risk of negative health impacts associated with exposure to wildfire smoke. For more information go to: https://www.cdc.gov/air/wildfire-smoke/socialmedia/wildfire-air-filtration-508.pdf

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, such as 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 explosive meter 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 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.

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. 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.

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.

Extraction, subsurface – (1) Vacuum pressure that suctions water from carpets and pads 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. (<u>See:</u> 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, ash, 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. <u>Education Note:</u> 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 would have been avoided if the insured had taken reasonable steps to mitigate the loss. For more information go to: http://www.propertyinsurancecoveragelaw.com/2010/03/articles/insurance-claim/consequences- of-a-policyholders-failure-to-mitigate/ http://www.propertyinsurancecoveragelaw.com/2010/03/articles/insurance/an-insurers-actions- may-excuse-mitigation-requirements/ and http://www.clausen.com/index.cfm/fa/firm_pub.article/article/455161b0-ab99-4908-a3dc-c168d5a7eb0f/The_Insureds_Duty_to_Mitigate_Mold_Damages.cfm

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 char, ash, and vegetative matter (wildfires) – A person having average eyesight where there is adequate sunlight or building light who can see char, ash, and vegetative matter fallout covering most all horizontal and many vertical indoor surfaces; this typically represents an extensive wildfire soot fallout cleanup situation.

Fallout, heavy char, ash, and vegetative matter (wildfires) – A person having average eyesight where there is adequate sunlight or building light can see char, ash, and vegetative matter fallout covering many horizontal and some vertical indoor surfaces; this typically represents a heavy wildfire soot fallout cleanup situation.

Fallout, light char, ash, and vegetative matter (wildfires) – A person having average eyesight where there is adequate sunlight or building light can see minute amounts (specks) of char, ash, and vegetative matter fallout on some horizontal indoor surfaces; this typically represents a light wildfire soot fallout cleanup situation.

Fallout, moderate char, ash, and vegetative matter (wildfires) **–** A person having average eyesight where there is adequate sunlight or building light can see sporadic char, ash, and vegetative matter fallout on several horizontal indoor surfaces; this typically represents a moderate wildfire soot fallout cleanup situation.

Fallout, nuisance char, ash, and vegetative matter (wildfires) – A person having average eyesight where there is adequate sunlight or building light can see minute amounts (specks) of char, ash, and vegetative matter fallout on a few horizontal surfaces; this typically represents a nuisance wildfire soot fallout cleanup situation.

Fallout, positive/negative laboratory findings for char, ash, and vegetative matter (wildfires) – The laboratory results are either: [1] positive for the presence of char, ash, and vegetative matter fallout; or [2] the results are negative for the presence of char, ash, and vegetative matter 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 code of regulation.

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*” For more information go to: 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).

FEMA “*How to Prepare for Wildfires*” – FEMA recognizes wildfires are unplanned fires that burn in natural areas like forests, grasslands, and prairies. They can spread quickly and affect communities and homes. For more information go to: https://www.ready.gov/wildfires#prepare

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 floor cleaning. The final cleaning process may proceed restoration and repair if it is necessary to complete this process.

Fine fuel moisture – The probable moisture content of fast-drying fuels which have a timelag constant of 1 hour or less, such as, grass, leaves, ferns, tree moss, pine needles, and small twigs (0-1/4").

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. (See: Flash fuels)

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 causes 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 having 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 once exposed, about (discussion) – Methods a person can use once they are known or believed to be exposed to cyanide. Education Notes: [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. [2] 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, it would move away from the area where it was released. [3] If individuals 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 the 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. [4] 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. [5] 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 from 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. [6] 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). [7] If you wear eyeglasses, wash them with soap and water. You can put your eyeglasses back on after you wash them. [8] 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 contaminated clothing. Disposing of clothes: After washing, place clothing inside a plastic bag. [9] 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 contaminated clothing should also be placed in the bag. [10] 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. [11] 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 number 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 gases 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 pyrolysis, such as 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*." For more information go to: https://www.oregonbuildingofficials.com/assets/Resources_Page/evaluating_fire-_and_heat-damaged_electrical_equipment_as_published.pdf

Fire-damaged property assessment – The evaluation and documentation of the extent of damage to residential, commercial, and other structures caused by wildfires for insurance or rebuilding purposes.

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 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 in 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 Notes: Contents surface soot contamination is classed as *Level 1* or *Level 2* depending on the heaviness of soot. [1] Level 1: “dry surface soot” particulate is removed by dry-brush dusting or HEPA vacuuming; [2] 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. [3] 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. [4] Level 4: contents are burned. Attempting to salvage and restore them must be done on a case-by-case basis. [5] 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, and 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.   For more information go to: 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 impact 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 Notes: [1] 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. [2] 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. [3] 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. For more information go to:
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. For more information go to: 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 is collected as evidence for laboratory examination.

Fire decay – The stage of 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 Notes: [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). [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 in 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). [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) BDMA: [1] remove the primary source (debris, char, heavily contaminated items, or surfaces); [2] clean all surfaces exposed to direct contamination; [3] apply odor counteractants; [4]

condition the air. (2) In IICRC Fire and Smoke Restoration Technician (FSRT) classes: [1] remove the primary source (debris, char, heavily contaminated items, or surfaces); [2] clean all surfaces exposed to direct contamination; [3] 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); [4] 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 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 large amounts of heat as they do so. Education Notes: [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 in the order of millionths of a second. [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. [3] Fire detonations are found in methamphetamine laboratory explosions.

Fire detonation/deflagration effects – The effects of detonations are quite different from those of deflagrations. Deflagrations tend to push, shove, and heave, often with extremely 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 deflagration 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 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 Notes: 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 Notes: [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. [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. Only certified electrical and electronic service technicians should complete the above. [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 the 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. <u>Education Note:</u> 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. <u>Education Note:</u> 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-impacted agricultural land recovery – Efforts to support the recovery and restoration of agricultural lands, crops, and livestock affected by wildfires, including financial assistance, soil management, and infrastructure repair.

Fire impacted building – A building that experienced heat damage from the wildfire. Education Notes: [1] Heat (thermal) damage can result in scorching, blistering, charring, changing material properties, shattering of glass windows and solar panels, to the melting of plastics, electrical wiring and other polymers. [2] Windblown embers can cause structure fire, and the burning of trees, shrubbery, lawn furniture, and vehicles.

Fire impaction – The presence of fire debris caused by burning. (See: Smoke impaction)

Fire injury – An injury suffered as the result of a fire that requires (or should require) treatment by a practitioner of medicine within one year of the fire, regardless of whether treatment was actually received.

Fire Inspector – A fire prevention specialist or arson investigator.

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 interval – The number of years between two successive fire events for a given area; also referred to as fire-free interval or fire-return interval.

Fire investigation – (1) The process of determining the ignition source, materials first ignited, ignition factors, and party responsible for a fire. (2) The process of determining the cause, origin, and circumstances surrounding a wildfire, often conducted by specialized fire investigators.

Fire investigative testing (combustion byproducts) – A process in fire investigation/investigative testing to determine the presence of fire residues (char, black carbon/soot, and ash). The results are often used to determine the extent of property damage caused by smoke at locations (residential, industrial, or wilderness) to address sourcing, liability, and assist with remediation of contaminants. Testing can be done after a fire event to determine what areas might have been impacted, or the testing can be used during or after cleaning or remediation to guide professionals in their remediation efforts. Depending on the analysis requested and the type of equipment available, the laboratory can provide a number of testing services for combustion by products, from simple presence or absence analysis through potential sourcing analysis using advanced chemical and microscopic techniques, which include but are not limited to, polarized light microscopy (PLM), epi-reflected light microscopy (RLM), scanning electron microscopy (SEM), transmission electron microscopy (TEM), etc. (EMSL Analytical, Inc.)

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. <u>Education Note:</u> 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 protect 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, dust or vapors. <u>Education Note:</u> 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 benefit 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, fumes, 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 which includes an 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, such as 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 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 meet 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 - 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-resistant landscaping – Landscaping practices and design principles aimed at creating defensible space and reducing the vulnerability of properties to wildfires.

Fire resistance rating – (1) The period 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 – (1) A 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.(2) A substance applied to vegetation or structures to slow or prevent the ignition and spread of fire.

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 the 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 gases, 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 – (1) All work, and activities connected with control and fire-extinguishing operations, beginning with discovery, and continuing until the fire is completely extinguished. (2) The process of extinguishing and controlling a wildfire through various tactics, such as direct attack, indirect attack, and containment. (3) 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), where 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 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 Notes: [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. [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.

Firebreak – (1) A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work. (2) A wide gap in vegetation or cleared area that acts as a barrier to stop the spread of a fire. (3) A cleared area or barrier, such as a road, river, or plowed line, that acts as a buffer to halt the spread of the wildfire.

Fireline / Fire trail – (1) A cleared area or barrier created to stop or control the spread of wildfire, typically through the removal of vegetation. (2) The part of a control line that is scraped or dug into mineral soil. Education Note: A fireline may also refer to a “wet line,” where water was used to create a burn boundary in light fuels such as grass.

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 for 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 2" x 4" 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 (building construction) – 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) 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. (2) Fire-resistant partition extending to or through the roof of a building to retard spread of fire. (3) 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. For more information about roofing construction go to: https://www.owenscorning.com/en-us/roofing/blog/the-anatomy-of-a-roof

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 a separate adjoining building that restricts 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 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, CC_{l4} 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, its delay in ignition, and it 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, such as 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 Notes: [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. [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) In 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, 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 the percentage 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 37.8ºC (100ºF), except any mixture having components with flashpoints of 100ºF 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 too “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.

Flank fire – Those portions of a fire that spread parallel to the main fire front, typically on the sides. Flank fires can exhibit variable intensity, depending on fuel conditions, wind direction, and topography. They can contribute to the overall growth and the spread of the fire.

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 releases 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 tend 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, such as carpet, sheet vinyl, vinyl composition tile, wood, and laminates.

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 an 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 safely 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 an exceptionally large quantity of 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 are 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 exceptionally fine droplets that resemble smoke or fog, and it remains suspended within the 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 rooms 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 extremely 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 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 moisture 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 conservation drying methods. For more information go to: https://www.archives.gov/preservation/conservation/drying-methods-01.html (3) 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/ 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 Notes: [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. [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 in only 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 fumes 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 fumes 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. <u>Education Note:</u> 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. <u>Education Note:</u> 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, such as 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. <u>Education Note:</u> 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 gases 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 the ability they must be able to spread out (or away) from one another. The more packed the molecules are in the substance the less space to maneuver, and therefore, the more difficult it is 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 to 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 in 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 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 an extremely 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 Notes: [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 fires burn 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. [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. [3] Do not use water to put out a grease fire; water will only cause burning oil to splash that spreads the grease fire.

Green waste recycling – Recycling and composting green waste generated during cleanup to reduce landfill waste.

Ground fire (wildfire) – (1) Fire that consumes the organic material beneath the surface litter ground, such as a peat fire. (2) A ground fire occurs primarily in the organic layer of soil, such as leaf litter, peat, or decaying vegetation. It burns at or below the ground surface and can smolder for extended periods, releasing smoke and consuming organic material. Ground fires can be challenging to detect and extinguish as they may travel underground and re-emerge in different locations.

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.

“*Guidance for Cleaner Air Spaces during Wildfire Smoke Events*” – The Canadian government’s 22-page document on what building owners and managers are expected to do in preparation for impending wildfires. For more information go to: https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-cleaner-air-spaces-during-wildfire-smoke-events.html

“*Guide to Wildfire Origin and Cause Determination*” – The occupant interview (1) 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. (2) The questioning of occupants about the cause and origin of a fire or wildfire. For more information go to: https://www.nwcg.gov/sites/default/files/publications/pms412.pdf

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 a 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, National Edition. Institute of Food and Agricultural Sciences, University of Florida. For more information go to:
https://www.larimer.org/sites/default/files/uploads/2017/handling_smoke_damage.pdf

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 particular 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 Standard – (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. <u>Education Note:</u> 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 they 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 fuel / Hazardous fuel – 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.

Hazard tree removal – (1) Identifying and removing trees that have been damaged or weakened by the fire, posing a risk of falling and causing further damage or injury. (2) The removal of trees damaged or weakened by a wildfire to prevent them from falling and posing a safety risk to people or structures.

Hazardous air pollutant (HAP) – Any air pollutant listed under CAA section 112(b). HAP is synonymous with air toxins.

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, dust 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 Notes: [1] This concentration may be approximated as a condition in which the dust obscures vision at a distance of 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. [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. [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 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 material abatement – The identification, containment, and removal of hazardous materials, such as asbestos, chemicals, or heavy metals, that may be present in fire-damaged structures.

Hazardous material cleanup – (1) The identification and safe removal of hazardous materials, such as organic and inorganic chemicals, including asbestos, that may have been present in the affected area. (2) The identification, containment, removal, and disposal of hazardous materials, such as chemicals or petroleum products, that may have been released or affected by a wildfire.

Hazardous materials – (1) Substances that are identified, classified, and regulated in the Code of Federal Regulations, Title 49, and Hazardous Materials Regulations 175. (2) A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce and which has been so designated.

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 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.

Hazardous waste cleanup – The identification, containment, removal, and proper disposal of hazardous materials and waste generated by wildfires, including chemicals, fuels, and other pollutants.

Hazardous waste in wildfires – 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. For more information go to: https://dtsc.ca.gov/disaster-related-hazardous-waste-removal/

HazMat/ Haz Mat; Hazmat – An abbreviation for a hazardous material. Any substance or material that could adversely affect the safety of the public, handlers, or carriers during transportation.

HAZMAT – Hazardous material management.

HazMat Unit / Haz Mat Unit / Hazmat unit – An abbreviation for Hazardous Materials Response Unit. With today’s complex and high technology world, many departments have invested resources and money to responding to such emergencies. Most of us would be surprised, if not alarmed to learn the many types and dangers associated with chemicals and products in our communities. Typically, one department in a region will have a HazMat unit and through mutual aid agreements other departments will support and share that unit.

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. (4) A sufficient concentration of atmospheric aerosols to affect a visible attenuation of light and measurable reduction in visual range. The aerosol particle diameter is near the wavelength of visible light, optimizing the light scattering efficiency of the particles.

Haze meter - An instrument for measuring the dependable range of distance at which a standard smoke column can be detected by the unaided eye under existing haze conditions.

Head of a fire (building fire; wildfire) – (1) The side of the fire has 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 Effects of Wildfire Smoke – Wildfire smoke is a mixture of air pollutants of which particulate matter is the principal public health threat. The initial basis for understanding wildfire smoke health effects was derived primarily from studies of ambient air pollutants, specifically particulate matter. Extensive scientific evidence has demonstrated health effects in response to short-term (i.e., daily) particulate matter exposure ranging from eye and respiratory tract irritation to more serious effects, including reduced lung function, pulmonary inflammation, bronchitis, exacerbation of asthma and other lung diseases, exacerbation of cardiovascular diseases, such as heart failure, and even premature death. Recent studies examining the health effects of wildfire smoke provide evidence of health effects consistent with those reported for particulate matter. However, there is only limited evidence about the potential health impacts due to cumulative exposures from repeated, multi-day wildfire smoke exposures or multiple, consecutive fire seasons. (Wildfire Smoke: A Guide for Public Health Officials, 2019)

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) Temperatures higher than that of the normal atmosphere, produced by the process of burning or oxidation. (2) A relative term meaning air or surface temperature is warmer as compared to air or surface temperature being colder. (3) Temperatures higher than that of the normal atmosphere, produced by the process of burning or oxidation. (4) 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 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, 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 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 as a result 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 release rates – (1) 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. Education Note: The rate at which fire releases energy; this is also known as power. HRR is measured in units of Watts (W), which is an International System unit equal to one Joule per second. Depending on the size of the fire, HRR is also measured in Kilowatts (equal to 1,000 Watts) or Megawatts (equals 1,000,000 Watts).

