ROCKY MOUNTAIN ASSOCIATION OF PUBLIC INSURANCE ADJUSTERS:

FIRE PROTOCOLS

Version: October 2025

These Protocols have been built by a team of experts assembled by the RMAPIA Board of Directors. The directions and analysis found herein are the Team's best, good faith efforts to provide the simplest, most efficient, and safest protocols for handling fire losses in the State of Colorado. These protocols may also have widespread application to other states that are seeking guidance in building protocols of their own or may provide a helpful reference for experts, professionals, insurers, and insureds in handling fire losses.

Please find below the RMAPIA Liaisons who spent long hours interfacing with the Protocols Team and the RMAPIA Board throughout the two years of protocol development.

Brett Allen (RMAPIA Board of Directors Member and Secretary, Public Adjuster, and External Relations Chair): Owner of BMB Enterprises, LLC

Michael Stoycheff (RMAPIA Board of Directors Member and Director): COO of and Executive Adjuster at Adjusters International/Matrix Consulting.

FIRE PROTOCOLS TEAM OVERVIEW

The following individuals directly researched, designed, and refined the protocols found herein on a pro bono basis for over two years. Without them these protocols would not exist. RMAPIA, its Board of Directors, and the many professionals that will no doubt have their lives made easier by these protocols, thank them for their long hours, dedication, and effort. Their CVs are found at the end of these protocols.

Dr. Joe Nieusma (Testifying Expert, Doctorate in Toxicology, and Pharmaceutical Scientist):

Protocol Areas: Toxicology, Thresholds, Human Affectation, At Risk Human Affectation, & Universal fire Testing Method (what to test for and best methods).

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David Phalen (Testifying Expert, Multi-State Licensed Public Adjuster, & RMAPIA Member):

Protocol Areas: Universal Fire Testing Method (Testing locality and result applications in determining the extent of toxin affection as well as toxic zones concept/diagram); Groups and Categories of Fire losses; and Replacement Analysis which includes Insurance/Coverage Considerations, Airflow & Waterflow Dynamics, Secondary Contamination Considerations, Replacement Threshold Applications & Considerations for Structures, and Contents Replacement. Following the departure of one of the team's members who was handling the Repair Analysis, David also provided a reference overview for repair applications and considerations. Repair may be fleshed out further in the future.

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FIRE PROTOCOLS OVERVIEW

Protocol Organization: These Protocols will first provide a brief and then more detailed description of fire groups and categories, followed by the testing methods and interpretations that place properties into said groups and categories and which address toxic zones. After, one may find the repair logic that directs operations to follow field standards and practices already existing and provided by national associations (such as ANSI/IICRC and NEMA). Following that, one may find the detailed replacement logic that explains airflow, waterflow, secondary contamination, and cost/risk practicalities (among other considerations) which make replacement the only reasonable course of action with standard toxic fire losses. Finally, one may find a detailed reference of sources utilized in creating these protocols.

GROUPS & CATEGORIES OF FIRE LOSSES

There are two primary groups of fire loss, fires without toxic byproduct levels and fires with toxic byproduct levels.

Each of these groups of fire losses is further separated into 2 categories. The first category involves structures without significant structural damage and the second category involves structures with significant structural damage.

In total this leaves us with 4 categories of fire loss:

GROUP 1: NONTOXIC

Category 1 (Nontoxic without Damage to Structural Integrity): Repairable.

Category 2 (Nontoxic with Damage to Structural Integrity): may be repairable or may require replacement.

GROUP 2: TOXIC

Category 3 (Toxic without Damage to Structural Integrity): Replacement necessary, with structures that involve unique property circumstances being *less* likely to require full replacement.

Category 4 (Toxic with Damage to Structural Integrity): Replacement necessary, with structures that involve unique property circumstances being *more* likely to require full replacement.

General Notes for Category Handling

Universal Note 1: In any circumstance, if the repair method cannot be reasonably guaranteed to restore the property to minimally its like kind and quality preloss condition, replacement is the proper method to utilize.

Universal Note 2: In any circumstance, if repair would cost more or cost nearly the same as replacement, replacement is the proper method to utilize.

Universal Note 3: Toxic fires are to be handled with the utmost caution. In the event of toxic levels of particulate matter being identified (either as individual toxins that exceed the toxic thresholds noted within these protocols' toxic threshold chart or as combined elevated particulate levels which rise to a level of toxicity as identified by a toxicologist), any unclarities regarding safety and handling should provide benefit of the doubt in favor of the safest option.

Repair and Replacement Universal Safety Notes:

-In the event that part of, or the entire structure/property, is deemed toxic or partially toxic and is going to be partially or fully repaired/torn down/replaced, work shall comply with the strictest controls set by the State, EPA, and OSHA for controlled hazardous materials and compounds with related work (be it demolition, disposal, repair work, containment, filtration, personal protective equipment to be worn, or any other work related considerations that could apply with hazardous materials and compounds).

-In the event that **no** toxic particulate levels (individual or combined elevated levels as determined by a toxicologist) are identified to the structure/property, work may proceed under standard safety protocols that any construction/repair work would be required to abide by for said work.

Group 1: Fires Without Toxic Byproducts

Note: This Group and its Categories do not have any toxic levels of fire byproducts (individual or combined elevated) identified.

Category 1 (Repairable): Non-Toxic Fire that does not damage the property's structural integrity but requires minor to significant repair work to address affectation caused by the fire or efforts to extinguish it.

This category of fire loss allows for cleaning of the affected areas in the property and minor to significant repair efforts which tend to focus on cleaning of surfaces, conducting localized removal and repair of heat/water/debris affected areas, addressing smells, and repainting/applying localized encapsulant and then painting).

A fire loss that falls under this category may have particulates/byproduct levels which exceed standard ranges, but which do not individually (as determined by the toxic threshold chart) or in combination (as determined by a toxicologist) reach a toxic level. Generally speaking, utilization of standard repair and remediation methods found in the ANSI/IICRC's S500 & S700 as well as the National Electrical Manufacturer's Association's guides evaluating fire and heat damaged electrical equipment/water damaged electrical equipment, would be appropriate for fires which fall into this category of loss.

Contents found in the property may be remediated as per field standards, though contents which are particularly dirtied or damaged by smoke/heat in manners which might make cleaning improbable to yield success would generally be recommended for replacement.

Category 2 (Possible Replacement Needed): Non-toxic fire that damages the property's structural integrity.

In the event that a property's structural integrity has been damaged by fire but the fire's byproducts do not individually (as determined by the toxic threshold chart) or in combination (as determined by a toxicologist) reach a toxic level, then one would need to more closely focus on costs and practicalities related to the fire. In particular, one would need to ask if the area of the property that must be repaired/remediated via **invasive** methods (ie. tearing out flooring/walls/structural members, **not** just wiping down and painting surfaces) is equal to or greater than 50% of the building's square footage (when taking into account other structural systems that are affected and which will need to be addressed—thereby increasing total affected areas in the property). If the total affected square footages are equal to greater than 50% of the property's square footage, then property replacement should occur.

If the affected area requiring invasive repair/remediation is less than 50% of the building's square footage, repair per previously noted protocols outlined in Category 1 should be initiated **as long as** it is not less expense or nearly the same cost to *replace* the damaged/affected property and as long as repair efforts can be reasonably guaranteed to be effective.

Group 2: Fires With Toxic Byproducts

Note: ***This Group and its Categories include any fire/smoke loss where toxic levels of fire byproducts (individual or combined elevated) have been identified.***

Category 3 (Replacement Needed): Toxic fire that does not damage the structural integrity of the property.

This category of fire has toxic byproducts, but the fire has not damaged the structural integrity of the property. This could be a wildfire, a fire occurring to a nearby property, a fire affecting the property's other structures but not the primary structure/s, or a fire to the primary structure/s that was put out before it could significantly imperil the structural integrity of the property itself.

Fire losses that fall into this category should result in the entire structure being removed and replaced, barring **unique property circumstances**.

> **Unique Property Circumstances**: These circumstance might include properties with hermetically sealed areas, very high dollar value per square foot areas that make it financially feasible to incur the cost of carefully deconstructing all but a portion of the property which was unaffected, or very large structures (factories/commercial structures exceeding 25,000 total square feet of floor space—airflow dynamics to properties larger than this size could make it feasible for toxins be localized to an area less than the entirety of the structure) or structures with isolated sections/systems that would be unlikely to facilitate byproduct transition (examples include but are not limited to skyscrapers, hospitals, laboratories, and related). It is important to note that even if an area is hermetically sealed or thought to likely be unaffected by smoke/heat, testing would still be required to confirm the area as safe when other testing to other locations identifies the presence of individual or combined toxic particulate levels, and, if the rest of the building was being demolished and rebuilt, it would often still be impractical to try and spare a small percentage of said structure.
>
> **Not Unique Property Circumstances**: Single Family Homes (and related structures such as detached garages/shops/sheds) and Structures equal to or under 25,000 square feet of floor space (Except that Track Homes/Condos which are attached to one another or found within the same building but fully separated with fire walls/barriers and which do not have interlinked systems—HVAC/Ductworks/electrical/plumbing—may be individually tested per the "Testing: Methods and Interpretation" section to confirm if each unit/area has been affected or not affected by toxic byproducts).

The primary structure/s that fall into this category of fire loss and do not fall into a unique property circumstance should, by default, be torn down and rebuilt. One may reference the "Testing: Methods and Interpretation" section of these protocols for clarity on testing and the interpretation of testing results as it pertains to structures and contents which are to be deemed toxic.

In addition to primary structures, other structures and contents which are deemed toxified/within a toxic zone are also to be replaced (in the case of contents) and torn down and rebuilt (in the case of other structures).

Category 4 (Replacement Needed): Toxic Fire that damages the property's structural integrity.

This category of fire has been affected by toxic fire byproducts and has incurred damage to the structural integrity of the property as a result of the fire. Barring **unique property circumstances** such as those noted in Category 3, the structure should be replaced in its entirety. In this category of loss, the same toxins identified in Category 3 are present and would resultantly require replacement of all structures/contents affected by said toxins, but the area is

also further damaged from the fire itself which means that, even with **unique property circumstances**, practicalities make it much more likely that replacement in entirety of even those properties may be the only cost effective method one can apply.

The primary structure/s that fall into this category of fire loss and do not fall into a unique property circumstance should, by default, be torn down and rebuilt. One may reference the "Testing: Methods and Interpretation" section of these protocols for clarity on testing and the interpretation of testing results as it pertains to structures and contents which are to be deemed toxic and one may consult a structural engineer if deemed necessary regarding the structural salvageability of unique property circumstances.

In addition to primary structures, other structures and contents which are deemed toxified/within a toxic zone are to be replaced (in the case of contents) and to be torn down and rebuilt (in the case of other structures).

Further, this category of loss is more expansive in replacement necessities, as even properties which might normally be deemed salvageable under the unique property circumstances exception may have incurred structural damages and costs that still make it more practical to fully replace the property itself.

TESTING: METHODS AND INTERPRETATION

Universal Fire Testing Method (UFTM)

This method should be applied to every uncontrolled combustion event (usually this would be a fire), and it is a testing battery that must be applied whenever there is such an event regardless of scope, duration, involved materials, or temperature. The purpose of this testing method is to ensure that there is a largely noninvasive, simple testing method that virtually any qualified professional can perform with minimal tools and equipment, and which will either rule out or identify nearly all combustion byproducts commonly associated with fires (or uncontrolled combustion events). There may be outlier tests that can still be performed above and beyond this prescribed method, and those tests may be helpful in some cases, but other tests may be more invasive, complex, and may not be something that can broadly be applied to all professionals in the field. Therefore, if the UFTM is applied accurately and fully, it can be understood that a reasonable, good faith effort was made to identify toxic levels of combustion byproducts.

Individual particulate levels must always minimally be reviewed against the "Individual Particulate Toxic Thresholds Chart." Combined elevated particulate levels may also be reviewed by a toxicologist to determine if said combined levels rise to a level of toxicity. If any threshold or toxicologist interpretation finds toxic levels of particulates, that determination will be the interpretation used.

This method is designed to be applied generally, however the interpretations for this method's results are principally focused on properties that do not fall under Unique

<u>Property Circumstances</u> (noted below). Unique Property Circumstances must be handled on a case-by-case basis but have a proposed testing and interpretation method at the end of this section.

<u>Unique Property Circumstances</u>: These circumstance might include properties with hermetically sealed areas, very high dollar value per square foot areas that make it financially feasible to incur the cost of carefully deconstructing all but a portion of the property which was unaffected, or very large structures (factories/commercial structures exceeding 25,000 total square feet of floor space—airflow dynamics to properties larger than this size could make it feasible for toxins be localized to an area less than the entirety of the structure) or structures with isolated sections/systems that would be unlikely to facilitate byproduct transition (examples include but are not limited to skyscrapers, hospitals, laboratories, and related). It is important to note that even if an area is hermetically sealed or thought to likely be unaffected by smoke/heat, testing would still be required to confirm the area as safe when other testing to other locations identifies the presence of individual or combined toxic particulate levels, and, if the rest of the building was being demolished and rebuilt, it would often still be impractical to try and spare a small percentage of said structure.

<u>Not Unique Property Circumstances</u>: Single Family Homes (and related structures such as detached garages/shops/sheds) and Structures equal to or under 25,000 square feet of floor space (Except that Track Homes/Condos which are attached to one another or found within the same building but fully separated with fire walls/barriers and which do not have interlinked systems—HVAC/Ductworks/electrical/plumbing—may be individually tested per the "Testing: Methods and Interpretation" section to confirm if each unit/area has been affected or not affected by toxic byproducts).

<u>General Note for Testing: Methods and Interpretation</u>

-Any **<u>singular</u>** test that shows a structure or property to have toxic levels of particulates present (individual or combined elevated particulates), will result in the entire property (structure/land/contents) being deemed toxic and treated as such **<u>until and unless</u>** additional testing is done per these protocols that proves otherwise. This addresses scenarios where an insurer doesn't conduct sufficient testing per these protocols (be it a refusal to test at all, refusing to pay sufficiently for proper testing, not testing for the proper particulates, or not following these protocols in some other meaningful way). Resultantly, an insured with less funds than the insurer might need to pay to get testing done and this allows that insured to conduct a **<u>single</u>** sample and test at a lower cost. If that or any single test shows toxic levels of particulates to be present, the insured will have then established the presence of a hazard for the entirety of their property, and this will be done without the need for them to pay as much out of pocket to do so. However, this process further affords the insurer the opportunity to pay out of pocket to conduct

additional testing as described in these protocols which will help better determine the extent of that hazard for the insureds while potentially reducing the total area needing to be replaced by the insurer.

Particulates to Test for, Sampling and Testing Methods, Where to Sample/Quantity of Samples to Take, and How to Act Upon the Results:

1. **Particulates to Test for**: It is critical to test for toxic particulates which coat surfaces following a fire. These particulate tests must minimally include testing for the presence and quantity of Volatile Organic Compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAH's), lead and other heavy metals, asbestos, dioxins, and furans, and these tests should occur with every fire from the start. The contamination of the property with toxic levels of these particulates (individual particulates per the "Individual Particulate Toxic Thresholds Chart" or combined elevated particulate levels as determined by a toxicologist) will drive the hard decisions for the property. The absence of these toxins at a property will allow for standard remediation methods followed by the decision to reoccupy the property knowing there is no long-term risk for chronic adverse effects for the occupants.

2. **Sampling and Testing Methods**: We must utilize EPA approved methods for sampling and analysis, which could include combinations of air samples, surface wipe samples, vacuum samples, and tape lift samples. Each sample will have to be analyzed with the corresponding EPA approved methods for each sample type. In most cases, Industrial Hygiene samples will utilize multiple sampling techniques and multiple methods of analysis. The micro-vacuum and wipe samples for heavy metals are usually EPA 6000 series methods specific to the analytical equipment of the laboratory. Industrial hygiene methods for heavy metals, dioxins and furans utilize EPA methodology following a vacuum sample collection procedure and evaluation of samples by qualified and certified operations. The sample collection utilizes a vacuum sample that pulls particulate matter from the chosen sampling point(s) in the property for a specific amount of time onto filter media that is then sent to the appropriate laboratory. This interval can be 30 seconds up to several minutes per sample spot depending upon the sample spot and condition of the property. Analysis consists of EPA method 6010 for heavy metals and EPA 8090 for dioxins and furans. Results are quantified and reported as picograms of analyte per gram of sample. The EPA method TO-15 would be applicable for VOCs. Heavy metals and PAHs have multiple accepted methods from EPA and NIOSH available based on the type of sample and medium of testing. Details are available through their specific websites.

-*Using the identified testing method which focuses on the noted particulates, we are using the fire testing protocols which have the highest likelihood to identify potentially hazardous levels of toxins if present in a structure.*

Individual Particulate Toxic Thresholds Chart

Table 1: Potential metals -toxic species found in smoke, ash, soot, char, and particulates.

Toxic Metal	Exposure limit	Exposure limit	Reference
Cobalt*	0.1 mg/m^3 OSHA	DNEL General Population inhalation 8.1 µg/m³	https://chem.echa.europa.eu/100.028.325/dossier-view/08bdffd9-57d4-4685-afd8-4956205ebc25/a8784087-d0c1-4109-811c-2ddef838ad1b_1e81eacd-da8e-46c7-a312-0ad9b5054098
Chromium	0.005 mg/m^3 OSHA	DNEL General Population Repeated Dose Toxicity 0.027 mg/m³	https://chem.echa.europa.eu/100.028.324/dossier-view/d6d66265-7a8e-414c-af96-aeb34c3b078a/IUC5-70607c6e-8523-4c23-9132-00244241c512_2e5e06a1-3050-454d-a362-125fc3c00779?searchText=chromium
Cadmium	0.005 mg/m^3 OSHA	DNEL General Population Repeated Dose Toxicity 1 µg/kg bw/day	https://chem.echa.europa.eu/100.028.320/dossier-view/6ecb88d5-fa0d-432b-802c-97a9998bd681/27982e86-7e7a-490f-a000-fb4dce02f87d_63199495-977d-435d-9d68-69a2b084838c?searchText=cadmium
Silver	0.01 mg/m^3 OSHA	DNEL General Population inhalation 0.002 mg/m³	https://chem.echa.europa.eu/100.028.301/dossier-view/b43d6b46-c045-45c9-9cff-f7f664e55bec/56b74590-cfcf-45cd-95b6-fd17d9ab7c5d_1bb13f1a-69ec-46a9-96cf-50f2310fc909?searchText=silver
Lead	0.05 mg/m^3 OSHA	DNELs Child 2 µg/dL Preg women 5 µg/dL Adults 20 µg/dL (blood levels)	https://chem.echa.europa.eu/100.028.273/dossier-view/c0464cff-4dfa-43ef-a4d3-e569a82803bf/8020ca43-4f4d-491d-93e7-24fb71b326df_cb5ea1e3-cfc2-451b-8772-946ab058121f?searchText=lead
Vanadium	0.05 mg/m^3 NIOSH	Rat oral repeat dose NOAEL 1000 mg/kg/day	https://chem.echa.europa.eu/100.028.337/dossier-view/ae11d0d0-78d9-465f-b8fe-92a5e1c88118/IUC5-96be1274-0d7d-44cc-

			a21a-d24fd48d4c43_5928507d-dbff-40ce-b071-607cb2406722?searchText=vanadium
Zinc	5 mg/m^3 OSHA	Rat NOAEC 1.48 mg/m^3	https://chem.echa.europa.eu/100.028.341/dossier-view/a2d9b11c-d84f-4f16-976e-57fb2d16463d/d3dbfe8d-29df-4047-bae7-35d291fdb315_e4bf1037-6718-4f93-8583-2c67b42dbcf7?searchText=zinc
Arsenic*	0.01 mg/m^3 OSHA	DNEL General Population inhalation 2 µg/m³	https://chem.echa.europa.eu/100.028.316/dossier-view/104a4e33-e910-49c5-a114-50666e771ff8/d173c76a-df81-47c8-9578-02c1dae9b1d6_600b5ff6-8ed1-4037-8119-9fc661f0bd7b?searchText=arsenic
Copper	0.1 mg/m^3 OSHA	Acute short-term exposure LOAEC 1,240 mg/m^3	https://chem.echa.europa.eu/100.028.326/dossier-view/769a3561-67ad-491f-9696-f2addc049add/IUC5-132ec672-34bd-4a30-87d9-fcb990ae015d_50f830c2-19e3-4a12-ac36-5d2d9f515eaf?searchText=copper
Nickel	1 mg/m^3 OSHA	DNEL General Population inhalation 60 ng/m³	https://chem.echa.europa.eu/100.028.283/dossier-view/4077cd76-ccb2-49ca-88fb-061e09fb6eff/aae27b55-6e16-49fb-966f-86c05b9f1076_da7e6236-8e36-40d9-bb16-52aa19176982?searchText=nickel

DNEL-derived no effect level
NOAEL – no observed adverse effect level
NOAEC - no observed adverse effect concentration
LOAEC – lowest observed adverse effect concentration
*denotes carcinogen

Table 2: Potential dioxins and furans -toxic species found in smoke, ash, soot, char and particulates.

