Superior Toxicology & Wellness

Joe Nieusma, Ph.D.
Senior Toxicologist

Grand Haven, Mi 49417

October 24, 2023

RE: [redacted] - post Marshall fire risk assessment.

Superior Toxicology is pleased to present our findings regarding the need for significant remediation or complete rebuild of [redacted] to achieve pre-loss condition. This opinion was requested by [redacted] to provide an independent assessment of the hazard from contamination and how to remove as much risk as possible for their family following the Marshall fire that damaged their [redacted] home in late December of 2021.

The opinions and statements contained in this report are based on: 1) my personal knowledge and review of the scientific literature pertaining to the types of hazards associated with combustion, water and smoke damage in a residential setting; 2) facts or data reasonably relied upon by persons in toxicology; 3) my scientific expertise and experience relating to toxicity of both voluntary and involuntary exposure; and 4) specific materials provided by the client as referenced in this report. My complete Curriculum Vitae is attached in Appendix 1 to fully describe my qualifications. Additionally, appendix 2 details my fee schedule for completing this work.

Background

On December 30, 2021, shortly before 10:30 a.m. MST, a grass fire broke out in Boulder County, Colorado, United States. The large fire was named the Marshall Fire by local fire authorities. In terms of structures lost, it was the most destructive fire in Colorado history. (Boulder County, Colorado). The home [redacted] was spared from burning completely to the ground but did suffer heat damage and significant contamination from fire residue including soot, ash, char, dioxins, furans, and heavy metals (Case Materials, 2023; Kyser 2022; Boivin, 2022).

[redacted] has a history of severe mold allergy and sensitivity to chemicals and environmental contaminants. The occupants of the home include the husband, the wife and daughter ([redacted] at time of fire, [redacted] presently) and one dog at time of fire, two now. People have lived in this house for 15 years (wife), 10 years (husband) and [redacted] years (child). The family has never experienced these issues described below prior to the Marshall fire. Issues the family has experienced post fire: Brain fog, confusion, lethargy, lack of ability to think, headache, burning face, constant sneezing, runny nose, itchy mouth, itchy throat, itchy eyes, nosebleeds, sneezing, coughing, inability to breathe, sense of doom, panic, tight chest, and wheezing. The daughter had elevated white blood cells and random onset of fevers which landed her in urgent care twice with breathing issues. She now has an inhaler. Family members were all tested multiple times for all things including covid, flu, and RSV. Each time medical practicioners didn't find a cause. The dogs have had respiratory issues, runny eyes, runny noses, and lethargy (Case Materials, 2023).

Since the fire, this family has followed the advice of local government and their insurance company with dismal results. Less than a month after the fire in January 2022, the family moved home and lived here in a home visibly covered in ash and smelling like smoke, without potable water or heat because the city said it was fine to come back and the insurance company recommended for the homeowner to vacuum. After 3-4 days the family was absolutely miserable, sick as can be with the previously mentioned symptoms.

After moving out, Air IQ professionals (report issued by [redacted]) noted visible ash through home and the heavy metals, dioxins and furans that typically accompany this sort of fire contamination. The recommendation to "vacuum and dust" from the insurance company would be woefully inadequate.

Following some remediation activities, the family returned to the home in July 2022 but immediately felt sick again. More testing resulted in further mitigation described below and ended up cleaning and testing multiple times before deciding to replace the furnace and air conditioner. The family moved back in prior to thanksgiving and Christmas of 2022 but felt ill again.

Over the summer, the family went camping for extended periods of time, and took a two-week vacation. Each time the family was out of the house, symptoms resolved around the third day, and they were feeling healthier with energy, could think, didn't feel like they were literally dying. When the family would return home, symptoms would return for all family members (Case Materials, 2023).

Additional testing determined the house was still contaminated with particulate matter, dioxins, furans, and heavy metals as described below.