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 Notes: [1] Sensible heat is the energy associated with the temperature of water; meaning, sensible heat is greater in warmer water as compared to colder water. [2] Warmed water and moisture at the surface of wet materials dries faster than surfaces having cooler water. [3] Heated air and warm air movement carries sensible heat from the air to a wet surface and then back to the air. [4] 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, such as 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, about – A major factor in the ignition, growth, spread, decay, and extinction of a fire. It is important to note that heat is always transferred from the hotter object to the cooler object's heat energy transferred to, and object increases the object's temperature, and heat energy transferred from, and object decreases the object's temperature.

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) number 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. (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, gases, 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.

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 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 very 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 the same. Education Notes: With some deviation, the recommended guidelines for cleaning soot particles through HEPA vacuuming tend to fall into a pattern: [1] Assess the extent of soot fallout in buildings; [2] seal-off all openings; [3] change building filters with pleated filters when the HVAC system must remain operational; [4] HEPA vacuum soot off of floors were foot traffic can grind in soot and contribute to cross-contamination; [5] in nuisance and light soot fallout situations, HEPA vacuum loose soot off of all horizontal surfaces; [6] 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 people 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 almost non-detectible combustion byproducts behind. In other words, hot fires consume materials rapidly leaving behind only ash as the remnant of the complete combustion process.

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.

Hotspot – A smoldering area within a wildfire that has the potential to reignite and spread.

Hot water extraction – A surface cleaning process in which heated detergent solutions are sprayed directly on contaminated materials followed by 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.

"*How to Prepare for Wildfires*" – FEMA recognizes wildfires are unplanned fires that burn in natural areas like forests, grasslands, and prairies. They can spread quickly and affect communities and homes. For more information go to: https://www.ready.gov/wildfires#prepare

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's 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.

HVAC system cleaning – The cleaning and restoring heating, ventilation, and air conditioning systems affected by smoke, ash, and fire.

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 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 permeates 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.

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.

Hydroseeding – (1) Applying a mixture of seeds, mulch, and fertilizers to promote vegetation regrowth in fire-affected areas. (2) The process of spraying a mixture of water, seeds, fertilizer, and other additives onto bare soil to initiate vegetation growth and stabilize slopes in fire-affected areas. (See: Erosion Control; Hydroseeding; Replanting, Seeding; Temporary erosion control measures)

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 odors that can be controlled or abated by hydroxyl deodorization. When using a hydroxyl generator, it works better in a humid environment between 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. (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. For more information go to: 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 increases.

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 at 120°-150°C/248-302°F; decayed wood ignites at 150°C/302°F; the ignition temperature of various woods is at 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 at 150°C/302°F; paper ignites at 218-246°C/424-475°F; leather ignites at 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; and cotton does not 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. www.IICRC.org

IICRC Standards that can be used to remove wildfire smoke film, char, ash, and organic debris – IICRC produces a number of industry standards in cleaning and restoration, where they apply in the cleaning and restoring homes to commercial buildings impacted by wildfire. There are several new standards in the public review phase that are also included in this list:

- **IICRC Current Standards and Guides Include:**
    - ✓ **ANSI/IICRC *"S100 Standard for Professional Cleaning of Textiles Floor Coverings."*** For more information go to: https://iicrc.org/s100/
    - ✓ **ANSI/IICRC *"S220 Standard for Professional Inspection of Hard Surface Floor***

Coverings." For more information go to: *https://iicrc.org/s220/*

- ✓ **IICRC *"S300 Standard for Professional Upholstery Cleaning."*** For more information go to: https://iicrc.org/s300/
- ✓ **ANSI/IICRC *"S500 Standard for Professional Water Damage Restoration."*** For more information go to: https://iicrc.org/s500/
- ✓ **ANSI/IICRC *"S520 Standard for Professional Mold Remediation."*** For more information go to: https://iicrc.org/s520/
- ✓ **ANSI/IICRC *"S800 Standard and Reference Guide for Professional Inspection of Textile Floorcovering."*** For more information go to: https://iicrc.org/s800/
- ✓ **IICRC *"Safety and Health Field Guide for Professional Cleaners"*** For more information go to: https://iicrc.org/fg2/
- ✓ **IICRC *"Field Guide for Safety and Health for Disaster Restoration Professionals."*** For more information go to: https://iicrc.org/fg1/

- **IICRC Standards in Development Include:**
  - ✓ **BSR/IICRC *"S210 Standard for Dimension Stone Maintenance and Restoration."*** For more information go to: https://iicrc.org/s210/
  - ✓ **BSR/IICRC *"S230 Standard for Professional Inspection of Flooring Subfloors and Substrates."*** For more information go to: https://iicrc.org/s230/
  - ✓ **BSR/IICRC *"S250 Standard for Professional Cleaning and Maintenance of Commercial Resilient Floor Coverings."*** For more information go to: https://iicrc.org/s250/
  - ✓ **BSR/IICRC *"S320 Standard for Professional Assessment, Cleaning, and Restoration of Contents."*** For more information go to: https://iicrc.org/s320/
  - ✓ **BSR/IICRC *"S340 Standard for Professional Cleaning and Maintenance of Leather Furnishings."*** For more information go to: https://iicrc.org/s340/
  - ✓ **BSR/IICRC *"S400 Standard for Professional Cleaning, Maintenance, and Restoration of the Commercial Built Environment."*** For more information go to: https://iicrc.org/s400/
  - ✓ **BSR/IICRC *"S590 Standard for Assessing HVAC Systems Following a Water, Fire, or Mold Damage Event."*** For more information go to: https://iicrc.org/s590/
  - ✓ **BSR/IICRC *"S700 Standard for Professional Fire and Smoke Damage Restoration"*** For more information go to: https://iicrc.org/s700/
  - ✓ **BSR/IICRC *"S740 Standard for Professional Restoration of Fire and Smoke Damaged Personal Items."*** For more information go to: *https://iicrc.org/s740/*
  - ✓ **BSR/IICRC *"S760 Standard for Professional Wildfire Investigations and Restoration of Impacts to Structures, Systems, and Contents."*** For more information go to: https://iicrc.org/s760/

IICRC "*Tips for Safe Wildfire Smoke Damage and Ash Cleanup in California*" – In the wake of recent wildfires that have damaged, destroyed, and permeated hundreds of homes and businesses in California, it's important for residents to be aware of the many dangerous health effects caused by returning to smoke-salvageable and smoke-damaged buildings. For more information go to: https://www.businesswire.com/news/home/20181119005709/en/IICRC-Offers-Tips-for-Safe-Wildfire-Smoke-Damage-and-Ash-Cleanup-in-California

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 provides 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.

“*Impact of Wildfire Smoke Events on Indoor Air Quality and Evaluation of a Low-cost Filtration System*” – An article in the Aerosol and Air Quality Research (AAQR) that provides aerosol articles. This one is on the indoor air quality in buildings after a wildfire. For more information go to: https://aaqr.org/articles/aaqr-21-03-tn-0046

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 impinging 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 where they constricted because of a reduction in heat and the removal of moisture. 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 wildland fires, require immediate attention to prevent injury or loss of life and to prevent damage 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, char, and ash. (2) A loss that arises because of direct damage to property. (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 waste 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)) Education Note: Incipient infers a fire that has just begun and is of such size that poor visibility, smoke inhalation, and high temperatures have not reached the degree to require the use of breathing apparatus.

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 of 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 small organic particles of carbon, oily tar-like substances, liquid droplets, and gases such as CO, CO_2, SVOCs, and PAHs, such as benzene, aldehydes (including formaldehyde) and acrolein. (2) 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. (3) The individual compounds present in smoke number in the thousands. <u>Education Note:</u> 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.

Increase risk factor – Anything that increases the chance or opportunity of a hazard, or a circumstance will happen. <u>Education Note:</u> 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. <u>Education Note:</u> 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. <u>Education Note:</u> 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 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 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.

“*Information on Health Risks of Wildfires for Children (Acute Phase) Guidance for Health Professionals*” – PEHSU’s Information for medical professionals on the assessment and treatment of children having acute health risks when exposed to wildfire smoke. For more information go to: https://www.pehsu.net/HealthProf_Acute_Risk_of_Wildfires.html

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 Notes: [1] Medium-wavelength electric IR heating may be ideal for 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. [2] The machine is 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 because 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: [1] there can be irritation, allergic reaction or other damage to the lungs, respiratory tract, and/or mucous membranes; [2] 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 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 are able to 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 (LC_{50}) 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 (LC_{50}) 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 (LC_{50}) 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; and [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, i.e., mineral. 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 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, cleanable items are cleaned first, unless sensitive items such as antiques and collectibles must be processed first. Often the staging and processing of contents (e.g., clothing, upholstery, appliances, works of art, collectibles, antiques) 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. (2) The gathering of information regarding the mold and moisture status of the building, system, contents, or area in question.

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.

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.

Invasive species management – Efforts to prevent, control, and eradicate invasive plant species that may establish and thrive in fire-affected areas, outcompeting native vegetation and disrupting ecosystem balance. (See: Long-term ecosystem management)

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 through 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 caused by chemical changes.

Irritant (biological) – The result of 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 – Insurance Service Office. A for profit organization that provides statistical information on insurance risk, including property potentially exposed to wildfire. The 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 go to: https://www.thebalancesmb.com/insurance-services-office-iso-462706

ISO about – For years the “ISO Rating” had a large impact on most fire departments. The ISO (PPC) rating is from “10 – 1”. With “1” being the best. At one time, almost all insurance companies calculated rates based upon the ISO rating. Education Note: For years homeowner insurance premiums were calculated using the “ISO / PPC” System. (Insurance Service Office / Public Protection Classification) A few states had their own rating system, such as the “Key-Rate” system) but even this accomplished the same thing. Around 1990 the last remaining state adopted the ISO/PPC system. But just as the last remaining state was getting used to the ISO system and all its various inspection idiosyncrasies, State Farm and some other insurance companies tossed it out in some states. In 2023, State Farm Insurance Company and Allstate say they are no longer writing residential policies in California. (Insurance Information Institute) For more information go to: http://www.iso.com/…and https://www.turnto23.com/news/23abc-in-depth/concerns-grow-as-insurance-companies-shy-away-from-california-properties

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 containing 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 Notes: 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; and [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 proper sampling and analysis method to prove a hypothesis involving particulate matter and smoke affecting buildings, contents, and the indoor environment. Education Note: Currently, there are no standards for analysis where different laboratories may have various methodologies involving equipment and analysis methods, resulting in different findings for the same set of 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) For more information go to: https://synergist.aiha.org/201608-after-the-fire#:~:text=Various%20techniques%20for%20particulates%2C%20metals%2C%20VOCs%2C%20sVOCs%2C%20or,indicate%20the%20presence%20of%20a%20particular%20wildfire%20residue. and https://synergist.aiha.org/202208-fire-combustion-residues and https://synergist.aiha.org/201610-evaluating-a-structure-fire (See: Black carbon and Carbon black soot explained)

Laboratory analysis decisions – Considerations 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. For more information go to: https://eaalab.com/wp-content/uploads/2022/08/Fire-analysis-methods-and-terminology-EAA-8-8-10-22.pdf

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 like 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. (See: Black carbon and Carbon black soot explained)

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 buildings. 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 include 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.

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 cleaning – Fire and smoke damage cleaning typically involves several levels of cleaning, depending on the extent of the damage and the type of materials affected. The level of cleaning depends greatly on the degree of heat, type of exposure, the kinds of materials and finishes affected, and the expertise of the restoration professionals. It is recommended to consult with experienced and industry certified professionals in fire and smoke damage restoration to assess the situation and determine the appropriate level of cleaning required. Here are some common levels of cleaning involved in fire and smoke damage restoration: [1] Surface Cleaning: This level of cleaning involves removing loose soot, debris, and residue from the surfaces of affected items and materials. It may include dry wiping, vacuuming, or using specialized cleaning tools to remove visible smoke particles. [2] Dry Cleaning: Dry cleaning methods, such as dry sponging or dry chemical cleaning, are used to remove light to moderate soot and smoke residue from surfaces. These methods are suitable for materials that may be sensitive to moisture or water damage, such as delicate fabrics or certain electronics. [3] Wet Cleaning: Wet cleaning involves using water-based cleaning solutions or detergents to remove moderate to heavy smoke residues from surfaces. This method is suitable for materials that can withstand moisture, such as hard surfaces, walls, and certain types of fabrics. [4] HEPA Vacuuming: High-efficiency particulate air (HEPA) vacuuming is used to remove fine soot particles and other contaminants from surfaces. HEPA vacuums have filters that can trap tiny particles, improving air quality and reducing the risk of recontamination. [5] Odor Removal and Neutralization: Smoke odors can penetrate various materials and surfaces. Odor removal techniques may include using ozone generators, thermal fogging, or specialized deodorizing agents to neutralize or eliminate smoke odors. [6] Duct Cleaning: Smoke can infiltrate HVAC systems and air ducts, spreading soot and odors throughout a building. Duct cleaning involves removing accumulated soot and debris from the ductwork to prevent the recirculation of contaminants. [7] Content Cleaning: Restoration of damaged items and belongings is an important aspect of fire and smoke damage cleaning. This can involve specialized cleaning techniques and equipment to salvage and restore affected items, such as furniture, electronics, clothing, and personal belongings. [8] Insulation Inspection and Possible Removal: Exposed insulation (batt, blown cellulose) impacted by fire and wildfire smoke, soot, char, and ash generally requires replacement rather than attempting to deodorize them. (See: Contents cleaning)

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 through 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 showing 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://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.120AppB and https://chemm.nlm.nih.gov/ppe.htm

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 where 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, building materials and contents.

Long-term ecosystem management – Sustainable land management practices implemented over the long term to promote ecosystem health, resilience, and fire adaptation, including prescribed burning, vegetation thinning, and habitat restoration. (See: Invasive species management)

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.

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 damaged 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 the 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) Reasonable and prudent steps taken to preserve, secure and protect property from experiencing 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.

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 and should be awarded when an item suffers minor damage that is not economical to repair but the item remains useful for its intended purpose. A LOV is particularly appropriate when the item is not of great value and has preexisting damage (PED). A 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.

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.

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 a structure or an object that is not economically feasible to repair. This level in particular, which is set when the cost to repair already exceeds 80 percent of the actual value. (2) The complete destruction of property beyond reasonable repair; losses that exceed policy limits. (3) Damage to structural components or contents whose repair costs exceed their value. (4) 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)

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 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. (2) Fresh air that is brought into 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 from among them. Risk management includes consideration of technical, scientific, social, economic, and political information.

Manipulation – The required handling and positioning of furniture and other personal property during completing the 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.

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, char, impressions, indentations, or traces on a surface. Education Note: Marks on building materials and contents should be identified to document potential pre-loss conditions, where in a fire, marks can be the result of the fire.

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. (IICRC) 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.

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 media such as shells, beads, dry ice, baking soda, sand, foam pellets. They are propelled by a compressor onto the 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 and 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. <u>Education Note:</u> 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 beads can be reclaimed and is most likely to be used in a blast cabinet. Often applied, 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 is 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 include several types of alcohols containing compounds, such 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. (2) The environment around us. (3) The larger-scale conditions and long-term influences that affect humans, buildings and materials, 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, smoke (wildfire smoke odor) – The gradual movement of wildfire smoke gases and compounds entering a building from outdoor air through doors and windows. Education Notes: [1] Smoke can also enter the indoor environment through ventilation systems, ducting, attics, crawlspaces. [2] Smoke can be released from incompletely burnt byproducts, such as embers containing char and vegetation. [3] Smoke odor can also be present when parts of the building become heated, creating thermal pressures inside exterior facing walls, and inside attics and crawlspaces.

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 / Mini enclosure –Mini containments are usually constructed using 6-mil thick polyethylene sheeting that is taped to walls or floors, where they are large enough for a worker to enter and complete work.

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 the air.