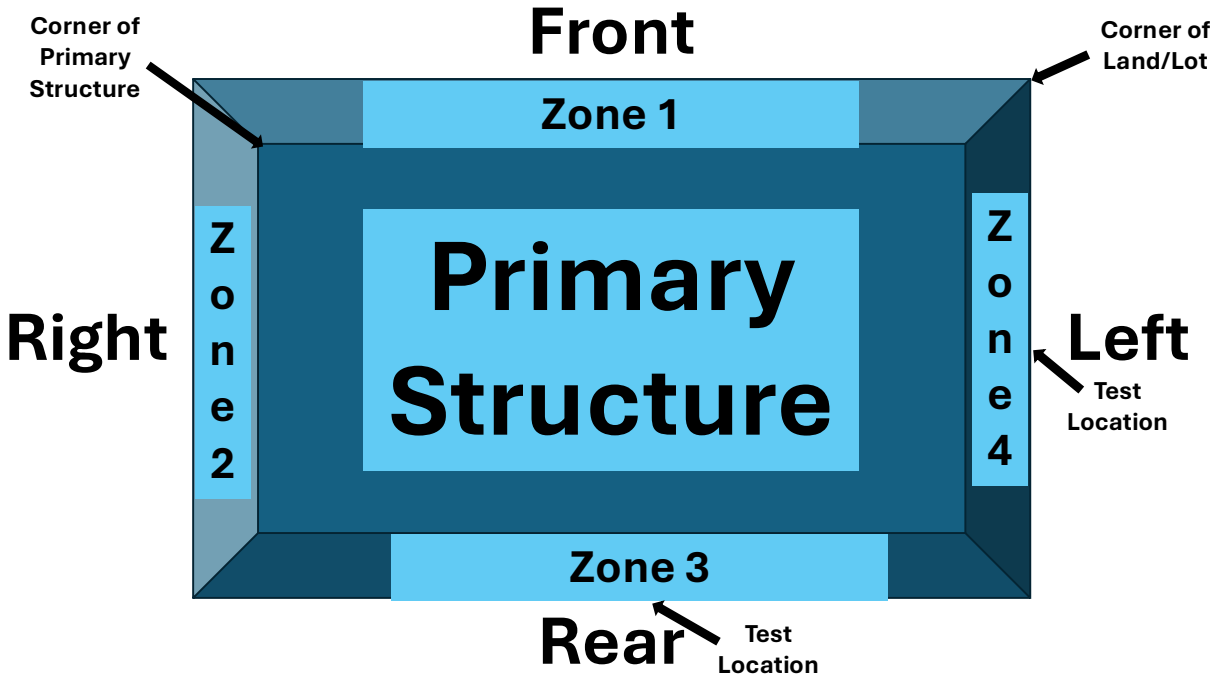
Analyte Dioxin and Furan species	Exposure limit	Reference
Total tetrachlorodibenzo-p-dioxins (TCDD)	Carcinogen – as low as possible to zero	WHO
Total pentachlorodibenzo-p-dioxins (PCDD)	70 picogram/kg per month	WHO
Total hexachlorodibenzo-p-dioxins (HxCDD)	70 picogram/kg per month	WHO
Total heptachlorodibenzo-p-dioxins (HCDD)	70 picogram/kg per month	WHO

Total octochlorodibenzo-p-dioxins (OCDD)	70 picogram/kg per month	WHO
Total tetrachlorodibenzofurans (TCDF)	Carcinogen – as low as possible to zero	
Total pentachlorodibenzofurans (PCDF)	70 picogram/kg per month	WHO
Total hexachlorodibenzofurans (HxCDF)	70 picogram/kg per month	WHO
Total heptachlorodibenzofurans (HCDF)	70 picogram/kg per month	WHO
Total octochlorodibenzofurans (OCDF)	70 picogram/kg per month	WHO

The World Health Organization (WHO) has reported a provisional tolerable monthly intake (PTMI) for dioxins of 70 picogram/kg per month. This level is the amount of dioxins that can be ingested over a lifetime without detectable health effects.

Toxic Zone Diagram

The Toxic Zone Diagram found below will be the principal reference regarding repairability or replacement necessity for other structures and contents which are *not* located inside the structure:



-Note that testing is occurring in the outer middle section of each zone.

-Any test with an individual particulate count that exceeds toxic thresholds (as found in the "Individual Particulate Toxic Thresholds Chart") or a combined elevated particulate count determined to be toxic by a toxicologist will render the entire zone, the zone's Other Structures, and all Contents within the zone, as toxic and fit for total replacement.

3. **Primary Structure/s**: Particulate testing should occur to identify the presence or absence of toxins in the primary structure (primary structure means the house/houses/or other structures that are inhabited throughout the day and/or evening). These tests involve taking samples per #2 "Sampling and Testing Methods" but with a default preference for samples from horizontal surfaces which have not been cleaned.
    a. Dwelling/Primary Structure testing should occur as follows:
        i. 1 Sample from the fire origin point
        ii. 4 Samples on same level as the fire origin point located toward center of each directional structural elevation (front, right, rear, and left elevation walls). Ideal locations for sample procurement would be horizontal surfaces around or inside of furnace air return ducts, outside door thresholds, windows/windowsills, or similar particulate accumulation points.

-For samples taken as noted anywhere in this "Testing: Methods and Interpretations" section of the protocols, it is recommended to avoid painted/glossed/varnished surfaces or generally surfaces where peeling/flecking surface material might interfere with accurate test results.

-If 3 of the 5 samples have toxin levels exceeding an individual toxin threshold or have combined elevated particulate levels that any toxicologist determines to be toxic (as a result of their combined effect despite each toxin only being elevated but not passing an individual toxic threshold level), then the structure in its entirety is to be deemed toxic.

-It is understood that disputes may arise. It may be that one party tests and finds toxins at the fire point of origin and on one wall but not at any of the other 3 perimeter walls. If this occurs, additional testing may occur and if any test on the walls that were not initially identified as toxic does find individual toxic threshold levels of particulates or combined toxic particulate levels (as determined by a toxicologist), then that test will be used instead of the test which did not identify toxins. If new testing identifies additional elevations to be toxic such that 3 or more of the 5 areas to be tested are determined toxic, then the structure will be replaced.

-Similar directional level testing may be conducted on the other full height levels of the structure if a party believes that level was not affected by toxins. If any sample tested on a level other than the level where the fire started is identified to have individual toxic thresholds of any particulate present or combined elevated levels that are determined by any toxicologist to be toxic, then that level will be determined to be toxic. If testing occurs and no samples test toxic on a level but the majority of areas on the main fire level tested toxic (individual or combined), then remediation of that level that did not test toxic may occur per field/state/federal repair standards (including those noted in the repair section of these protocols. Please note that the party identifying no toxins, should inform

the owner of such and further inform the owner that they may conduct additional testing for levels that did not show individual or combined levels that were toxic, and that, if additional testing showed the presence of toxins, this would supersede the previous nontoxic samples.

4. **Other Structures**:
    a. If the fire occurs to the Dwelling/Primary Structure:
        i. And the Land the Primary Structure/s resides on is **equal to or less than .5 acres**
        ii. And the Primary Structure/s fire particulate samples exceed an individual toxic particulate threshold OR the combined elevated particulate levels are deemed by a toxicologist to be toxic when considered in combination with one another,
        iii. Then all Other Structures should be also replaced.
    b. If the fire occurs to the Dwelling/Primary Structure:
        i. And the Land the Primary Structure/s resides on is **greater than .5 acres**
        ii. And the Primary Structure/s fire particulate samples exceed an individual toxic particulate threshold OR the combined elevated particulate levels are deemed by a toxicologist to be toxic when considered in combination with one another,
        iii. Testing all 4 perimeters of the lot shall occur with test samples that are toxic (either via individual toxin thresholds or combined elevated particulate counts reaching toxic levels as determined by a toxicologist) being used to identify their respective zones as toxic. Testing should be in areas/on surfaces which are most likely to have toxins present (ie. particulate accumulation zones such as crevices that would collect particulates or significant airflow locations on nonprimary structures). Test samples should generally be pulled from the center, outermost areas of the perimeter.
            1. Any test with an individual particulate level that exceeds toxic thresholds or combined elevated particulate levels which is deemed toxic by a toxicologist will render the entire zone, its Other Structures, and all Contents within the zone as toxic and fit for total replacement.
            2. If any perimeter test does not reach a level of toxicity, the testing location may be moved inward toward the primary structure until toxicity is identified or the testing has reached the primary structure without toxicity being identified.

3. If a test **within** a zone is toxic, the area from that test point inward in the zone shall be determined toxic and everything within that zone area shall be replaced while everything outside that zone area for that zone maybe be cleaned/remediated per field standards (which may largely be identified in the Repair section of these protocols).
4. Following a perimeter test that does not identify toxic levels of particulates, if testing occurs to the innermost area of that zone (abutting the primary structure) without the presence of toxic levels of particulates being identified, the zone and its contents will be deemed repairable/cleanable per field standards (largely found in the Repair section of these protocols).
5. Any test that identifies toxic levels of particulates within or along the perimeter of a zone, even if previous tests did not show toxicity, will supersede previous, nontoxic tests and be used to confirm zone toxicity.

5. Contents:

a. If the fire occurs to the Dwelling/Primary Structure:
   i. And the Land the Primary Structure/s resides on is **equal to or less than .5 acres**
   ii. And the Primary Structure/s fire particulate samples exceed an individual toxic particulate threshold OR the combined elevated particulate levels are deemed by a toxicologist to be toxic when considered in combination with one another,
   iii. Then all Contents should be also replaced.

b. If the fire occurs to the Dwelling/Primary Structure:
   i. And the Land the Primary Structure/s resides on is **greater than .5 acres**
   ii. And the Primary Structure/s fire particulate samples exceed an individual toxic particulate threshold OR the combined elevated particulate levels are deemed by a toxicologist to be toxic when considered in combination with one another,
   iii. Testing all 4 perimeters of the lot shall occur with test samples that are toxic (either via individual toxin thresholds or combined elevated particulate counts reaching toxic levels as determined by a toxicologist) used to identify their respective zones as toxic. Testing should be in areas/on surfaces which are most likely to have toxins present (ie. particulate accumulation zones such as crevices that would collect particulates or significant airflow locations on nonprimary structures).

Test samples should generally be pulled from the center, outermost areas of the perimeter.

1. Any test that comes back as toxic (via individual thresholds or combined elevated particulate levels as determined by a toxicologist) to the center, outermost area of a zone will render the entire zone, its Other Structures, and all Contents within the zone as toxic and fit for total replacement.
2. If any perimeter test does not reach a level of toxicity, the testing location may be moved inward toward the primary structure until toxicity is identified or the testing has reached the primary structure without toxicity being identified.
3. If a test **within** a zone is toxic, the area from that test point inward in the zone shall be determined toxic and everything within that zone area shall be replaced while everything outside that zone area for that zone maybe be cleaned/remediated per field standards (which may largely be identified in the Repair section of these protocols).
4. Following a perimeter test that does not identify toxic levels of particulates, if testing occurs to the innermost area of that zone (abutting the primary structure) without the presence of toxic levels of particulates being identified, the zone and its contents will be deemed repairable/cleanable per field standards (largely found in the Repair section of these protocols).
5. Any test that identifies toxic levels of particulates within or along the perimeter of a zone, even if previous tests did not show toxicity, will supersede previous, nontoxic tests and be used to confirm zone toxicity.

6. **If the fire occurred somewhere other than the Primary Structure** (on the property or a fire in the vicinity of the property— a neighboring property or wildfire), Testing will occur as follows.
    a. If the Point of Fire Origin is onsite (anywhere on the lot/other structures), one particulate test will occur at the point of Origin.
        i. A toxic result (individually exceeding or as a combined elevated particulate count that is determined by a toxicologist to be toxic) will require additional site testing.
            1. Additional site testing will occur to site zones at the center, outermost perimeters of each zone and a toxic test result will deem each zone toxic which will require replacement of all Other Structures and Contents located within that zone.

a. If any perimeter test does not reach a level of toxicity, the testing location may be moved inward toward the primary structure until toxicity is identified or the testing has reached the primary structure without toxicity being identified.
b. If a test within a zone is toxic, the area from that test point inward in the zone shall be determined toxic and everything within that zone area shall be replaced while everything outside that zone area for that zone maybe be cleaned/remediated per field standards (which may largely be identified in the Repair section of these protocols).
c. Following a perimeter test that does not identify toxic levels of particulates, if testing occurs to the innermost area of that zone (abutting the primary structure) without the presence of toxic levels of particulates being identified, the zone and its contents will be deemed repairable/cleanable per field standards (largely found in the Repair section of these protocols).
d. Any test that identifies toxic levels of particulates within or along the perimeter of a zone, even if previous tests did not show toxicity, will supersede previous, nontoxic tests and be used to confirm zone toxicity.

2. Additional testing will occur inside the Primary Structure/s with 4 samples on ground level, 2 samples at each level other than the ground level. Samples will be taken on opposite elevations from one another and in areas most likely to accumulate particulates (air supply ducts, windowsills, and similar). If 50% of samples taken (2 of 4 opposite elevations samples at ground level, 1 of 2 opposite elevation samples on other levels), the primary structure as a whole will be deemed toxic. Each level with 50% or more opposite elevation samples that test toxic will be deemed toxic as a whole. If more than 50% of the structure's floor area or total square footage is deemed toxic, the structure as a whole will be deemed a total loss (the value of proper repair work occurring to the structure will effectively have reached a replacement practicality at such a point).

ii. A nontoxic result of the point of origin sample (if the point of origin is available to test/onsite) will not require additional testing of the zones or primary structure/s (though additional testing may occur if any party desires such) and will not require replacement of any property until

damaged by the heat, smoke, water associated with the loss event, or repair/cleaning is deemed impractical.

iii. Any Additional tests that show toxicity in areas which were originally shown as nontoxic will render those areas toxic.

b. If the Point of Fire Origin is not onsite (ie. a structure fire next door, a wildfire, etc.)
    i. 4 exterior zone tests shall occur with samples taken in the center, outermost section of each of the 4 zones.
        1. A toxic result (individually exceeding or as a combined elevated particulate count that is determined by a toxicologist to be toxic) will deem each zone toxic which will require replacement of all Other Structures and Contents located within that zone.
            a. If any perimeter test does not reach a level of toxicity, the testing location may be moved inward toward the primary structure until toxicity is identified or the testing has reached the primary structure without toxicity being identified.
            b. If a test within a zone is toxic, the area from that test point inward in the zone shall be determined toxic and everything within that zone area shall be replaced while everything outside that zone area for that zone maybe be cleaned/remediated per field standards (which may largely be identified in the Repair section of these protocols).
            c. Following a perimeter test that does not identify toxic levels of particulates, if testing occurs to the innermost area of that zone (abutting the primary structure) without the presence of toxic levels of particulates being identified, the zone and its contents will be deemed repairable/cleanable per field standards (largely found in the Repair section of these protocols).
            d. Any test that identifies toxic levels of particulates within or along the perimeter of a zone, even if previous tests did not show toxicity, will supersede previous, nontoxic tests and be used to confirm zone toxicity.
        2. Any Toxic test result of any exterior zone will require the primary structure to be tested. That testing will occur inside the Primary Structure/s with 4 samples on ground level, 2 samples at each level other than the ground level. Samples will be taken on opposite elevations from one another and in areas most likely to accumulate particulates (air supply ducts, windowsills, and similar) if 50% of

samples taken (2 of 4 opposite elevations samples at ground level, 1 of 2 opposite elevation samples on other levels), the primary structure as a whole will be deemed toxic. Each level with 50% or more opposite elevation samples that test toxic will be deemed toxic as a whole. If more than 50% of the structure's floor area or square footage is deemed toxic, the structure as a whole will be deemed a total loss (the value of proper repair work occurring to the structure will effectively have reached a replacement practicality at such a point).

ii. A nontoxic result of all 4 zone tests will not require additional testing of the zones or primary structure/s (though additional testing may occur if parties desire such) and completely nontoxic results will not require replacement of any property unless damaged by the heat, smoke, water associated with the loss event, or repair/cleaning is deemed impractical.

iii. Any Additional tests that show toxicity in areas which were originally shown as nontoxic will render those areas toxic and testing and replacement should occur as directed with toxic results.

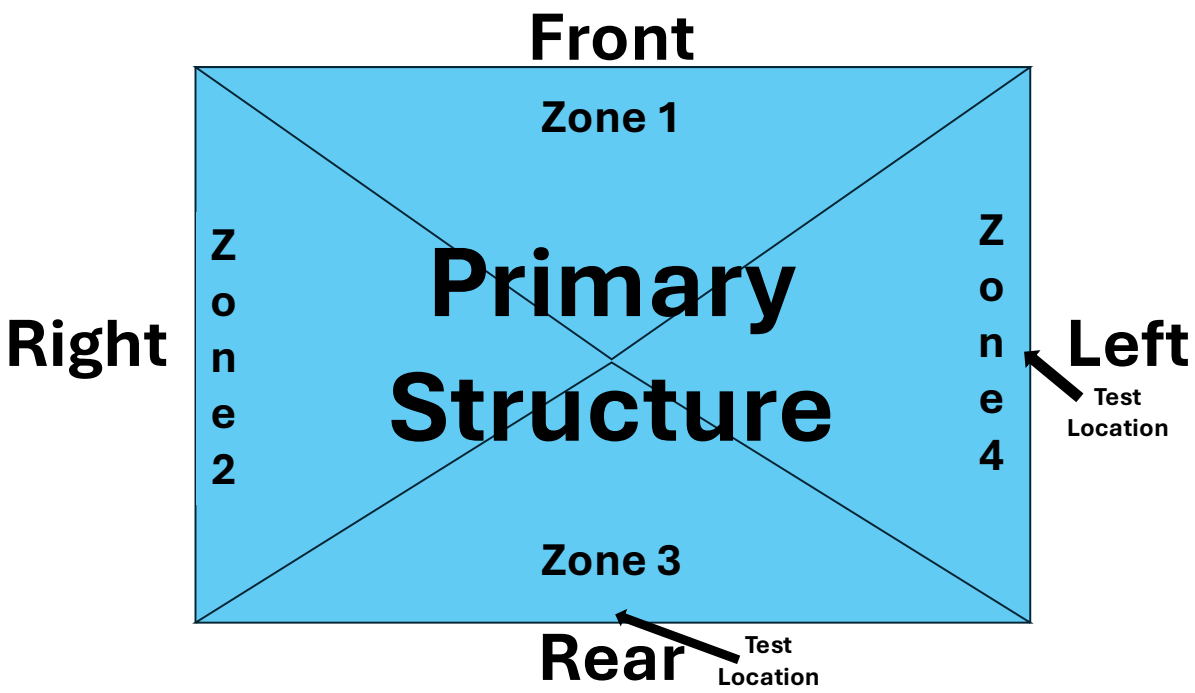
General Note: *In ANY circumstance with ANY testing to ANY area, even if the entire area or structure is not deemed toxic but some areas are deemed toxic and it is not practical to only repair as a result (be it by cost, risk, or other practical considerations), replacement should be the method utilized. An example would be a 3-story house (Full basement and two levels above grade). The ground level is toxic but for some reason the second level and basement don't test nontoxic. Since one would need to replace the ground level, this would logically require one to replace the second level and now more than 50% of the structure's square footage is being replaced which would result in a full rebuild. As a counter example, let's suppose the second level tested toxic but the ground and basement levels did not test toxic. In that event, one could reasonably replace the second level and conduct repairs to the other levels (though repairs might still cause costs to be more than replacement in such a situation).*

Proposed Method for Handling Unique Property Circumstances

Note: While it is impossible to consider every variation of a property that might exist, some properties are large enough, compartmentalized, or expensive enough that fire particulates may not have infiltrated them or the cost of disassembling all affected areas and cleaning might be a cost/risk effective solution. This "Testing" Section and protocol in general takes the time to outline clearly what types of properties would and would not be **Unique Property Circumstances**. This is done to maximize understanding and the efficiency of these protocols. If a property does fall under a unique property circumstance, it would be advised to utilize the

test methodology and options listed below. If the property being addressed cannot reasonably utilize these proposed methods, it would be advised to utilize the logic of these protocols and apply the closest methodology possible. Please view the **Modified Toxic Zone Diagram** below to better understand the internal zones (inside the primary structure) referred to below.

Modified Toxic Zone Diagram



When a fire has affected the building directly (ie. the fire was in the building or did burn the exterior of the building):

1 sample shall be taken at the point of Fire Origin (principal burn area in/to the building)

4 samples shall be taken on the same level as the fire origin point located toward the center, outermost area of each directional structural elevation (front, right, rear, and left elevation walls). These Samples would occur to the exterior walls of each elevation but would be taken from the interior of the structure. Ideal locations for sample procurement would be horizontal surfaces around or inside of furnace air return ducts, outside door thresholds, windows/windowsills, or similar particulate accumulation points if none of those previous suggestions are available to pull samples from.

If the building is multiple levels, take 4 samples from each level using the same methodology until no samples have individual or combined (if a toxicologist is being used to review combined elevated particulate levels) toxic levels of particulates. Testing

levels above or below a level that has no toxic test results will not be required but may be done if a party wishes to.

If 4 zones are toxic, the entire level is deemed toxic and effectively needing replacement.

If 3 zones are toxic the entire level is deemed toxic and effectively needing replacement.

If 2 zones are toxic, the entire level is deemed toxic **<u>until and unless</u>** additional testing is performed in a similar manner moving toward the center of the level from the outer perimeter walls that did not test as toxic. If toxic levels of particulates are found in that internal zone, then replacement shall occur from the point where the testing comes up toxic inward to the proximate center of the level within that internal zone. If toxic levels of particulates are not found present within the internal zone, then repair/cleaning/remediation may occur per the Repair section of these protocols.

> -if there are concrete or metal structural members, everything may be removed and replaced except for the members which must be tested with any toxic test results requiring continued cleaning until they no longer come up toxic. This logic is applied because the extreme cost of continued cleaning and testing may be worthwhile in circumstances where large portions of **unique properties** are not toxified.
>
> Any Zone or portion of a zone that is not toxic would be treated as repairable as long as only zones or less were found toxic on a given level).

If only 1 zone is toxic the same logic as noted for when two zones were found toxic would apply.

In the event that the structure is **only one level**, is a unique property, and has less than 4 elevation samples that test toxic, additional sampling may occur in those zones moving inward toward the center of the structure until a sample tests toxic or the center of the structure has been reached. Toxic zones should be replaced and nontoxic zones may be remediated/cleaned.

As always, one must consider the fact that, even if a structure has less than 4 toxic zones on a single level structure or less than 100% of the structure's multiple levels test as toxic, the costs of repairing structures tend to be more than replacement unless 50% or less of the structure's floor area or total square footage is affected. In the event of repair instead of replacement, the risk of missed toxins is a constant and likely issue in many of these cases. Further, in the event that the cost of ***proper*** repairs + the cost of replacement in the event repairs are ineffective is more than total insurance policy coverages for the structure, it would be irresponsible to attempt repairs that cannot **<u>guarantee</u>** a preloss

condition is achieved and which would resultantly require replacement in the event repairs are ineffective.

When the building has been affected by particulates but not by fire (ie. the fire was not in the building or did not burn the exterior of the building).

The same sampling, testing, and logic as a building that was directly affected by fire applies except that there is no fire origin point sample that would be taken since the fire was not onsite.

REPAIR ANALYSIS

Repair and Replacement Universal Safety Notes:

-In the event that part of, or the entire structure/property, is deemed toxic or partially toxic and is going to be partially or fully repaired/torn down/replaced, work shall comply with the strictest controls set by the State, EPA, and OSHA for controlled hazardous materials and compounds with related work (be it demolition, disposal, repair work, containment, filtration, personal protective equipment to be worn, or any other work related considerations that could apply with hazardous materials and compounds).

-In the event that **no** toxic particulate levels (individual or combined elevated levels as determined by a toxicologist) are identified to the structure/property, work may proceed under standard safety protocols that any construction/repair work would be required to abide by for said work.

Repair for Nontoxic Fire Losses

In the event that testing does not identify a structure, level, zone, or content item as toxic (either via individual particulate thresholds or combined elevated particulate thresholds as determined by a toxicologist), then those items shall be handled as directed by this repair section.