The list of home remediation that this family has tried is listed here:

Mitigation done:
replaced all windows
full encapsulation of interior
sanded floors and recoated
replaced carpets
insulation replaced in attic and garage
ducts cleaned 4x
some exposed ducts replaced (could not be cleaned- visible streaking on caulk etc)
all soft goods replaced
most other items replaced
cleaned the house 4x
outlets and exterior doorknobs replaced (soot was coming through them)

Hazard Assessment

At this stage of post-fire cleanup, the potential health risk from the wildfire residuals is most likely from inhalation, skin contact, and ingestion of particulates—mainly char and ash deposited by the smoke, as well as the polycyclic aromatic hydrocarbons (PAHs) that have become adsorbed onto the fire particulates and onto surfaces in the home. Wildfire smoke is a veritable cocktail of products of incomplete combustion. Ash and char, the main components of wildfires, usually contain heavy metals, PAHs, and dioxins and furans and this has been shown to be true in this case (Medina, 2016, Kyser, 2022, Boivin, 2022b). This particulate matter more likely than not enters the home through the HVAC system and any compromised windows in the

home. The history of extensive testing and results showing remaining contamination after remediation efforts suggests that one or more reservoirs of contamination have been omitted from remediation. All potential sources of contamination need to be address for a remediation to be successful.

The health effects of wildfire smoke inhalation range from acute irritation, inflammatory responses, asthma triggers, and immune system suppression to changes in lung function (measured as increased airway resistance); reduced lung function capacity; chronic illnesses, including bronchitis, obstructive pulmonary disease, and cardiac disease; and cancers of the lung, skin, and bladder (Medina, 2016).

Background sources of PAHs in urban outdoor air and in homes not affected by wildfire smoke include smoke from fireplaces and cigarettes, asphalt pavement sealers containing coal tar, and vehicle exhaust. Background PAH levels in indoor air range from 0.00027 $\mu g/m^3$ to 0.05 $\mu g/m^3$, approximately twice the background levels found in outdoor air (Medina, 2016). PAHs exist in equilibrium between a vapor and a solid phase and have a strong affinity for organic matter like charcoal. They attach to building materials and furnishings, such as carpet, gypsum wallboard, and even stainless steel, and slowly off-gas for time periods ranging from hours to weeks or months. As a result, PAHs are commonly found as a component of household dust. Typical background levels are in the range of 0.15 to 1.64 micrograms per gram ($\mu g/g$) of dust. Dust ingestion by children is the second most important route of exposure to carcinogenic PAHs, after inhalation exposure. Acute effects notwithstanding, household dust needs to contain more than 150 times the typical PAH background levels to pose a lifetime cancer risk above one-in-one-million (Medina, 2016).

IAQ Professionals issued a report for this property with findings including presence of particulate matter, quantitative information on common contaminants from wildfires including dioxins, furans and heavy metals (Boivin, 2022; Kyser, 2022). The fact that the family experienced adverse symptoms when they returned to the home establishes a temporal relationship between the results of the fire and the family's adverse effects. This temporal relationship is strengthened by the fact that when the family is away from the house for multiple days, the symptoms subside, but return after the family returns to the house. All of the types of contaminants will produce adverse effects with underlying mechanisms involving irritation, reactive oxygen species and inflammation in the house occupants, leading to many, if not all the listed symptoms the family has suffered since the fire (Case Materials, 2023).

The three forms of dioxins and three forms of furans detected were at levels described in table 1 below for the house. The dioxin that has been shown to be a known human carcinogen is tetrachlorodibenzo-p-dioxin and this species is present in the home. The furan that has been shown to be a known human carcinogen is tetrachlorodibenzofuran and this species is not present in the home (Boivin, 2022). There is no known safe level of exposure to known carcinogens and all exposure should be eliminated or minimized to remove or reduce potential risk, respectively. The detected levels of each of these species is high and will result in acute and chronic adverse effects for occupants of the dwelling.

Table 1: Dioxin & Furan species detected at [redacted] (Boivin, 2022).