Misting – The process 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.

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. 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 chemical 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 to works of art – In conservation management of art, collectibles, and antiques, the moderate degree of damage means “dry” char, ash, soot, and/or organic matter is noticeable, where it may be in inside the piece, increasing severity of damage and complications of its removal. Education Notes: [1] The presence of “dry ash” can further increase the degree of damage to metal parts, along with finishes that can discolor, corrode, and pit. [2] The presence of “dry ash” in a humidified environment (e.g., above 50% rH) can accelerate the degree of damage to metal parts, along with finishes that can discolor, corrode, and pit. (See: Art conservation management)

Moderate smoke and soot damage – Damage to a surface area or material that is damaged somewhere between light and heavy. Education Notes: [1] Moderate damage in a wildfire may be described as soot contamination in an attic causing insulation to be removed and replaced. [2] In addition: [a] the removal of soot by HEPA vacuuming followed by cleaning of contents and flooring; [b] cleaning of ventilation systems because of the presence of soot; [c] cleaning of contents, walls, floors; [d] cleaning of 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) of heated building materials – The percentage or weight of moisture in materials, as compared to the weight of that material when completely dry (oven dried), such as structural wood with a moisture content of 10% indicates that 100 pounds of that wood contains 10 pounds of water. Education Note: As building materials heat, they give up their moisture content. The pores of materials open when heated and seal as the air cools. Depending on the material and heat temperature, they may not respond to retaining their normal moisture content.

Molecule – The smallest unit into which matter may be subdivided and still maintain the original characteristics of that substance.

Monitoring and assessment – Conducting ongoing monitoring and assessment to evaluate the progress of cleanup and restoration efforts.

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. (<u>See</u>: Safety Data Sheet)

MSFT – Master Fire & Smoke Technician.

MSR – Master Fire and Smoke Restorer. A master’s certification is given to students who have successfully passed their IICRC prerequisite courses.

Mulching – The application of mulch, such as straw or wood chips, to bare soil in burned areas to retain moisture, reduce erosion, and promote the establishment of new vegetation. (<u>See</u>: Long-term species management)

Multiple chemical sensitivity (MCS) – (1) A condition in which a person reports sensitivity or intolerance (as distinct from “allergic”) to a number of 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. 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. <u>Education Note:</u> NIH says: “MCS is an intolerance condition attributed to extreme sensitivity to various environmental chemicals, found in air, food, water, building materials, or fabrics.” <u>Education Note:</u> 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.

Muriatic acid – Commonly used as a brick cleaner after masonry work is completed.

MVOC/mVOC – Microbial volatile organic compound. (See: Microbial volatile organic compound)

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NADCA ACR Standard, 2021 edition: “Assessment, Cleaning & Restoration of HVAC Systems” – An industry ventilation system cleaning standard developed by the National Air Duct Cleaners Association. For a free download go to: https://acrstandard.nadca.com/

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; and [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 Rating” 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.

National Wildfire Coordinating Group (NWCG) – The NWCG provides national leadership to enable interoperable wildland fire operations among federal, state, local, tribal, and territorial partners. Primary objectives include: [1] Establish national interagency wildland fire operations standards. Recognize that the decision to adopt standards is made independently by the NWCG members and communicated through their respective directives systems. [2] Establish wildland fire position standards, qualifications requirements, and performance support capabilities (e.g., training courses, job aids) that enable implementation of NWCG standards. [3] Support the National Cohesive Wildland Fire Management Strategy goals: to restore and maintain resilient landscapes; create fire adapted communities; and respond to wildfires safely and effectively. [4] Establish information technology (IT) capability requirements for wildland fire. [5] Ensure that all NWCG activities contribute to safe, effective, and coordinated national interagency wildland fire operations. For more information go to: https://www.nwcg.gov/

Natural conditions – Atmospheric conditions that are acceptable to the majority of people.

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 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 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 the 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; and [4] the suffering of damages by the plaintiff. (Williams v. Melby, 699 P.2d 723, 726 (Utah 1985))

Negligible degree of damage (conservation) – The management of works-of-art where there is negligible damage, which is generally insignificant that may not need immediate attention, where works-of-art are to be placed and monitored in a controlled environment.

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: http://www.physicscurriculum.com/Sample%20Chapters/Physics%20for%20Engineering%20Students%20Ch18.pdf

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

NIOSH “*Emergency Use Situation Respirator*” – 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 “*Continuous Flow Respirator*” – 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 “*Orinasal Respirator*”– A respirator that covers the nose and mouth and that generally consists of a quarter - or half-facepiece.

NIOSH “*Respirator*” – Any device designed to provide the wearer with respiratory protection against inhalation of a hazardous atmosphere.

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 “*Single-Use Dust (dust and mist) Respirator*” – Respirators approved for use against dusts or mist that may cause pneumoconiosis and fibrosis.

NIOSH “*Wildland Firefighting Health: Some Burning Questions*” – The ‘Science Blog’ of NIOSH that has a number of searchable categories including questions about everyone should be wearing a respirator. For more information go to: https://blogs.cdc.gov/niosh-science-blog/2020/09/28/wildland-firefighter-health/

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. (2) Materials that have poor absorption and evaporation rates are called 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.

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 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 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.

NWCG – “*Guide to Wildfire Origin and Cause Determination*” – The guide provides recommended procedures, practices, and techniques (methods) for use within a problem solving framework to conduct a systematic wildland fire investigation resulting in a determination of the ignition area, cause, and ignition sequence, including collection of factual data pertinent to the investigation, an analysis of data, formulation of a hypothesis(es), testing of the hypotheses, and selection of a final hypothesis. For more information go to: https://www.nwcg.gov/sites/default/files/publications/pms412.pdf

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O_3 – Ozone.

Occupant interview – (1) 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. (2) The questioning of occupants about the cause and origin of a fire or wildfire. For more information go to: “*Guide to Wildfire Origin and Cause Determination*” https://www.nwcg.gov/sites/default/files/publications/pms412.pdf

Occupant interview explained – A process of conducting a structured conversation with the owners of a home or building. The purpose of an occupant interview can vary depending on the context, but it generally aims to gather information about the occupants’ experiences, needs, preferences, and feedback related to property damage or contamination. During the occupant interview, specific questions are asked to elicit valuable information and insights. These questions cover topics such as cause of loss, date of damage, events surrounding what occurred shortly after the loss. When the loss involves an insurance claim, it includes identifying the insurer, adjuster, policy and claim number, insurer’s response, was an emergency service provided by a restorer, what did they do, etc. The occupant interview then moves to reviewing photos, videos, and documents, such as the restorer’s emergency service contract, estimates of damage and repair, and so on. Once the initial fact-finding is complete, it is followed by conducting a site inspection and when necessary, testing. The collected data is then analyzed and used as a decision-making process that addresses concerns raised by occupants.

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 environment – 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.

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. <u>Education Note:</u> 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. <u>Education Note:</u> 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 – 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.

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, 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 they 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 can also affect the central nervous system. Several 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 absorbing, 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.

Odor pockets – Cavities, cracks, air spaces and voids in or behind building materials, finishes and contents that allows fire odor to remain.

Odor, smoke – (See: Smoke odor)

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 of an odorant in the air 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. Several 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 affecting 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 their physical properties including viscosity and thickness. Education Note: Traction and friction are the other physical measurements for determining oily films. 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. (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 Notes: [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. [2] The olf should not be confused with the unit of scent immission (as opposed to emission).

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 the 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. (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 with 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 – (1) Carbon-containing plant and animal residues that can burn in a fire. (2) That fraction of the soil that includes plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by the soil population.

Organic soil – Any soil or soil horizon containing at least 30% organic matter (e.g., muck, peat).

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 composed of strand-like flakes that are aligned in directions to make the panel stronger, stiffer, and with improved dimensional properties. (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. (1) A type of engineered wood panel commonly used in construction and building applications. It is made by compressing layers of wood strands or flakes with adhesive under high pressure and temperature. (2) When using OSB in construction projects, it is important to follow the manufacturer's guidelines for proper installation, including appropriate fastening methods and spacing. Additionally, considering the specific environmental and moisture conditions of the project site will help ensure the long-term performance and durability of OSB panels. Education Notes: Here are several facts and uses of OSB: [1] Composition: OSB is typically composed of three or more layers of wood strands or flakes, which are aligned in specific orientations. The wood strands are coated with adhesive, such as phenol-formaldehyde or polymeric diphenylmethane diisocyanate (PMDI), to bond them together. [2] Strength and Durability: OSB panels have excellent structural strength and dimensional stability. The orientation of the wood strands provides strength in both directions, making OSB a versatile and robust building material. [3] Moisture Resistance: OSB panels are engineered to have good moisture resistance. However, they are not waterproof and can be susceptible to swelling and warping if exposed to excessive moisture for extended periods. Proper installation and use of a moisture barrier or waterproofing measures are important when using OSB in areas prone to moisture, such as bathrooms or basements. [4] Uses in Construction: OSB is commonly used as sheathing for walls, roofs, and floors in residential and commercial construction. It provides a sturdy and stable surface for attaching siding, roofing materials, and flooring. OSB is also used as a subflooring material and in the manufacturing of furniture, packaging, and other applications. [5] Cost-Effectiveness: OSB is generally more cost-effective than other types of engineered wood panels, such as plywood. It offers comparable structural properties at a lower price point, making it a popular choice in construction projects where cost considerations are important. [6] Sustainability: OSB is considered an environmentally friendly building material. It is made from fast-growing, renewable wood species, and the manufacturing process minimizes waste. However, the adhesive used in OSB may contain formaldehyde, so it's important to choose low-emitting or formaldehyde-free OSB panels for applications where indoor air quality is a concern. [7] Code Compliance: OSB panels are widely accepted by building codes and standards organizations. They are tested and certified for various performance criteria, including structural integrity, fire resistance, and shear strength.

OSB and Smoke – When it comes to smoke impaction on the surface of OSB, it is important to note that the fallout of smoke is primarily a surface-level issue. Unlike soot or ash, which can settle and adhere to surfaces, smoke is composed of small particles and gases that can permeate porous materials like OSB. The impact of smoke on OSB will depend on various factors, including the intensity and duration of the smoke exposure. In severe cases, where the OSB has been extensively affected by smoke and fire damage, where replacement is required. When addressing smoke impact on OSB, prioritize safety, proper cleaning techniques, and consult with fire damage restoration professionals to ensure effective restoration and mitigation of smoke-related issues was completed. Education Notes: Several points to consider regarding smoke impaction: [1] Smoke Odor: Smoke particles can penetrate the surface of OSB, leading to the absorption of smoke odors. These odors can linger and be noticeable even after the visible signs of smoke have been removed. Proper cleaning and deodorization techniques may be necessary to mitigate smoke odor from OSB surfaces. [2] Dry Surface Cleaning: To remove visible smoke residue from OSB, thorough cleaning is required. Start by removing loose soot and debris using vacuum cleaner with a HEPA filter. Avoid using water or liquid cleaners initially, as OSB is susceptible to swelling and warping when exposed to excessive moisture. [3] Sanding: Abrasive cleaning includes a light sanding of the OSB surface. This method helps minimize the risk of damaging OSB. [4] Grinding: Grinding is a more aggressive sanding process where the surface is removed because of exposure to heat. An evaluation of the OSB is required to determine salvageability. More than likely, grinding OSB is not an acceptable process, where replacement is required. [5] Deodorization: Smoke odor can persist even after cleaning and sanding OSB. Deodorization techniques may be necessary to eliminate or reduce the odor. This can involve using specialized smoke odor neutralizers and other professional deodorization services. [6] Consult Professionals: It is highly recommended to contact a licensed contractor, engineer, or building inspector who has knowledge about OSB and the structural integrity of OSB after a fire.

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. (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)

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 of 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, that produces 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 Notes: [1] Chlorate (ClO_3), permanganate (MnO_4), and nitrate (NO_3), are examples of oxidizers. Note, all oxidizers contain oxygen (O). [2] 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.

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 in 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).

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 Notes: [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.[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 allow 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 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 meet 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 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 is capable of removing 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 comes in contact with. 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). [4] Major anthropogenic sources include the burning of coal refuse banks, coke production, automobiles, commercial incinerators, and wood gasifers (Lesage and Jackson, 1992). About (PNAs): [1] They are often 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 are common products of combustion of organic materials. [3] Any 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: [1] 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 windowsill or floor) are equal to or greater than the dust-lead hazard levels identified in the definition of “Dust-lead hazard.” [2] 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). [3] Any chewable lead-based painted surface on which there is evidence of teeth marks. [4] 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 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’s fire loss that does not completely destroy or render their property worthless or the fire and resulting damage does not 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 appear 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; and [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 of 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. Through PLM analysis, 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) – (1) Any liquid or solid particles. “Total suspended particulates”, as used in air quality, are those particles suspended in or falling through the atmosphere. They generally range in size (diameter) from 0.1 to 100 micrometers. Any vaporized liquid or solid particles, known as “total suspended particles.” (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. Asbestos fibers are especially dangerous when captured by lung tissues. (3) Particulate matter or particulates are anything that is suspended in the air. Particulates are classified by size. Education Note: 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. (4) 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} deposits 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. 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 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)

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 a 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://en.citizendium.org/wiki/Parts- per_notation

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.

Passive fire protection – A device or system designed to confine fire and smoke in zones, such as compartmentalization.

Passive smoking – Inhalation of side stream smoke by people who do not smoke themselves.

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 Notes: [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 0.25mm to 1.5mm diameter) to deliver a fine stream of abrasive accurately to a small part or a small area on a larger part. Education Notes: [1] Generally, the area to be blasted is from about a millimeter to only a few centimeters at most. [2] 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. [3] 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 need 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 Notes: [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•ft^2•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•m^2•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.

Permeate – (1) The passing or seepage of a liquid substance through a material until it is saturated. (2) To diffuse through or to penetrate through a gas or material (e.g., smoke permeates the air within a structure; moisture permeates gypsum board causing it to dissolve). Education Note: A permeable material is one having pores or holes capable of allowing liquids or gases to pass through.

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 substances that is stable in the environment, is liable to long-range transport, may bio-accumulate in human and animal tissue and may have significant impacts on human health and the environment. Education Notes: [1] Examples are arsenide, fluoride, cadmium salts and lead salts. [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 chemicals 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).

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. (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. (4) Safety gear worn by workers involved in wildfire cleanup to protect against hazardous materials, ash, smoke, and other potential risks. (5) Safety items designed to prevent exposure to potential hazards. Examples include respirators, gloves, goggles, protective clothing, and boots. 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.

PEHSU – Pediatric Environmental Health Specialties Unit. A network of experts in reproduction and children’s environmental health issues. For more information go to: https://www.pehsu.net

PEHSU’s “*Fact Sheet for Health Professionals*” – A downloadable fact sheet for health professionals, families, and communities that describes the types of exposures to children during wildfires and focuses on the acute phase environmental hazards, smoke, and ash. The fact sheet provides recommendations for mitigating these exposure risks. For more information go to: https://www.pehsu.net/HealthProf_Wildfire_Smoke_and_Ash.html

PEHSU's "*Information on Health Risks of Wildfires for Children (Acute Phase) Guidance for Health Professionals*" – Information for medical professionals on the assessment and treatment of children having acute health risks when exposed to wildfire smoke. For more information go to: https://www.pehsu.net/HealthProf_Acute_Risk_of_Wildfires.html

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: [1] 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. [2] An example of a product containing petroleum jelly is Vaseline.

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. 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/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, whether 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 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 (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 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. For more information go to: http://beaconhill.bluekeyblogs.com/tools-for-agents-understanding-the-differences-between-sudden-accidental-and-broad-form-cpl/ and http://www.law360.com/articles/92110/clarifying-sudden-and-accidental-pollution-coverage

Pollution prevention – Actively identifying equipment, processes, and activities which generate excessive waste or use toxic chemicals and then making substitutions, alterations, or product improvements. Conserving energy and minimizing waste 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 as a result 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 – 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 contaminated building material that allows them to be safely removed and disposed of.

