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Honorable Kevin Atkinson
Chairman, Committee on Labor and Commerce

Dear Chairman Atkinson:

The National Toxic Encephalopathy Foundation, (NTEF), is a 501 c3, non profit project of United Charity Programs, situated in Las Vegas. We were asked by Assemblyman Aizley to provide some science and known legal issues on the air freshening, incense, candles and ozone portions of AB234 and to comment on the IFRA-North America's Opposition to this bill. We will provide under separate cover, our research on pesticides.

We will provide known scientific facts regarding the bill. Where as IFRA only references a diagnosis, which is not the intended disabilities, which warrants attention in this bill. Nor did they provide any independent science to substantiate their opposition.

This enactment of this bill could be one of the few truly useful and cost-reducing bills to come out of any U.S. legislature in recent times.

The governmental agencies and medical associations that they referenced do acknowledge what we will be presenting.

Public health is seriously threatened by exposure to ambient and indoor particulate matter (PM). Epidemiological studies have demonstrated that long-term exposure is associated with lung cancer and other pulmonary diseases. [1]

The NTEF primarily deals with the neurological effects of chemicals upon the brain and nervous system.

Encephalopathy and neurotoxicity can best be defined by the:

National Institute of Neurological Disorders and Stroke a division of the National Institutes of Health:

"Neurotoxicity occurs when the exposure to natural or manmade toxic substances (neurotoxicants) alters the normal activity of the nervous system. This can eventually disrupt or even kill neurons, key cells that transmit and process signals in the brain and other parts of the nervous system.

Neurotoxicity can result from exposure to substances used in … certain foods and food additives, pesticides, industrial and/or cleaning solvents, cosmetics, and some naturally occurring substances. Symptoms may appear immediately after exposure or be delayed. They may include limb weakness or numbness; loss of memory, vision, and/or intellect; headache; cognitive and behavioral problems; and sexual dysfunction. Individuals with certain disorders may be especially vulnerable to neurotoxicants." [2]

This bill addresses ADA barriers and according to federal law, those with respiratory, brain and neurological disabilities are fully covered as these disabilities have an effect upon one or more of life major activities

TITLE 42 - THE PUBLIC HEALTH AND WELFARE
CHAPTER 126 - EQUAL OPPORTUNITY FOR INDIVIDUALS WITH DISABILITIES
Sec. 12101. Findings and purpose
(a) Findings
The Congress finds that
(1) physical or mental disabilities in no way diminish a person's right to fully participate in all aspects of society, yet many people with physical or mental disabilities have been precluded from doing so because of discrimination; others who have a record of a disability or

are regarded as having a disability also have been subjected to discrimination;
(2) historically, society has tended to isolate and segregate individuals with disabilities, and, despite some improvements, such forms of discrimination against individuals with disabilities continue to be a serious and pervasive social problem;
(3) discrimination against individuals with disabilities persists in such critical areas as employment, housing, public accommodations, education, transportation, communication, recreation, institutionalization, health services, voting, and access to public services;
(5) individuals with disabilities continually encounter various forms of discrimination, including outright intentional exclusion, the discriminatory effects of architectural, transportation, and communication barriers, overprotective rules and policies, failure to make modifications to existing facilities and practices, exclusionary qualification standards and criteria, segregation, and relegation to lesser services, programs, activities, benefits, jobs, or other opportunities;
(6) census data, national polls, and other studies have documented that people with disabilities, as a group, occupy an inferior status in our society, and are severely disadvantaged socially, vocationally, economically, and educationally;
(8) the continuing existence of unfair and unnecessary discrimination and prejudice denies people with disabilities the opportunity to compete on an equal basis and to pursue those opportunities for which our free society is justifiably famous, and costs the United States billions of dollars in unnecessary expenses resulting from dependency and non productivity.
(a) Findings
(2) in enacting the ADA, Congress recognized that physical and mental disabilities in no way diminish a person's right to fully participate in all aspects of society, but that people with physical or mental disabilities are frequently precluded from doing so because of prejudice, antiquated attitudes, or the failure to remove societal and institutional barriers; [3]

Nevada's NRS 426.068 mirrors a portion of the US Department of Justice's definition of a disability:

NRS 426.068 "Disability" defined.