Analyte Dioxin and Furan species	Pg/g
Total tetrachlorodibenzo-p-dioxins	1.87
Total pentachlorodibenzo-p-dioxins	ND
Total hexachlorodibenzo-p-dioxins	ND
Total heptachlorodibenzo-p-dioxins	34.2

Total octochlorodibenzo-p-dioxins	189
Total tetrachlorodibenzofurans	ND
Total pentachlorodibenzofurans	ND
Total hexachlorodibenzofurans	1.62
Total heptachlorodibenzofurans	8.79
Total octochlorodibenzofurans	7.99

The data on the metal contamination levels in [redacted] home is shown in table 2 (Kyser, 2022). The metals contamination needs remediation for the residence to be considered to be at a pre-loss condition and any residual levels will continue to contribute to adverse effect in occupants of the house. The well-known health effects of metals exposure are not detailed in this report at this time for simplicity's sake. All potential exposures including inhalation, ingestion, and skin contact, would be decreased by following the recommendations contained in the report below.

Table 2: Metal contamination levels detected at [redacted] (Kyser 2022).

Metal	**Surface Result (µg/kg)**	**Detection Limit (mg/kg)**	**Exposure Limit**	**Exposure characterization**
Cobalt	2.40	0.2	0.1 mg/m^3 OSHA	High
Chromium	10.7	0.5	0.005 mg/m^3 OSHA	High
Cadmium	<0.2	0.2	0.005 mg/m^3 OSHA	None
Silver	<0.5	0.5	0.01 mg/m^3 OSHA	None
Lead	20.2	0.5	0.05 mg/m^3 OSHA	High
Vanadium	8.56	0.5	0.05 mg/m^3 NIOSH	High
Zinc	8260	0.5	5 mg/m^3 OSHA	High
Arsenic	2.25	1.0	0.01 mg/m^3 OSHA	High
Copper	856	0.5	0.1 mg/m^3 OSHA	High
Nickel	5.82	0.5	1 mg/m^3 OSHA	Low

An important principal, that is universally ignored nearly all of the time, is that a "chemical safe limit of exposure" exists and can be established for exposure to that chemical. However, rarely, if ever, does an exposure to only one chemical actually occur. Safe levels of exposure to a chemical does not consider mixtures of toxic exposure at all. It does not consider simultaneous exposures to additional toxins like dioxins with furans species, heavy metals, particulate matter from ash, char and soot, volatile organic compounds, dietary toxins, air borne toxins (burned Tesla batteries in close proximity), drinking water borne toxins or health-based exposure challenges (drugs). Considering the multiple toxins detected in this house, and the levels of toxins detected in this house, the best way to attempt to provide a safe scenario as a sound remediation strategy to ensure the future safety of the occupants would be to tear down the

house to the studs and subfloors, including removing duct work and water lines, follow accepted encapsulation practices and rebuild the home following a retest of the encapsulated building materials to document the process was successful (Hubbs & Murphy, 2019; Medina, 2016). The alternative scenario to also consider is to scrap the entire home and completely rebuild the house.

The presence of these dioxin chemical species will require the extensive remediation including the removal of drywall, laminate counter tops, porous cabinets, vinyl flooring and water supply lines in the home (Hubbs & Murphy, 2019; Medina, 2016). The furans species are found in food and dietary exposure in the USA is up to 8.54 pg/day of the dibenzofurans species (Gonzalez & Domingo, 2021). Any furan levels in the residence are problematic and need to be carefully remediated by removing the contaminated materials listed above. Furan species are not completely removed by laundering (Fent et al., 2020). All soft textiles including but not limited to clothes, drapes, curtains, mattresses, furniture, coats and footwear, will need to be disposed of and replaced. The residence has been visited for only a few hours to days and the family had reactions and effects quickly. This process will be essential for all items and goods that are contaminated. The list of detected dioxins and furans does contain the dioxin species that are known human carcinogens (Fent et al., 2020).