Polyurethane floor cleaning alternative – Cleaning methods that are different from traditional hardwood floor cleaning processes, but they may be appropriate for a situation. Education Notes: [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 cleans 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. [3] 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 Notes: [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.

Pool fire – A turbulent diffusion of fire that burns 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. (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. (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 their 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.

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 gases.

Post-fire assessment (ecosystem) – The evaluation of the ecological, hydrological, and geological impacts caused by a wildfire to inform restoration and management plans.

Post-fire assessment (buildings and contents) – (1) The evaluation of the structure after it has undergone fire damage repair, rebuilding, and smoke odor neutralization. (2) After smoke enters a building from a wildfire, an evaluation of the cleaning and deodorization processes and determining their success. Education Note: While the restorer or an independent specialist may determine the building and contents are back to pre-wildfire impact conditions, the final authority on determining the success of a post-fire assessment is the customer.

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.

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 verification (PRV), wildfire – Once cleaning and deodorization is complete, the PRV is an inspection and assessment performed by the cleaning or restoration contractor, or an independent qualified person. The PRV involves inspection of all parts of the building, mechanicals systems, and contents, to ensure they are free of wildfire particulate, discoloration, residue, and there is no detectible smoke odor. Education Note: In some situations, PRV involves a qualified professional to independently verify the wildfire impact was removed successfully through sampling and laboratory analysis.

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.

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 x 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 (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. 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 appropriately worn. For more information go to: http://www.osha.gov/SLTC/personalprotectiveequipment/ and http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=977 7 and http://www.osha.gov/Publications/osha3151.pdf and http://www.osha.gov/OshDoc/data_General_Facts/ppe-factsheet.pdf

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 percentage).

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 x 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.

PRE – Post remediation evaluation. (See: Post remediation verification)

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 Notes: [1] 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. [2] 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. [3] 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.

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. (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.

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.

“***Preparing for Wildfires***” – A CDC factsheet on how to protect your home and family from impending exposures to a wildfire. It includes tips for gathering medication to having respirators available. For more information go to: https://www.cdc.gov/disasters/wildfires/beforefire.html

Pre-remediation assessment – The determination by an IEP of Condition 1, 2, and 3 status for the purpose of establishing a scope of work.

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.

Pre-remediation sampling – (1) A preliminary inspection creating a sampling strategy and performing sampling services to establish Condition 1, 2, and 3 of buildings, systems, and contents. (2) A sampling strategy and performing sampling services 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.

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 contaminated 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. 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 Notes: [1] Pressurized smoke occurs when smoke and other gases from a fire increase in size due to fuel and heat. The heat is causing the moving particles to penetrate confined areas. [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 as a result 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.

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. (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.

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) For more information go to: 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.

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.

"*Protect Your Health During Wildfires*" – An American Lung Association pamphlet describing the harm of wildfire smoke that can cause debilitating lung and health effects. For more information go to: https://www.lung.org/getmedia/695663e2-bdb8-4a61-9322-02657f530b99/Protect-Your-Health-During-Wildfires-5-29-2020-(1).pdf

"*Protect Yourself from Ash*" – A CDC "Wildfire Smoke Factsheet" on how to protect yourself and others from exposure to wildfire ash. For more information go to: https://www.airnow.gov/sites/default/files/2021-06/protect-yourself-from-ash-factsheet.pdf

"*Protecting Yourself from Wildfire Smoke*" – A CARB (California Air Resource Board) bulletin that provides information about air quality, wildfire smoke and wearing the proper respirator. For more information go to: https://ww2.arb.ca.gov/protecting-yourself-wildfire-smoke

Protection factor (PF) – The number assigned by OSHA to illustrate the level of protection for a type of respiratory protection equipment. For more information go to: https://www.dli.mn.gov/sites/default/files/pdf/construction_sem_sept18.pdf (See table below)

Type of Respirator	Quarter Mask	Half-face Mask	Full-face Mask	Helmet / Hood	Loose Fitting Facepiece
Air Purifying Respirator (including N95/KN95)	5	10	50	–	–
Powered Air Purifying Respirator (PAPR)	–	50	1,000	25/1,000	25
Supplied Air Respirator (SAR) or **Airline Respirator** • Demand mode • Continuous flow mode • Pressure demand mode	 – – –	 10 50 50	 50 1,000 1,000	 – 25/1,000 –	 – – –
Self-Contained Breathing Apparatus (SCBA) • Demand mode • Pressure -demand or other positive pressure mode	 – –	 10	 50 10,000	 50 10,000	 – –

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 the 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, 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 5 air changes per hour (>5 ACH) using a MERV 13 or greater filter. (CDC/EPA/ASHRAE)

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 Notes: [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. [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 at 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 very small areas. To break up protein smoke, it requires the use of degreasing chemicals and cleaners that must meet all affected surfaces.

PRV – Post remediation verification. (See: Post remediation verification)

PS – Point source. A stationery 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.

Public health and safety measures – Implementing measures to ensure public health and safety during and after the cleanup process.

Public health monitoring – Ongoing monitoring and assessment of air quality, water quality, and other environmental factors to protect public health in fire-impacted areas.

Public infrastructure restoration – Repairing or replacing damaged roads, bridges, utilities, and other public infrastructure to ensure safety and functionality in fire-affected areas.

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 causes 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.

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*) Education Note: Pure water/deionized water is preferred in fire damage restoration where electrical and electronic components must be cleaned. (See: Distilled Water)

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 mostly 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 begins. 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 change 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 Notes: [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. [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 mostly 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. [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 encountering air.

Pyrophytes (wildland fire management) – Species of fire-loving plants that must be subjected to fire to complete a part of their life cycle.

(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).

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. (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. (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.

Quantity, large (contents management; contents manipulation) – (1) A room that has a large number of contents. (2) A term in Xactimate estimating describing several contents that must be moved (manipulated) or removed. Education Note: A room having a large number 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."

Quantifiable wildfire air quality – The measurable aspects of air pollution caused by wildfires.

When wildfires occur, they release various pollutants into the atmosphere, including particulate matter (PM), gases, and volatile organic compounds (VOCs). These pollutants can have detrimental effects on air quality and human health. By quantifying these aspects of wildfire air quality, scientists, researchers, and policymakers can better understand the extent of pollution, assess the associated health risks, and implement appropriate measures to mitigate the impacts on both air quality and public health. To assess and quantify wildfire air quality, various parameters are measured and monitored. Several quantifiable indicators include: [1] Particulate Matter (PM): PM refers to tiny airborne particles that can be inhaled into the lungs. It is categorized based on size, such as PM10 (particles with a diameter of 10 micrometers or less) and $PM_{2.5}$ (particles with a diameter of 2.5 micrometers or less). $PM_{2.5}$ is of particular concern as it can penetrate deep into the respiratory system. [2] Air Quality Index (AQI): The AQI is a standardized scale used to measure and communicate the level of air pollution. It provides an indication of the current air quality and its potential impacts on health. The AQI is often calculated based on the concentrations of specific pollutants, including $PM_{2.5}$, PM_{10}, ozone (O_3), nitrogen dioxide (NO_2), and carbon monoxide (CO). [3] Visibility: Visibility is an indicator of air quality that measures how far an observer can see clearly. During wildfires, smoke and particulate matter can reduce visibility significantly, indicating poor air quality. [4] Chemical Composition: The chemical composition of wildfire smoke can be analyzed to quantify specific pollutants present, such as carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), volatile organic compounds (VOCs), and hazardous air pollutants (HAPs). [5] Meteorological Conditions: Meteorological factors, including wind speed, wind direction, temperature, and humidity, play a crucial role in determining the transport and dispersion of wildfire smoke. Monitoring and analyzing these conditions help assess the potential impact of wildfire emissions on air quality in different areas. [6] Health Effects: Quantifying the health effects of wildfire air pollution involves assessing the prevalence and severity of respiratory symptoms, emergency room visits, hospital admissions, and other health outcomes related to exposure to wildfire smoke. This information can help quantify the health burden caused by wildfires and inform public health interventions. (See: Air Quality Index (AQI))

Quantity, medium (contents management; contents manipulation) – (1) A room that has a medium (normal) number of contents. (2) A term in Xactimate estimating describing several contents that must be moved (manipulated) or removed. Education Note: A room having a medium number 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) number of contents in it. (2) A term in Xactimate estimating describing several contents that must be moved (manipulated) or removed. Education Note: A room having a small number 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 on 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, such as electromagnetic waves. Education Notes: [1] The transfer of heat in straight lines through a gas or vacuum other than by heating of the intervening space. [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.

Railroad fire – A fire resulting from any operation or activity of a railroad, except smoking.

Range fire – Any wildfire on rangeland.

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 reentered 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.

"*Ready Wrigley Prepares for Wildfires and Smoke*" – A CDC comic book for children on how to prepare for wildfires and understanding health effects. For more information go to: https://www.epa.gov/air-research/research-diy-air-cleaners-reduce-wildfire-smoke-indoors

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.

Reclamation – The restoration and rehabilitation of land and ecosystems affected by the wildfire, including reseeding, erosion control, and habitat restoration.

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 in order 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 Notes: [1] 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. [2] 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.

Rehabilitation planning (ecosystem) – The development of long-term plans and strategies for the rehabilitation and restoration of fire-impacted landscapes, including prioritizing restoration activities and resource allocation. (See: Erosion Control; Hydroseeding; Replanting, Seeding; Temporary erosion control measures)

Rehabilitation of trails and recreation areas – Restoring and repairing trails, recreational facilities, and amenities in fire-damaged areas.

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, such as 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 Notes: [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. [3] 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.

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.

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.

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.

Remediation supervisor – An individual trained to supervise work being conducted by remediation workers.

Remediation verification, post – (See: Post remediation verification)

Remediation worker – A trained individual who works for a company that provides remediation services.

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. (3) The remediation contractor or the remediation worker. (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. (<u>See:</u> 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 the release or threatened release of hazardous substances, such as containing waste from a building fire. <u>Education Note:</u> Removal action is a response to reduce or eliminate further problems and 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 sponge 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 contaminants such as heat damage to char and ash entering a building.

Remove and replace – The process of removing a building material or content for disposing of the original item and replacing it with a new one. Remove and replace is commonly applied in fire damaged buildings, and in wildfires, where materials cannot be salvaged, or they are not cost effective to restore.

Remove and reset (contents) – The manipulation by means of picking up contents and moving them to another space.

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 secure 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.

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) 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.

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.

Replanting – The act of planting new trees, shrubs, and vegetation in fire-affected areas to restore forest cover, enhance biodiversity, and provide habitat for wildlife. (See: Erosion Control; Hydroseeding; Seeding; Temporary erosion control measures)

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 originates 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. (2) in biology, a contaminant remaining in an organism or in other material such as food or packaging, following exposure. (IUPAC)

Residue from 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 Notes: [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. [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 management – The management and disposal of fire-related residues, such as ash, charred debris, and firefighting chemicals, in an environmentally responsible manner.

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.

Resource conservation (ecology) – Efforts to conserve and protect natural resources, such as water, soil, and wildlife habitats, in fire-affected areas through sustainable land management practices.

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 $PM_{2.5}$ – Airborne particles that penetrate deep into lungs. Particles having an aerodynamic diameter <=2.5 microns. $PM_{2.5}$ particles settle slowly out of the air because they are so light and any form of air movement keeps them airborne (e.g., several hours, days, or weeks) depending on inversion layers and air movement.

Respirable particles PM_{10} – Airborne particles having an aerodynamic diameter <= 10 microns. Particles < 5 microns in size can penetrate 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 “*The Right Respirator and Proper Fit During Wildfires*” – An EPA pamphlet about the right and wrong type of respirator and its use during a wildfire. For more information go to: https://www.airnow.gov/sites/default/files/2020-02/the-right-respirator-and%20proper-fit-508.pdf

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 decision logic (RDL) – Respirator selection guidance developed by NIOSH that contains a set of respirator protection factors.

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, 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, 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 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, 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, 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, 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: http://ehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info:doi/10.1289/ehp.7559

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 more than allowable exposure limits.

Respiratory protection factor – The assigned protection factor given to types of respirators. For more information go to: http://www.osha.gov/Publications/3352-APF-respirators.pdf and http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/part020-appa.html

Respiratory protection program – The standard set by the 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 [1] 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 [2] 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 bringing 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 time 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 references 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.

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 of natural habitats – Implementing ecological restoration measures to restore habitats and support the recovery of native flora and fauna.

Restoration options – Methodology that can vary the outcome of a restoration project such as damage caused by fire or wildfire. Education Note: [1] Restoration options can result because of codes and regulations, funding, materials, and customer requests. [2] Unless the contract scope of work is defined differently, the restorer is expected to return damaged property back to its pre-loss condition.

Restoration, period of – The period 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 techniques – Methods used in rebuilding buildings and structures with historically accurate materials to achieve historical authenticity in keeping with a 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. For more information go to: http://crdn.com/AboutUs.aspx

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.

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. Education Notes: [1] Restorative cleaning often requires the use of specialized cleaning techniques and equipment. [2] Restorative or “salvage” cleaning is required when soiling has become severe and, at the request of the consumer, the furnishing must be returned to a sanitary condition and improved state of order. [3] 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.

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. (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. (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)

Retardant – (1) Any substance that slows or blocks a fire or an odor. (2) A substance or chemical agent which reduces the flammability of combustibles.

Revegetation – Planting native vegetation to restore and enhance the natural landscape.

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 actually 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

Ring fire – A fire started by igniting the full perimeter of the intended burn area so that the ensuing fire fronts converge toward the center of the burn. Set around the outer perimeter of a resource to establish a protective black-line-buffer.

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. (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. (3) A methodology used to examine all possible risks involved with a particular product or organism. (USEPA) Education Notes: Risk assessment can be divided into four parts: [1] Identification of hazards; [2] Dose response (how much exposure causes particular problems, such as 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 from them. Risk management includes consideration of technical, scientific, social, economic, and political information. (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 / Roof 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 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 or wildfire damages an entire community. Education Note: Each hole in 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. For more information go to: 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, 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 (embers) – The penetration of a roof, soffit, vent, or other openings, which results in heat damage and smoke to enter a building.

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 oxides 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 alert – A warning or alert concerning critical information relating to firefighter safety, that is distributed via email through an NWCG mail server. There are three types of alerts: [1] Safety Warning; [2] Safety Advisory; and [3] Safety Bulletin. (See: Safety advisory; Safety bulletin; Safety warning)

Safety briefing – A safety briefing emphasizes key safety concerns regarding the incident and is presented at each briefing session. The safety briefing should contain information to alert incident personnel of potential risk/hazard considered to be most critical.

Safety bulletin – A safety alert containing factual confirmation of a serious wildland fire accident, incident, or fatality. (See: Safety alert)

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 logging (ecology) – The process of removing and recovering usable timber from areas affected by wildfires to reduce economic losses and promote forest regeneration.

Salvage operations – Salvaging any valuable or salvageable items from the fire-damaged area.

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 particular 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 – (1) The control of physical factors in the human environment that could harm development, health, or survival. (2) 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.

Seal check test – A respiratory fit test check that is done every time a person puts on a respirator. The US federal code 29 CFR 1910.134 requires an annual fit test of any respirator that forms a tight seal on the wearer's face before it is used in the workplace. Once a fit test has been done to determine the best respirator model and size for a particular user, a user seal check should be done every time the respirator is to be worn to ensure an adequate seal is achieved. (NIOSH Publication 2018-130)

Seal check test for N95 Respirator – Anytime a person puts on an N95 or KN95 respirator, they are expected to complete a fit test and a seal check test. For more information go to: https://www.dir.ca.gov/dosh/dosh_publications/N95-mask-questions.html

Sealants – Viscous materials that change from their liquid state to become 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 in order 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. A 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." (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 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.