Before considering repairs, it should be noted that in any case, if the circumstances of the loss make it impractical to conduct repairs, replacement should be the course of action. Common examples of this include:

1. When repair is deemed unlikely to succeed/would be contrary to standard, reasonable field practices for repair.
2. When repairs are not long-term solutions and insurance is involved, then replacement would be the proper course of action.
3. When insurance is involved and the cost of repair plus the cost of replacement would exceed available coverages in the event the repair is not successful (and when repair is not guaranteed to work), then replacement should occur.
4. When the cost of repair is nearly equivalent or greater in cost than replacing the damages, then replacement would be the logical method.

If the loss does not have the aforementioned or similar replacement-worthy circumstances and if the loss is not toxic, then repair is the proper course of action and the following guidelines for repair would be reasonable:

-ANSI/IICRC S700 "Standards for Professional Fire and Smoke Damage Restoration"[1] & ANSI/IICRC S500 "Standards for Professional Water Damage Restoration."[2]

-One must consider both smoke/heat and water damages because, where there is fire, there is often water being used to put out said fire and both damage affectations spawn from the one event.

-NEMA (National Electrical Manufacturer's Association) Guidance related to Smoke and Heat damages (document "NEMA-GD-2-2016-Evaluating-Fire-and-Heat-Damaged-Electrical-Equipment-Guide"[3]) and from Water damages (document "NEMA-GD-1-2016-Evaluating-Water-Damaged-Electrical-Equipment-Guide"[4])

-As noted previously, heat and smoke may be the primary cause of damage from a fire, but water used to put out the fire will certainly cause additional damages as well. Unaddressed impacts to electrical lines/components may create future fire hazards.

The only caveat is that any state/federal requirements for repairs should be followed, and it should further be understood that the guidelines noted above represent minimum standards to be abided by. If insurance is involved, one should consider that like kind and quality repairs may, in some cases, require more work than the minimum standards in the S500, S700, NEMA guidelines, and those guidelines provided by the state or federal government. When said cases arise, the insurer should consider and utilize the most reasonable (lowest cost but proper) method to effectuate a minimally like kind and quality restoration to preloss conditions.

-When a Standard or Guidance does not address the specific circumstances one finds with a loss, one must use professional discretion to address the circumstance as closely as possible/in the spirit of the Standards and Guidance available.

Please note that one must not only consider direct damages caused by the fire/smoke event's circumstances but must also consider secondary (often access related) damages that may result from addressing such. For instance, suppose wiring must be removed and this will consequently require damaging the walls to access affected wiring. This would mean that damages related to the fire event would involve both the wiring and the walls/texture/paint as well as anything else such as cabinets or flooring that might be affected in the process of accessing and addressing said wiring.

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[1] ANSI/IICRC S500 (2025), Standards for Professional Fire and Smoke Damage Restoration. Accessed online at: https://iicrc.org/s700/

[2] ANSI/IICRC S500 (2025), Standards for Professional Water Restoration. Accessed online at: https://iicrc.org/s500/

[3] National Electrical Manufacturer's Association (2016). Evaluating Fire- and Heat-Damaged Electrical Equipment. Accessed online at: https://www.nema.org/docs/default-source/secure-document-library/nema-gd-2-2016-evaluating-fire-and-heat-damaged-electrical-equipment-guide.pdf?sfvrsn=a9714adc_3

[4] National Electrical Manufacturer's Association (2016). Evaluating Water-Damaged Electrical Equipment. Accessed online at: https://www.nema.org/docs/default-source/secure-document-library/nema-gd-1-2016-evaluating-water-damaged-electrical-equipment-guide.pdf?sfvrsn=7034f9b6_2

REPLACEMENT ANALYSIS

Repair and Replacement Universal Safety Notes:

-In the event that part of, or the entire structure/property, is deemed toxic or partially toxic and is going to be partially or fully repaired/torn down/replaced, work shall comply with the strictest controls set by the State, EPA, and OSHA for controlled hazardous materials and compounds with related work (be it demolition, disposal, repair work, containment, filtration, personal protective equipment to be worn, or any other work related considerations that could apply with hazardous materials and compounds).

-In the event that **no** toxic particulate levels (individual or combined elevated levels as determined by a toxicologist) are identified to the structure/property, work may proceed under standard safety protocols that any construction/repair work would be required to abide by for said work.

Analysis

The Objective of Insurance is to provide indemnification of a property by assessing a loss and providing what must be given to restore the property to minimally it's like kind and quality pre-loss condition. It is understood as a matter of common practice in the insurance industry that if the repair will not restore the property to minimally its pre-loss condition, then replacement is what must occur, even if that results in the insured being in a better position than they were in before the loss. The goal is to return the insured/their property to minimally a pre-loss position/condition.

In order to accurately scope an insurance loss, one must first determine if there is an event that caused damages/changed the property from its pre-loss condition in the first place. This is commonly done by visual identification of damages and alterations. Examples of said identification **with a fire-related loss** might be burned and damaged materials, soot laden surfaces, and one might employ the sense of smell to identify combustion byproducts are present in the general vicinity of a structure (though one should generally be wearing minimally an N95 mask during an initial site inspection inside a building that has experienced a fire loss, one would likely still be able to smell smoke when arriving at site if the fire was substantial). Ultimately, any fire loss should involve testing of the primary loss site by a qualified professional and comprehensive particulate testing at a laboratory that is able to detect heavy metals, Volatile Organic Compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), asbestos, Dioxins, Furans, and related toxins. **Should toxic levels of particulate matter be identified on site for a property that is not a unique property circumstance** (be it of individual particulates that exceed toxic thresholds or combined elevated levels of multiple particulates which a toxicologist determines to be toxic by their combined elevated nature), **the loss effectively always becomes a replacement scenario as a matter of financial/functional practicalities and risks associated with any method other than replacement**. It is often helpful to utilize a toxicologist with fire losses as they are able to review and clarify lab results, ensure the labs have tested for all key toxins one would anticipate as byproducts of combustion, and they are able to identify the hazards presented by specific toxins to individuals with unique medical conditions.

Fires, in addition to the heat and flames, also commonly involve two other hazards, the **smoke (particulates)** they produce and the **water/fire retardants** used to put out the blaze (water will be the focus for this analysis as it is the principal liquid used in firefighting).

While **smoke** may sometimes leave visible particulate deposits, and while water may leave visible stains and related damage, these damages are often hidden. Combustion-based particulates are microscopic and capable of saturating every crack, crevice, seam, and texture one can see (either by air or waterflow). The human eye can see down to 40 microns[5] and combustion-based particulates range in size from .01-10 microns in size[6] (Per PDF page 9 of "Combustion Particle Size"). One must also note that combustion particles that tend to be hazardous are those which are 2.5 or less microns in size. Therefore, if one can see an opening, no matter how small, it is usually scores to hundreds of times larger than necessary for most hazardous, combustion-based particulates to enter and saturate it with contaminants. This means there is often smoke (particulate) contamination which is present but is not identifiable by sight or other, non-laboratory testing means. **If a fire to a primary structure produces toxic smoke, that smoke will have generally contaminated the entirety of the primary structure, all of its contents, and the other structures and contents in close proximity to the primary structure, regardless of the visibility of said contamination** (ie. there won't be visible discoloration or staining in many/most contaminated areas).

Similar to smoke, **water** may accumulate in certain areas which are visibly wet or identifiable due to dampness, but liquids have the ability to travel via a variety of means identified later in this analysis, and this may cause damage and contamination that is not immediately identifiable or anticipated. One of many examples of this would be where water is sprayed on or around a fire and where the water absorbs the toxic particulates from that fire, thereafter transporting the toxins and water throughout the building via electrical conduits, HVAC ductworks, and by zigzagging down the structure's levels as it travels from ceiling to wall to floor to blockages which redirect it with this process repeating until the toxic water reaches the lowest levels of the building. The result is that water which may have begun on one side of a structure can end up on the other side of the structure, that water which began being sprayed on a roof and entering through the attic ends up on ground or basement levels, and where toxins that might have had heavier concentrations near a fire initially can be redistributed via water flow to other areas of the structure which were not directly adjacent to the fire.

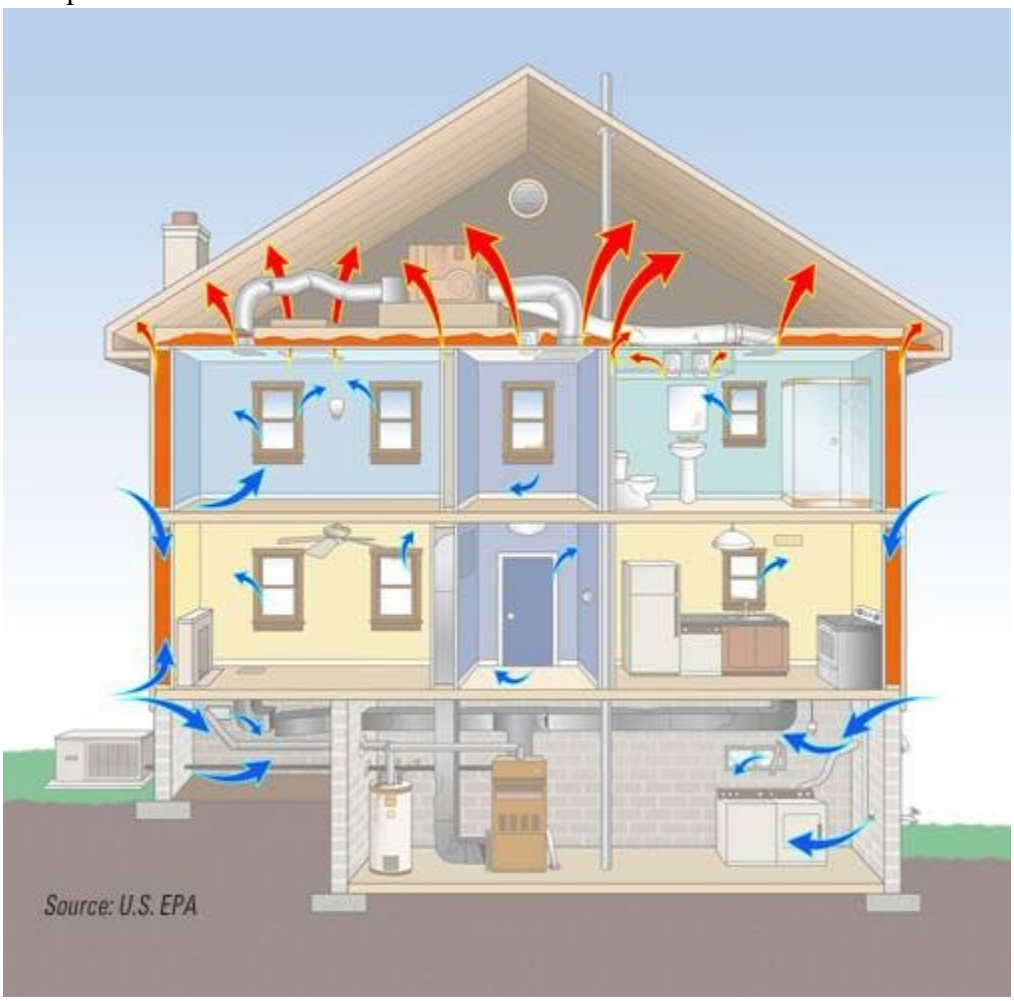
In addition to air and waterflow dynamics, toxins are also distributed via secondary contamination methods. These secondary contamination methods include firefighting efforts which may involve primary and secondary searches for life (opening every door to every room to make sure people aren't trapped in the building or passed out from smoke inhalation somewhere within) as well as interior firefighting operations focused on detecting and addressing hotspots. In addition to secondary contamination related to firefighting efforts, one may find

[5] Gene Franks (2013) Meshes and Microns: The Measurements of Water Treatment. Accessed online at http://www.purewatergazette.net/how-water-treatment-is-sized-meshes-and-microns-february-24-2013/
[6] Paul Baron (2010) Generation and Behavior of Airborne Particles (Aerosols). Accessed online at https://townofwappingerny.gov/wp-content/uploads/2020/03/Aerosol_101.pdf

contamination caused by water evaporation and condensation post fire. This involves the water condensing on surfaces, picking up particulates and transferring them ever downward throughout the property. Any temporary shoring and shuttering of the damaged property would also tend to dislodge and distribute particulates localized to work areas where impacts, vibrations, or alterations of airflow (any attempted drying efforts) would occur.

Structural Air & Water Flow Dynamics
(Hazardous Particulate Matter Related)

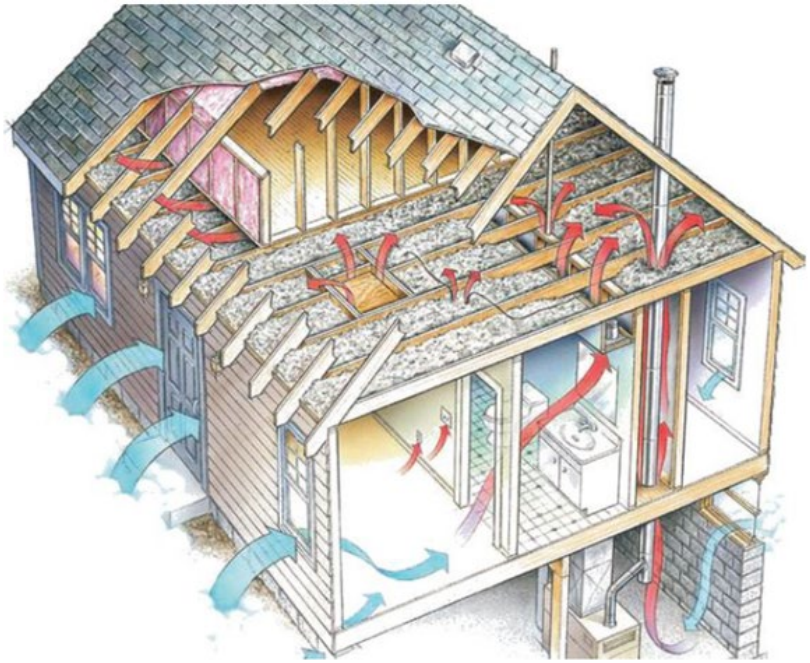
When one considers the presence of hazardous particulate matter, it is pertinent to consider transmission methods by which the dangerous particulates might spread. **The primary manner of transmission of hazardous particulates is airflow** and the following diagram exemplifies the EPA's description of airflow as its source:



Per the EPA website[7] we learn that if there is a crack, gap, joint, vent, light, plug, window, door, chimney, or HVAC/Plumbing-related opening in a wall, air is flowing through it from the outside. We generally also learn that fresh air will enter a building through wall levels as low as the

[7] US EPA (2024). How Does Outdoor Air Enter a Building. https://www.epa.gov/indoor-air-quality-iaq/how-does-outdoor-air-enter-building.

basement, and warm air inside the building will transition upward. In other words, air from the outside of the building will flow throughout the entire structure. The EPA clarifies that air doesn't just transition through outer walls and roofing, but that infiltration is a "process by which outdoor air flows into the house through openings, joints and cracks in walls, floors and ceilings, and around windows and doors." Said another way, air will move through every structural component of a building, including floors, ceilings, and interior walls. This is important because it means that incomplete combustion byproducts, namely toxins, soot, char, and ash, can enter all the same places that air will flow, starting from outside the primary structure as it is blown into and infiltrates the building with the assistance of any wind in the area. When there are other harmful particulates from hazardous materials that might be on the outside of the structure and which are damaged by fire/water/wind/or impacts, it also means that hazardous particulates will transition from the outside to the inside of the structure via these airflow dynamics. When the hazardous particulates begin inside a structure or enter a structure from outside sources, we can also see how the particulates would flow throughout the structure (generally from bottom to top but not exclusively), and we can imagine how hazardous particulates which may have started in one small area of a structure would easily spread through the entire structure itself. The following diagram pulled from All in One Insulation helps provide a better sense of how hot air transitions upward through a building while cool air currents move downward:

 [8]

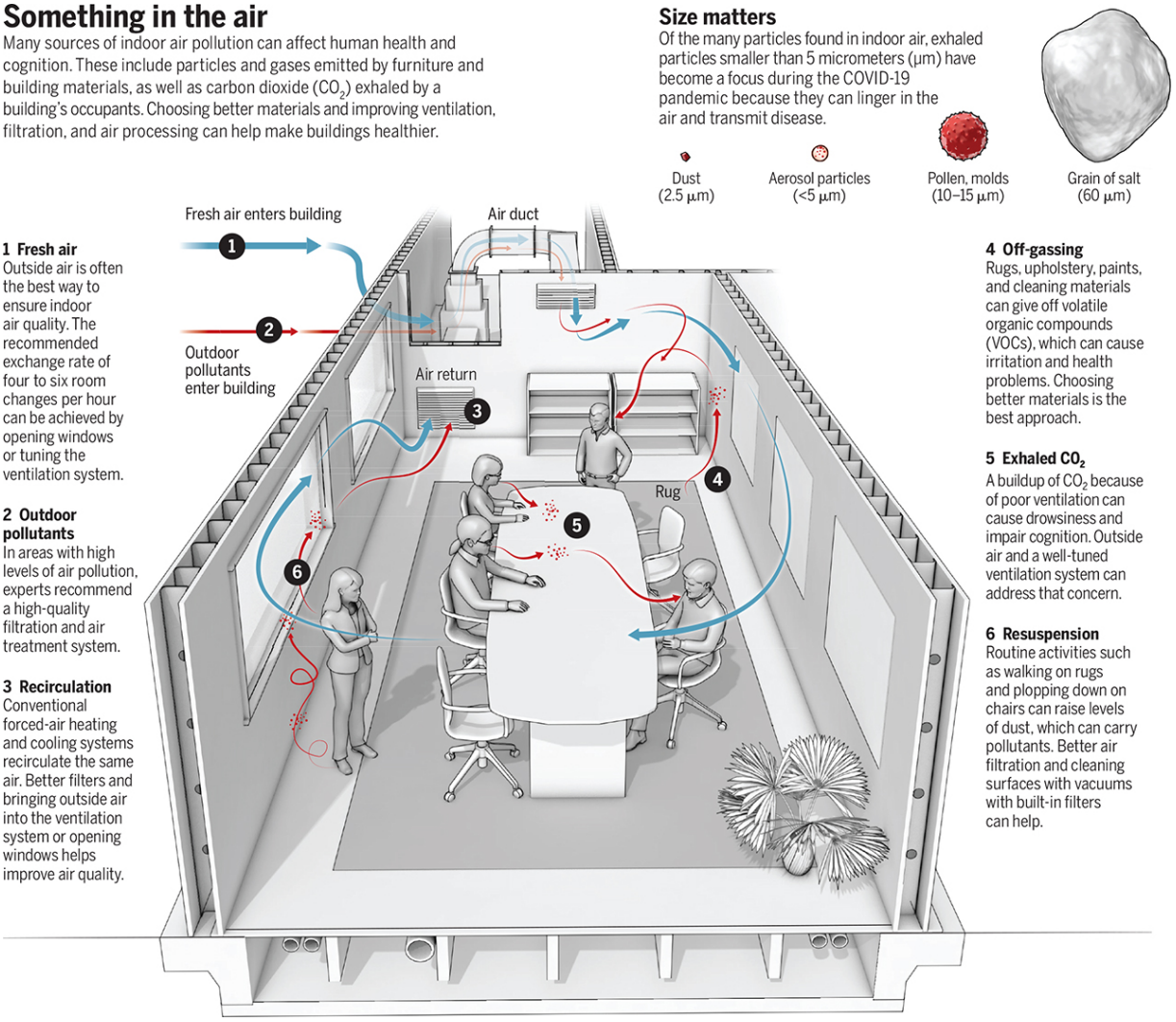
This image is explained via a governmental study by the City of Surrey. This study repeats much of what is found on the EPA website and further explains that hot air inside a building

[8]All in One Insulation (2024). The All In One System. Accessed online at http://allinoneinsulation.com/insulation/the-all-in-one-system/ and at https://sustain.ubc.ca/sites/default/files/2016-24_Using%20Thermal%20Cameras%20for%20Energy%20Efficient%20Buildings_Plowright.pdf

naturally travels upward while creating a kind of vacuum that pulls outside air into the building.[9] As a structure is heated by fire, airflow dynamics that already exist only intensify. Even without the added assistance of fire, nearly every structure is designed to facilitate fresh air entering from the outside with cooler air currents flowing downward and warming air currents flowing upward throughout the structure. Warm air eventually collects at the attic/roof level and flows out of the structure through the roofing level vents and membranes. This diagram also does a nice job of showing how air in buildings will transition through lights, switches, plugs, ventilation, and vertical gaps in the walls as well. Further, we see that outside air also sweeps horizontally across floors and this makes it reasonable to suggest that air entering into a building would travel virtually everywhere within that structure, inside and out. Not only that, but buildings are designed to circulate air. Buildings have HVAC systems and ductworks that are very carefully designed to productively transfer air throughout a structure.

The diagram which follows helps us to better visualize how outside air and pollutants enter through an HVAC system and distribute those pollutants through a room (in this case, it is an office building, but the concept applies to all structures generally). Please note that, while the diagram notations that speak on common pollutants are not addressing combustion-centric pollutants/hazardous particulate matter, those toxic particulates are generally equal to or much smaller than common pollutants and would toxify rooms in a similar manner. The pictorial representation is the greater focus:

[9] Andrew Plowright, M.Sc. (2016). Using Thermal Cameras To Promote Energy Efficiency In Buildings. Accessed online at: https://sustain.ubc.ca/sites/default/files/2016-24_Using%20Thermal%20Cameras%20for%20Energy%20Efficient%20Buildings_Plowright.pdf



[10]

We see that fresh air and outdoor pollutants/hazardous particulates enter through the ductworks, disperse themselves within the room and its surfaces where they are disturbed and transitioned through everyday movement and that pollutants/hazardous particulates are then recycled back through the air return. Please note that there may be an air filter in the furnace, but common air filters found in HVAC systems are not HEPA filters which are designed to filter out most particles as small as combustion-related/hazardous particulate matter.[11] Further, even if a HEPA filter was present, these filters tend to quickly become overwhelmed by large quantities of smoke/particulates, which would then cause them to no longer work effectively.[12] With

[10] Douglas Starr (2021). The Air Investigator. Accessed online at: https://www.science.org/content/article/scientist-says-cleaning-indoor-air-could-make-us-healthier-and-smarter?utm_campaign=SciMag&utm_source=Social&utm_medium=Facebook

[11] Custom Comfort Air (2025). Understanding the Differences Between MERV and HEPA Filters. Accessed online at: https://customcomfortair.com/understanding-the-differences-between-merv-and-hepa-filters/#:~:text=Part%20of%20the%20reason%20that,throughout%20the%20room%20or%20building.