Additionally, the chemical species present will have acute exposure hazards. These potentially toxic species associated with the particulate matter observed in the home is the prime target for causing any adverse health effects. All potential exposures including inhalation, ingestion, and skin contact, could also be involved in the resultant adverse effects. For all potential chemical threats, remediating for the heavy metals as described in the following paragraphs, the levels of dioxin and furans will also be reduced by the same procedure recommended for the heavy metals. Levels of all contaminants should be verified with testing following remediation and prior to rebuilding.

Typical exposure risk in the wake of a fire is present for this home, however, there is additional risk at this home due to the close proximity of the Tesla auto dealership damaged by fire and the extensive volume of water spent on this dealership to save it from complete loss by fire. These two issues present significant additional risk to this home and when taken in consideration with the dioxins, furans and heavy metals also present, make this home uninhabitable unless demolished and rebuilt with uncontaminated materials. The Tesla fire is significant due to the hazardous gases, extreme heat and particulate after the fact that can result in future exposure, adverse effects and harm to inhabitants of the home.

When burned, the lithium-ion batteries in electric cars produce hydrogen fluoride gas and phosphoryl fluoride as well as carbon monoxide, carbon dioxide, lithium cobalt oxide, nickel oxide, manganese oxide and lithium hexafluorophosphate (Sironval et al 2018, Sironval et al., 2020, Larsson et al., 2017). The use of water on the fire causes hydrogen fluoride gas to be released more quickly. The hydrogen fluoride binds to water droplets and increases the amount of very toxic hydrofluoric acid on all surfaces touched by that water. The collective presence of these toxins may result in severe allergic reactions on unprotected skin. Additionally, these metal oxide particles will result in lung inflammation and lung fibrosis. The particles result in oxidative stress and hydroxyl radical generation leading to genotoxic potential including DNA lesions, DNA strand breaks, chromosomal breaks and micronuclei formation (Sironval et al 2018, Sironval et al., 2020, Larsson et al., 2017). The presence of the Tesla dealership or any personal vehicles in neighboring houses in close proximity of this home has potentially coated all surviving surfaces with potentially carcinogenic particles that will persist over time in addition to the chemical risk for short term exposure issues.

Remediation

Where lead dust and the other seven heavy metals may have contaminated textiles or soft goods, drives the removal and replacement of these goods. The use of ozone, hydroxyls, cleansers, or deodorizers are not effective to remove lead dust or other heavy metals and should not be used for this purpose. Walls, floors, doors, cabinets, water pipes, railings and dishes and other hard goods would more likely than not be contaminated above levels that will cause adverse effects for the family and should be replaced. Clothes, bedding, soft goods, or children's toys should not be cleaned as the laundering process does not remove all of the contaminates (Fenta et al., 2020). These items should be treated as contaminated and properly disposed of to prevent chronic exposure situations or exacerbation of the family's known medical conditions. Children often chew on their toys, clothes, blankets, and put things in their mouths. This is how lead can be ingested and is the main cause of lead poisoning amongst children (Scott & Scott, 2019). These same pathways of exposure discussed by Scott & Scott (2019) are relevant to the rest of the metals listed by [redacted] (2022a) as having high levels in this property.

This analysis and remediation plan is primarily based on lead as a model for heavy metal abatement and cleanup. The levels of the seven other metals listed in the home inspection report should improve due to the action plan to clean up lead levels. Post clean up testing is expected to show this result. The particulate matter as ash, soot, and char is what contains the heavy metals. This particulate matter more likely than not enters the home through the HVAC system and any compromised windows in the home. The HVAC system cleaning and maintenance of filters is paramount to blocking this path to exposure and window replacement to more modern, better technology would block significant portions of repeat contamination. Window replacement would likely contribute significantly to lowering the risk of toxic exposure for the family.