Sediment barriers – Physical barriers, such as silt fences or straw wattles are used to prevent erosion and manage water runoff by capturing sediment and filtering water.

Sediment control – Installing barriers and erosion control structures to prevent sediment runoff into water bodies.

Seeding – The act of distributing seeds over a burned area to facilitate the regrowth of vegetation and aid in ecosystem recovery. (See: Erosion Control; Hydroseeding; Replanting; Temporary erosion control measures)

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 out 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. 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 defrosting (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.

Sensitivity (emotion) – The restorer's understanding about the concerns of their customer during a traumatic time.

Sensitization – An allergic condition that usually affects 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, 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 outlined 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. 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 size 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, 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 (µg/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. (29 CFR 1926.1153, Table 1)

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

Silt fencing (ecology) – Temporary barriers made of geotextile fabric used to control sediment runoff and prevent soil erosion in post-fire cleanup operations.

Site stabilization – The stabilization of the site to prevent further damage, such as securing loose structures and debris.

Six Minutes for Safety – A short safety briefing or training session that lasts approximately six minutes. While it is typically associated with regular safety meetings or briefings for firefighters, it can also be relevant in the context of wildfire response and prevention. The purpose of these sessions is to quickly address key safety topics, reinforce important protocols, and raise awareness about potential hazards. Education Notes: During a "six minutes for safety" session related to wildfires, some topics that may be covered include: [1] Fire Behavior: Discussing the basic principles of fire behavior, including how it spreads, the influence of weather conditions, and potential hazards associated with different fire types. [2] Personal Protective Equipment (PPE): Reinforcing the importance of wearing and maintaining appropriate PPE, such as fire-resistant clothing, helmets, gloves, and boots, to ensure personal safety during wildfire operations. [3] Communication: Highlighting the significance of clear communication among team members, emphasizing the use of radios, hand signals, and other communication tools to maintain situational awareness and coordinate actions effectively. [4] Escape Routes and Safety Zones: Emphasizing the identification and pre-planning of escape routes and safety zones as critical elements of firefighter safety during wildfire operations. [5] Environmental Hazards: Addressing potential hazards in the wildland environment, such as uneven terrain, falling trees, wildlife encounters, and poisonous plants, and providing guidance on how to mitigate these risks. [6] Traffic Safety: Discussing the importance of traffic safety measures during wildfire response, including the proper positioning of vehicles, use of warning signs, and adherence to established traffic control protocols. [7] Fatigue Management: Highlighting the need for adequate rest, hydration, and nutrition to combat fatigue and maintain optimal cognitive and physical performance during prolonged firefighting efforts. [8] Heat Illness Prevention: Providing guidance on recognizing the signs of heat-related illnesses, such as heat exhaustion and heatstroke, and discussing preventive measures, including hydration strategies and scheduled rest breaks. [9] Emergency Medical Procedures: Reviewing basic first aid procedures and emergency medical protocols for responding to injuries, burns, and other medical emergencies that may occur during wildfire operations. [10] Mental Health and Well-being: Addressing the importance of maintaining mental health and well-being, promoting open communication, and providing resources for managing stress, trauma, and emotional challenges associated with firefighting.

Size, smoke, and fume – The size of smoke and fume particles suspended in air. (1) According to journals of science, smoke and fumes suspended in air can range from 0.001 to 100 microns. (2) According to IICRC’s FSRT (fire and smoke, restoration technician course), 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. (See: Air Quality Index (AQI))

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, and provide workers with a safe work environment.

Smoke (building fire) – (1) 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. (2) 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. (3) 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. (4) An air suspension of particles, often originating from combustion or sublimation. (5) A colloid 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. (6) 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)

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 (See: “*Wildfire Smoke: A Guide for Public Health Officials,*” 2019).

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 grass. (Kirsten Shaw, CSC)

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 fumes suspended in air can range from 0.001 to 100 microns. (2) According to IICRC's FSRT course, 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 is capable of converting 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 Notes: [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.

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 damaged 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 restoration – Restoring surfaces, furniture, and belongings affected by smoke and soot damage.

Wildlife habitat restoration: Implementing measures to restore and enhance natural habitats affected by the fire, including replanting native vegetation and creating wildlife corridors.

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 reentered 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 of 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 grass. (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 by 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 a given 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: [4a] 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; [4b] 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, which is the transfer of energy from a higher temperature a lower temperature through conduction, convection, and radiation. Education Notes: [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) [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; last revised 01/31/2020) For more information go to: https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=347791&Lab=NHEERL

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 their physical properties including viscosity and thickness. Education Note: Traction and friction are the other physical measurements for determining oily films. 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"*)

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, SVOCs, 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 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.” (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 dry cleaner requests – A statement to clothing and drapery dry cleaners who agree to dry-clean smoke contaminated articles of clothing, linens, draperies, and other fabrics. 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 absorbing, 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 sinking.

Smoke odor – The perceived presence of odors by olfactory nerves that detect quantities of aerosolized combusted substances and gases. Education Note: Using odors by itself as the main indicator for identifying smoke, char, and ash impaction is problematic, since certain chemicals in smoke do not have an odor. Further, while completing building inspection, the nose shortly becomes desensitized to smoke compounds, where the nose cannot be relied on as an indicator of detecting smoke odor.

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 absorbing, paring, digesting, diffusing, oxidizing or neutralizing smoke odors.

Smoke odor in wildfires – After a wildfire, smoke odor refers to the lingering smell or scent that remains after exposure to smoke. Education Notes: [1] Smoke odor is often characterized by a distinct, pungent, and sometimes unpleasant smell that can persist even after the visible smoke and particulate matter dissipated. [2] Smoke odor is caused by the presence of volatile organic compounds (VOCs) and other chemical byproducts that are released during the combustion process. These compounds can become trapped in various materials, such as fabrics, furniture, carpets, walls, and other surfaces, resulting in a persistent odor. [3] The composition of smoke odor can vary depending on the type of material burned and the specific chemicals released during combustion. For example, smoke odor from a fire may contain different chemical compounds than smoke odor from tobacco smoke or the burning of food. [4] Removing smoke odor can be challenging because the odor particles can penetrate porous materials and surfaces, and can be affected by temperature, humidity, and air movement, making them difficult to eliminate entirely. Common methods for addressing wildfire caused smoke odor include: [a] Ventilation: Opening windows and using fans and air purifiers can help improve air circulation and reduce the concentration of smoke odor particles in an enclosed space. In addition, changing the building's ventilation filters immediately after the wildfire, and again the first couple of weeks after the wildfire using a MERV 13 to 16 filter. [b] Cleaning:

Thoroughly cleaning affected surfaces, including walls, floors, furniture, and fabrics, can help remove smoke residues and reduce the odor. This may involve using specialized cleaning products or techniques designed to neutralize or eliminate smoke odor. [c] Deodorizing Agents: Various deodorizing agents, such as baking soda, activated charcoal, vinegar, or commercial odor neutralizers, can be used to help absorb or mask smoke odor. These agents can be applied to affected surfaces or used in combination with cleaning methods. [d] Ozone, Hydroxyl, and Chlorine Dioxide (ClO_2) Treatment: Ozone generators are sometimes used to treat smoke odor. These machines generate ozone, which can help break down smoke odor molecules. However, ozone treatment should be performed by professionals and with caution, as ozone can be harmful to humans and should not be present during treatment. [5] It is important to note that persistent smoke odor may require professional restoration services to effectively eliminate the odor and restore the affected space. These professionals may utilize specialized equipment, techniques, and products to address the specific challenges associated with smoke odor removal. Overall, addressing smoke odor often involves a combination of ventilation, cleaning, deodorizing, and sometimes professional assistance to achieve the best results. For more information go to: https://www.epa.gov/indoor-air-quality-iaq/wildfires-and-indoor-air-quality-iaq and https://www.epa.gov/indoor-air-quality-iaq/create-clean-room-protect-indoor-air-quality-during-wildfire

Smoke odor neutralization – Techniques and products used to eliminate or reduce persistent smoke odors from fire-damaged structures and belongings.

Smoke pall (wildland fire; building fire) – An extensive, thick blanket of smoke that typically spreads more or less horizontally out from a 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 Notes: [1] 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. [2] 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. [3] Particle pollution includes [a] "coarse particles," also known as PM_{10} and $PM_{2.5}$, having diameters from 2.5 to 10 micrometers and [b] "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 very 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 Notes: [1] Pressurized smoke occurs when smoke and other gases from a fire increase in size due to fuel and heat. The heat is causing the moving particles to penetrate confined areas. [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 remediation – The process of removing and mitigating smoke odors, particles, and contaminants from indoor environments impacted by wildfire smoke.

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 Notes: [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. [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 that is acid – Fire residues characterized by acidity that is capable of damaging, corroding and discoloring materials and finishes.

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, discussion about – The means and methods for removing smoke, soot, char, and ash from the interior and exterior. Education Notes: [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. [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. [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. [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. [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. [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. [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 – The removal of smoke, char, ash, and burnt vegetative matter 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 Notes: [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.) [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. [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 – The removal of smoke, char, ash, and vegetative matter from the interior including attics, crawlspaces, and ventilation systems, which requires the separation of contents from affected rooms or building allowing the structure to be vacuumed, wet cleaned and likely prepared for painting. Education Notes: [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. [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, built-in appliances that remain in place, kitchen, and bathroom exhaust vents. [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. [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. [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 – The removal of smoke, char, ash, and vegetative matter from the surface of the interior and contents using vacuuming and wet cleaning methods. Education Notes: [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 impact and discussing findings with the customer or their agent, including an insurance adjuster. [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. [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 – The removal of smoke, char, ash, and vegetative matter from the interior including attics, crawlspaces, ventilation systems and contents using vacuuming and wet cleaning methods. Education Notes: [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. [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. [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. [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 – The removal of smoke, char, ash, and vegetative matter from contents in affected rooms or buildings using multiple cleaning processes. Education Notes: [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. [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. [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. [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 – The removal of smoke, char, ash, and vegetative matter from contents in affected rooms or building using dry vacuum and damp cleaning methods. Education Notes: [1] Contents, including furniture, appliances, clothing, and personal items should be video documented, such as with photos, Matterport or I-Guide. This form of documentation benefits all parties that shows the number 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. [2] Surface cleaning includes HEPA vacuuming and surface wet wiping using a mild detergent.

Smoke washing, residential interior contents cleaning moderate – The removal of smoke, char, ash, and vegetative matter from contents in affected rooms or building using multiple cleaning processes. Education Notes: [1] Contents, including furniture, appliances, clothing, and personal items should be video documented, such as with photos, or a Matterport or I-Guide tour, 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. [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. [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. [4] 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 – The removal of char, ash, and vegetative matter particles that contain smoke which are settled on the surface of the interior and on contents. Education Notes: [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 impact and discussing findings with the customer or their agent, including an insurance adjuster. [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. [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. [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, about – Smoldering is 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 similar to 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 electrical fire VOC investigation – A smoldering fire is one that heats slowly, where it often produces toxic smoke without any visible sign of flame. It occurs when electrical components or wiring become overheated and begin to smolder due to factors such as electrical faults, overloaded circuits, faulty connections or damage caused by a wildfire. Smoldering electrical fires can be dangerous because they can go unnoticed for an extended period, allowing thermal degradation or pyrolysis of the source to spread and cause significant damage to components and the building. During fire investigation, the following signs of smolder and its source should be considered: [1] Sensory Detection of a Burning Smell: the presence of a persistent burning odor, similar to the smell of overheated plastic or rubber. [2] Health Hazards of Breathing Burning Smells: [a] the burning smell contains volatile organic compounds (VOCs) that can be toxic to breathe; [b] smoldering emissions may also contain irritant gases that decrease their escape probability from a confined space. For example, in under-ventilated conditions, such as in a wall cavity with insulation, a smoldering fire produce substantial amounts of asphyxiants, such carbon monoxide and hydrogen cyanide; [c] The released toxic volatiles and asphyxiants may endanger the investigator and occupants before dense smoke and open flame appear; [d] The accumulation of carbon monoxide is likely to be incapacitating before smoke entirely fills the wall cavity or a room. In fact, in involuntary fires, inhalation of toxic fire effluents is the main cause of death, which is higher than when there is flaming. [3] Respiratory Protection: [a] once smoldering VOCs are detected, the investigator is expected to wear (donn) a respirator having a minimum of an organic vapor cartridge (OVC); [b] while the OVC is filtering out (absorbing) many toxic gases, it does not filter out carbon monoxide and other gases; [c] the only true respiratory protection against all VOCs, is donning a self-contained breathing apparatus (SCBA) respirator, which has its own oxygen in a tank or supply air hose. [4] Dilemma: [a] one would think, by wearing a proper respirator that filters out toxic gases, the investigator just impeded him or herself from detecting a potential source; [b] while this is true when detecting gases through the sense of smell, the investigator is properly protecting their health; [c] there are electronic detection instruments the investigator will use to potentially identify the source of smolder. [5] Smoke: [a] The presence of visible smoke without flame or signs of charring. [b] the presence of visible smoke in an increase of degree is an indicator to identify a possible source. [6] Discolored Outlet or Switch Plates: Signs of discoloration, scorch marks, or melting around electrical outlets or switches. [7] Investigator’s Visual Cause and Origin Investigation Methods: [a1] when inspecting motors, transformers, to jacketed wiring, it is ideal to do so while systems are operating, however, this produced inherent dangers. Investigation may require turning off electric power, then, with a thermal imaging camera or infrared digital thermometer, identify changes in heat temperature; [a2] in situations where electric power is off, this may limit the investigator’s use of thermal imaging cameras and IR thermometers; [b] when ceiling and walls remain covered with drywall or paneling, or cabinet and wall mounted appliances are present, they can further hinder the investigation, where they should be removed; [c1] when an appliance is considered a possible source, it should be removed, however, other fire investigators, such as insurance investigators, prefer to complete identifying the source of smolder or the cause of flaming themselves; [c2] when this is not possible, all aspects of the dismounting and removing appliances should be documented, the appliance and its connections (e.g., gas, electrical) are to be kept with the appliance, where the suspect appliance(s) are secured for further investigation; [c3] properly documenting the location of the appliance before handling it/them, removing appliance(s), and storing them in a safe place is critically important to avoid spoilation of evidence. [8] Investigator's Electronic Cause and Origin Investigation Methods: [a] Using a PID (photoionization detector), many multi-gas PIDs can detect fugitive emissions "total VOCs" (TVOCs); [b] Some PIDs can discriminate to detecting specific compounds, and they can be set at low ppb, low ppm, mid-range ppm, wide/high-range ppm detection; [c] like a dog trained to sniff for illegal drugs or bombs, electronic instrument detection is only as good as its ability to identify the source, meaning, smolder investigation is often exploratory. For more information go to: https://www.frontiersin.org/articles/10.3389/fmats.2019.00250/full and https://www.mdpi.com/2076-3417/13/6/3766 and https://graywolfsensing.com/ and https://www.sciencedirect.com/science/article/pii/S092540052101529X and https://ionscience.com/usa/products/tiger-handheld-voc-gas-detector/

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.

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 has contact with 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 in 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 – (1) Expenses incurred in a project that are not directly related to construction or remodeling in the strictest sense. Examples are loans, 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.

Soft furnishings – Fabric-based upholstered furniture, including draperies 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.

Soil erosion control matting – Installing erosion control matting to stabilize soil and prevent erosion.

Soil remediation – The process of treating or removing contaminated soil caused by the release of toxins and pollutants during the fire.

Soil stabilization – Implementing measures to stabilize and restore soil health and fertility after a wildfire.

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 is capable of dissolving another liquid, solid or gas. (2) A liquid substance that is capable of dissolving other substances. The most common solvent is water.