"Disability" means, with respect to a person:

1. A physical or mental impairment that substantially limits one or more of the major life activities of the person;
2. A record of such an impairment; or
3. Being regarded as having such an impairment.

Sec. 12102. Definition of disability

As used in this chapter:

(1) Disability

The term "disability" means, with respect to an individual

(A) a physical or mental impairment that substantially limits one or more major life activities of such individual;

(B) a record of such an impairment; or

(C) being regarded as having such an impairment (as described in paragraph (3)).

(2) Major Life Activities

(A) In general

For purposes of paragraph (1), major life activities include, but are not limited to, caring for oneself, performing manual tasks, seeing, hearing, eating, sleeping, walking, standing, lifting, bending, **speaking, breathing, learning, reading, concentrating, thinking, communicating**, and working.

(B) Major bodily functions

For purposes of paragraph (1), a major life activity also includes the operation of a major bodily function, including but not limited to, functions of **the immune system**, normal cell growth, digestive, bowel, bladder**, neurological, brain, respiratory**, circulatory, endocrine, and reproductive functions.

For purposes of paragraph (1)(C):

(A) An individual meets the requirement of "being regarded as having such an impairment" if the individual establishes that he or she has been subjected to an action prohibited under this chapter because of an actual or perceived physical or mental impairment whether or not the impairment limits or is perceived to limit a major life activity.

(B) The term "substantially limits" shall be interpreted consistently with the findings and purposes of the ADA Amendments Act of 2008.

(C) An impairment that substantially limits one major life activity need not limit other major life activities in order to be considered a disability.

(D) An impairment that is episodic or in remission is a disability if it would substantially limit a major life activity when active. [3]

There have been awards for failure to accommodate employees with fragrance related issues. The most highly publicized one is Mc Bride v City of Detroit, Plaintiff won $100,000. [4]

With the majority of businesses intentionally enacting barriers, can the businesses afford this type of fine and the negative publicity that will be generated from such awards?

The brain is the most important organ in the human body. Anything that has an effect upon the brain will usually have a systemic effect upon the entire body. When determining if a person should be taken off of life support etc., they use the brain to determine if the patient can survive without mechanical intervention to sustain life.

The prevalence of brain related disorders is substantial. In May 2008, the National Neurotechnology Initiative Act, was introduced by bi-partisan members of Congress and the Senate to allocate 200 million dollars to battle brain related illnesses. It is estimated that 1 in 3 Americans are living with a brain related illness, injury or disease. "*Bipartisan Group of Senators and Representatives Introduce Bill to Battle Brain-related Illness*" [5]

This equates to over 100 million people with this type of disability.

The ingredients that IFRA 'research', when fully researched, show that these chemical ingredients have know health risks associated with them, which are not provided to the public. The volume of chemicals used in fragrance mixtures number around 12,500, with less than 20% being researched.

NRS 585.500 Adulterated cosmetics. A cosmetic shall be deemed to be adulterated:

1. If it bears or contains any poisonous or deleterious substance which may render it injurious to users under the conditions of use prescribed in the labeling or advertisement thereof, or under such conditions of use as are customary or usual…"**Caution—This product contains ingredients which may**

cause irritation on certain individuals and a preliminary test according to accompanying directions should first be made…
[11:177:1939; 1931 NCL § 6206.10]

Table 1 shows the warnings that are referenced on the Material Safety Data Sheets (MSDS) for a few of the chemicals that AromaSys purchases from their supplier International Aromatics, Inc., with a summary of the know health effects and concerns associated with some of the chemicals being utilized, from independent Material Safety Data Sheets. There are references that the toxicological effects of these chemicals has not been fully evaluated, targets specific organs, sensitizers etc.