[12] MontanaWildFireSmoke.org (2025). HEPA Portable Air Cleaners For Wildfire Smoke. Accessed online at: https://www.montanawildfiresmoke.org/hepa-filters.html#:~:text=During%20wildfire%20smoke%20season%2C%20they,the%20more%20it%20is%20used.

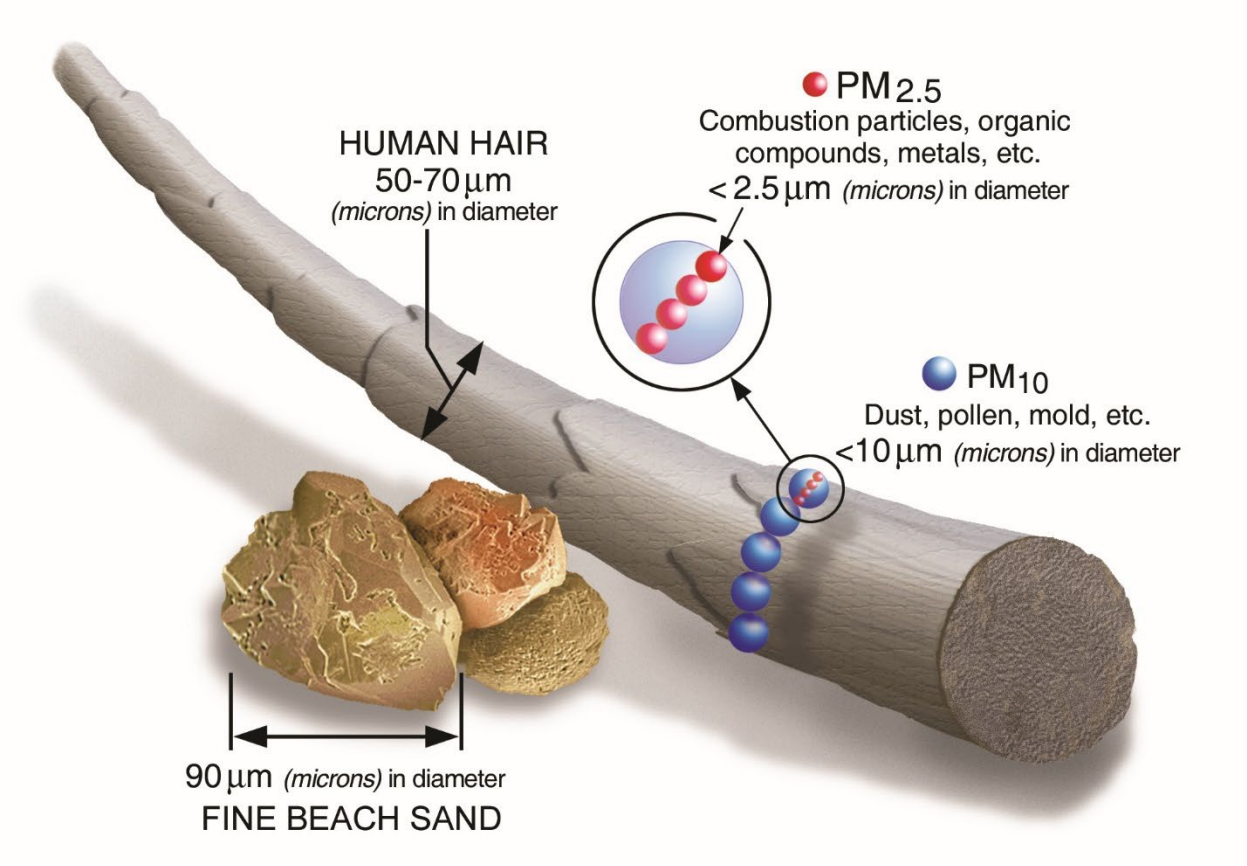
purification processes of air flowing through ductworks quickly diminishing, more toxic particulates would remain unfiltered and would recirculate and spread throughout the already toxified, particulate laden building as a result.[13] There are also typically gaps, screw holes, and seams in ductworks that also allow for toxin transmission via these systems despite the potential presence of HEPA filtration.

Another helpful visualization[14] below shows the visual representation of different particulate matter sizes. The diagram shows a grain of salt being 60 microns and a grain of dust being 2.5 microns (for clarity, dust particles are sometimes broken into several categories of dust that range from .5 microns to 100 microns) and we can see it zooms down to wildfire smoke being between 0.4-0.7 microns (though fire byproducts may fully range smaller or larger than this in size).

[13] Roger Bakies (2023). Six Side Effects of a Dirty Air Filter. Accessed online at: https://indoortemp.com/resources/side-effects-dirty-air-filter.

[14] Graphic design of image by Harrison Schell (2020). Zooming In: Visualizing the Relative Size of Particles. Accessed online at: https://www.visualcapitalist.com/visualizing-relative-size-of-particles/

Yet another diagram[15] and clarification on particulate matter from the EPA can be found below:



One may note that both combustion and dust particles can be 2.5 microns, and the in document subnotation explains that the particulate matter at 2.5 microns or smaller being "the greatest concern to public health from wildfire smoke".[16] On the same page, it notes that "Particles from smoke tend to be very small, with a size range near the wavelength of visible light (0.4-0.7 microns)." Data shows that lead dust is as small as 0.1-0.7 microns, and combustion-related particles are 0.01-2.5 microns[17]. A second source, this time from the CDC, notes that combustion particles tend to start out as 0.01- 0.05 microns in size but that they agglomerate into larger particles. That source shows a chart range for combustion particles being from .01-10 microns in size.[18] It may be helpful to note that dioxins and asbestos dust are also as small as .1 microns in size (precombustion).[19]

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[15] US EPA (2025). Why Wildfire Smoke is a Health Concern. Accessed online at: https://www.epa.gov/wildfire-smoke-course/why-wildfire-smoke-health-concern

[16] EPA: Office of Air and Radiation (2003) Particle Pollution and Your Health. Accessed online at https://www.airnow.gov/sites/default/files/2018-03/pm-color.pdf

[17] The Engineering ToolBox (2005). *Particle Sizes*. Accessed online at: https://www.engineeringtoolbox.com/particle-sizes-d_934.html

[18] Paul Baron (2010) Generation and Behavior of Airborne Particles (Aerosols). Accessed online at https://townofwappingerny.gov/wp-content/uploads/2020/03/Aerosol_101.pdf

[19] Utah Department of Environmental Quality (2023). Frequently Asked Questions: Asbestos. Accessed online at: https://deq.utah.gov/air-quality/frequently-asked-questions-asbestos & Kimiyoshi Kitamura, Takeo Sakurai, Jae-Won Choi, Noriyuki Suzuki, Masatoshi Morita, National Institute for Environmental Studies, Tsukuba (2004).

In other words, contaminants from combustion/hazardous materials are very small. This means that those contaminants can reasonably be anticipated to be carried through the air during a fire, to be pulled into the various gaps and openings in a building, and to be able to flow through any and all internal spaces within the structure because there is effectively ***no*** gap, cut, groove, hole, joint, and so on which would be too small for said particles to flow through. Remember that if the human eye can see a gap, it has to be at least 40 microns or larger[20], and hazardous particulate matter/combustion-based particulates are as small as 0.01 microns in size, which means that any visible gap is typically hundreds of times larger than required for hazardous particulates to freely move through it. Since air circulates throughout the entirety of a structure, that would mean that hazardous particulates/contaminants would circulate and be deposited through the entirety of a structure.

One last point as it pertains to airflow is that very small particles, those smaller than 1 micron take days to years to settle in a quiet atmosphere (an area with essentially no air movement), but it is noted that, in a turbulent atmosphere (such as a building that has windows, doors, temperature differentials, foot traffic, heating and cooling systema, and so on), those particles may never settle out.[21] This means that one should expect that the particles that have saturated gaps and crevices throughout the internal areas of the building will eventually flow out of the walls and recontaminate the structure as a whole *if* one were to not fully replace the structure in the first place.

The second method of hazardous particulate matter transmission throughout a structure is waterflow. Water being sprayed onto burning materials, through smoke, or onto surfaces or which travels through those areas indirectly will capture hazardous particulate matter and pull it along those surfaces with it. The dynamics of waterflow are generally simple. Water flows from higher locations to lower locations (ie. if there is a leak on the top floor, the water from that leak will move ever downward toward the lowest floors). Water also diffuses from areas of high concentration to areas of low concentration (ie. if there is a room filled with water but surrounding rooms have nearly no water, the water will generally diffuse from the filled room to the unfilled rooms).[22] Water will absorb into permeable/porous materials (materials with the ability to allow water into them). Finally, water will move via osmosis and capillary action and may be pulled horizontally or even vertically in smaller spaces where layers of flooring or wall material create tight channels and the opportunity for water pressure dynamics to occur. [23] [24]

Physio-Chemical Properties, Distribution And Modelling, Relationship between dioxin concentration and particle size for suspended sediment. Accessed online at: https://scholar.google.com/scholar?q=PHYSICO-CHEMICAL+PROPERTIES,+DISTRIBUTION+AND+MODELLING+Relationship+between+dioxin+concentration+and+particle+size+for+suspended+sediment&hl=en&as_sdt=0&as_vis=1&oi=scholart

[20] Gene Franks (2013) Meshes and Microns: The Measurements of Water Treatment. Accessed online: http://www.purewatergazette.net/how-water-treatment-is-sized-meshes-and-microns-february-24-2013/

[21] The Engineering ToolBox (2005). *Particle Sizes*. Accessed online at: https://www.engineeringtoolbox.com/particle-sizes-d_934.html

[22] Matthew M. Copeland, PE, RRC (2020). How Water Moves: Airflow and Diffusion. Accessed online at: https://copelandbec.com/2020/11/28/how-water-moves-airflow-and-diffusion/

[23] Water Science School (2018). Capillary Action and Water. Accessed online at: https://www.usgs.gov/special-topics/water-science-school/science/capillary-action-and-water

[24] Michael J. Lopez; Carrie A Hall (2023). Physiology, Osmosis. Accessed Online at:

In addition to standard water flow dynamics, one must keep in mind that water evaporates as it warms and can then condense on surfaces which can cause dripping off of ceilings and water trails down walls, thereby creating further damage, degradation, and contamination as it continues to absorb and deposit hazardous particulate matter along with it. Finally, if water is present in a structure from burst pipes (or water from a highly pressurized firehose), the water jets from the pressurize water source will erode wall/ceiling materials such as asbestos while also damaging lead paint that might be found on surfaces. As those materials are splattered or deposited in areas that then dry, they will also become airborne and flow throughout the structure more freely. Please note that these hazardous particulates will not only be on the visible surfaces of a structure but will also drain into the walls and between levels which will not be able to be sealed off, meaning the particulate matter will contaminate the structure via its walls, ceilings, and floors. If firefighting activities occur and water is being sprayed at a structure, that water will also absorb hazardous particulate matter that is in the air or on building surfaces and will actually force that particulate matter into the structure via the pressure of the water, which then causes contamination inside the structure wherever the water runs, finally causing secondary contamination as the water dries and the contaminants then move throughout the structure's walls, ceilings, floors, and rooms via airflow.

It is also important to understand that structures have intervening components such as ductworks, electrical wires or conduits, floors, vents, supports, cracks, fixtures, piping, and multiple layers of sheathing/flooring/wall materials. These sorts of components and their configurations allow water to alter course or may block water, forcing it to pool in some areas while flowing more freely in others. The gist is that water doesn't just flow in straight lines through a building, it tends to zigzag its way from top to bottom. The harder the wall and ceiling materials are, the more likely water is to not permeate through it, and the water will be forced to pool and divert as it moves throughout the structure. As an example, ceilings covered in just drywall are likely to get saturated and have the water breach through the ceiling's seam tape or the ceiling drywall may collapse under the water weight, thereby creating a more streamlined water flow path. In a structure where the ceilings are plaster, the plaster will tend to hold water for prolonged periods and cause it to divert throughout the structure first before eventually weakening, cracking, and crumbling, resulting in more direct water flow paths.

As a third consideration related to both water and airflow, it is important to touch on why the air and water flow dynamics described previously are not interrupted by wall material composition (such as brick, stone, masonry) or wall framing types (such as wood studs or metal studs). The following photos provide some nice examples of why water and air can flow easily through all of these compositions and wall types.

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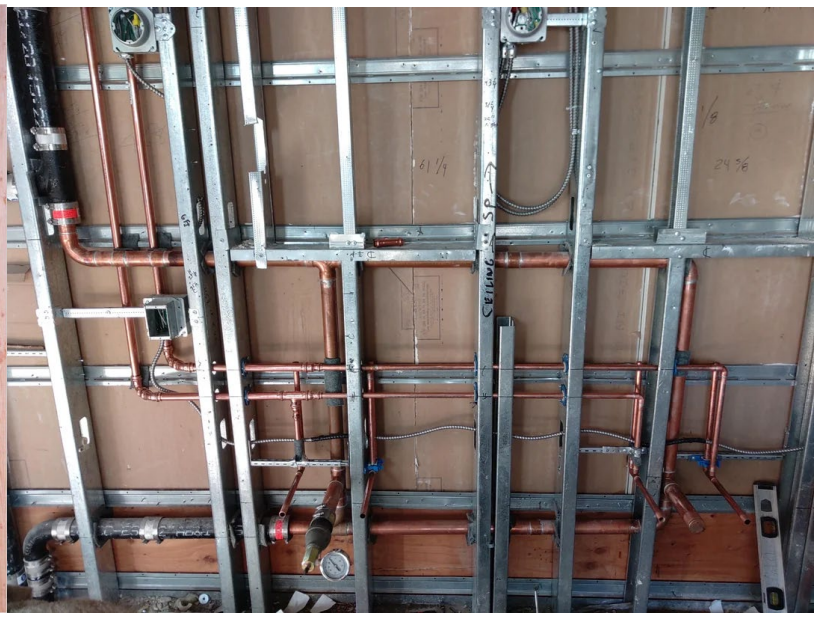
https://www.ncbi.nlm.nih.gov/books/NBK557609/#:~:text=Introduction,osmotic%20pressure%20of%20a%20solution.

Here one may see a brick wall with cracks running through it as well as a cable wire that has been drilled and run through the wall. There is another brick wall with wood lathe that previously held plaster atop it. One may note gaps in the bricks, gaps in the wood lathe (which is how it is installed), and cracked/damaged plaster. Remember that visible gaps, cracks, or holes are ***minimally*** 40 microns in size and that means they are minimally between 16 and 4000 times the size of how small hazardous particulate matter is (0.01-2.5 microns), so air and water can easily transition through them with hazardous particulate matter. Please note that combustion byproducts are between 0.01 microns and 10 microns in size but it is generally noted that dangerous combustion byproducts are those which are 2.5 microns or less in size.

CMU (Concrete Masonry Unit) and painted CMU with cracks and gaps, similar to the brick wall above.

Stone wall with cracks and gaps similar to those noted previously.



In the first photo above one may see metal stud walls that have holes throughout them (this is generally how they are manufactured). In the second photo, piping may be observed running through the designed holes with additional, nonmanufactured holes cut through them. One may also see piping protruding out of the wall surface area (where drywall or other wall surface coverings would be present). In other words, one may see how easily water could run down walls and flow into or out of wall surface or freely transition from one wall member to the next. Please also observe that the base of the metal stud wall will cause water to collect and run along it until exiting through cuts, seams, and holes in the base. As one would suppose, anywhere water would freely move through is somewhere that air also could freely move through, including the holes and gaps found throughout metal studwalls.

The photos above show wood stud walls. While these walls don't have holes drilled through them in the manufacturing process, one will note that they do have holes drilled through them for

electrical and plumbing purposes. One may also see that there are drywall seams running horizontally atop the studs and that the drywall has small gaps between it and the wood framing. Finally, one may note gaps and seams in the wall base and the floor boarding where water can easily run along and through the walls and floor levels. All of these are simply examples of common construction circumstances found in nearly every structure (save for specialized labs and hermetically sealed areas).

Secondary Contamination
(Firefighting and Related Efforts)

When there is a fire, many events tend to occur. Emergency services arrive onsite and typically begin fire containment efforts. They blast water at and into the structure from multiple angles, saturating walls, floors, and attic spaces, and one tends to find water trails that transition from the highest areas of the structure (often initially sprayed by highly pressurized water from firehoses) toward the lowest levels of the structure (where most interior water eventually ends up). It is not uncommon for mold or similar water-based, biological hazards to spring up as a result of the water-laden nature of a given structure. As noted previously, water will also traverse exterior surfaces which have various fire-based byproducts and will absorb those often-toxic byproducts. The toxic water will then contaminate the structure as it saturates and transitions through the structure, depositing those toxins which will eventually dry and become airborne again (though some toxins may be absorbed within the materials themselves).

Firefighters will often damage doors, windows, and/or structural elements as they seek to enter the structure to check for life and to conduct additional firefighting efforts from the interior of the structure. This can create temporary shifts in primary airflow related to the fire. As firefighters open doors throughout the interior of a building, checking to make sure everyone is out of the building, they are performing a necessary service, but they are moving throughout the building with soot/toxin-laden boots and gear, depositing these hazardous particulates throughout virtually every room as they go. They also open essentially every door in a structure, which further increases the levels of smoke infiltration and contamination in those rooms. Though all areas in a structure would feasibly become contaminated regardless of the firefighters' efforts, this notation is mainly meant to dispel the notion that doors are closed during fires and that this somehow means a room is protected from smoke. This is not the case and standard firefighting efforts further guarantee this to not be the case.

Another form of secondary damage occurs when firefighting efforts apply invasive/destructive means to access areas where suspected hotspots inside of walls, floors, ceilings, and attics are thought to reside. This involves sawing, tearing, or chopping open areas to then put out those hotspots. Materials may be removed from hotspot areas and scattered as firefighting efforts continue to tear open surrounding areas in search of remaining hotspots. As a result, this causes increased localized contamination where smoke and partially combusted debris exit hotspot access points.

Practicality of Repair vs. Replacement

It is generally argued that it is less expensive to repair than to replace a system. This is a good argument when the amount of damage to a system is localized and when one is repairing a small area of the system, but the per square foot cost to repair a system is far higher than the per square foot cost to replace a system in its entirety. So, when an entire structure and all of its systems are fully affected and need to have every square foot addressed, the cost to repair is far higher than the cost to just replace the entire building. Utilizing a very simple example produced in Xactimate, the standard estimating system used in the insurance industry, one may gain a greater understanding of how much less expensive it is to replace per square foot than it is to repair per square foot. While this analysis is generalized, the cost differences and associated logic would apply similarly to any property. Per this analysis produced in 2024, the repair cost to remove a single shingle is valued at $13.99 and to replace a single shingle is valued at $31.91, thereby totaling $45.90 in cost for that single shingle to be repaired.[25] Comparatively, the cost to remove a square of shingles comes to $93.12, and the cost to replace that square of shingles comes to $444.64, thereby totaling $537.76 for a square of shingles to be replaced. A square is 100 square feet of shingles, and there are roughly 3 bundles in a square with each bundle having between 15-29 shingles[26], so minimally 45 shingles and maximally 87 shingles in a square. If one takes the per square cost of $537.76 and divides it by 45 or by 87 one learns the per shingle cost is maximally $11.95 and minimally $6.18 to just perform replacement work. **Replacement work is, therefore, between 284% and 643% less expensive than comparable repair work**. Even if one were to add in ancillary costs such as felt and roof flashings broken down into the shingle replacement costs, the cost is still hundreds of percent cheaper on an average per shingle cost to replace the system than to repair the system. Therefore, one sees that repair is only financially practical when a very small area is affected and that it is otherwise far cheaper to conduct replacement operations. Please note that repair versus replacement per-square foot cost will vary for various different systems and the total amounts of costs will change as time moves on *but* the principle of replacement being vastly cheaper per square foot than repair will always be the same.

As is shown by airflow dynamics, in the event that there is an interior or proximate fire that produces toxic/harmful particulates, those particulates will end up everywhere inside and outside of the building, its walls, floors, ceilings, siding, roofing, insulation, HVAC/Electrical system, finishes, stud walls, and so on. In other words, 100% of the structure will be affected, and one would be calling for the repair of 100% of the structure and its systems, which, per the logic and financial math noted previously, would cost far more to attempt repairing an entire structure than it would to replace the structure. This means that, before even considering other aspects, replacement is the proper method for the dwelling/contents and usually the other structures for suburban/urban lots (less than or equal to a half-acre in size).

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[25] David Phalen (2024). Repair vs. Replace Price Example. Produced using Xactimate estimating software.
[26] Roofer The Roof Docs (2025). Learn More About Roofing From Roof-ER. Accessed online at: https://theroofdocs.com/blog/roofing-square?ref=13#:~:text=Roof

At this point it's pertinent to address the common and erroneous argument that is nearly always tendered in these types of circumstances. Inevitably, someone argues that one can just clean and encapsulate everything in the structure, and this will result in inhabitants being hypothetically protected from the toxins and hazardous particulates at less cost than replacing the structure. Please note that encapsulant is essentially the concept of coating everything with a paint-like membrane layer that is supposed to encapsulate whatever is below it and prevent it from leaving the surface the encapsulant is applied to.

One should pay attention to the notation "hypothetically protected." This concept is *hypothetical* because encapsulant only encapsulates surfaces that one can access in order to apply it to. **By keeping structural components in place, encapsulant can't be applied to the bottoms, tops, or rear areas of many of those components** throughout the building. **Areas that have multiple layers** of wood/structural members, such as doorways, windowed areas, floor substrates and supports, siding and roof sheathing, and attached supports, **would not allow for one to access between those layer intersections to clean and encapsulate them**. This is to say nothing of the fact that sheathing, be it oriented strand board or plywood, has countless imperfections in the wood fibers, which causes little gaps in the encapsulant. Further, one needs to consider that wood structural components have little splits in the wood, knots, small gaps between studs, and have nails or screws throughout. All of these imperfections and circumstances create gaps and weak points in the encapsulant which allow toxins to immediately escape out from where there is a lack of encapsulation or to eventually escape from due to encapsulant failure at weak points. But let's pretend for a moment that one is somehow able to fully encapsulate every inch of a structure despite the fact that this is not possible without fully deconstructing said structure. Buildings naturally expand and contract with daily and seasonal temperature changes. Structures and their systems flex and move with pressure differentials and wind forces. Wood expands and contracts with increasing and decreasing moisture from within the structure and from the weather. This means that the areas one is pretending were able to have been fully encapsulated, specifically joints and any hole, deformation, or multiple layering of structural or sheathing components, will cause the encapsulant to fail by applying repetitive expansion and contraction forces to those areas. Much as a paper clip might withstand some force applied to it at first but will snap with repetitive forces moving back and forth to it, the encapsulant will last for a while but will inevitably fail in areas where those expansion and contraction forces are applied to it.