Solvent – (1) A liquid, solid or gas that is capable of dissolving 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 is 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 similar to carbon black, fine micron/submicron sized spheroids <u>Education Notes</u>: [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. [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, char, 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, char, and smoke damage assessment of antiques – (1) A visual antique assessment process that inspects each surface for signs of heat damage, along with soot, char, ash, smoke 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, char, ash, 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, SVOCs, 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. The morphology of soot particles are like carbon black, fine micron/submicron sized spheroids. Education Note: The EDS spectrum of soot shows strong carbon concentrations with few or no trace elements present.

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. (See: Black carbon and Carbon black soot explained)

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 a number of 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 sponge 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 absorbed 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: 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: Soot sealers are 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 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 correct one which employee’s must follow unless site conditions, such as hazards, health and safety considerations, and codes and regulations, unless 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: http://www.epa.gov/quality/qs- docs/g6-final.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: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/rsv9182

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 completely 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.

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 can no longer serve the purpose intended; or is nonfunctional in the sense that it cannot continue to be used for its original purpose. (EPA Memorandum 9441)

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 of. Spoilage also occurs when electricity in a cooled building or refrigeration appliance is turned off causing damage to produce or a product.

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, ash, char, 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 Notes #1: [1] In theory, once the sponge media collides with surface contaminants, very 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 damaging 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 Notes #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 are 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. (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 the 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, plenty of fresh air is sucked into the fire room by the 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.nist.gov/el/fire-research-division-73300/fire-modeling-programs 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

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 room or building.

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.

STEL – Short term exposure limit.

Sterilize – The use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.

Strategies to Reduce Exposure to Wildfire Smoke – In areas where the public is experiencing wildfire smoke, public health and air quality agencies should provide advice on strategies to limit exposure, which include staying indoors; limiting physical activity; reducing indoor air pollution sources; effectively using air conditioners and air filters or cleaners; creating cleaner air shelters; and using respiratory protection appropriately. The most common advisory during a smoke episode is to stay indoors, where people can better control their environment. Whether at home or in a public space, indoor environments that have filtered air and climate control can provide relief from smoke and heat. High-efficiency heating, ventilation, and air-conditioning (HVAC) filters (rated MERV 13 or higher) in systems that can accommodate them. (“*Wildfire Smoke: A Guide for Public Health Officials*”, 2019)

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.

Structural cleaning – Thorough cleaning and restoration of fire-damaged structures, including removal of char, soot, ash, and other contaminants from surfaces, furniture, and fixtures.

Structural integrity of buildings impacted by wildfire heat – The restorer should inspect the building for signs of visible exterior or interior structural damage. A qualified professional, such as a licensed general contractor or engineer, should complete inspection when the restorer is not properly trained, certified, or licensed. [1] <u>Initial Activities</u>: (a) Inspect the Property: (1a) Visual inspection should be completed only after the hazard assessment is completed; (1b) Visual inspection should consider wind-blown embers that could have collected against the building or entered a crawlspace or attic, that have potentially affected building cavities; (1c) The initial inspection of the property should include its proximity to the burn zone, the wind-direction of travel, and anecdotal information made by occupants during or immediately after the wildfire (e.g., wind direction, smoke density, settled debris, proximity to burning structures); (1d) In addition, inspection should include the type of construction and analysis opportunities for wildfire smoke to penetrate the structure and how open the structure was at the time of impact; (1e) Other initial activities may include but are not limited to: (1f) Develop a work plan and cost estimate; (1g) Obtain client’s acceptance of the workplan and cost estimate; and (1h) Obtain permits as required. [2] <u>During Restoration</u>: (2a) Establish a controlled work area: (2a) Install warning signs; (2c) Secure the area by making it safe, such as by supporting the structure; (2d) Monitor and document the restoration progress.

Structural integrity of buildings impacted by wildfire heat discussion – (1) After a wildfire, the structural integrity of buildings and other structures can be compromised due to the intense heat, flames, and other factors associated with the fire. The extent of damage to the structure depends on various factors, including the severity of the fire, the materials used in construction, and the proximity of the structure to the fire’s epicenter. (2) It is recommended to engage licensed professionals, such as structural engineers, architects, or building inspectors, to assess the structural integrity of a building after a wildfire. They can provide expert guidance, conduct detailed evaluations, and make recommendations for repairs, reinforcements, or necessary building code compliance. (3) Remember, safety should be the top priority during the assessment and restoration process. It is crucial to follow appropriate safety protocols and consult with professionals experienced in post-wildfire structural evaluations and repairs. (4) Included are some key considerations regarding structural integrity after a wildfire: [1] Safety Hazards: It is important to be cautious of potential safety hazards, such as weakened structures, falling debris, unstable chimneys, or damaged gas lines. Engaging professional contractors or structural engineers can help identify and address safety concerns. [2] Visual Inspection: It is important to conduct a thorough visual inspection of the structure to assess the damage. This includes examining the exterior walls, roof, windows, doors, and other components for signs of charring, melting, warping, or other fire-related damage. [3] Foundation Assessment: The foundation of the structure should be inspected for any signs of heat damage or shifting. The stability and integrity of the foundation are crucial for the overall structural soundness of the building. [4] Electrical and Plumbing Systems: The electrical and plumbing systems should be carefully examined for damage. Fire can melt or damage wiring, conduits, pipes, and fixtures, which can pose safety hazards or affect the functionality of these systems. [5] Structural Elements: The integrity of load-bearing structural elements, such as beams, columns, and trusses, should be assessed. These elements may experience weakening or damage due to prolonged exposure to high temperatures. [6] Roofing and Exterior Components: The roof and exterior components, such as siding, soffits, and fascia, should be inspected for fire damage. Damaged or compromised roofing can lead to water infiltration and further deterioration of the structure. [7] HVAC Systems: Heating, ventilation, and air conditioning (HVAC) systems should be inspected for fire damage, including the heat exchangers, ductwork, and components. These systems can harbor smoke residues or soot, affecting air quality and system functionality.

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.

Structure – A constructed object, usually a free-standing building above ground.

Structure (vegetative) **–** The arrangement of vegetation in terms of density, basal area, cover, and vertical arrangement.

Structure fire – Fire originating in and burning any part or all of any building, shelter, or other structure.

Structure Protection Plan – A plan developed by the Structure Protection Specialist that provides operational guidelines to suppress resources responsible for providing wildland fire structure protection. (See: Structure Protection Specialist)

Structure Protection Specialist (STPS) – An individual responsible for developing an incident’s structure protection plan, providing tactical direction and recommendations to incident planning and operations on efficient and safe utilization of resources assigned to provide wildland fire structure protection. (See: Structure Protection Plan)

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 contrast 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 1/10th 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 (the prime 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 odors 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 – Damaged sustained to property or persons from a sudden and accidental occurrence. A car crash, burst pipe or fire can cause sudden and accidental damage.

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 burns 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 – (1) A fire that burns loose debris on the surface, which includes dead branches, leaves, and low vegetation. (2) A surface fire is a low-to-moderate intensity fire that spreads across the surface of vegetation and combustible material, such as grass, leaves, and small shrubs. It typically moves relatively slowly and is influenced by factors such as fuel moisture, wind, and topography.

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 natural, and 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 the 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 on 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. For more information go to: ASTM E1216-21 “*Standard Practice for Sampling for Particulate Contamination by Tape Lift*” https://www.astm.org/e1216-21.html

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, soot, ash, and vegetive matter.

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, such as in fire damage restoration.

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 in order 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. (See: Black carbon and Carbon black soot explained)

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 at 120°-150°C/248-302°F; decayed wood ignites at 150°C/302°F; the ignition temperature of various woods is at 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 at 150°C/302°F; paper ignites at 218-246°C/424-475°F; leather ignites at 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; and 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 is allowed to 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 [1] “Thermal and Mechanical Properties of Gypsum Boards and their Influences on Fire Resistance of Gypsum Board Based Systems;” [2] “Drywall Thermal Properties Exposed to High Temperatures and Fire Condition;” [3] “Mechanical Properties of Gypsum Board at Elevated Temperatures;” [4] “Measurement of Thermal Properties of Gypsum Board at Elevated Temperatures;” [5] “Thermal Properties and Microstructure of Gypsum Board and its Dehydration Products: A Theoretical and Experimental Investigation.” Education Note: 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, swelling at joints, where 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 impact 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 fencing and security – Installing temporary fencing and security measures to protect the fire-damaged area from unauthorized access.

Temporary erosion control measures – Temporary measures implemented to prevent erosion and sediment runoff in burned areas until more permanent stabilization measures can be implemented. (See: Erosion Control; Hydroseeding; Replanting, Seeding)

Temporary housing assistance – Support and resources provided to individuals or families displaced from their homes due to wildfire damage, including temporary shelters, rental assistance, or housing vouchers.

Temporary repairs – (1) Any reasonable repair which protects the property from further damage. (2) The use of equipment and supplies that secure 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. Three elements must be present for the fire to occur heat, oxygen and fuel, and the chemical chain reaction. Together, this process is referred to as "fire tetrahedron."

"*The ABCs of Wildfire Residue Contamination Testing: Post Assessment of the Indoor Environment*" – An article in the Synergist (AIHA's technical journal) where it addresses visible char and ash, and invisible odors containing sVOCs and PAHs. For more information go to: https://synergist.aiha.org/201711-wildfire-residue-contamination-testing

"*The Right Respirator and Proper Fit During Wildfires*" – An EPA pamphlet about the right and wrong type of respirator and its use during a wildfire. For more information go to: https://www.airnow.gov/sites/default/files/2020-02/the-right-respirator-and%20proper-fit-508.pdf

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 – (1) The molecular deterioration of materials (usually organics) because of overheating. (2) Processes whereby the action of heat or elevated temperature on an item causes a deterioration of one or more of 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 exceedingly 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 lower thermal inertia rises relatively quickly when heated, where a material having a high thermal inertia cools 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 wax or urethane or fabric protection.

Three-Dimensional Distribution of Biomass Burning of Aerosols from Wildfires (building exterior) – In principle, there are three heat transfer mechanisms than can cause the ignition of buildings: radiation from the flames, convection of hot gases and spotting, such as the transport of hot particles and firebrands by the flow of gases. The existence of non-zero convective fluxes on the building surface is an indicator of the impingement of the hot gas flow on building components and correspondingly indicates a possibility of hot particles to get in contact inside them. The impact of the distribution of biomass impacting structures is important to consider when inspecting wildfire contaminated structures. For more information go to: https://www.mdpi.com/2571-6255/4/1/12 and https://www.mdpi.com/2072-4292/14/11/2582 and https://hal.science/hal-02892557/document and https://nvlpubs.nist.gov/nistpubs/Legacy/IR/nistir7803.pdf and https://www.sciencedirect.com/science/article/abs/pii/S0010218019304316 and https://www.fs.usda.gov/rm/pubs/rmrs_gtr315.pdf

Thunder – The sound due to rapidly expanding gases along the channel of a lightning discharge. Education Notes: [1] 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. [2] Thunder audibility also is influenced by humidity, wind velocity and wind shear, temperature inversions, terrain features, clouds, etc. [3] Thunder contains a roughly cylindrical initial pressure shock wave at the lightning channel in excess of 10 atmospheres. The shock wave decays to a sound wave rapidly, within meters. [4] 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 in 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, 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 the 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 Notes: [1] The chemical complexity of airborne particles requires that the composition and sources of a large number of 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. [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 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.

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).

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.

Toxicity of wildfire smoke affecting humans – Wildfire smoke contains a mixture of pollutants, some of which can be toxic and harmful to human health. The specific composition and toxicity of wildfire smoke to humans depend on various factors, including the type of vegetation burning, the temperature of the fire, and the distance from the source. https://ww2.arb.ca.gov/protecting-yourself-wildfire-smoke Currently, wildfires in Canada are affecting a major part of the eastern US, where outside air and indoor air quality is the worst in years. https://www.cnn.com/us/live-news/canada-wildfire-smoke-air-quality-06-28-23/index.html and https://www.nbcnews.com/news/us-news/live-blog/poor-air-quality-live-updates-rcna91545 and https://www.npr.org/2023/06/29/1184989815/air-quality-midwest-red-purple-alert-canada-wildfires-smoke During wildfire events, it is essential to stay informed about air quality conditions through local air quality monitoring agencies and follow their recommendations to protect your health. If you experience severe symptoms or have concerns about your health due to wildfire smoke exposure, consult with a healthcare professional. Included is the current science about wildfire smoke: [1] Particulate Matter (PM): Wildfire smoke consists of fine particles, known as particulate matter (PM), which can be inhaled deep into the respiratory system. $PM_{2.5}$ refers to particles with a diameter of 2.5 micrometers or smaller and is of particular concern due to their ability to penetrate the lungs. These particles can contain toxic substances, such as heavy metals, organic compounds, and combustion byproducts. [2] Respiratory Irritants: Wildfire smoke contains various irritants that can cause respiratory symptoms and exacerbate existing respiratory conditions. These irritants include gases like carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), and volatile organic compounds (VOCs). Prolonged exposure to these irritants can lead to respiratory discomfort, coughing, wheezing, shortness of breath, and reduced lung function. [3] Hazardous Air Quality Index (AQI): During wildfires, the concentration of pollutants in the air can reach hazardous levels. The Air Quality Index (AQI) is a scale used to measure and communicate air quality. When the AQI reaches high levels, it is advised to limit outdoor activities and seek shelter in areas with cleaner air. [4] Health Risks: Exposure to wildfire smoke can pose health risks, particularly for vulnerable populations such as children, older adults, pregnant women, and individuals with pre-existing respiratory or cardiovascular conditions. It can aggravate asthma, bronchitis, and other respiratory diseases. Long-term exposure to wildfire smoke may increase the risk of developing respiratory and cardiovascular problems. [5] Chemicals of Concern: Wildfire smoke can release toxic substances, including polycyclic aromatic hydrocarbons (PAHs), benzene, formaldehyde, and heavy metals. These chemicals have been associated with various health effects, including cancer, neurological issues, and reproductive problems. [6] Indoor Air Quality: Even while remaining indoors, wildfire smoke can infiltrate buildings and impact indoor air quality. To reduce exposure, it is recommended to keep doors and windows closed, use high-efficiency air filters or air purifiers, and create a clean indoor environment.

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.

Tree and vegetation removal – Clearing and removing fire-damaged trees, shrubs, and other vegetation.

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 when 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 particular 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, such as 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 in which the structural members entirely made 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, Inc. An independent testing agency that checks electrical devices and other components for possible safety hazards. (See: Underwriters Laboratories)

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 many 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 break up water into millions of individual water droplets that are broadcast 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, the 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."

Underwriters Laboratory's "*An Evaluation of DYI Air Filtration*" – A study completed at Underwriters Laboratories, Inc., showing how homemade air filtration systems work to reduce smoke and particulate matter in buildings. For more information go to: https://chemicalinsights.org/wp-content/uploads/2022/03/DIY-Box-Fan-Report-2021.pdf

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.

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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.

Urban interface fire – Also known as a wildland-urban interface fire, an urban interface fire, refers to a fire that occurs in or threatens areas where urban development meets or intermingles with wildland or natural areas. These fires pose unique challenges due to the proximity of structures and the need to protect both human lives and property.

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 SDS 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. <u>Education Notes:</u> [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. [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. <u>Education Note:</u> 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.

Vegetation management – The clearing, pruning, or replanting vegetation to reduce fuel loads, prevent future wildfires, and promote the recovery of natural ecosystems.

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 gases to the outside. Also, another word for the moving glass part of a window sash, such as a 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 exhaust out of a building. The firefighting operation for removing smoke and heat from a 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 at 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 is able to interface with managers and supervisors at 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 close up 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 rooms 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.