The non-cancer adverse health effects can result from exposure to respirable particulate matter. The fate and transport of the residual contaminants depends in part on housekeeping practices, the chemicals' partition coefficients, and the type of ventilation. The larger-size fractions of settled dust are removed by regular cleaning, while the respirable-size particulates may remain longer in the absence of HEPA filtration. Adsorbed semi-volatile organic compounds (sVOCs) continue to off-gas following their gas-solid phase equilibrium kinetics for days, weeks, and even months (Medina, 2016). This particular situation combined with the family's known medical reactions to date warrant the removal of drywall, laminate counter tops, porous cabinets, vinyl flooring, HVAC and water supply lines in the home (Hubbs & Murphy, 2019; Medina, 2016).

Traditional remediation strategies described by Battelle (1998) are an extension of what has already been tried on this house with poor results as the family is still experiencing adverse effects upon staying in the dwelling (Case Materials, 2023). The only way to solve the problem for this house is the removal of drywall, laminate counter tops, porous cabinets, vinyl flooring, HVAC Ducts and water supply lines in the home (Hubbs & Murphy, 2019; Medina, 2016). Indoor environments are the most limited for techniques of remediation and are limited to component replacement, HEPA vacuuming, wet mopping, sealing known reservoirs of contamination and combination of these techniques (Battelle, 1998). This successful strategy in this case will be by following the component replacement recommendation (Battelle, 1998). This strategy removes the toxin-containing materials by replacement and encapsulation. Any process contamination or simple construction debris and dust can be cleaned up thoroughly by wet mopping the residence, usually with a detergent solution. Alternatively, HEPA vacuuming, or a

combination of the two methods, may be employed. Surfaces of the residence (e.g., floors, tabletops, counters, windowsills) exhibiting elevated levels of dust lead are replaced followed by wet wiped or mopped. This process must be repeated regularly since residential dust can rapidly become recontaminated. In Battelle (1998) it was noted that dust-lead concentrations had returned to original levels two weeks following a thorough residential cleaning. If performed regularly, however, dust removal intervention can significantly reduce residential dust-lead loadings (Battelle, 1998).

The best remediation recommendation for a positive outcome of restoring to pre-loss conditions, is to remove and replace drywall, laminate counter tops, porous cabinets, vinyl flooring, HVAC and water supply lines in the home (Hubbs & Murphy, 2019; Medina, 2016) as well as carpeting throughout the home using the specific steps described herein to collect as much contamination as possible. Additionally, more heavy metal samples should be conducted to test any hardwood floors, and other finished flooring in the home prior to remediation. These additional samples should be analyzed. If the data shows high metal levels, removal of metal contaminated hard wood floors and tiles will be necessary if wet wiping and HEPA vacuuming does not eliminate the high levels of heavy metals. All potential exposures including inhalation, ingestion, and skin contact, would be decreased by following the recommendations contained in the report.

The remediation steps for drywall must contain at a minimum:
>Remove the drywall and HEPA vacuum the debris.
>Reinstall preferred nontoxic drywall material and finish. Paint using an oil-based metal sequestering product.
>Retest for metal levels.

The remediation steps for hardwood must contain at a minimum:
>Take wipe tests or vacuum tests for metals as before and analyze the results.
>If levels are high, wet wipe and HEPA vacuum the existing hardwood and retest.
>If metal levels are high, re-sand and refinish the hardwood and HEPA vacuum the refinished floor.
>Retest for metal levels.

The remediation steps for carpet must contain at a minimum:
>HEPA vacuum the existing carpet prior to removal.
>Remove the carpet and pad followed by HEPA vacuuming the subfloor.
>Before pad and carpet reinstallation, apply an oil-based sealing coat of primer/paint on the subfloor.
>Reinstall final flooring (pad/carpet, wood, laminate, etc.).

Additionally, since the likelihood of recontamination due to dust and disturbed burn sites nearby the residence, regular (weekly or biweekly at the longest) professional house cleaning service should be covered to continually remove any recontamination due to airborne dust entering the home during the reconstruction period for the surrounding area. The cleanings should be covered until the last home is rebuilt and construction in the burn zone has ceased. Replacement of damaged windows with new, better technology would contribute significantly to decreasing the recontamination due to wind blow dust from nearby burn sites.