One must also bear in mind that people walk across building floor and stair surfaces, which further applies pressure to those areas. But let's pretend again that one can perfectly encapsulate every inch of a structure, *and*, in this new case, material and structural sciences change in that the encapsulant somehow never fails despite being affected by forces that would cause it to fail. Even in this hypothetical circumstance, the insured property would not be returned to its preloss condition by applying encapsulant because the very purpose of encapsulant is to try and contain something beneath it, meaning the toxins from the fire are being kept present onsite, not removed. With such being the case, an insured could not decide to remodel their building or change the walls around without disturbing the toxified structure and breaching the encapsulant in that circumstance. Had the walls been restored to their preloss

condition (ie. been replaced and without contaminants), the insured could have remodeled and shifted walls around worry-free.

While the "clean and encapsulate" argument is one of the most common arguments proffered, there is another argument that is often provided but which is just as impractical. That argument typically involves saying that nonporous, nonorganic systems and materials can be cleaned and remediated without needing to be replaced. Metal is as close to a nonporous, nonorganic system as one might expect to find in a building, and it is often argued that one can just clean out HVAC ductworks, yet this is not the case. These ductworks have metal seams, joints, screws, and similar imperfections which allow contaminants to accumulate within and which do not allow cleaning methods to fully remove said contaminants without the disassembly of the entire system (even then areas such as seams would effectively require destroying the ducts to access those areas). If one cleans the surface of the system and then turns on a new furnace, vibrations will cause contaminants to work themselves out of the system imperfections which couldn't be accessed for cleaning and will release those contaminant into the circulating air with the effect of retoxifying the building, and this vibrational or expansive/contractive release in the system is a prolonged process which may not necessarily release most of the contaminants for months or years. Should one attempt to disassemble the system in order to clean it, the process of careful disassembly, cleaning, testing, and reassembly costs considerably more than just replacing the system and eliminating 100% of the risk of retoxifying the entire building in an attempt to save a few thousand dollars on a system by using a method that is impractical and more costly (remember that it costs hundreds of percent more to repair a system per square foot than it does to replace a system per square foot and the entire system is affected in the event of a structure fire or proximate fire that toxifies the structure, so repair is already a financial impracticality). One must also understand that, in addition to the risk of retoxifying the entire building by attempting costly remediation and repair, there is also the risk that the system is damaged in this process and still needs to be replaced regardless. The takeaway is that costs and risks are far lower to simply replace systems affected by contaminants than to try and remediate and repair them at the risk of recontaminating the entire structure.

Let's go back to the idea of people sometimes referring to materials as porous and nonporous. This reference tends to more often be used as it relates to water absorbing into a material or perhaps air absorbing into a material, but it is a largely erroneous reference. Nearly everything is porous at a microscopic level (including stone, concrete, and metal). Remember that the toxins and hazardous particulates we are typically referring to from fire byproducts are typically all microscopic. To be clear, it is true that things like wood and fabric are more porous and will trap more toxins and byproducts within them, but even metal is porous as a material. That is why many cooking pots and pans are coated with materials to make them less porous to make it harder for food to stick to them. This concept is important to help one understand that even metal in a structure or metal in contents will have hazardous particulates stick to it and even absorb into it under certain conditions. Attention is drawn to this concept because it is sometimes argued that "non-porous" contents made of metal, ceramic, plastics, and so on can just be cleaned, but the problem with this thought process is that:

1. Cleaning will only be able to reduce the amount of microscopic toxins present, and it is virtually impossible to eliminate all microscopic toxins from the less porous contents, let alone the more porous contents.

2. Less porous contents are essentially always comprised of various bends, folds, screws, grooves, holes, integrated components, textures, open spaces, and unreachable areas, which make it impossible or financially impractical to disassemble/attempt to clean them.

3. The cost of attempting to remediate contents involves paying to catalog contents, load contents, transport and store contents, attempt to clean contents, transport contents back to the site, and move contents to their proper locations at the site (this **doesn't even take into account the per test costs for various toxins which range from hundreds of dollars to around a thousand dollars for each sample test that would need to be conducted for each content item to ensure the area sampled on the content is free of hazardous particulates** despite the fact that any other areas which are not able to be accessed to test may still have toxins present).

4. There is a **severe likelihood and risk** that the contents being cleaned of toxins and hazardous particulates by a person who is being paid a slightly more than fast food wages will still be laden with those same toxins and hazardous particulates, which would mean that transporting those contents back into a building which is fully rebuilt will just result in recontaminating the entire structure as the particulates transition from the contents, into the air, and saturate the building again, thereby undoing all work previously done as a result of attempting to save a few dollars on a remediation process that will be ineffective and actually cost more than just replacing the contents in the first place.

Please note that, as stated above, **contents restoration professionals are paid a bit more than fast-food workers**. Per 2024 research, the hourly wage for an advertised Colorado Springs McDonald's crew member is listed as $16-$17 an hour[27], and the average hourly wage for a contents restoration technician is noted to be $17.50 an hour.[28] Please note that 2025 research did not show any significant change in this pay dynamic as some fast food jobs (Jersey Mike's Subs Denver daytime server crew member at $20-$21per hour)[29] offered pay equal to or slightly less than offers for contents restoration jobs (Paul Davis Denver contents Technician at $19-$22 an hour).[30] Recall that the concept is to entrust this person to remove hazardous, microscopic particulates from contents that children will play with or that people will use and eat off of, and said person could make about the same amount at any fast-food place. It is unlikely such a worker is incentivized to perfectly clean every content item under their watch. Please note

[27] ZipRecruiter (2024). Crew Member Mcdonald's. Accessed online at: https://www.ziprecruiter.com/
[28] Talent.com (2024). Contents Restoration Technician Average Salary in the USA, 2024. Accessed online at: https://www.talent.com/
[29] ZipRecruiter (2025). Daytime Server Crew Member. Accessed online at: https://www.ziprecruiter.com/c/Jersey-Mikes-Subs/Job/Daytime-Server-Crew-Member/-in-Denver,CO?jid=ef3cca980ff83614
[30] ZipRecruiter (2025). Contents Technician- Denver, CO. Accessed online at: https://www.ziprecruiter.com/c/Paul-Davis/Job/Contents-Technician-Denver,-CO/-in-Denver,CO?jid=04c73b768cba9017&utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic

that, if the idea is to clean ***nontoxic*** particulates off of contents, it *is* reasonable to entrust the cleaning of these contents to these workers because the hazard is not poisonous and the risk is not replacing an entire building for a second time or causing individuals to be more predisposed to cancer, immune system issues, respiratory issues, or infertility (among other risks).

One needs to understand that there are various other issues that don't involve improper cleaning. If an insured starts with one contractor for content cleaning but something changes which causes nonpayment or a new contractor to be entrusted to that previous contractor's role, it can be the case that the previous contractor drops off contaminated contents back at/inside the insured building. This results in the structure being subjected to recontamination by said contents while also exposing the inhabitants to those contaminants. In the case that the structure has been rebuilt at the time contaminated contents are returned to the property, such an event could result in recontaminating the newly built structure. **This is a natural risk that exists *only* if one is attempting to clean toxic contents instead of disposing of them all** and buying new contents.

So, there are the various cost of moving/attempting to clean the contents, but then one doesn't know if each content item is actually clean. The concept is to just trust the folks getting paid about what fast food workers are paid based on zero data other than their statement that the contents are clean. The cost for each test for each content item (in order to actually know if the individual contents are safe or not), depending on the type of test, is typically over one hundred dollars per test for simpler tests and around a $800 to $1200 for more intensive tests which are needed to identify dioxins, furans, and other small particulates (per invoicing reviewed). It is unreasonable for any individual to be required to send their clothes, plates, furniture, and other contents off to be cleaned with a process that can't guarantee the contents are actually clean and then to further ask that party to pretend that the contents are clean despite there being zero testing per content item to confirm such. Alternately, the idea of batching tests and pretending that because one plate is clean, this means every plate is clean with the reason being that a different plate tested as clean is also not a reasonable guarantee the contents have been brought back to their preloss condition and made safe. In the same right, it is hard to imagine anything but the absolute rarest of scenarios (a Picasso painting or some other very rare item) where it would be cheaper to go through the entire process and series of costs for cleaning contents and testing them versus just buying new contents at a 0% risk of recontamination.

The final concept of repair versus replacement is the ***risk*** involved with attempting repair instead of replacement. While this concept has largely already been addressed, a synthesis will likely be helpful. Remember that the goal with a fire loss, especially with an insurance fire loss, is to restore the affected property back to minimally its preloss condition. If the repair was feasible, practical, and cost-effective, then repair would be the logical avenue to use. Where the success of repair in achieving this goal is ***not* guaranteed** (such as with toxic fire/smoke losses that do not fall under a "unique property circumstances" exception), one needs to weigh the risk related to the repair as well.

The cost of repairing an entire property/its contents will always cost more since repair is designed to be financially effective for only small and localized work, not entire properties or

contents, and repair comes with the remaining risk that toxins were not fully addressed and that replacement of the property would be needed regardless. Further the attempted repair will only *hope* to have removed all toxins, and, if it did not (which is a virtual certainty), the result will be the retoxification of the property and its contents. Then replacement of the property would end up occurring but at essentially double the cost as what would have been incurred if the lower cost, zero risk method of replacement had occurred from the start. Therefore, the risk analysis of toxic fire/smoke losses supports the position that the proper handling method for property within the toxified zone of such a loss, so long as it is not a "unique property circumstance," should always be replacement in order to achieve a minimally like kind and quality preloss condition.

Applying risk to **policy** considerations, one should also consider the fact that if a loss involves a choice between either a substantial repair (totaling a large portion of total coverages) or a full replacement of a structure/its contents with any risk that the repair will be ineffective and that replacement will be needed instead, then replacement should always be the selected option in that scenario. This is because the result of an attempted but failed repair would mean the insured has used a substantial part of available coverage caps for repair only to find that replacement should have occurred but they now no longer have the available coverages to pay for full replacement as their claim funds have been wasted. All this said, it has also been made clear that the cost of repair for toxic fire losses will essentially always be more than replacement and will further leave extreme risks for the insured. The only practical method for addressing these types of loss is total replacement of affected structures and their contents/toxified zone properties and the contents within those zones. So, if the insurer directs repair be made instead of replacement in such cases, this essentially forces the insured to waste funds with the direct harm being that their claim process is prolonged and they end up having to initiate replacement anyway, but now, often with deficient remaining claim funds which results in the insured being forced to pay out of pocket to conduct replacement.

Please note that it is not problematic for insurers to explore reasonable repair methods with losses so long as the cost of ***properly*** repairing the damages **combined** with the cost of ***properly*** replacing those damaged systems/areas in the event the repair fails would not exceed total coverage limits. This is **not the case** when it comes to toxic fire losses, and, more often than not, the result of attempting repairs with these types of losses only to find replacement should have occurred instead, creates disputes and delays. Examples include utilizing a lawyer, mediator, court, experts, absorption of maximum additional living expense coverages (and beyond), everything costing more to replace due to the march of time and inflation, and years of time absorbed during lengthy legal processes which create fiscal/emotional/and sometimes medical hardships with insureds while burdening the judicial system with greater caseloads in the process.

REFERENCES

Testing: Methods and Interpretation:

-Toxic Thresholds Chart—References found within Chart Reference Column

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Replacement Analysis

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Grand Haven, MI 49417
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E-mail: drjoenieusma@gmail.com
Webpage: www.superiortoxicology.com

EMPLOYMENT/EXPERIENCE

Toxicology, Research and Consulting Experience:
Main mission: Maintain excellent relationships with multiple clients through superior work products combined with outstanding project progress and genuine customer service.

September 2022 – present **PSN Labs Toxicology Contractor**
Medical Device Toxicology Support - Matt Heidecker, Ph.D. Vice President/Principal Scientist – Extractables/Leachable risk assessment, VOCs risk assessment, biocompatibility assessments, pharma product OEL/ADE derivation.

January 2025 – present **International Safety Systems, Inc - Toxicology Contractor**
Pharma & Biotech Toxicology Support – Ankit Sharma, CIH, LFOH, Associate Director – Pharma product OEL/ADE derivation, justifications for impurity, degradation impurity, residual solvent, nitrosamines, genotoxic impurity, industrial hygiene support.

April 2004 – present: **Senior Toxicologist,** Superior Toxicology & Wellness

- Legal Expert Responsibilities:
  - Case review, literature review for chemical/drug related litigation and malpractice
  - opinion report on causation or relationship between effect and agent,
  - deposition analysis for opposing opinions.
  - depositions and testimony
- Cases to date:
  - Emma Dale Parker, as mother of Kambre Elaine Kelly, deceased vs. Wyeth f/k/a Whitehall-Robins Healthcare, Pfizer, Inc., Warner-Lambert Consumer Group, Novartis Consumer Group, Inc. Civil Action No. in Western District of Washington: CV-03-0849. Opinion on phenylpropanolamine (PPA) litigation and deposition 3-29-06
  - Brumfield vs. Wyeth et al. opinion PPA litigation and deposition
  - Cage vs. Wyeth et al. opinion PPA litigation
  - Evans vs. Wyeth et al. opinion PPA litigation
  - Specht vs. Bayer Corp. et al. recommended not to proceed with PPA litigation

- Joseph Charles v. Bayer Corporation, et al. USDC, WDWA, Civil Action No. 02-CV-2148. Opinion PPA litigation and deposition 9-25-2006
- Wynn vs. Wyeth et al opinion PPA litigation
- Baltizar Death, Medical Malpractice. Recommended not to proceed.
- Mark Russell vs. Associated Pharmacy. Certificate of Merit for case, expert report.
- Miller vs. American Optical Corporation, et al. Opinion on multiple industrial chemical and dust exposures resulting in lung conditions leading to death.
- McCune v. Fallsburg Gas, et al. Affidavit for Summary Judgement Hearing. September 2007
- Mark Russell vs. Associated Pharmacy. Opinion on lithium drug interaction resulting in toxicity
- Evans vs. Fleet, MD. Medical Malpractice opinion on desipramine drug levels in a fatal medical case. Civil Action No. CV-03-2863.
- Prasad vs. Las Vegas PD, et al. Causation opinion on medical conditions resultant from acute high dose exposure to tear gas. Prepared for Thomas Christensen of Christensen Law Offices, LLC. December, 2013.
- James S. Wilkinson, Jr and Melissa W. Vancil vs. Virk MD, Southern Medical Partners, Sample DO, Bell MD, Jackson Montgomery Emergency Physicians, Jackson Montgomery Hospitalists and Jackson Hospital & Clinic, et al. Medical Malpractice expert report issued and deposition on lovenox drug levels in a fatal medical case. CV-14-901851.
- Thompson vs. State Farm, claim no: 06-2X46-883 (2016-08957-CO). Expert report issued on opioid abuse in a wrongful death case.
- Leslie Coy et.al. v. Metro Football Stadium District, et. al. Denver County, Colorado District Court 2017CV33936. Consulting for toxicology rebuttal in wrongful death. Expert report issued and deposition.
- Lori Whalen v. State of Colorado felony child abuse case. Consulting for toxicology aspects of drug testing. Expert report issued.
- McDonald v. 9900 Culver Blvd 3A. Exposure to high carbon dioxide levels in apartment leading to adverse health effects in children. June 2020. Expert report issued.
- Faizan Ahmad v. Dr. Yasir Anwar. Medical Malpractice defense opinion on diazepam drug levels not the cause of death in a fatal medical case. Expert report issued. July 2020.
- Charles Holmes v. State of Arizona. Methamphetamine in hair positive drug test defense case. Consult.
- Barbara Tate Wrongful Death Case for Stephen Tate. Employee with chronic exposure to PCBs resulting in liver cancer. Sept 2020. Expert report issued.
- Joeail Williams vs. Seattle Fish Company & Mario Munoz. Motor Vehicle Accident. Defendant tested positive in an opioid drug screen. Opinion. Oct. 2020. Expert report issued.
- Abram Russo Sick Building Case from Sewer backup. Bacterial & Fungal based health risk opinion. Nov 2020. Expert report issued.
- Susan Cespedes/Armor Heath. Toxicology review of all case materials for attorneys. June 2021.

- Park v Fresh Start. Toxicology defense opinion for pesticide effects in utero resulting in death of infant. Toxicology review of all case materials for attorneys. Settled prior to opinion report being issued. April 2022.
- Hammond v Hammond. Toxicology for drug testing in hair and fingernails for amphetamine and methamphetamine. Testimony at a process hearing March 2022.
- Serafini v Curry. Toxicology review of all case materials for attorneys. April 2022.
- Aves Lawes v Amfoods, LLC. Case material review and toxicology opinion. April 2022.
- Melissa Emery Case. Toxicology review of positive drug test and opinion on blood levels v. prescribed levels. July 2022.
- Stokanic v Myers Case. Testimony regarding positive drug test results for cocaine and amphetamines in a family custody case. July 2022.
- Janie Blount Case. Toxicology report on child drug test in hair positive for methamphetamine. Opinion on environmental exposure.
- Retained by Clint Brasher, Brasher LawHardy Dyson Life Insurance Payment Denial. Opinion on why post-mortem BAC was inaccurate for contesting denial of life insurance payment. May 2023.
- Retained by Riley Scott, Burnham Law: Supervised parenting time for ex-husband of Jamie opinion due to abuse of nitrous oxide. Testified remotely at emergency custody hearing June 1, 2023.
- Pace vs. CSAA Insurance. Retained by Katie Goodrich for risk assessment of fire and water damaged home following the Marshall fire in Superior, CO.
- Fisher vs. Pensky truck. Retained by Charles Hamilton. Opinion on causation for carbon monoxide poisoning.
- Matt Sautter DUI Drugs case with public defender. 10/15/23 opinion on drug-drug interactions.
- Sara Mahle v Insurance. Retained by Katie Goodrich for risk assessment of fire and water damaged home following the Marshall fire in Superior, CO.
- Champlin vs. Nationwide Insurance. Retained by Katie Goodrich for risk assessment of contractor damaged home following asbestos exposure in Aurora, CO.
- Lewis vs. State Farm. Retained by MerlinLawGroup for risk assessment of fire and water damaged home following the Marshall fire in Superior, CO.
- Craig & Lizanne Tessem v. Safeco. Retained by Jason Johnson for risk assessment of fire and water damaged home following a fire in Ridgeway, CO.
- Lenard Smith v. Insurance Co. Retained by homeowner for risk assessment of fire and water damaged home following a fire in Erie, CO.
- Antonio v Darling. Retained by Sutton-Booker for defense in a civil suit wrongful death of their 5-year-old in a house fire. Mother's capacity to care at issue due to drugs and alcohol.
- Kaisha Williams v. Insurance Co. Retained by Attorney James Anderson for post-fire risk assessment in Lakewood, CO.
- Liz & Cole Morrison v. Insurance Co. Retained by Attorney James Anderson for post-fire risk assessment in Louisville, CO.

    - Karen Reeder v. Landlord. Retained by Attorney James Anderson for health risk assessment from mold exposure to tenant in Lakewood, CO.
    - Janell Sherr ordered contamination status report following Marshall Fire.
    - Rebecca and Daine Kvasager v. USAA. Risk Assessment for fire loss in Wellington, CO. January, 2025.
    - Barney Barber v. Antrim County MI. Opinion on positive drug test for cocaine. Retained by Candace Baker through Schraw & Associates. February 2025.
    - Nicholas Jones v. State of MI. Retained by Attorney Gabrielle Lacy. Opinion on Bond violation from positive THC test. March 2025.
    - Cherry v. Insurance. Risk Assessment for fire loss in Dallas, TX. February 2025. Retained by Rocky Cherry, homeowner.
    - 1923 O Plaza Rd NW Albuquerque, NM v. Insurance CO. Retained by Peter Ridulfo, PA. Risk Assessment for fire loss at commercial property.
    - Tasew v. Travelers Insurance Co. Retained by Mulu Tasew, property owner for risk assessment for fire loss in rental property 6617 Georgia Av NW, Washington, DC 20012.
    - Sundet v. Insurance Co. Risk Assessment regarding asbestos contamination and safe habitability. Retained by Peter Ridulfo, PA.
    - Sandoval v. Nationwide Insurance. Retained by Peter Ridulfo, PA, through Seamus Bradley, agent. Risk Assessment for fire loss at Commerce City, CO residential property.
    - Cooperheart v Liberty Mutual insurance. Retained by Ed Walsh, PA. Risk Assessment for fire loss at Virginia Beach, VA property.
    - Ben & Rachel Tucker v State Farm Insurance. Retained by homeowners. Risk Assessment for fire loss at North Pasadena, CA property.
- Toxicology Responsibilities:
    - Risk Assessment for chemicals from extraction & leaching from medical devices,
    - OEL development for products, solvents, raw materials and intermediates, preliminary potency categorization of product candidates,
    - industrial hygiene-monitoring, analysis of data, interpretation of results,
    - reproductive toxins in the workplace and issues for family planning of all employees,
    - hazard communication
        - training programs: annual requirements, chemical specific training
    - MSDS writing, reviewing, approving,
    - impurity justification for presence in final product, raw material, intermediates, residual solvent level justification, excipient levels above the FDA inactive ingredient guideline justifications,
    - environmental reporting for SARA, biennial hazardous waste reporting, monthly air emissions of volatiles, pharmaceutical solids,
    - safety training on many topics,
    - review of any procedures necessary for HS&E regulations or any toxicological processes,
    - emergency response plan development and review,
    - toxicology training and coordination of spill response teams,
    - product exposure investigation and possible dose reconstruction,

    - chemical hazard testing data interpretation for dust explosion potential
- Wellness Responsibilities:
    - dramatically changing lifestyle wellness through analysis and recommendations
    - multiple drug analysis for overdose/toxicity, interactions of drugs
    - Establish HOPE (Health Optimization Prescription Evaluation) program January 2020
    - air purification applications using compact state-of-the-art technology to remove dust, smoke, odors, chemicals, pet dander, allergens, mold and mildew.

October 2017 – December 2019: **Co-founder**, TwinOxide-Colorado, in partnership with TwinOxide-North America

Responsibilities:

- Identify potential clients
- Present to potential clients
- Close sale for TwinOxide
- Install and optimize TwinOxide system at client sites
- Maintain TwinOxide at client sites with ongoing service contracts

September 2018 – July 15, 2022: **North American Operations Management**, TwinOxide-North America

Responsibilities:

- Support existing clients
- Support all product trials to conversion to permanent accounts
- Install and optimize TwinOxide system at client sites for clients and customers
- Maintain TwinOxide at client sites with ongoing service contracts for clients and customers
- Manage small package shipping for hazardous materials regulations compliance

June 2017 – February 10, 2020: **Board of Directors**, Allegiance Ranch and Equine Rescue

Responsibilities: Allegiance Ranch and Equine Rescue's mission is to help horses and heroes by offering a safe place for healing, developing a sense of purpose, and establishing meaningful connections between horses and humans.