VOCs and PAHs in wildfire from a homeowner's perspective – VOCs are organic chemicals that can vaporize at room temperature and contribute to odors. PAHs are a group of chemicals formed during incomplete combustion of organic materials, such as wood and vegetation. The effectiveness of odor removal methods may vary depending on the specific circumstances, the extent of the fire, and the materials affected. Patience may be required, as some odors may take time to dissipate fully. They can be released into the air during wildfires resulting in the persistence of odors. VOCs and PAHs from wildfire smoke can be persistent and challenging to identify and eliminate. They can penetrate porous materials and linger long after the fire has been extinguished. Consider the following in identifying and removing wildfire smoke odors: [1] Ventilation: Ensure proper ventilation in indoor spaces affected by wildfire smoke odors. Open windows and use fans to increase airflow, which can help dissipate the odors over time. [2] Air Purifiers: Consider using air purifiers equipped with high-efficiency particulate air (HEPA) filters to remove particles and VOCs from the air. Look for models specifically designed to address smoke and odor removal. [3] Cleaning Surfaces: Clean surfaces in the affected areas to remove soot, ash, and residue that may contribute to lingering odors. Use appropriate cleaning methods for each surface, such as mild detergent and water for non-porous surfaces and HEPA vacuuming for carpets and upholstery. [4] Professional Restoration Services: In severe cases of VOC and PAH odors, it may be necessary to seek professional restoration services. These professionals have specialized equipment and expertise to address complex odor issues, including the use of ozone generators, thermal fogging, or other advanced techniques. [5] Odor Neutralizers: Consider using odor-neutralizing products specifically formulated to target VOC and PAH odors. These products work by chemically neutralizing the odorous compounds and can be applied to surfaces or used in the air.

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 such 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 in room conditions.

Volunteer cleanup efforts – Community-driven initiatives and volunteer programs that mobilize individuals to assist in post-fire cleanup activities, such as debris removal, erosion control, and replanting.

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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 absorb 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.

Warping – The deformation of a surface from its original or intended shape caused by sharp temperature increases and/or changes in moisture content.

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. (See: Content lost its warrantee)

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 (structure) – 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 restoration (ecosystem) – Restoring water sources and addressing any contamination or damage caused by firefighting efforts.

Water runoff management (ecosystem)– Implementing strategies to control and direct water runoff to prevent erosion, protect water bodies from contamination, and minimize further damage to the landscape.

Watershed protection – Measures taken to protect and maintain the health of watersheds and water resources in fire-impacted areas, including erosion control, water quality monitoring, and restoration activities.

Water tender – (1) Any ground vehicle capable of transporting specified quantities of water. (2) A specialized firefighting vehicle used to transport and deliver large quantities of water to fire-affected areas.

Waterway cleanup (ecosystem) – Removing debris, sediment, and pollutants from waterways affected by the fire.

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 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 that are 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 can vary 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 the 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 Notes: [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 that are 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. [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 sponges 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, 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, about – A "wildfire" is an uncontrolled fire that burnt in the wildland vegetation, often in rural areas. Wildfires can burn in forests, grasslands, savannas, and other ecosystems, where they have been doing so for hundreds of millions of years. They are not limited to a particular continent or environment. Wildfires can burn in vegetation located both in and above the soil. Ground fires typically ignite in soil thick with organic matter that can feed the flames, like plant roots. Ground fires can smolder for a long time, even an entire season, until conditions are right for them to grow to a surface or crown fire. Surface fires, on the other hand, burn in dead or dry vegetation that is lying or growing just above the ground. Parched grass or fallen leaves often fuel surface fires. Crown fires burn in the leaves and canopies of trees and shrubs. Some regions, like the mixed conifer forests of California's Sierra Nevada Mountain range, can be affected by different types of wildfires. Sierra Nevada forest fires often include both crown and surface spots. Wildfires can start with a natural occurrence, such as a lightning strike, or a human caused spark. However, it is often the weather conditions that determine how much wildfires will grow. Wind, high temperatures, and little rainfall can all leave trees, shrubs, fallen leaves, and limbs dried out and primed to fuel a fire. Topography plays a big part too: flames burn uphill faster than they burn downhill. Wildfires that burn near communities can become dangerous and even deadly if they grow out of control. For example, the 2018 Camp Fire in Butte County, California destroyed almost the entire town of Paradise; in total, 86 people died. Still, wildfires are essential to the continued survival of some plant species. For example, some tree cones need to be heated before they open and release their seeds; chaparral plants, which include manzanita, chamise (*Adenostoma fasciculatum)*, and scrub oak (*Quercus berberidifolia*), require fire before seeds will germinate. The leaves of these plants include a flammable resin that feeds fire, helping the plants to propagate. Plants such as these depend on wildfires in order to pass through a regular life cycle. Some plants require fire every few years, while others require fire just a few times a century for the species to continue. Wildfires also help keep ecosystems healthy. They can kill insects and diseases that harm trees. By clearing scrub and underbrush, fires can make way for new grasses, herbs, and shrubs that provide food and habitat for animals and birds. At a low intensity, flames can clean up debris and underbrush on the forest floor, add nutrients to the soil, and open up space to let sunlight through to the ground. That sunlight can nourish smaller plants and give larger trees room to grow and flourish. While many plants and animals need and benefit from wildfires, climate change has left some ecosystems more susceptible to flames, especially in the southwest United States. Warmer temperatures have intensified drought and dried out forests. The historic practice of putting out all fires also has caused an unnatural buildup of shrubs and debris, which can fuel larger and more intense blazes. For more information go to: https://education.nationalgeographic.org/resource/wildfires/ and https://www.rd.com/article/what-is-a-wildfire/ and https://www.ucdavis.edu/climate/definitions/wildfire

Wildfire and the Wildland Urban Interface (WUI) – While the wildland urban interface (WUI) is a term commonly known in areas that experience wildfires, where it may not be a common term to some city and rural fire departments. WUI is the zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Education Notes: [1] WUI is an area within or adjacent to an "at-risk community" (see below for the definition of an "at risk community") that is identified in recommendations to the Secretary of Agriculture in a Community Wildfire Protection Plan, or A WUI is any area for which a Community Wildfire Protection Plan is not in effect but is within ½ mile of the boundary of an "at risk community". [2] A WUI is also any area that is within 1 ½ miles of an "at risk community" and has sustained steep slopes that may affect wildfire behavior or has a geographic feature that aids in creating an effective fuel break or is in fuel condition class 3. (An area classified as fuel condition class 3 implies that the current condition of the vegetation within the area would not be sustainable due to the absence of two or more natural fire cycles. In other words, an excess of vegetation and fuels has occurred due to the exclusion of fire which naturally reduces the level of forest fuels.) An area adjacent to evacuation routes for an "at risk community" is another example of a WUI. (https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_053107.pdf) For more information go to: https://www.usfa.fema.gov/wui/what-is-the-wui.html and https://www.usfa.fema.gov/wui/ and https://www.nwcg.gov/sites/default/files/training/docs/s-215-firescope-wui.pdf

Wildfire and worker heat stress and heat stroke – Wearing PPE and certain clothing ensembles can often increase an employee's risk of experiencing heat-related illnesses. PPE (e.g., outer protective clothing, respirators, face shields, boots, and gloves) are often required to reduce or eliminate exposure to external hazards (e.g., smoke, ash, debris). PPE reduces the body's normal way of getting rid of heat by sweating and other means. PPE holds excess heat and moisture inside, making the worker's body even hotter. The increase of physical effort to perform duties while carrying the extra weight of the PPE and can lead to the worker getting hotter faster (e.g., working muscle increases body heat production).

"Wildfire Glossary for Restorers, Environmental Professionals, and Insurance Adjusters" 2023 Edition

Wildfire at risk populations – At-risk lifestages and populations, most healthy adults, and children, will recover quickly from smoke exposure and will not experience long-term health consequences. However, certain at-risk lifestages and populations may be at greater risk of experiencing severe acute and chronic symptoms. While the focus of this discussion is on groups at greatest risk of experiencing health effects from exposure to fine particles and chemicals, pollutants emitted from wildfires can undergo atmospheric reactions and form secondary pollutants, where people with asthma and other lung diseases, children, older adults, and people who are active outdoors (e.g., outdoor workers) may be at increased risk of experiencing an adverse health effect.

Wildfire characteristics – Wildfires require three conditions to start, which includes "fuel", "oxygen", and a "heat source". The three together are known as the "fire triangle". Education Notes: [1] Fuel is anything that can burn such as grass, brush, trees and even homes and other structures. The more fuel there is to burn, the more intense a fire can be. [2] Fire needs oxygen to grow and winds increase oxygen supply and fire intensity. Plus, winds can push heat from the fire into new areas, preheating and drying fuels and moving the fire rapidly forward. [3] Heat sources spark the fire and bring fuel temperatures hot enough to ignite and burn. The sun, lightning, burning campfires, cigarettes, sparks, and hot winds are all examples of heat sources necessary to start and promote growth of wildfires. [4] Once ignited, fuels, weather. and topography govern fire behavior and determine how fast the fire spreads, how intensely it burns, and how much smoke it will put into the air on a given day. The changing climate is also influencing the frequency, duration, and severity of wildfires due to a warming climate, longer fire seasons, and increases in drought conditions. (Westerling et al. 2003; USGCRP 2018)

Wildfire "DIY Air Cleaner to Reduce Smoke Indoors" – An EPA document outlining how homeowners and others can create a makeshift 20" box fan with a 20" air filter. For more information go to: https://www.epa.gov/air-quality/wildfires-and-smoke (See: EPA's "Research on DIY Air Cleaners to Reduce Wildfire Smoke Indoors;" "Evidence on the Use of Indoor Air Filtration as an Intervention for Wildfire Smoke Pollutant Exposure A Summary for Health Departments")

Wildfire "*Eye in the Sky: Satellites that Show Us the Western Wildfires*" – NASA satellites capture wildfire smoke crossing the western US. For more information go to: https://www.engineering.com/story/eye-in-the-sky-satellites-that-show-us-the-western-wildfires

"*Wildfire Glossary of Environmental, Insurance and Restoration Terms and Definitions*" 2014, a glossary published by Patrick Moffett. The glossary was updated in 2019 and 2020. This glossary "Wildfire Glossary for Restorers, Environmental Professional, and Adjusters" 2023, is the current edition.

"Wildfire Glossary for Restorers, Environmental Professionals, and Insurance Adjusters" 2023 Edition

Wildfire hazard assessment of burnt structures – Firefighters, inspectors and restorers are exposed to hazards when assessing burnt structures. Education Notes: [1] The hazard assessment of standing burnt structures starts by protecting individuals with appropriate PPE. The PPE should protect firefighters, inspectors, and workers from exposure to aerosolized fumes containing hydrochloric acid, ammonia, carbon dioxide, carbon monoxide, hydrogen sulfide, hydrogen cyanide, formaldehyde, phthalates, halogens, and dioxins. [2] For partially burnt structures, it may involve stabilization to salvaging personal contents, where prior to permitting employees to start stabilization or demolition operations, a qualified person shall make a survey of the structure is completed to determine the condition of the framing, floors, and walls, and the possibility of an unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked. (California Title 8 §1734 Supervision, Subchapter 4, Article 31, Demolition) [3] For completely burnt structures it involves removing or stopping explosive conditions such as propane tanks, gasoline, and natural gas lines. [4] Part of worker exposure can occur during the stabilization of the biomass in burnt structural debris with the use of a glue-like adhesive that locks down asbestos, lead-paint, and other hazardous compounds until the site can be professionally mitigated. For more information go to: https://synergist.aiha.org/201608-after-the-fire and https://synergist.aiha.org/201711-wildfire-residue-contamination-testing and https://www.fs.usda.gov/rm/pubs_other/rmrs_2009_urbanski_s001.pdf and https://ww2.arb.ca.gov/news/new-analysis-shows-spikes-metal-contaminants-including-lead-2018-camp-fire-wildfire-smoke and https://www.epa.gov/sciencematters/study-shows-some-household-materials-burned-wildfires-can-be-more-toxic-others and https://theredguidetorecovery.com/dioxins-the-most-hazardous-substance-in-structure-fire-environments/ and https://www.dir.ca.gov/dosh/wildfire/worker-health-and-safety-during-fire-cleanup.html and https://www.dir.ca.gov/Title8/1734.html

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 substances such as lead-based paint. Southern California Quality Management District (SCAQMD) says, even modern buildings can contain asbestos, where fire damaged structures should be tested for asbestos contaminating materials (ACM).

"***Wildfire Impact on Indoor and Outdoor PAH Air Quality***" – A study about air quality impacts from wildfires are poorly understood, particularly indoors. As frequencies increase, it is important to optimize methodologies to understand and reduce chemical exposures from wildfires. Public health recommendations use air quality estimates from outdoor stationary air monitors, discounting indoor air conditions, and do not consider chemicals in the vapor phase, known to elicit adverse effects. We investigated vapor-phase polycyclic aromatic hydrocarbons (PAHs) in indoor and outdoor air before, during, and after wildfires using a community-engaged research approach. Paired passive air samplers were deployed at 15 locations across four states. Twelve unique PAHs were detected only in outdoor air during wildfires, highlighting a PAH exposure mixture for future study. Heavy-molecular-weight

(HMW) outdoor PAH concentrations and average Air Quality Index (AQI) values were positively correlated ($p < 0.001$). Indoor PAH concentrations were higher in 77% of samples across all sampling events. Even during wildfires, 58% of sampled locations still had higher indoor PAH air concentrations. When AQI values exceeded 140 (unhealthy for sensitive groups), outdoor PAH concentrations became similar to or higher than indoors. Cancer and noncancer inhalation risk estimates from vapor-phase PAHs were higher indoors than outdoors, regardless of the wildfire impact. Consideration of indoor air quality and vapor-phase PAHs could inform public health recommendations regarding wildfires. For more information go to: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9301925/

Wildfire insurance claims – (1) The process of filing and assessing insurance claims for property damage, loss, or destruction of personal property caused by wildfires. (2) The process of filing and assessing insurance claims for personal property caused by wildfires that are not covered under the building’s fire coverage.

Wildfire loss adjuster – An insurance professional who specializes in handling insurance claims related to property damage caused by wildfires. Their role is to assess the extent of the damage, determine the coverage provided by the insurance policy, and facilitate the claims process for policyholders affected by wildfires. When a homeowner or property owner experiences property damage due to a wildfire, they typically file an insurance claim with their insurance company to seek compensation for the losses. A wildfire insurance adjuster is assigned to these claims to investigate and evaluate the damage and work with the policyholder to ensure a fair and accurate settlement. The responsibilities of a wildfire insurance adjuster may include: [1] Claim Investigation: The adjuster visits the affected property to assess the damage caused by the wildfire. They inspect the property, document the extent of the damage, and gather relevant information from the policyholder. [2] Coverage Evaluation: The adjuster reviews the insurance policy to determine the coverage available for wildfire-related damages. They assess the policy terms, exclusions, deductibles, and limits to understand the scope of coverage applicable to the specific claim. [3] Damage Assessment: The adjuster evaluates the extent of the property damage caused by the wildfire. This may include assessing structural damage to buildings, damage to personal belongings or contents, and any other affected property elements. [4] Cost Estimation: Based on their assessment, the adjuster estimates the repair or replacement costs for the damaged property. They consider factors such as materials, labor, local market prices, and any additional expenses necessary to restore the property to its pre-loss condition. [5] Settlement Negotiation: The adjuster works with the policyholder to negotiate a fair and equitable settlement. They communicate with the insurance company, advocating for the policyholder’s interests and ensuring that they receive appropriate compensation for the wildfire-related damage covered under the policy. [6] Documentation and Reporting: The adjuster prepares detailed reports and documentation supporting the wildfire insurance claim. This includes itemized lists of damaged property, repair estimates, photographs or videos of the damage, and any other relevant information required by the insurance company. [7] Education and Experience: Wildfire insurance adjusters require a strong understanding of insurance policies, property valuation, and construction practices. They must have effective communication and negotiation skills to interact with policyholders, contractors, and other parties involved in the claims process. [8] Other Adjusters: In complex wildfire events with widespread damage, insurance companies may deploy teams of adjusters, including wildfire insurance adjusters, contents adjusters, building or property adjusters, and other specialists, to handle the volume and complexity of claims resulting from the wildfire.