AromaSys is one of the major suppliers of scent branding and HVAC Air fresheners in Nevada, along with Scent-Air.

TABLE 1

CHEMICAL NAME & SYNONYMS	**MSDS STATEMENTS**
Linalool C10H18O allo-Ocimenol 2,6-Dimethylocta-2,7-dien-6-ol 3,7-Dimethylocta-1,6,dien-3-ol 3,7-Dimethyl-1,6-octadien-3-ol Linalyl alcohol	Causes skin (sensitization), eye and respiratory system irritation. Mutagen The toxicological properties of this substance have not been fully investigated.
Eugenol C10H12O2 4-Allycatechol-2-methyl ether p-Allyguaiacol 4-Allyguaiacol 4-Ally-1-hydroxy-2-methoxybenzene 1-Hydroxy-2-methoxy-4-allybenzene 4-Hydroxy-3-methoxyallybenzene 1-Hydroxy-2-methoxy-4-prop-2-ethylbenzene	**HARMFUL.** Allergic skin reaction. May cause skin sensitization, an allergic reaction which becomes evident upon re-exposure to this material. Slightly hazardous in case of skin contact (permeator). Toxic to lungs, nervous system, mucous membranes. Repeated or prolonged exposure can produce target organ damage. Eye irritant.

4-Allyl-2-methoyxphenol Eugenic Acid p-Eugenol 1,3,4-Eugenol FA 100 FEMA No. 2467 Caryophyllic acid 2-Methoxy-4-allyphenol 2-Methoxy-4-prop-2-enylphenol 2-Methyoxy-4-(2-propenyl) phenol Phenol,2-methoxy-4-(2-propenyl) Synthetic Eugenol	Target organ: Skin Mutagen This is an experimental neoplastigen, tumorigen and carcinogen. Toxicity data not evaluated.
Citral C10H16O 3,7-Dimethyl-2,6-octadienal Lemsyn GB NCI-C56348 Gernialdehyde Neral Geranial	Irritant. Hazardous in case of skin (sensitization) contact, inhalation (lung irritant), eye irritant Toxicity data not evaluated.
Citronellol C10H20O Cephrol 2,6-Dimethyl-2-octen-8-ol 3,7-Dimethyl-6-octen-1-ol Rhodinol Rodinol	Severe skin irritant and sensitization. Irritating to eyes and respiratory system. Target organs: skin eyes and respiratory system. Toxicity data not evaluated.
Geraniol C10H18O 2,6-Dimethyl-trans-2,6-octadien-8-ol 3,7-Dimethyl-trans-2,6-octadien-1-ol Geraniol Geraniol alcohol Geraniol Extra Geranyl alcohol Guaniol	Hazardous in case of skin contact (sensitization, severe irritant and permeator). Risk of serious damage to the eyes (irritant). Causes respiratory tract irritation. Target organs: Respiratory system, eyes and skin Toxicity data not evaluated.

Lemonol 2,6-Octadien-1-ol,3,7-dimethyl- trans	
Amyl Cinnamal C14H18O Amylcinnamaldehyde alpha-Amyl cinnamaldehyde Amylcinnamic acid aldehyde alpha-Amyl cinnamic aldehyde Amyl cinnamic aldehyde Alpha –Amyl-beta=phenylacrolein 2-Benzylideneheptanal Buxine Flomine Heptanal,2-benzylidene Heptanal, 2-(phenylmethylene Jasminal Jasminaldehyde Pentylcinnamaldehyde alpha-Pentylcinnamaldehyde	Irritating to eyes, respiratory system and skin (sensitization by contact). Toxicity data not evaluated.
Linalool C10H18O allo-Ocimenol 2,6-Dimethylocta-2,7-dien-6-ol 3,7-Dimethylocta-1,6,dien-3-ol 3,7-Dimethyl-1,6-octadien-3-ol Linalyl alcohol	Causes skin (sensitization), eye and respiratory system irritation. Mutagen The toxicological properties of this substance have not been fully investigated.