August 2007 – present: **Marketing Consultant and Member of Scientific Advisory Board**, Vitro Biopharma, contracted by Jim Musick, Ph.D.

Responsibilities: Bring new stem-cell related products for diabetes research to scientific, pharmaceutical, and ultimately medical markets.

March 2011 - present: **Editorial Board,** Toxicology Mechanisms and Methods, published by Informa Healthcare.

October 2005 – February 2018: **Senior Toxicologist**, Affygility Solutions, contracted by Dean M. Calhoun, CIH.

Responsibilities:

- Prepare potent compound assessments,
- Set occupational exposure limits (OEL) and devise safe handling guidelines for drug discovery projects for Affygility Solutions clients.
- Set Acceptable Daily Exposures (ADE) for drug manufacturing facilities with multiple products to prevent cross-contamination and carryover between product batches in the same equipment and for setting cleaning limits for drugs.
- Design and participate in world-class webinar internet-based training on multiple topics.
- ADE limit justification for product degradants, solvents, raw materials and intermediates
- Exposure banding and handling recommendations for preliminary potency categorization of product candidates
- reproductive toxins in the workplace and issues for family planning of all employees
- impurity justification for presence in final product, raw material, intermediates, residual solvent level justification, excipient levels above the FDA inactive ingredient guideline justifications,

Green Energy Research Management:

January 2008 – November 2015: **Chief Executive Officer,** Colorado Energy Research Technologies

Main mission: We create abundant solutions by developing advanced innovative technology that responds to global needs through more profound understandings of resonance.

- Customer interactions
- Investor interactions
- Daily operations management
- Oversee 6-30 employees dependent upon projects
- Develop and maintain appropriate budgets
- Contract negotiations

February 2007 – March 2013: **Aquatics Instructor,** Power Wellness Management. Lakeshore Athletic Club, Broomfield, CO.

Main mission: Maintain excellent relationships with multiple clients through superior work products combined with genuine customer service.

October 2007 – March 2011: **Guest Editor & Ad Hoc Reviewer,** Toxicology Mechanisms and Methods, published by Informa Healthcare.

May 1998 – April 2004: **Industrial Toxicologist**, Sandoz, formerly Geneva Pharmaceuticals.

Responsibilities: Toxicological evaluation of new and existing products to establish safe occupational exposure levels. Justify safe levels of pharmaceutical contaminants, excipients and solvents for ANDA submissions. Review and revise handling procedures for all chemical hazards on site and maintain employee right-to-know label system. Administer the hazard communication and reproductive hazard review programs. Conduct

extensive training of all employees on multiple topics and the HS&E department on all required SOP training. Provide toxicology support to Geneva Pharmaceuticals Technology Corporation in NJ, oversee contract toxicology studies and interact with Novartis toxicologists to avoid redundant work practices. Project manager for improvement of dust control engineering in production. Containment manufacturing suite – team member. Manage Industrial Hygiene program including contracting for analytical method development, air sampling, data analysis, implementing recommended changes based on data and supervising IH staff. Regulatory compliance, filing of environmental reports SARA title III and form R, biennial hazardous waste report, Novartis docount report, and monthly air emissions report. Represent Sandoz in various external committees, maintain adherence to GMP and back up safety specialists and environmental staff.

May 2001 – April 2004: **Editorial Board Toxicologist**, Micromedex, Inc.
Responsibilities: Toxicological evaluation of potential new products and databases as needed.

July 2002 – August 2002: **Senior Toxicologist**, Affygility Solutions, contracted by Dean M. Calhoun, CIH.
Responsibilities: Prepare potent compound assessments, set occupational exposure limits and devise safe handling guidelines for drug discovery projects for Affygility Solutions clients.

February 2001 – August 2001: **Human Health Risk Assessment Toxicologist**, contracted by David Pyatt, Ph.D.
Responsibilities: Toxicological evaluation of over 100 chemicals in support of a Human Health Risk Assessment of a US Naval incinerator in Osaka, Japan.

Nov. 97 – July 98: **Toxicology Consultant**, Clinical Consultants
Responsibilities: Litigation support including evaluation of plaintiff, defendant, witness and expert witness materials and depositions for toxic exposure litigation. Evaluate opinions of experts, critically evaluate scientific and case literature.

June 93 – May 98: **Doctoral Toxicology Researcher**, School of Pharmacy, University of Colorado, Molecular Toxicology and Environmental Health Sciences Program
Responsibilities: Critical analysis of literature in order to develop analytical methodology for the detection and quantitation of benzene and butadiene metabolites and conjugates, involving high pressure liquid chromatography (HPLC), gas chromatography (GC), GC-mass spectroscopy (MS), extraction, tissue culture, enzyme kinetics and toxicity testing. These methods were then used to produce metabolic profiles investigating effects of stereochemistry on toxicity and metabolism of butadiene in a freshly isolated hepatocyte cellular system. Results were critically evaluated and documented for publication. Directed laboratory technician in support of the butadiene research grant.
Dissertation committee chairman and advisor: Dr. David Ross

Feb. 96 – Dec. 97: **Analytical Toxicology Consultant**, Department of Ophthalmology, University of Colorado Health Sciences Center, Denver, CO. Analytical and Technical

Consultant for "Delivery of Viroptic® across the cornea by use of a collagen shield" and for "Delivery of Tobradex® across the cornea by use of a collagen shield."

Responsibilities: Revise and implement an HPLC method to detect and quantitate Viroptic® following extraction from biological matrices. Formulate the data in a clear and concise report in a timely manner following receipt of samples. Develop a method to detect both substituents of Tobradex® (tobramycin and dexamethasone) following extraction of these compounds from corneal tissue and from aqueous humor. Advise on long term storage of samples until necessary equipment for analysis of tobramycin is located, borrowed or acquired.

July 96 – Nov. 97: **Computer Network Consultant**, FirstLink™ Consulting, Boulder, CO. Network Technician

Responsibilities: Set up local area networks and assure proper function.

Aug. 91 – June 93: **Biochemistry Researcher**, School of Pharmacy, University of Colorado, Molecular Toxicology and Environmental Health Sciences Program

Responsibilities: Conduct biochemical studies to determine the inhibitory effects of acrolein and iodoacetamide on DNA polymerase alpha. Techniques included cell culture methods, nuclear isolations, DNA synthesis assays, use of p-32 labeled nucleotides, scintillation counter functions and calculations using Igor software.

Jan. 91 – July 91: **Molecular Toxicology and Biotransformation Intern**, Dow Chemical Company, Midland, MI.

Responsibilities: Designed, set up and completed an inhalation study involving rats and mice exposed to ^{14}C-labeled ethyl chloride in order to determine the disposition and biotransformation of ethyl chloride. Daily tasks included monitoring and care of study animals, handling and tracking for radiolabeled gaseous compounds, inhalation chamber equilibration and exposure monitoring to achieve desired dose range, tissue collection and analysis for radioactivity, generation of a data set via GLP and presentation of scientific data.

Sept. 89 – Dec. 90: **Molecular Toxicology Technologist and Project Monitor**, Dow Chemical Company, Midland, MI.

Responsibilities: All duties necessary to maintain the day to day operations of a biotransformation toxicology testing laboratory from washing dishes, to preparing for studies, to packaging and tracking radioactive and hazardous laboratory wastes. As a study monitor, duties included daily care of the animals post dosing with the radiolabeled compound of the study, taking daily samples (urine, feces, CO_2, and tissues at termination), analyzing those samples and generating the data set via GLP.

Sept. 88 – May 89: **Undergraduate Student Researcher**, Central Michigan University, Department of Biology, Mt. Pleasant, MI. Undergraduate Research Project

Responsibilities: Design and conduct the experiments necessary to complete the project entitled "Effects of storage on ion transport in corneas from *Rana catsbiana* (bullfrog)."

Techniques include corneal dissection, use of electrophysiological ion monitoring equipment, glass electrode assembly, ion fluctuation detection in single corneal cells, designing procedures for storage of the corneas, daily care of frogs and making all necessary solutions including pond water, storage buffer and perfusion buffer. The proposal won competitive approval for funding by the Department of Biology at Central Michigan University.

EDUCATION

Doctor of Philosophy, Pharmaceutical Sciences. Molecular Toxicology and Environmental Health Sciences Program, School of Pharmacy, University of Colorado.

Dissertation: JL Nieusma. Stereochemical aspects of 1,3-butadiene metabolism and toxicity. University of Colorado, School of Pharmacy, Molecular Toxicology and Environmental Health Sciences Program.

Bachelor of Science, Biology and Chemistry. Department of Biology, Central Michigan University.

Communication Training:

Team Communication Training, Mike Bensley, Instructor, Geneva Pharmaceuticals, July, 2003.
Leadership Concepts and Practices, Sue Strong, Instructor, Geneva Pharmaceuticals April to August 2003.
Media Training for Toxicologists Workshop, March 1999
Geneva Pharmaceuticals Media Communications Training, September 1998
Media Workshop: Breaking News, Breaking Barriers, March 1998
Risk Communication Workshop at the Occupational Toxicology Roundtable, October 2007, Indianapolis, IN

Continuing Education:

Cutaneous Toxicity-Current Methods and Concepts in Safety Evaluation and Relevance to Human Exposure, Society of Toxicology Annual Meeting, Salt Lake City, UT, March 2003.
Industrial Hygiene Course, Traveler's Insurance, Hartford, CT, April 2002.
Toxicology of Naturally Occurring Toxins—Don't Mess with Mother Nature, Society of Toxicology Annual Meeting, Nashville, TN, March 2002
Complete Environmental Regulations Course on the applicability and impact of the regulations of the United States Environmental Protection Agency on industrial and commercial operations. Lion Technology, Inc. Denver, CO, January 2002
Project Management II, Best Practices of Project Management. Franklin Covey, Denver, CO, September 2001.
Containment of Potent Compounds. Advanced Containment Technologies and Regulatory Guidelines. Barnett International, Philadelphia, PA, June 2000.
Tetra Tech EM Inc. Environmental Compliance Series, Denver, CO

Pollution Prevention Programs and Projects in Colorado. Parry Burnap CDPHE, Kendra Morrison EPA, Michael Keefe Tetra Tech, January 2001
Groundwater Models-Can They Provide a Cost-Effective Solution? Jim Wulff, June 2000
Surviving Maximum Achievable Control Technology, William Cote, April 2000
Using Risk Assessment to Facilitate Contaminated Site Closure, Paul Damian, Ph.D., MPH, DABT, March 2000

Environmental Risk Assessment and Applied Toxicology, University of Colorado Health Sciences Center, Dr. David Pyatt, instructor, 1999

In Vitro Methods for Evaluating Biokinetic Parameters for Risk Assessment, Society of Toxicology Annual Meeting, New Orleans, LA, March 1999

Target Organ Toxicology: Respiratory Tract Dosimetry and Response to Inhaled Toxicants, Society of Toxicology Annual Meeting, New Orleans, LA, March 1999

International Harmonization of Non-Clinical Toxicology: Regulation vs. Practice, Society of Toxicology Annual Meeting, Seattle, WA, March 1998

Effective Risk Communication: Avoiding the Pitfalls, Society of Toxicology Annual Meeting, Seattle, WA, March 1998

Toxicology of Agents: Metals Society of Toxicology Annual Meeting, Cincinnati, OH, March,1997

Use of the Benchmark Dose in Risk Assessment Society of Toxicology Annual Meeting, Cincinnati, OH, March 1997

Basic Applications in Risk Assessment, Society of Toxicology Annual Meeting, Baltimore, MD, March 1995

Basic Molecular Methods for the Analysis of Gene Regulation and Expression, Society of Toxicology Annual Meeting, Baltimore, MD, March 1995

Occupational Toxicology Roundtable, Risk Communication Workshop, Boston, MA Sept. 2006

ACTIVITIES/AWARDS

Toxicology Mechanisms and Methods, Guest Editor Occupational Toxicology Special Edition, March 2011.

Society of Toxicology; associate member

Occupational Toxicology Roundtable

Rho Chi Honor Society inducted 1992

Outstanding Research Award at the 3rd annual UCHSC Graduate Student Research Forum, January 1995.

Society of Toxicology, Mountain West Chapter, Award for research presentation 1995.

Society of Toxicology, Mountain West Chapter, Award for research presentation 1996.

Cedar Cove Condominium Owners Association, Aurora, CO; president 1997 – 2004, VP 96-97.

Denver Men's Adult Baseball League; president Jan. 97 – Jan. 99; VP Jan 95-Jan. 97.

Sunwest Homeowner's Association, president July 2001 – October 2002, secretary Nov. 2000 – July 2001.

Inline Hockey Team Captain, January 2000 – June 2002, January 2003-March 2003.

1st Annual Labor Day Heroes Ice Hockey Tournament – Patriot's Division Champions 2002.

Ice Hockey Summer Season 2002 Champions.
Ice Hockey Summer Season 2002 Championship Game Most Valuable Player.
Adult Ice Hockey Team Captain, February 2003-May 2018.
Fall/Winter 2004-2005 league champions
Spring 2008 league champions
Winter 2008-2009 league champions
Summer 2010 league champions
Fall/Winter 2010-2011 league champions
Fall/Winter 2016-1017 league champions
Occupational Toxicology Roundtable - annual meeting co-organizer, October 2003, South Seas Resort, Captiva Island, FL.
Broomfield Local Emergency Planning Committee, co-chair January 2004-January 2005.
YMCA Volunteer Coach Little Sluggers tee ball program 2005, 2006.
Monarch Little League Volunteer Coach baseball 2007, 2009, 2012.
Rock Creek Flyers Swim Club Stroke Judge, 2006.
Rock Creek Flyers Swim Team Parent Board 2007- present. Secretary & Volunteer Job Coordinator, 2011 Vice-president & Volunteer Job Coordinator, 2012-2017 Vice President.
Boulder Valley Youth Ice Hockey Association volunteer coach Mites level 2006-2007, 2007-2008, 2008-2009, 2009-2010.
Superior Mustangs Youth Football Coach 2008 to 2012.
Bonfils Blood Center, over 12 gallons donated.

BIBLIOGRAPHY

Manuscripts:

JL Nieusma, DJ Claffey, C Maniglier-Poulet, T Imiolczyk, D Ross, and JA Ruth. Stereochemical aspects of 1,3-butadiene metabolism and toxicity in rat and mouse liver microsomes and freshly isolated rat hepatocytes. Chemical Research in Toxicology 10:450-456, 1997.

JL Nieusma, DJ Claffey, DR Koop, W Chen, RM Peter, SD Nelson, JA Ruth, and D Ross. Oxidation of 1,3-butadiene to (R)- or (S)-butadiene monoxide by purified recombinant cytochrome P450 2E1 from rabbit, rat and human. Toxicology Letters 95:123-129, 1998.

JL Nieusma, DJ Claffey, JA Ruth, and D Ross. Stereochemical aspects of the conjugation of epoxide metabolites of butadiene with glutathione in rat liver cytosol and freshly isolated rat hepatocytes. Toxicological Sciences 43:102-109, 1998.

LH Pottenger, JL Nieusma and JS Bus. Species specific, route dependent, and dose dependent disposition and metabolism of ethyl chloride in female F344 rats and B6C3F1 mice. Toxicological Sciences, submitted March, 1999.

DM Calhoun and JL Nieusma. Design and Implementation of an Effective Potent Compound Program. Contract Pharma 9(8):80-90, October 2007.

JL Nieusma. Employee Safety as a Goal Creates Communication, Cooperation, and Using the Best Data Available. Toxicology Mechanisms and Methods, 21(2):75. May 27, 2010.

DM Calhoun, AB Coler and JL Nieusma. Strategies for Preventing Occupational Exposure to Potent Compounds. Toxicology Mechanisms and Methods, 21(2):93-96. May 27, 2010.

G Eastman, and JL Nieusma. Use of TwinOxide ClO_2, 99.9% pure, as the primary and sole water disinfectant eliminated disinfection by products (TTMs & HHAs), improved clarity, color and taste of community water produced by Magnolia Village water treatment plant in Edgewater, Florida. Manuscript in preparation. September 2022.

JL Nieusma. Ketone and carbon 60 mixture creates a protective environment from reactive oxygen species while protecting cell organelles from oxidative damage. Manuscript in preparation. May 2024.

D Phalen and JL Nieusma. Thresholds of concern for smoke damaged but not destroyed residential properties for ash, soot, char, heavy metal surrogates, furans and dioxins. Guidance for returning to pre-loss conditions. Manuscript submitted to TMAM. June 2025.

Abstracts:

LH Pottenger, JL Nieusma, and JS Bus. Species-dependent disposition and toxicity of ethyl chloride in female mice and rats. Toxicologist 12:1674, 1992.

MF Hiser, BJ Markley, RH Reitz and JL Nieusma. Metabolism and disposition of acetyl tributyl citrate in male Sprague-Dawley rats. Toxicologist 12:568, 1992.

JL Nieusma, C. Maniglier-Poulet, JA Ruth and D Ross. Metabolism and toxicity of the major metabolites of 1,3-butadiene in freshly isolated rat hepatocytes. Toxicologist 15:1402, 1995.

JL Nieusma, C. Maniglier-Poulet, DJ Claffey, JA Ruth and D Ross. Stereochemical aspects of butadiene metabolism and toxicity in rats and mice. Toxicologist 36:1607, 1997.

JL Nieusma, DJ Claffey, JA Ruth and D Ross. Stereochemical aspects of the conjugation of epoxide metabolites of butadiene with glutathione in rat liver cytosol and freshly isolated rat hepatocytes. Toxicologist 42:423, 1998.

Book Chapters:

JL Nieusma. What is the Corona Virus? Basic Science for the book, “Clarity Press book, "When China Sneezes: From the Wuhan Lockdown to the Global Politico-Economic Implications."” Edited by Dr. Cynthia McKinney submitted March 31, 2020.

Presentations/Seminars:

JL Nieusma, C. Maniglier-Poulet, JA Ruth and D Ross. Metabolism and toxicity of the major metabolites of 1,3-butadiene in freshly isolated rat hepatocytes. 1st Annual Department of Pharmaceutical Sciences Research Day, Denver, CO. May, 1995.

JL Nieusma, JA Ruth, D Ross, DJ Claffey and C Maniglier-Poulet. Stereochemical aspects of butadiene metabolism and toxicity. 3rd annual Department of Pharmaceutical Sciences Research Day, Estes Park, CO. June 1997.

JL Nieusma. Stereochemical aspects of 1,3-butadiene metabolism and toxicity. Dissertation Defense Seminar, University of Colorado, School of Pharmacy, Molecular Toxicology and Environmental Health Sciences Program. May 13, 1998.

JL Nieusma. Weekly New Employee Orientation at Geneva Pharmaceuticals. Health, Safety and Environment issues including Zero Incident Concept, Hazard Communication, Fire Safety, First Aid and Ergonomics. June 1998 to present.

DM Calhoun and JL Nieusma. Potent Compound Programs in the Pharmaceutical Industry. Guest Speaker, American Industrial Hygienists Association, Rocky Mountain Regional Meeting. May 11, 1999.

JL Nieusma. Nitrofurantoin Handling. Training for a Class 3 potent compound. Presented to Development Scientists and Pilot Plant Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, September, 1999.

JL Nieusma. New Employee Orientation Process. Geneva Pharmaceuticals, Inc. Safety Coordinator Training, Doubletree Hotel, Westminister, CO, November 8, 1999.

JL Nieusma. Potent Compound Classification. Geneva Pharmaceuticals, Inc. Safety Coordinator Training, Doubletree Hotel, Westminister, CO, November 8, 1999.

JL Nieusma. Hazard Communication. Geneva Pharmaceuticals, Inc. Safety Coordinator Training, Doubletree Hotel, Westminister, CO, November 9, 1999.

JL Nieusma. Reproductive Hazards in the Workplace. Geneva Pharmaceuticals, Inc. Safety Coordinator Training, Doubletree Hotel, Westminister, CO, November 9, 1999.

JL Nieusma. Handling of Potent Compounds. December 1999 Safety Topic. Presentations to all shifts and departments. Geneva Pharmaceuticals, Inc., Broomfield, CO, December, 1999 and January, 2000.

JL Nieusma. Role of the Industrial Toxicologist in the Pharmaceutical Industry. Micromedex, Inc., Englewood, CO, April 20, 2000.

JL Nieusma. Case studies and tasks involving Micromedex product use by Industrial Toxicologists in the Pharmaceutical Industry. Micromedex, Inc. All-Company Meeting, Highlands Ranch, CO, November 29, 2000.

JL Nieusma. Hazard Communication. Safety Training presented to all Geneva Production Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, May, 2001.

JL Nieusma. Methylprednisolone Handling. Training for a Class 3 potent compound. Presented to Chemists and Geneva Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, May and June, 2001. (Continuous training program)

JL Nieusma. Warfarin Handling. Training for a Class 3 potent compound. Presented to Chemists and Geneva Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, June and July, 2001. (Continuous training program)

JL Nieusma. Ribavirin Handling. Training for a Class 3 potent compound. Presented to Chemists and Geneva Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, August and September, 2001. (Continuous training program)

JL Nieusma. Pharmaceutical Industrial Toxicology for Sales Personnel. Micromedex University, Micromedex, Inc. Englewood, CO, January 2002.

JL Nieusma. Hazard Communication. Safety Training presented to all Geneva Production Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, May 2002.

JL Nieusma. Pergolide Handling. Training for a Class 3 potent compound. Presented to Chemists and Geneva Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, June 2002. (Continuous training program)

JL Nieusma. Leflunomide Handling. Training for a Class 3 potent compound. Presented to Chemists and Geneva Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, July 2002. (Continuous training program)

JL Nieusma. Azathioprine Handling. Training for a Class 3 potent compound. Presented to Chemists and Geneva Operators, Geneva Pharmaceuticals, Inc., Broomfield, CO, October 2002. (Continuous training program)

JL Nieusma. Occupational Exposure to Pharmaceutical Active Ingredients. Invited presentation for, “Environmental, Health and Safety for the Life Science Industry,” January 30, 2003, Westminster, Colorado.

JL Nieusma. Blood Borne Pathogens Safety Training presented to Bioscience Park Building, Fitzsimmons Campus, University of Colorado, Aurora, Colorado. November 2005.

JL Nieusma. Lockout Tagout and Electrical Safety Training presented to Bioscience Park Building, Fitzsimmons Campus, University of Colorado, Aurora, Colorado. January 2006.

JL Nieusma. Biotechnology Company Safety Startup Checklist Training presented to Bioscience Park Building, Fitzsimmons Campus, University of Colorado, Aurora, Colorado. May 2006.

JL Nieusma. Toxicity and Your Health. The Changing Paradigm, Dr. Patricia Hill, moderator. Grass Roots TV, Aspen, Colorado. October 9, 2006.