Wildfire "*Measurement of Polycyclic Aromatic Hydrocarbons (PAHs) on Indoor Materials: Method Development*" – A science-based article cited by the American Chemical Society (ACS) that addresses the presence of wildfire smoke that penetrates indoors, where polycyclic aromatic hydrocarbons (PAHs) in smoke may accumulate on indoor materials. Authors of the article developed two approaches for measuring PAHs on common indoor materials: (1) solvent-soaked wiping of solid materials (glass and drywall) and (2) direct extraction of porous/fleecy materials (mechanical air filter media and cotton sheets). For more information go to: https://pubs.acs.org/doi/10.1021/acsomega.3c01184

"***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. The 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} deposits are 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 (µg/m^3) to 35 µg/m^3 and retained the current annual fine particle standard at 15 µg/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. 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 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) (See: Toxicity of wildfire smoke affecting humans)

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 semi volatile organic compounds (SVOCs).

Wildlife refuge – An area designated for the protection of wild animals, within which hunting and fishing are either prohibited or strictly controlled.

Wildfire remnants remaining days and weeks afterwards where there is smoke odor indoors – Days and weeks later, the smoke odor from a wildfire can persist indoors if proper mitigation measures have not been taken. Smoke odor can cling to surfaces, furniture, fabrics, and even penetrate into the ventilation system and insulation. When smoke odor persists despite the homeowner's best efforts to ventilate their house, consult with an environmental professional specializing in wildfire inspections or a professional restoration services experienced and certified in smoke odor deodorization. They can provide specialized techniques and equipment to address stubborn smoke odors effectively. Following are several key factors that can contribute to the persistence of smoke odors indoors: [1] Smoke Particles: Smoke particles from a wildfire can settle on various surfaces within the indoor environment. These particles contain volatile organic compounds (VOCs) and other odor-causing substances that can continue to release odors over time. [2] Porous Materials: Porous materials, such as carpets, upholstery, curtains, and clothing, have a higher tendency to absorb smoke particles and retain the odor. These materials can release the odor gradually, contributing to the persistence of the smoke smell. [3] Ventilation System: Smoke odor can infiltrate the ventilation system of a building, including air ducts and filters. If the HVAC system was operating during the wildfire or if windows were open, the odor can be circulated throughout the indoor space, prolonging its presence. [4] Residual Ash and Char: When ash and char residue is not properly cleaned up after the fire, they can continue to emit odors. Ash and soot particles can be difficult to remove completely, especially from hard-to-reach areas or surfaces with intricate textures including carpet and attic insulation. [5] Residual Soot: For soot to be present in measurable amounts often it is not produced by the burning of vegetation but rather from the burning of neighboring buildings. Soot is a chemical byproduct of melted road tar, and burnt building materials, such as paint, sidings, plastics, roofing, carpet, pad, and other synthetics. [6] Cross-Contamination: Smoke odor can also spread to unaffected areas through cross-contamination. For example, if smoke particles settled on clothing or other belongings during the wildfire, they can release the odor when brought into previously unaffected rooms or spaces. [7] For the homeowner in addressing smoke odor indoors, consider the following steps: [a] Ventilation: Open windows and promote airflow to help dissipate the odor. Use fans or air purifiers equipped with activated carbon filters to help remove odor particles from the air. [b] Interior Surface Cleaning: Thoroughly detergent clean all surfaces, including walls, floors, ceilings, furniture, and countertops. Use appropriate cleaning solutions recommended for the specific materials to remove smoke residue and odor. [c] Carpet and Upholstery Cleaning: Have carpets, rugs, and upholstery professionally cleaned, as they can retain smoke odor. Steam cleaning and specialized odor-removing treatments can be effective in removing trapped smoke particles. [d] Laundering and Dry Cleaning: Wash clothing, curtains, and other washable fabrics that may have absorbed smoke odor. For delicate or dry-clean-only items, consult professional dry cleaners experienced in removing smoke odors. [e] Ventilation System Cleaning: Consider having the HVAC system inspected and cleaned by professionals to remove any smoke residue or odor from the ductwork, filters, and other components. [f] Odor Neutralizers: Use odor-neutralizing products specifically designed for smoke odor removal. These products can be sprayed on surfaces, fabrics, or used in air purifiers to help eliminate lingering odors. [8] Hiring Environmental Professionals: If the above steps do not provide relief consult with environmental professionals having a specialty in wildfire assessments, where they are expected to take into consideration: [a] the closeness of your house to the wildfire burn area; [b] the closeness of your house to other houses and roadways that burnt nearby; [c] whether your house is on a hilltop, flatland, or in a valley, where its location can help document its relationship to the fire; [d] the length of time (e.g., days, weeks) the community was in a smoke and temperature inversion area. [e] reviewing with you the cleaning and deodorization methods you applied and determine what else may help with cleaning and deodorization, such as professional ventilation system cleaning, removal and replacement of attic and crawlspace insulation, increasing the chemistry of deodorization. In certain cases where occupant health remains a concern, the environmental professional may recommend sampling particulate matter for sVOC and PAHs, or surfaces and air for chemical residue.

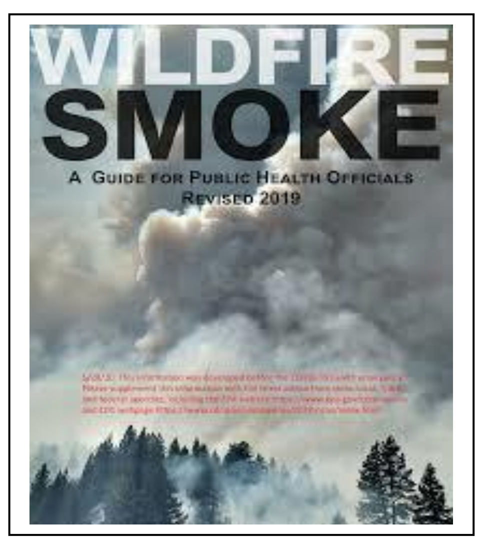
"*Wildfire Residue Contamination Testing -Post Assessment of the Indoor Environment, The ABCs of*" (See: "The ABCs of Wildfire Residue Contamination Testing: Post Assessment of the Indoor Environment")

Wildfire respiratory protection for environmental professionals, adjusters, and cleanup workers – A NIOSH-approved filtering facepiece respirator (FFR), like an N95 or greater, can be worn to reduce exposure to airborne particulates from wildfire smoke and ash. It is important to understand that FFRs do not protect against gases, such as carbon monoxide, SVOCs, and PAHs. When an employer requires employees to be exposed to smoke and ash, employees are to use appropriate respirators, and must do so as part of the employer's respiratory protection program to limit employees having smoke exposures when working. They must don respirators as part of a comprehensive respiratory protection program as required under the OSHA Respiratory Protection Standard 29 CFR 1910.134, and state OSHA regulations. This includes medical evaluations, respirator fit testing, and training of workers required to wear respirators. Additionally, when required tight-fitting respirators "cannot" be used by workers having facial hair that interferes with the respirator's face seal. Furthermore, when evaluating fire debris leading to cleanup, employees can have exposures to silica, asbestos, lead paint, heavy metals, other organic and inorganic compounds, including polyaromatic hydrocarbons, where a Health Hazard Evaluation (HHE) must be in place and completed before exposing workers to those conditions. For more information go to: https://www.cdc.gov/niosh/topics/firefighting/wffsmoke.html and https://www.cdc.gov/niosh/hhe/reports/pdfs/2018-0094-3355.pdf and https://www.cdc.gov/niosh/topics/firefighting/cleanup.html

Wildfire respiratory protection for the public and building occupants – Wildfire smoke and ash can irritate eyes, nose, throat, and lungs. They can make a person cough or wheeze and can make it hard to breathe. A respirator is a device (mask) that covers the nose and mouth, where it fits tightly to the face. Properly worn, it can filter out smoke or ash particles before they are breathed. Respirators are not sized for babies, and most children, where they should remain out of wildfire smoke and ash impacted areas. People experiencing health effects from a smoky environment, even if indoors, may benefit from using a tight-fitting respirator to reduce their exposure. However, wearing a respirator can restrict breathing, while working, walking, and even sitting, where people having respiratory problems when wearing a respirator, they should not be in a smoke and ash impacted area, nor should they wear a respirator without having medical advice. Wearing a face mask or scarf, like many people wore for the Coronavirus (COVID-19), they are not a respirator. (CDC/NIOSH) At a minimum, wear a N95 or KN95 respirator, or when available, a P100 respirator.

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, Revised 2019*" – Updated 01/31/2020, this guide is an interagency collaboration of individuals and government agencies that revised the original 2002, then the 2008 and 2016 editions. For more information go to: https://www.airnow.gov/sites/default/files/2021-05/wildfire-smoke-guide-revised-2019.pdf



"*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 and https://www.airnow.gov/wildfire-smoke-guide-publications/

Wildfire smoke and air quality impacts – The science of wildfire behavior and management is complex and highly technical. Wildfire smoke produced from combustion of natural biomass contains thousands of individual compounds, including particulate matter, carbon dioxide, water vapor, carbon monoxide, hydrocarbons and other organic chemicals, nitrogen oxides, and trace minerals. Wildfires can move into the wildland urban interface (WUI), burning homes and structures and thereby consuming manmade materials in addition to natural fuels. More research is needed to understand potential health impacts of breathing this complex mix of natural and manmade material emissions. Wildfire behavior will vary depending on natural fuel type; fires in forest fuels can range from mild to severe and can spread very slowly or extremely rapidly depending on weather and fuel conditions. Wildfires in forests can last for weeks or months and are often the type that results in the most severe and longest duration air quality impacts. Smoke levels in populated areas can be difficult to predict. Most of the tens of thousands of wildfires in the United States are suppressed when they first start. Those that continue past the initial suppression attempt can become large, of long duration, and a significant source of smoke. On these types of fires, an Incident Management Team (IMT) is usually 2 engaged, which is then guided by the landowner/ manager/agency administrator and pre-existing land management plans. (See: Toxicity of wildfire smoke affecting humans; "*Wildfire Smoke: A Guide for Public Health Officials*, 2019")

"*Wildfire Smoke and Children*" – A CDC factsheet about protecting children from exposure to smoke, and children who have preexisting health conditions. For more information go to: https://www.cdc.gov/air/wildfire-smoke/children.htm

"*Wildfire Smoke and Indoor Air Quality: How to Create a Clean Room at Home*" – An EPA "You-Tube video" describing how to create a clean and smoke free area within the house. For more information go to: https://www.airnow.gov/wildfire-smoke-guide-publications/

"*Wildfire Smoke and Pregnancy*" – A CDC factsheet for women who are pregnant and must protect them self during a wildfire event. For more information go to: https://www.cdc.gov/air/wildfire-smoke/pregnancy.htm

"*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 composition – Smoke from combustion of natural biomass is a complex mixture of particulate matter, carbon dioxide, water vapor, carbon monoxide, hydrocarbons and other organic chemicals, nitrogen oxides, and trace minerals. The individual compounds present in smoke number in the thousands. Most research on wildland fire emissions has centered on natural biomass fuels—the vegetative materials comprised of trees, needles, leaves, branches, litter, duff, stumps, grasses, shrubs, and downed trees. Wildfires may also move into the WUI burning homes and structures in the process and thus consuming manmade materials in addition to natural fuels. More research is needed to understand potential health impacts of breathing this complex mix of natural and manmade material emissions. In wildfire smoke, particulate matter, especially the smallest size component $PM_{2.5}$, is the principal air pollutant of concern for public health. Particulate matter is a generic term for particles suspended in the air, typically as a mixture of both solid particles and liquid droplets. The size of the particles affects their potential to cause health effects. Particles larger than 10 micrometers in diameter do not usually reach the lungs though they can irritate the eyes, nose, and throat. Particles with diameters less than 10 micrometers (PM_{10}) can be inhaled into the lungs and affect the lungs, heart, and blood vessels. The smallest particles, those less than 2.5 micrometers in diameter ($PM_{2.5}$) are the greatest risk to public health because they can reach deep into the lungs and may even make it into the bloodstream. Most of the effort to quantify, describe, and monitor smoke and health effects from wildfires focuses on $PM_{2.5}$. Particles from smoke tend to be very small, with a size range near the wavelength of visible light (0.4–0.7 micrometers), which can be deeply inhaled into the lungs. Many other chemicals are present in wildfire smoke but at much lower concentrations than particulate matter, ozone, and carbon monoxide. These include an extensive list of HAPs that can be potent respiratory irritants and carcinogens. Given that the specific effects of these pollutants are hard to quantify and measure during an active smoke incident, $PM_{2.5}$ is typically the pollutant that is tracked and monitored, and the pollutant that is used to estimate public health effects from wildfire smoke. However, when buildings burn near unburnt buildings, their chemicals can be introduced into unburnt structures. (See: Toxicity of wildfire smoke affecting humans)

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 Smoke: Protect Yourself from Ash”* – An EPA factsheet on how to avoid having contact with ash, breathing in ash, and not allowing children and pets having exposure to ash. For more information go to: https://www.airnow.gov/sites/default/files/2021-07/protect-yourself-from-ash-factsheet.pdf

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 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 suction modifies the natural air movement within a building.

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 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 the updrafts away from the fire; upstream surface wind and mixed layer wind speeds that become independent from each other.

Wildfires and Indoor Air Quality (IAQ) – An EPA report outlining what a homeowner can do to improve their indoor air quality when smoke impacts their community. For more information go to: https://www.epa.gov/indoor-air-quality-iaq/wildfires-and-indoor-air-quality-iaq

“Wildfires and Indoor Air Quality in Schools and Commercial Buildings” – [1] As wildfire events increase in the U.S., public health and emergency response professionals in areas prone to wildfires or routine prescribed burning can help reduce exposure to smoke, whether outdoors or indoors, within the community during wildfire or prescribed burn events. Breathing in smoke is harmful to health, and fine particulate matter ($PM_{2.5}$) is the greatest health concern. [2] Exposure to fine particles in smoke can cause respiratory and cardiovascular health effects, especially for those with preexisting conditions like asthma and heart disease. [3] When smoke from fires becomes a health hazard, state and local health departments may advise people to stay indoors and avoid outside activity when possible. [4] Smoke from a wildfire can last for days and weeks, which is why it is important for building owners and managers to have information on best practices for reducing exposure to smoke that may enter schools, commercial buildings, or multi-unit housing. Communities affected by wildfire smoke may also choose to set up or identify cleaner air spaces and cleaner air shelters where people can seek relief from smoke.

Wildland fire – Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland fire investigation – The process of determining the cause and origin of wildfires through forensic analysis and investigative techniques to assist in prevention and legal proceedings, if applicable.

“*Wildland Firefighting Health: Some Burning Questions*” – The ‘Science Blog’ of NIOSH that has a number of searchable categories including questions about everyone should be wearing a respirator. For more information go to: https://blogs.cdc.gov/niosh-science-blog/2020/09/28/wildland-firefighter-health/

Wildlife habitat restoration – Efforts to rehabilitate and restore habitats for wildlife that have been impacted by wildfires, including the creation of nesting sites and planting of native vegetation.

Wildlife rescue and rehabilitation – Providing support for the rescue, rehabilitation, and release of wildlife affected by the fire.

WHO – The World Health Organization.

Wind driven smoke and soot (wildland fires) **–** A condition where the force of heat and wind are driven towards buildings.

Wipe, char and ash – A small piece of uncolored, non-fragranced cellulosic or synthetic material used to collect combustion particles (char, soot, ash, etc.) from a surface for laboratory analysis. 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, wet surface – A streak test collected from a given surface that is intended to identify carbon black, soot, and other naturally occurring environmental particulates such as from furnaces, copiers, 2-D and 3-D printers, fireplaces, automobiles, and trucks.

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)

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 having contact with smoke and soot residue. Yellowing is often caused by nitrogen dioxide (NO_2) in smoke and soot.

(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.

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.