"Geraniol, eugenol, isoeugenol, citral and coumarin are considered natural ingredients. "compounds not yet regarded as natural substances, may be present in products claimed to be based on natural ingredients." [6]

"The murine local lymph node assay (LLNA) is currently recognized as a standalone sensitization test for determining the sensitizing potential of chemicals, and it has the advantage of yielding a quantitative endpoint that can be used to predict the sensitization potency of chemicals. …. Nine chemicals (i.e. …. cinnamicaldehyde, citral, eugenol,…) categorized as human contact allergen classes 1-5

were tested by the non-RI LLNA with the following reference allergens… isoeugenol as a class 2 human contact allergen. Sensitization potency data are useful for evaluating the sensitization risk to humans of exposure to new chemical products. ….".[7]

"Ingredients supplied by the manufacturer …Benzophenone-2.. were found to be responsible for the patients contact allergy to the commercial product. These
substances contain chemical structural alerts giving them antigenic ability. The common use of new chemicals to manufacture fragrances, and the increased number of patients sensitive to them but with negative fragrance mix reactions, makes it necessary to identify new potential fragrance sensitizers in commercial products."

"Analogous to other monoterpenes studied, such as limonene and linalool, geraniol has the potential to oxidize on air exposure and form highly allergenic compounds… The autoxidation of geraniol greatly influenced the sensitizing effect of geraniol. The oxidized samples had moderate sensitizing capacity, quite different from that of pure geraniol" [9]

"Citral is a well known contact allergen and a contact irritant." [10]

"The air-exposed samples of linalool produced clearly positive responses, and the hydro-peroxides were the strongest allergens of the tested oxidation products. The study demonstrated the importance of autoxidation on the sensitizing potential of linalool. We also conclude that the sensitizing potential differs with the composition of the oxidation mixture and thus with the air exposure time." [11]

"The two monoterpenes linalool and d-limonene are the most frequently incorporated fragrance chemicals in scented products. Previous studies on d-limonene show that this monoterpine oxidizes on air exposure (autoxidation) and that allergenic oxidation products are formed. Due to structural similarities, linalool might also form allergenic oxidation products on air exposure. The aim of the present study was to study the autoxidation of linalool and to investigate the sensitizing potential of linalool before and after air exposure…Linalool

was oxidized for 10 weeks…It is concluded that autoxidation of linalool is essential for its sensitizing potential." [12]

"It was found that the combination of two allergens in individuals allergic to both substances had a synergistic effect on the elicitation response evaluated by all three methods. The 1:1 mixtures of the two allergens elicited responses as if the doses were three to four times higher than those actually used, which is significantly more than expected if an additive effect had been present." [13]

"There are so many complaints about the respiratory effects of fragrances: "Analysis shows small particle size increasing the likelihood of inhalation and the intended stimulation of the olfactory system. At 1.5 ft. ht the variation in the concentration of each material resulted from volatilization of particles they become lighter and remain suspended. While airborne levels of the nine fragrances were reproducible, the physiological interpretation concentration is unknown at this time. One possible starting point for the biological significance of these results could be the ACGIH guidelines for Particulates Not Otherwise Classified of 10 mg/m3 for inhalable particles and 3 mg/m3 for respirable particles. These data provide an understanding of modeling for standard exposure conditions and show that any assessment of exposure from different fragranced product forms is influences by the product form. **The information will be useful in the design of future clinical studies in normal and sensitive subpopulations to assess the potential effects of inhaled fragrance materials."** [14]

It is generally known that the two main reasons for scent branding and air fresheners in public facilities are to either cover up the olfactory perception of a 'malodorous' smell or to effect the perception of the guests/visitors. Once a fragrance is created to have an effect upon perception, which is a major function of the brain and nervous system, the product now becomes classified as a drug.