Summary

It is more likely than not that without remediation including complete window replacement, removal of drywall, laminate counter tops, porous cabinets, vinyl flooring, HVAC and water supply lines in the home and replacement, flooring removal and replacement and ongoing maintenance and cleaning, the residence will not provide a safe and healthy environment for this family with medical challenges including breathing issues, environmental allergies and multiple chemical sensitivities. The results of the post-fire pre-remediation analysis should be repeated after the remediation efforts have been completed to determine the efficacy of the remediation efforts for dioxin, furan and heavy metal removal. Analysis for the heavy metal levels should be repeated at intervals that coincide with rebuilding efforts in the general vicinity to monitor potential effects of disturbing the burn area that could cause reintroduction of contamination from dust.

Additionally, it is possible that remediation would not restore this home to pre-loss condition. With the extensive and wide variety of known toxins and carcinogens, this home may be best suited for complete removal and rebuild from dirt. Usual protocols for less toxic situations would allow for remediation through cleaning and sealant usage to stop future exposure, but in this case, with the presence of multiple toxins with significant acute and chronic exposure issues, the home should be considered as a complete loss with scrap and rebuilt as the plan to restore to pre-loss condition. The complete removal of all construction materials of the previous dwelling will remove the presence of dioxins, furans, cobalt, chromium, lead, vanadium, zinc, nickel, arsenic, copper, and potentially lithium hexafluorophosphate, and hydrofluoric acid present in this house.

I have based my opinion on the information described herein as well as my experience and training as an industrial toxicologist and pharmaceutical scientist. I reserve the right to modify or supplement my opinion if additional information becomes available.

Sincerely,

Joe Nieusma, Ph.D.

[redacted]

References relied upon by Dr. Nieusma

Battelle (1998) Review of studies addressing lead abatement effectiveness: Updated edition. Technical Programs Branch Chemical Management Division Office of Pollution Prevention and Toxics U.S. Environmental Protection Agency Washington, DC 20460. Accessed online 4-4-22 at https://www.epa.gov/sites/default/files/documents/finalreport.pdf.

Boivin L (2022) Analysis of diagnostic polychlorinated dibenzo-p-dioxin and polychlorinated dibenzofurans, and homologs in accordance with approved EPA Modified Method 8290. Enthalpy Analytical, Mt. Pleasant, MI Client NO 99534.

Case Materials (2023) Provided to Dr. Nieusma by [redacted] both verbally and via email.

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Kenneth W. Fent, Mark LaGuardia, Drew Luellen, Seth McCormick, Alexander Mayera I-Chen Chena Steve Kerber, Denise Smithd, Gavin P. Horn (2020) Flame retardants, dioxins, and furans in air and on firefighters' protective T ensembles during controlled residential firefighting. Environment International 140:105756.

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Larsson F, Andersson P, Blomqvist P, Mellander BE. (2017) Toxic fluoride gas emission from lithium-ion battery fires. Nature.com/Scientific Reports 7: 10018 | DOI:10.1038/s41598-017-09784-z.

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Scott, BC and Scott, S (2019) Lead Contamination in Structure Fires. Lessons learned from the Notre Dame Cathedral fire. Accessed online at: https://www.randrmagonline.com/articles/88641-lead-contamination-in-structure-fires.

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Appendix 1: Curriculum Vitae for Dr. Joe Nieusma updated 10-5-2023

JOE L. NIEUSMA, Ph.D.

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EMPLOYMENT/EXPERIENCE

Toxicology, Research and Consulting Experience:
April 2004 – present: **Senior Toxicologist,** Superior Toxicology & Wellness
Main mission: Maintain excellent relationships with multiple clients through superior work products combined with outstanding project progress and genuine customer service.

- 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.

- 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.

D Lenci, M Flint, 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.

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

REFERENCES:

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