JL Nieusma. Designing an Effective Potent Compound Safety Program. Invited presentation for, "Environmental, Health and Safety for the Life Science Industry," February 1 & 2, 2007, Lafayette, Colorado.

JL Nieusma. Toxicology for Industrial Hygienists. American Industrial Hygienists Association, Rocky Mountain Regional Continuing Education Lecture Series for CIH Exam Preparation, Lakewood, Colorado. April 5, 2007.

JL Nieusma and DM Calhoun. Potent Compound Safety Training. Invited presentation for ThermoFisher on May 1, 2007, Lafayette, Colorado.

JL Nieusma. Designing an Effective Potent Compound Safety Program. Invited presentation for MDS Pharmaceuticals on May 9, 2007, Bothell, Washington.

JL Nieusma. Potent Compound Safety Training. Invited presentations for Sandoz on May 14, 15, 17 and 22, 2007, Broomfield, Colorado.

DM Calhoun and JL Nieusma. Occupational exposure to isofluorane. Occupational Toxicology Roundtable, October 2007, Indianapolis, Indiana.

DM Calhoun and JL Nieusma. Recent OSHA enforcement actions in pharmaceuticals. Occupational Toxicology Roundtable, October 2007, Indianapolis, Indiana.

DM Calhoun and JL Nieusma. Potent Compound Safety, 5 Modules web-based interactive training. Affygility Solutions, Inc. Quarterly training from December 2007 through the present.

DM Calhoun and JL Nieusma. Isofluorane Training – Safety & Handling. Web-based interactive training. Affygility Solutions, Inc. Semi-annual training from December 2007 through the present.

DM Calhoun and JL Nieusma. Methylene Chloride Training – Safety & Handling. Web-based interactive training. Affygility Solutions, Inc. Semi-annual training from December 2007 through the present.

DM Calhoun and JL Nieusma. Dermal Absorption of APIs. Web-based interactive training. Affygility Solutions, Inc. Quarterly training from August 2008 through the present.

DM Calhoun and JL Nieusma. Decommissioning of a non-penicillin beta-lactam manufacturing facility, a case study. Occupational Toxicology Roundtable, September 2008, Baltimore, Maryland.

DM Calhoun and JL Nieusma. Intro to Potent Compound Safety & Handling for the Pharmaceutical Manufacturing Employee. Web-based interactive training. Affygility Solutions, Inc. Quarterly training from January 2009 through the present.

DM Calhoun and JL Nieusma. Recent Enforcement Action Regarding Pharmaceutical Waste. Occupational Toxicology Roundtable, October 2009, Santa Barbara, California.

JL Nieusma. Occupational Toxicology, Industrial Toxicology and Nontraditional Toxicology Opportunities. Invited Lecture by Dr. Dennis Peterson on April 5, 2011, University of Colorado School of Pharmacy Graduate Students.

DM Calhoun and JL Nieusma. Are You High? Developing an Occupational Exposure limit for Tetrahydrocannabinol. Pharmaceutical EHS Roundtable. April 22, 2015, St. Julien Hotel Boulder, CO.

JL Nieusma. TwinOxide. Colorado Rural Water Association Annual Meeting. General Session, February 12, 2018, Crowne Plaza DIA, Denver, CO.

G Eastman and JL Nieusma. TwinOxide. Colorado Rural Water Association Annual Meeting. Vender Education Session, February 13, 2018, Crowne Plaza DIA, Denver, CO.

JL Nieusma. TwinOxide. Colorado Rural Water Association Annual Meeting. Management Session, February 13, 2018, Crowne Plaza DIA, Denver, CO.

G Eastman and JL Nieusma. TwinOxide. Colorado Rural Water Association Annual Meeting. Vender Education Session, February 14, 2018, Crowne Plaza DIA, Denver, CO.

JL Nieusma. TwinOxide. Colorado Rural Water Association Annual Meeting. Water Operator Session, February 14, 2018, Crowne Plaza DIA, Denver, CO.

JL Nieusma. TwinOxide. Colorado Rural Water Association Annual Meeting. Waste Water Session, February 14, 2018, Crowne Plaza DIA, Denver, CO.

G Eastman and JL Nieusma. TwinOxide. Marshall Frasier Beef Symposium Meeting. February 20, 2018, Lincoln County Fair Grounds, Hugo, CO.

G Eastman and JL Nieusma. TwinOxide. Cherokee Metropolitan District Meeting. March 19, 2018, Colorado Springs, CO.

G Eastman and JL Nieusma. TwinOxide. Bethune City Council Meeting. March 20, 2018, Bethune, CO.

G Eastman and JL Nieusma. TwinOxide. Colorado Livestock Association Annual Meeting. April 5, 2018, Embassy Suites Hotel, Loveland, CO.

G Eastman and JL Nieusma. TwinOxide. Colorado Cattleman's Association Annual Meeting. June 18-20, 2018, Embassy Suites Hotel, Loveland, CO.

G Eastman and JL Nieusma. TwinOxide presentation. John Lofdahl and Kep Procter of Mountain Prairie Pig Farms, August 8, 2018, Las Animas, CO.

G Eastman and JL Nieusma. TwinOxide presentation. Justin Miller of JBS Feedlots. August 31, 2018, Lamar, CO.

D Lenci and JL Nieusma. TwinOxide presentation. IPPE- International Poultry Processing and Equipment. February 12, 2019, Atlanta, GA.

JL Nieusma. TwinOxide presentation. Canadian Poultry Show. April 3, 2019, London, Ontario.

D Lenci and JL Nieusma. TwinOxide presentation. Florida Water Resources Conference. April 15, 2019, Tampa, FL.

D Lenci and JL Nieusma. TwinOxide presentation. Guy Barrett Miccosukee Tribe. April 22, 2019, Everglades, FL.

D Lenci and JL Nieusma. TwinOxide presentation. William Cattrel Athens Water Treatment plant. April 22, 2019, Athens, GA.

D Lenci and JL Nieusma. TwinOxide presentation. Puerto Rico to Medina Group. June 11, 2019, Tampa, FL.

G Eastman, D Lenci and JL Nieusma. TwinOxide presentation. Robert Casey Publix. August 14, 2019, Lakeland, FL.

G Eastman, D Lenci and JL Nieusma. TwinOxide presentation. Ivy Drexler of Pinellas County Utilities Wastewater Reclamation Facility. October 4, 2019, St Petersburg, FL.

G Eastman and JL Nieusma. TwinOxide presentation. Sightline Retail Management Group. October 9, 2019, Bentonville, AR.

G Eastman and JL Nieusma. TwinOxide presentation. Egan Water Plant personnel. November 5, 2019, Egan, LA.

G Eastman and JL Nieusma. TwinOxide presentation. Andy Germer Zylum industries. January 9, 2020, Louisville, CO.

M Champie and JL Nieusma. C60, Toxicology & HOPE program presentation on "Business Game Changers" Host Sarah Westall. January 14, 2020.

JL Nieusma. Coronavirus, C60, Toxicology & HOPE program presentation on "Business Game Changers" Host Sarah Westall. January 27, 2020.

D Lenci and JL Nieusma. TwinOxide presentation. IPPE- International Poultry Processing and Equipment. January 28-30, 2020, Atlanta, GA.

JL Nieusma. Coronavirus, C60 & HOPE program presentation on "Living In The Solution" Host Dr. Elaina George. February 16, 2020.

JL Nieusma. Coronavirus, C60 & HOPE program presentation on "How to Stay Young" Host Judy Gamon. February 19, 2020.

M Champie, L Ivory and JL Nieusma. Coronavirus, C60, vaccines & HOPE program presentation 3 on "Business Game Changers" Host Sarah Westall. March 19, 2020.

JL Nieusma. Coronavirus, C60 & HOPE program presentation on "Transform your Mind" Host Myrna Young. March 16, 2020.

JL Nieusma. Coronavirus, C60 & HOPE program presentation on "Yak About Today" Host David Yakir. March 17, 2020.

M Champie and JL Nieusma. Coronavirus, C60, Toxicology & HOPE program presentation 3 on "Business Game Changers" Host Sarah Westall. March 19, 2020.

JL Nieusma. Coronavirus, C60 & HOPE program presentation on "Leadership Happy Hour" Host Charles "Chip" Lutz. March 26, 2020.

JL Nieusma. Coronavirus, Coronavirus & 5G influence program presentation on “Transform your Mind” Host Myrna Young. March 31, 2020.

JL Nieusma. Coronavirus, Wellness, Nutrition & Toxic Exposure presentation on Dr. Keoni Teta & Bryan Brozy’s “The Well Man’s Podcast”. April 4, 2020.

JL Nieusma. Coronavirus, C60, Toxicology & HOPE program presentation on “Business Game Changers” Host Sarah Westall. April 10, 2020.

JL Nieusma. Organic vs. Pharma C60 & HOPE program presentation on “The Success Chronicles” Host Chip Baker. April 29, 2020.

JL Nieusma. Coronavirus Myths and Disinformation, “Business Game Changers” Host Sarah Westall. May 4, 2020.

JL Nieusma Aging, Oxidative Stress, C60, Coronavirus, HOPE, “Elder & Wiser” Host Betsy Heeney, May 16, 2020.

JL Nieusma Drugs & Side Effects, HOPE, “Boomers Today” Host Fred Samson, July 31, 2020.

JL Nieusma C60-what it is, how it works, which one is best? HOPE, “Collective Evolution” Host Joe Martino, August 5, 2020.

JL Nieusma “A path for you to potentially get off multiple drugs, eliminate side effects, and regain control of your health & wellness through HOPE, “Fearless Aging” Host Rico Caveglia, August 12, 2020.

JL Nieusma “Wellness for Life” RadioMD, Host Dr. Susanne Bennett, August 14, 2020.

JL Nieusma “Two Fit Crazies and a Microphone Podcast! Everything Fitness, Health, Nutrition, Inspiration & Fun!” Hosts Brian Prendergast & Christine Conti, August 21, 2020.

JL Nieusma A path for you to potentially get off multiple drugs, eliminate side effects, and regain control of your health & wellness through HOPE, “Aging Greatfully” Host Holley Kelley, August 26, 2020.

JL Nieusma A path for you to potentially get off multiple drugs, eliminate side effects, and regain control of your health & wellness through HOPE, “Ever Forward Radio” Host Chase Chewning, September 8, 2020.

JL Nieusma “Mindful Medicine” Host Holly Lucille, September 10, 2020.

JL Nieusma “Upside of 40” Host Sean Mooney, September 28, 2020.

JL Nieusma Top 10 medical conditions facing the elderly and the top 10 prescribed drugs. “Aging Greatfully” Host Holley Kelley, October 1, 2020.

JL Nieusma Regain control of your own wellness through HOPE. “Mindfulness Mode” Host Bruce Langford, October 7, 2020.

JL Nieusma. Wellness Keto Style. Ketogenic Living 101 hosted by Kate Jaramillo, October 23, 2020.

JL Nieusma. How to not get sick and die. Hosted by Matty Lansdown, October 23, 2020.

JL Nieusma. Fit Dad Fitness. Hosted by Michael Ashford, October 29, 2020.

JL Nieusma. Fuel Radio. Hosted by Ron Jan, Recorded: November 23, 2020.

JL Nieusma. Strive 4 More hosted by Ronica Jacobs, Recorded: November 23, 2020.

JL Nieusma. Hom-Bod Podcast. Hosted by Heather Dumas and Ashley Stuart, Recorded: November 24, 2020.

JL Nieusma. Going Viral Podcast. Hosted by Matthew Zinder. Recorded 11-30-2020.

JL Nieusma. Food Experience Podcast. Hosted by Dr. Michelle Seilding. Recorded 12-1-2020.

JL Nieusma. Power to Grow Podcast. Hosted by Donna Gannor. Recorded 12-21-2020.

JL Nieusma. MindCep Podcast. Hosted by Alex Muir. Recorded 12-23-2020.

JL Nieusma. Rooks Health Podcast. Hosted by Farouk “Rook” Bello. Recorded 1-1-2021.

JL Nieusma. Best Morning Routine Podcast. Hosted by Dr. Lunide Louis. Recorded 1-7-2021.

JL Nieusma. Simply Human Podcast. Hosted by Mark Rogers. Recorded 1-13-2021.

JL Nieusma. Performance Optimal Health Podcast. Hosted by Todd Wilkowski & Mike Beecher. Recorded 1-20-2021.

JL Nieusma. Living Fearlessly. Hosted by Lisa McDonald. Recorded 2-2-2021.

JL Nieusma. Detox podcast. Hosted by Wendy Myers. Recorded 2-25-2021.

Sheriff Mack, Christopher James, Terry McDonald and JL Nieusma. Pushing back on the plan to destroy America Part 1, on “Business Game Changers” Host Sarah Westall. March 24, 2021.

JL Nieusma. Bonfire Entrepreneurs. Hosted by Kajal Khurana. Recorded 4-26-21.

JL Nieusma. Toxicological aspects affecting the bodies ability to heal. Matcha Morning Podcast. Hosted by Amanda Kingsmith. Recorded 6-3-21.

JL Nieusma. Covid Vaccine, Spike protein, Effects and what you can do after the fact. Mom’s Counter Culture Show hosted by Tina Griffin. Recorded 8-10-21.

JL Nieusma. Covid Vaccine, Spike protein, Effects and what you can do after the fact. Business Game Changers Show hosted by Sarah Westall. Recorded 8-13-21.

JL Nieusma. Covid Vaccine, Spike protein, Effects and what you can do after the fact. Organic Healthy Lifestyles Show hosted by Nancy Addison. Recorded 8-24-21.

JL Nieusma. Covid Vaccine, Spike protein, Effects and what you can do after the fact. Common Sense Show hosted by Dave Hodges. Recorded 9-9-21.

JL Nieusma. Specific ways to optimize defenses against the covid Vaccine, spike protein, effects. Business Game Changers Show hosted by Sarah Westall. Recorded 9-16-21.

JL Nieusma. Self-care for life coaching concerning health, wellness and defense for current challenges facing society. Power to Live Podcast hosted by Jo Dodds. Recorded 9-21-21, broadcast 11-5-21.

JL Nieusma. C60 study analysis to show bad science. Business Game Changers Show hosted by Sarah Westall. Recorded 10-5-21.

JL Nieusma. Chlorine Dioxide 2. Celestial Report. Hosted by Celeste Solum. Recorded & streamed live 10-7-21.

JL Nieusma. Occupational Toxicology, Industrial Toxicology and Nontraditional Toxicology Opportunities for Health Care Workers. Invited Lecture by Dr. Loretta Ivory on October 22, 2021, Front Range Community College Applied Herbalism Students.

JL Nieusma. Survival Protocol: Update with new tools. Business Game Changers Show hosted by Sarah Westall. Recorded 11-16-21.

JL Nieusma. C60Complete show. Mother Nature’s Treasure Chest. Hosted by Sandy Bolognia and Nada Cory. Recorded 12-1-21.

JL Nieusma. Survival Protocol: Update with new tools. Business Game Changers Show hosted by Sarah Westall. Recorded 2-7-22.

JL Nieusma. C60, mRNA vaccines. Health Made Radio. Show hosted by Dr. Michael Karlfeldt. Recorded 2-9-22.

JL Nieusma. Toxins in the local home environment and how to limit exposures. Balance Your Life. Show hosted by Meghan Pherrill. Recorded 2-15-22.

JL Nieusma. Dr Nieusma: Deaths Accelerating, We Must Prepare & Protect our Loved Ones. Business Game Changers Show hosted by Sarah Westall. Recorded 7-5-22.

JL Nieusma. C60 & Chlorine Dioxide for use with pets. Hosted by Jody Miller-Young of The Hound Healer podcast on Facebook Live. Aired 7-7-22.

JL Nieusma. The situation is serious, so it is time for you to get serious too. Business Game Changers Show hosted by Sarah Westall. Recorded 11-22-22.

JL Nieusma. How to heal with Dr. Joe Nieusma. Patriot Party Podcast. Show hosted by Vlynn & Mick. December 7, 2022.

JL Nieusma. Strategies to combat spike protein in a common sense manner with Dr. Joe Nieusma. Blood Money hosted by Vem Miller. Recorded 2-23-23.

JL Nieusma. The Censorship Conference – Truth That needs to be heard! COVID Vaccine and Combating Adverse Effects. Business Game Changers Show hosted by Sarah Westall. Recorded 3-17-23.

JL Nieusma. Meeting Frontline Doctors. Dr. Joe Nieusma. Americahappens.com and Medicalfreedom.com hosted by Vem Miller. Recorded 4-3-23.

JL Nieusma. Medicine Box with Dr. Joe Nieusma: Chlorine Dioxide and C60complete. Americahappens.com and Medicalfreedom.com hosted by Vem Miller. Recorded 4-7-23.

JL Nieusma. Toxicology of Wildfire and how public adjustors can use toxicologists in practice. Rocky Mountain Association of Public Insurance Adjustors. Cherry Creek, CO. May 2, 2023.

JL Nieusma. Radionics Group Forum. COVID Vaccine and Combating Adverse Effects and Strategies to combat spike protein in a commonsense manner. Hosted by Roxanne Matacia on July 12th.

JL Nieusma. COVID Vaccine and Combating Adverse Effects and Strategies to combat spike protein in a commonsense manner. How to not get sick and die. Hosted by Matty Lansdown, August 21, 2023

L Ivory & JL Nieusma. Radionics Group Forum. C60 effects on macular degeneration case study. Hosted by Roxanne Matacia on November 15, 2023.

JL Nieusma. Guest Interview on AmericaHappens.com discussing COVID 19, vaccine, long covid, viral infection and the use of chlorine dioxide and carbon 60 to battle lingering effects. Hosted by Corrine Cliford on May 20, 2024.

JL Nieusma. Radionics Group Forum. Current State of affairs with infectious disease: Mpox, Bird Flu, COVID and Combating Adverse Effects and Strategies to combat all of these issues in a commonsense manner. Hosted by Roxanne Matacia on August 21, 2024.

JL Nieusma. Guest Interview on Genius Podcast hosted by Richard Jacobs. Discussing C60 product evolution from LiveLongerLabs. Recorded on 4-25-25.

JL Nieusma & D Phalen. Fire Toxicology & Public Adjusting: The Hazards & Costs. Rocky Mountain Association of Public Insurance Adjusters. May 8, 2025, in Westminster, CO 80020.

JL Nieusma. Guest Interview on Aging Well Podcast hosted by Jeff Armstrong. Discussing C60 product evolution from LiveLongerLabs. Recorded on 5-24-25.

JL Nieusma. Guest Interview on Over 40 Fitness Hacks. Podcast hosted by Brad Williams. Discussing C60 product evolution from LiveLongerLabs. Recorded on 5/29/25.

JL Nieusma. Guest Interview on Designed to Heal. Podcast hosted by Dr. Ben Rall. Discussing C60 product evolution from LiveLongerLabs. Recorded on 6/17/25.

JL Nieusma. Guest Interview on Reawaken Your Health. Podcast hosted by Dr. Amy Novotny. Discussing C60 product evolution from LiveLongerLabs. Recorded on 6/18/25.

REFERENCES:

Grady Eastman, 303-817-9960, Eastman Consulting International, Inc
Dan Timmons, 720-774-8803, Founder Allegiance Ranch & Equine Rescue
James Anderson, Associate Trial Attorney, Fielder Trial Lawyers, 719-964-8435
David Phalen, PA, 815-878-2602, Consistent Claim Service.
Matt Heidecker, Ph.D. Vice President/Principal Scientist PSN, 814-769-9431
John Arlotti 949-697-8337, Founder Restore Patch
Wayne J. Powell 303-704-2275, Colorado Energy Research Technologies, LLC.

DAVID PHALEN

Address: 5778 E. Wetlands Dr
Frederick, CO 80504
Phone: 815-878-2602
Email: david@consistentcs.com
Website: https://consistentclaimservices.com/

Qualifications:

Education:

Continuing Education:

2024-2026: Ongoing

2022-2024: 24 hours

Adjusting: 21 hours
Adjusting Ethics: 3 hours

2020-2022: 51 hours

Adjusting: 40 hours
Adjusting Ethics: 11 hours

2018-2020: 30 hours

Adjusting: 25 hours
Adjusting Ethics: 4 hours
Homeowners: 1 hours

2016-2018: 28 hours

Adjusting: 21 hours
Adjusting Ethics: 5 hours
Homeowners: 2 hours

2019 International Roofing Expo (Nashville, TN):
3 Days of Courses on Roofing Products, their Material Construction, their Applications, and Events and Conditions which Damage the Systems or Diminish their Life.
Some Courses Taken Included:

-Metal Deck Replacement
-Understanding Metal Roofing Systems
-Thermoplastic Roofing Systems
-Low Slope Roof Coatings and Applications
-Low Slope Insulation and Substrate Applications
-Metal Roofing Production and Material Functions
-Algae, Fungi, and Other Conditions that Deteriorate Roofing Systems

Crawford and Company Independent Adjusting Training:
5 Solid Weeks Property and Casualty Training at International Headquarters

2 Solid Weeks Business Interruption Training
Completed Various Continuing Education and Training Courses, Including:
-Property Technical Certification Full Curricula
-Business Interruption Curricula
-Miscellaneous Property and Casualty Related Policy and Field Courses
-Symbility and Xactimate Training/Certification
-HAAG Hail Damage Certification
-EPIC Mitigation Training

Service Master of Boulder County Company Training:
Studying of the IICRC Standards with associated training courses/quizzes—Related to water & mold. Received ancillary training related to hazardous materials/remediation.

New York Life Insurance Training:
Received In-House Training Related Principally to Life Insurances and Their Varieties
Received Preliminary Training on annuities and

Northern Illinois University-DeKalb, IL
Received Graduate-Level Teacher Certification in Secondary English Education as well as Endorsements in Psychology and History. 2009-2011

Thomas M. Cooley Law School-Lansing, Michigan
Attended for two years. Accumulated 45 credit hours. 2007-2009

University of Illinois Urbana Champaign, IL
Obtained a Bachelor's Degree in Liberal Arts and Sciences with a Major in Rhetoric. 2005-2007

Illinois Valley Community College Oglesby, IL
Associates in Arts. 2003-2005

Experience:

Our Umpire LLC/Consistent Claim Services
Phone: 815-878-2602 2019-Present
-*Our* Umpire
-Operating as an umpire for parties in need throughout the United States.
-DBA "Consistent Claim Services" 2020-Present
-Conducting insurance appraisals, adjusting, consulting, and umpiring in Colorado and available throughout the U.S. based on claim/work circumstances and notice.

Solutia Adjusters/Solutia Consultants
Phone number: 720-636-7444 2017-2019

-Executive General Adjuster/Executive Loss Consultant

-Under Solutia Adjusters for the first year and a half, I operated as a public adjuster handling commercial losses exclusively, often in the million-dollar-plus range. Reached agreement on most losses with the insurer agreeing in entirety with our estimate (on multi-hundred thousand and multimillion-dollar losses alike)

-Under Solutia Consultants, the company transitioned from public adjusting to property damage-related consulting.

-Under both directions of the company, I also operated as an umpire, being jointly proposed and selected by both insurer and insured appraisers on residential and commercial losses.

Consistent Claim Services
Phone: 815-878-2602 2016-2017
-Appraiser/Umpire

-Appraised residential to commercial losses and ranging in value from below a hundred thousand dollars into the multi-millions.

-Began umpiring on losses, residential and commercial, proposed and selected by both insurer and insured appraisers.

Crawford & Company Centennial, CO
Phone: 720-533-4476 2014-2016
-Senior Property Adjuster

-Handling large and complex residential and commercial losses, estimating costs, timelines for repair, reinspections to confirm repairs made properly, analyzing commercial and residential leases for potential coverage considerations, evaluating contractor estimates for pricing/scope discrepancies, reaching agreed scope and pricing, conducting market research on unique construction designs such as curved solariums, antique signs, etc. Conducted appraisals for my last year at the company

-Handling losses involving vehicular impact to buildings, hail, fire smoke, flooding, water-related losses, mold remediation, HOA's, medical facilities/hospitals, rare and valuable artwork restoration, asbestos removal, earth movement, vandalism, lightning, theft, and so on.

-Professional Training in both Xactimate and Symbility.

-Was offered General Adjuster position but turned it down to start Consistent Claim Services.

New York Life Arvada, Co
Phone: 303-403-5600 2013-2014
-Agent

-Life insurance & Annuities Sales

-Series 6 Prep

-have worked with and sold life insurance designed to fit a variety of client needs

-learned a large array of financial concepts to add to my investment

knowledge

ServiceMaster of Boulder County Louisville, Co
Phone: 303-443-6020 2012- 2013
-Project Manager
-Managing all aspects of mitigation/remediation jobs that enter our office
-Fielding incoming calls with emergencies (anything from floods to shootings)
-Getting tech teams on-site to handle the initial situation
-Scope site and convert it to the Xactimate or Symbility sketch
-Monitor mitigation/remediation of site
-Work with client, adjuster, and insurance agent to create an equitable outcome for all parties involved
-This was a job that the company president thought would take 2-3 months for me to handle claims independently. In actuality, I was handling my own claims by 2 weeks, had finished all training by that time, and had stayed so far ahead that I was finishing all work by 12:00 pm.
-Managed project totals equivalent to all three other project managers' workloads combined.

SJ Roofing Arvada, Co 80003
Phone: 303-353-1703 2011-2012
-General Manager
-Managed every aspect of a startup roofing company
-Hired and trained all personnel
-Aided with all sales and made over 75% of the year's sales
-Generated all company referral sources, training materials, and most marketing materials.
-Found, hired, and paid all subs
-Managed every aspect of all production in the company, which included generating Xactimate reports, corrections, and supplements to insurance, quoting roofing (laminate, TL, decra), guttering, screening, painting, windows, and ventilation jobs, ordering all materials, acquiring licensing and permits for all jobs, mid and post-job inspections and city/county inspection scheduling.

Newman Hall Student Center, Champaign, IL 61820
Phone 217-344-2166 2006
-Head Student Carpenter
-Carpentry, Maintenance, and management of student workgroups.

Phalen Steel Construction Company, Mendota, IL
Phone 815-539-9391 (Summer Work) 2000-2007
-Yardsman

-Forklift operator, shipping & receiving, inventory control, vehicle maintenance, blueprint reading, and a variety of site work ranging from assisting on site layouts to punch list completion items, etc.

Projects of Note: *These in no way encapsulate the entirety of the large, complex, or general projects I've operated on. These are just some examples of projects I've worked on. It is fair to say that I'm very comfortable working on nearly any loss type and circumstance a structure could encounter. Unless identified otherwise, assume the referenced projects are in Colorado (I am always happy to assist with out-of-state projects—please see my fee schedule for billing inquiries).*

Umpiring:

Iowa—75,000 Sq Ft. Church—Derecho Wind Damages Related to Slate, EPDM, 3 Tab shingles, and Laminate Roofing: Church, School, Day Care with multistory access, street closure concerns, very steep roofing, and various repair and safety concerns in addition to considerations necessary for continued operations during work.

+130 Building HOA—Hail Damages to Community: Multi-Million-dollar hail loss to exteriors of every building in the community. Mutually selected by appraisers. 4.4 million dollar resolution signed by all three parties (myself and both appraisers). Panel was required to follow court-ordered process for appraisal, our review, and our award.

Grow Facility and Lab—Fire/Smoke Damages to Most of the Facility: Multi-Million-Dollar fire claim mutually selected as umpire to review and operate as Umpire. Involved addressing damage to electrical systems, hydroponics, per-room HVAC systems, CO2 systems, bombproof labs, and remediation/mitigation.

22-Story Residential Skyscraper—Hail Damages to Exterior and Water Damages to Roughly 65% of Residential Units from Top Floor to Ground Floor: Multi-Million-Dollar hail/water claim. Mutually selected by appraisers. Each interior residential unit throughout was unique in its construction/materials/damages and the skyscraper itself was located in a high-density, heavy-traffic area with difficult access.

Residential Pipe Break Water Loss: involving water damage to a home and contents on all three levels.

Commercial Low Slope Roof: Hail loss to EPDM Roof with water intrusion, high-end roof skylights, and ancillary code considerations (insulation in particular).

Troves of Claims Involving: Tile, Wood Shake, Shingle, Thermoplastic, EPDM, Bitumen Roofing Type Losses; Involving Wood/Metal/Vinyl Siding, Stucco/EIFS;

Involving Metal Clad Wood/Wood/Vinyl/Aluminum Windows; Wood/Trex Decking; Wood/Metal Doors and Overhead Doors Involving Code-Related/Safety/Access/Security/Repairability/Line of Sight/Kind and Quality/Visual Uniformity/(Matching in some NonColorado States)/Depreciation/Causation/ Contingency Circumstances/Overhead and Profit and various other Considerations; And Involving Hail, Wind, Fire, Smoke, and Water-Related Damages.

Appraisal:

High End Custom Home–Fire/Smoke Loss: ~3 million dollar loss to +3600 sq. ft. Premium grade home. Involved total loss to home, 95% of contents, and additional living expenses valuations. Furnishings involved couches worth 20k, Paintings totaling in the 10's of thousands, and similarly high end furnishings and adornments.

Iowa Retirement Community—Hail Damages: 1.7 million dollar plus window-specific (and ancillary window-related work) appraisal per agreement by insurer and insured parties. Involved custom structural-steel plate-glass wall, solariums, and a large variety of window types with work occurring in spaces that involve critical care, hospice, a 24-hour secure memory care ward, assisted living units, unassisted living apartments, a kitchen and cafeteria, and this also involved areas which were locked down and undergoing covid quarantine protocols (all of which would require work within them). Involved review of materials totaling around 14,000 pages.

Wyoming Hotel— Low Slope Roofing Hail Damages: To Granulated Modified Bitumen Roof, Roof Metals, HVAC Systems, and Guttering as well as some paint.

Wyoming Hotel— Internal and External Hail/Water Damages: Million-dollar plus hail damage to all four elevations affecting EIFS and windows; Hail damages to HVAC rooftop units, built-up roofing (with code compliance aspects); And water damages to roughly 50% of top floor rooms.

Commercial Low slope Structure—Hail/Water Damages: Multi-Million-Dollar loss that involved rent abatement, a primary insured tenant with several noninsured renters with water damages throughout 70% of the structure that involved everything from artificial astroturf to commercial carpets, electrical lines/systems to cabling/servers, and discerning category, class, and degree of water damages to contents and structures as well as hail damage degrees to the low slope roof and building envelope.

HOA Numerous Large Multi-Level Residential Structures—Hail Damages: Multi-Million-dollar hail loss involving siding, roofing, and windows principally

Century-Old Custom Residential Estate—Hail/Water Damages w/ Hazardous Materials: Involved a +22 million dollar loss to a 17,000 square foot home with a detached pool cabana and a detached garage/apartment in addition. The scope involved 100-150 year Spanish roof tiles, EPDM low slope roofing, lightening rods, tube and knob electrical systems, gold-leafed ceilings, plaster walls and ceilings, wall paintings/decals/murals, groin-vaulted and custom molded plaster features, interior fountains, full ductwork replacement, bringing the entire primary dwelling up to code on electrical/HVAC/plumbing/insulation and so on, protecting floors, remediating lead paint and asbestos found in nearly all primarily structural coverings throughout the estate, stained glass, Additional Living Expenses, Content pack-out and storage involving over 2 million dollars in Swarovski crystals, a Tiffany lamp, very high end furniture and paintings, a baby grand piano, high end wine, +7 foot chandeliers, custom wood trims and works originally milled by shipwrights, specialty paints/glosses/coatings, custom & historical doors and windows throughout the facility, custom constructed triangular skylights (among other greenhouse skylights, custom bent, fluted, copper downspouts and half-round copper gutters), among other features. My written position was 338 pages long with a 27-page addendum and a 373-page estimate.

Restaurant—Hail/Water Damages: to shingle roof and EPDM roof as well as stucco, gutters, solar panels, interior walls, electrical, and kitchen systems.

Dental Facility—Hail Damages: to tile roofing, guttering, windows, and paint.

Multipurpose Church and Separate Parsonage—Hail damage to modified bitumen roof, wood shake roof (very steep & high with unique additional access considerations), metal roof, metal siding, laminate roof, HVAC, various windows metal siding, various significant code modifications to the roof and rooftop systems due to insulation increases and a taper system.

Slate Roofing on Multi-Million-Dollar Home—Hail Damages: highest-end slate roofing damages involving a half-million-dollar plus slate roofing replacement. Slate is a particularly complex and rarer roofing type to work with.

Nearly Century-Old Custom Residence—Pipe Freeze Breaks/Water/Hazardous Materials: Multiple pipe freeze break with subsequent water intrusion (via 82,000 gallons of water), and hazardous materials throughout the property (lead paint and asbestos) with related contamination throughout the property.

Multistory Denver Hotel Covering ¼th of City Block & Multi-Level Apartment Building— Hail Damages: Damages to granulated modified bitumen roofing, windows, HVAC Rooftop Units, Paint, interior water damage, street closure, safety, code, and access considerations.

Generally speaking, I've Handled Losses as an Appraiser Involving: Hail, Wind, Water, Fire, Smoke, and Hazardous Material losses related to nearly any kind of material type, building system, and structural component that exists on/in buildings that range from residential homes to massive estates and commercial facilities ranging from a humble carpet store to sprawling commercial compounds and HOA communities.

Adjusting:

Three Wing Hospital Water Loss Related to Partial Sprinkler Discharge: Involved navigating category 3 water loss in the mechanical room and part of a hall in the heart of a massive hospital. Involved evacuation planning, working around potential loss of business income, patient and staff safety, noise and operational concerns, off-standard hours of operation, and so on.

Full Surgical Facility Shutdown Due to Full Facility Sprinkler Malfunction and Discharge: Involved loss of business income, extra expenses, scoping of category 3 water throughout the facility, repair/replacement of medical equipment, and repairs to the structure.

A Tourist Resort Structure W/ Damages to the HOA, Hotel, and Three Shops W/in the Same Structure—Water/Business Interruption Damages W/ Subrogation Considerations: Worked directly with the VP of an insurance company to address all of these damages & considerations.

An Xray Equipment Distributor with Warehouse Smoke Damages: Addressed mitigation and content considerations

A 13,000 Sq. Foot Home—Smoke Damages Throughout: Addressed cleaning on rare artworks and sketches (one from Picasso, a Monet Painting as well if I recall correctly), Cleaning gold wall inlays, mitigating smoke throughout the home generally, repair of the damaged HVAC system (one of 3 in the home).

A 40 Million Dollar Estate with Water Damages and Subbrogation Considerations: Basement-level wood flooring had an improperly installed in-floor hydrothermal heating system that failed and damaged most of the basement-level wood flooring.

A 10 Million Dollar Plus Estate with a Failure in Hydrothermal Lines Running Below Flagstone and Concrete Patio that Spanned an Area of Several Thousands of Square Feet.

A 1 Million Dollar Plus Low Slope Roofing Loss at a Strip Mall.

A Multi-Million Dollar Loss at an Aircraft Repair Facility with Security Considerations—Hail and Water Damages: Roofing types included Built-up

Roofing, EPDM, Modified Bitumen, Sandwich panels, and Ribbed Metal Roofing.

A Million Dollar Plus Loss at an Entertainment Facility—Hail Damages to Metal Roofing, Modified Bitumen, Low Slope Roofing, Wood Siding, and Wood Decking.

A Litany of Multi-Hundred Thousand to Multi-Million-Dollar HOA Hail Losses Involving Damages to a Multitude of Siding, Window, Porch, and Roofing Types.

Commercial Structures Ranging From Strip Malls to Churches to Multi-Structure Industrial Complexes to Medical Facilities to Residential Structures Which Range From Trailers to Warehouses to Custom Built Homes—With Damages Ranging from Lightning to Fire to Smoke to Water to Waste Water to Irrigation Ditch Overflows to Hail to Wind to Hazardous Materials (Asbestos/Lead/Chemicals) to Mold to Structural Impact to Snow loads to Vandalism to Loss of Business Income and the List Goes On.

Expert and Consulting Related:

Marshall Fire Loss to Residential Home (Scope & Valuation): Retained to analyze scope and value of a residential home that experienced heat and smoke/toxins damages. +3600 sq ft custom home with two above grade levels and basement. Involved Contents, Other Structures, Dwelling, and Additional Living Expense.

Fire Loss to Residential Home (Scope, Valuation, & Handling): Retained to analyze scope & valuation for dwelling, other structures, contents, additional living expenses of house with garage fire/chemicals/8 vehicles/custom and high end 5,800 sq foot home. Also requested to analyze adjuster/contractor/agent claim handling, operations, and coverage caps.

Fire Loss to Residential Home (Scope, Valuation, & Handling): Retained to analyze scope & valuation for dwelling, other structures, contents, additional living expenses of house with garage fire/chemicals. Also requested to analysis adjuster/contractor handling and operations.

North Dakota HOA Fire: Retained to analyze valuation concerns between two insurers regarding one insurer's valuation and another insurer's obligations in a fire loss that involved subrogation concerns**.**

Colorado Marshall File Loss Scope and Valuation: Retained to analyze a 3.8 million dollar case for Superior residential loss which was affected by fire but not destroyed by flames. Analyzed toxicologist & hygienist reports, EPA, OSHA, meteorological & satellite data, and considered structural airflow dynamics,

remediation and mitigation methods, and considered like kind and quality components as they related to the loss to determine the proper scope and value of the loss in order to bring the insured structure back to its preloss condition. Also conducted a Loss of Use/Additional Living Expense comparative analysis to determine if provided benefits complied with the insured's preloss living arrangements. All of this was done with consideration of the policy and its endorsements, which I was also brought on to review and utilize as it applied to the claim. Finally, I was requested to provide a comparative analysis of cost considerations as it related to the claim costs at the time of the loss versus costs at the current time of loss review and this applied to the structure and loss of use/additional living expense components of the loss.

Colorado Marshall File Loss Scope and Valuation: Retained to analyze a million-dollar-plus Louisville Home, which was affected by smoke and heat but not destroyed by the fire. Initial was brought on with an urgent request to address potential hazardous contamination related to the fire and to address any need to extend loss of use/additional living expenses to the insured pending recontamination and health concerns. Produced a report on such. Analyzed toxicologist & hygienist reports, EPA, OSHA, meteorological & satellite data, and considered structural airflow dynamics, remediation and mitigation methods, and considered like kind and quality components as they related to the loss to determine the proper scope and value of the loss in order to bring the insured structure back to its preloss condition. Also conducted a Loss of Use/Additional Living Expense comparative analysis to determine if provided benefits complied with the insured's preloss living arrangements. All of this was done with consideration of the policy and its endorsements, which I was also brought on to review and utilize as it applied to the claim. Finally, I was requested to provide a comparative analysis of cost considerations as it related to the claim costs at the time of the loss versus costs at the current time of loss review and this applied to the structure and loss of use/additional living expense components of the loss.

Fire Loss to Food Production and Distribution Facility for Restaurant Chain (Scope & Valuation): Consulting services were requested to review the loss and determine the necessary scope and valuation to restore the property to preloss condition and to consider hazardous materials, fire/smoke damages, and other health and safety compliance aspects.

Fire Loss to Residential Home (Scope and Valuation): Retained to create proper loss scope and value for residential home fire analyze shortfalls between my scope and value versus the improper provided scope and value.

Adjusting Standards & Practices: retained on a 3.5 Plus Million Dollar Custom Home Loss to review public adjusting firm's work and compliance with State of Colorado’s Public Adjusting Statutes/Regulations/Contractual requirements. Involved reviewing over 16,000 pages of file documents, photos, depositions,

communications, and assessing adjusting practices and services of the public adjusters.

Adjusting Standards & Practices, Fee Analysis: Retained to review a 3 million dollar plus loss and confirm adjusting practices and standards were in compliance with Colorado's Public adjusting Statutes/Regulations/Contractual requirements, to review operations by other parties within the loss and address handling concerns where those parties professed to operating a public adjuster without a license, and calculated approximate time absorptions related to Public Adjusting operations as it related to hourly cost versus contingent fee costs. Involved over 11,000 pages of review.

Hotel Water Loss (Causation, Scope, and Valuation): Retained to review water loss through hotel roofing from contractor conducting exploratory cuts and not sealing them previous to a very heavy rainfall. Water damage occurred through two wings of the hotel, and the loss involved replacement of built-up roof, repair to exterior EIFS, and repair to soffit drywall. Identified approximate areas of interior water damage. Valued exterior damages, and firm utilized a remediation contractor to calculate interior water damage and hazardous materials.

Scope & Valuation for TV Station/Church: Retained to analyze provided scope and valuation to a TV broadcasting station that broadcasts throughout the US/several other countries and is a church. Involved slate roofing, modification of roofing system, EPDM roofing, EIFS, metal work, significant safety, access, and general conditions considerations.

Causation, Scope, & Valuation for Industrial Property: Consulting Services to review public adjuster estimate for accuracy and to shore up any inaccuracies related to such. Particular areas of note were significant code deficiencies and minor roofing ancillaries. Loss involved a built-up, hail-damaged roofing and rooftop units. Report with related analysis and support.

Causation, Scope, & Valuation for Industrial Property: Consulting Services to review public adjuster estimate for deficiencies. Particular areas of note were shoring of causation/damage identification, code deficiencies, painting, operational/safety components, and some HVAC costs. Involved three buildings with built-up roofing. Report with related analysis and support.

Causation, Scope, & Valuation for Industrial Property: Consulting Services to review public adjuster estimate for deficiencies. Noted Code, access, and damages identification deficiencies. Loss involved Built-up roofing and granulated modified bitumen roofing along with HVAC and guttering damages. Report with related analysis and support.

Causation, Scope, & Valuation for Urban HOA Property: Consulting Services for hail loss to Downtown Denver HOA involving identification of hail damages

to built-up roofing, 30 yr. laminate roofing, windows, gutters, and paint. Scope and valuation production for loss. Report with related analysis and support.

Disclosures:

Depositions:

September 2020

Civil Action No. 1:16-cv-02009-CMA-KLM
GREAT NORTHERN INSURANCE COMPANY,
v.
100 PARK AVENUE HOMEOWNERS ASSOCIATION

-Operated as Umpire—Was subpoenaed and deposed by both parties.

February 2021

Civil Action No. 1:20-cv-00990-RM-MEH
POR BOY STORES, INC., d/b/a PORTICE CARPET ONE
v.
TRAVELERS CASUALTY INSURANCE COMPANY

-Operated as Insured Party Appraiser-Was subpoenaed and deposed by both parties.

August 2024

Civil Action No. 1:23-cv-00594-SKC-JPO
SIMCHAT TORAH BEIT MIDRASH, A NONPROFIT CORPORATION,
Plaintiff,
v.
PHILADELPHIA INDEMNITY INSURANCE COMPANY,
Defendant.

-Operated as Plaintiff expert—Deposed by both parties. My area of Expertise was as an Adjusting Valuations Expert with a minor focus on Public Adjusting Practices.

January 2025

Case Number: 2023CV30495
Plaintiff: TINWOODS, INC.
v.
Respondent: AX CO, LLC d/b/a AX CO SOLAR AND ROOFING and SOUTHWEST ROOFING LLC

-Operated as Plaintiff Expert—Deposed by Defendant Party. My area of Expertise was on Scope/Value of the Loss.

Courtroom Expert Testimony:

October 2024

Case No: 2024CV030135 Div. 2
Plaintiffs: Tess Pace and Daniel Pace
v.
Defendant: CSAA General Insurance Company

-Operated as Plaintiff Expert. Accepted as an expert in Adjusting as it pertains to Scope, Valuation, and Claims handling with the specific case involving a fire-damaged home (The Marshall Fire).

February 2025

IN THE UNITED STATE DISTRICT COURT
FOR THE DISTRICT OF COLORADO
Civil Action No.: 1:23-cv-00594-SKC-TPO
SIMCHAT TORAH BEIT MIDRASH
Plaintiff,
v.
PHILADELPHIA INDEMNITY INSURANCE COMPANY,
Defendant.

-Operated as Plaintiff Expert. Accepted as a valuation rebuttal expert.

Manuscripts:

June 2025: D Phalen and JL Nieusma. Thresholds of concern for smoke damaged but not destroyed residential properties for ash, soot, char, heavy metal surrogates, furans and dioxins. Guidance for returning to pre-loss conditions. Manuscript submitted to TMAM.

Presentations/Classes:

4/10/2025: The Boulder Avalon Ballroom: I was invited to come as a Guest Speaker/Panelist to present to the Boulder Area Human Resource Association (BAHRA) on the subject of Insurance Appraisals.

5/08/2025: JL Nieusma & D Phalen. Fire Toxicology & Public Adjusting: The Hazards & Costs. Rocky Mountain Association of Public Insurance Adjusters. In Westminster, CO 80020.

Past Work:

I've worked as an appraiser for Allstate and many insureds on individual occasions. I've worked as an adjuster for too many insurers to possibly remember them all (some larger ones that I can recall are Loyds of London, Zurich, Allstate, USAA, CHUBB, Foremost, Liberty-Mutual, ASI, EMC, Great Western, The Hartford, Progressive, Amica, CNA, and perhaps up to 30-40 more smaller insurance companies on a few occasions, but they are lesser known and I can't recall all there names).

I've worked as an adjuster for too many insureds to remember all their names, but these adjustments were almost always singular occurrences.

I have worked in a consultative or expert role to a multitude of clients over the years, but these interactions were typically singular or very limited occurrences.