As a preponderance of these are made to impede olfactory perception by the deposition of oil based particles that line the nasal mucosal linings.

If an establishment sells a version of their fragrance or air freshener they fall under:

NRS 585.520 Prohibited acts. The following acts and the causing thereof within the State of Nevada are hereby prohibited:

1. The manufacture, sale or delivery, holding or offering for sale of any food, drug, device or cosmetic that is adulterated or misbranded.

2. The adulteration or misbranding of any food, drug, device or cosmetic.

3. The sale, delivery for sale, holding for sale or offering for sale of any article in violation of NRS 585.490.

4. The dissemination of any false advertisement.

NRS 585.080 "Drug" defined.

1. "Drug" means:

*(c) Articles, other than food, intended to affect the structure or any **function of the bodies of humans** or other animals; …*

[Part 2:177:1939; 1931 NCL § 6206.01]

The Material Safety Data Sheets from the individual chemical ingredients used in fragrances and Table 1:

Air Fresheners and fragrances contain ingredients that are classified as a pesticides, endocrine disruptors, teratogens, probable carcinogens, mutagens, dermal, ocular and respiratory irritants, sensitizers, reproductive effectors, tumorigens, CNS irritants.

Industry wants you to believe that all the chemicals that are used in fragrances and air fresheners are fully tested for safety. When in reality they have only assessed a small percentage of them.

According to the National Institutes of Environmental Health Services a division of the National Institutes of Health, defines an endocrine disruptor as:

"Endocrine disruptors are chemicals that may interfere with the body's endocrine system and produce adverse developmental, reproductive, neurological, and immune effects in both humans and wildlife. A wide range of substances, both natural and man-made, are

thought to cause endocrine disruption, including…polychlorinated biphenyls, DDT and other pesticides, and plasticizers such as bisphenol A. Endocrine disruptors may be found in many everyday products…cosmetics, and pesticides. The NIEHS supports studies to determine whether exposure to endocrine disruptors may result in human health effects including lowered fertility and an increased incidence of endometriosis and some cancers. Research shows that endocrine disruptors may pose the greatest risk during prenatal and early postnatal development when organ and neural systems are forming." [15]

Air fresheners caused headaches, breathing difficulties, or other problems for 17.5% and 20.5%. [16]

"Up to 30% of the people are affected by perfumes and other fragrances although they are not aware of this", according to retired EPA scientist, Lance Wallace. The opponents to AB234, claim that enactment of the bill only effects a few people, I believe you will concur and acknowledge that this is not considered a 'small' segment of the population.

Asthma statistics:
"Asthma ranks among the most common chronic conditions in the United States, affecting an estimated 14.9 million persons in 1995 and causing over 1.5 million emergency department visits, about 500,000 hospitalizations, and over 5,500 deaths. The estimated direct and indirect monetary costs for this disease totaled $11.3 billion in 1998. Asthma disproportionately affects children and blacks. Within the general population, asthma affects females more than males; however, among children, it affects males more. The burden of asthma has been increasing over the past 20 years, especially among children."

"The prevalence among children ages 5 to 14 increased 74 percent, from 42.8 per 1,000 in 1980 to an average of 74.4 per 1,000 in 1993-94." [17]

Childhood chemical injuries create future uncertainty:

- 100% not being given accommodations at college

- 86% have/intend to complete college level courses
- 100% employment future looks bleak as to receiving accommodations
- 100% change of college or major if assured of receiving accommodations
- Childhood cancers are on the rise

NIH in October, 2007, announced they are going to spend 21 years following children to understand the effects of a wide array of factors on children's health, "to find explanations for the rising rates of premature births, childhood obesity, cancer, autism, endocrine disorders and behavioral problems". The anticipated budget is $2.7 billion. [18]

Work related chemical exposures:

- Using cleaning sprays at least once per week were 50 percent more likely to have increased asthma symptoms, wheeze, or asthma medication use in nine years than those who used such products less frequently
- Employees who used sprays at least four times per week were significantly more likely to be diagnosed with asthma than those who used them less frequently
- The strongest association was found with air fresheners, glass cleaners and furniture-cleaning sprays
- Exposure to cleaning products may be responsible for as many as one in seven cases of adult-onset asthma

Chemical Exposure Ups Brain Disorders:

Industrial chemicals may be responsible for a "silent pandemic" of brain development disorders affecting millions of children worldwide and not enough is being done to identify the risks, along with the increasing number of earlier onset of Parkinson's Disease:

- 10% of 1.5 million with Parkinson's are under 40 years of age
- ADD/ADHD has been directly linked to both allergies and environmental toxins and can be either eliminated or highly mitigated with proper diagnostic testing, control of electrolyte

imbalances, reduction of environmental toxicants (pesticides, VOC's, air fresheners, cleaning products) foods, chemicals or food additives

- ❖ Allergies (air borne, chemical, food) do mimic ADD/ADHD, etc., and with proper identification can eliminate or reduce the use of prescription drugs (Ritalin etc.) that mask the underlying problem
- ❖ Child exposed to an allergen during testing will elicit neuro-behavioral conditions that resolve when allergen is neutralized, as demonstrated in the video, Is Your Child's School Making Them Sick, by Doris Rapp, MD.
- ❖ Research utilizing twins has established that genetics probably plays a minor role in Parkinson's disease, making environmental exposures more of a probability
- ❖ 202 potentially harmful industrial chemicals that may be contributing to dramatic increases in autism, attention deficit hyperactivity disorder (ADHD), and other brain disorders among children
- ❖ Fragrances upon inhalation are introduced directly into the brain by the olfactory cells (most are lipophilic "fat loving", brain is made up of lipids)

The United States Department of Justice has accepted allergens as a component of what is covered as a disability:

The United States Department of Justice, effective March 15, 2011, under what is classified as a service animal,… tighten the definition of service animals to just dogs and in some cases miniature horses…."individually trained to do work or perform tasks for the benefit of an individual with a disability, including a physical, sensory, psychiatric, intellectual, or other mental disability.
Examples of work or tasks as defined in the new regulations include: Alerting individuals to the presence of allergens…" [19]

Many Air Fresheners Have Harmful Ingredients

"86 percent (12 of 14 top sellers) of air freshener products tested have harmful phthalates in them according to tests… Some of those tested were sold as "unscented" or "all-natural." Phthalates are known to cause hormonal abnormalities, birth defects, and reproductive

problems. None of the products tested listed phthalates on their labels."

"Researchers have also detected other chemicals of concern to human health in these products as well. The European Consumers' Organization, BEUC (Bureau Europen des Consommateurs), commissioned a study in January 2005 to analyze the chemical substances present in indoor air following the use of air fresheners (including incense, natural products, scented candles, gels, aerosols, liquid and electric diffusers. The BEUC study found volatile organic compounds (VOCs) in these products at high levels and concluded that VOCs significantly contributed to indoor air pollution. In particular, the European study detected cancer-causing chemicals such as benzene and formaldehyde in some air fresheners. Benzene is known to cause leukemia in humans, and formaldehyde has been linked to cancers of the upper airways. The majority of products also contained allergens (such as limonene). People with allergies to these chemicals could have adverse reactions, including rashes or even asthma attacks, from exposure to air freshener products." [20]

"Smog and soot worsen asthma and trigger attacks. There is some evidence that ozone (a main ingredient in smog) and diesel exhaust particles may even cause asthma in some cases." [21]

Mayo Clinic asthma and allergy specialist James T. Li, M.D. on air fresheners: "Occasional exposure to air fresheners isn't likely to cause problems, as long as the products are used as directed. However, the chemicals in air fresheners may irritate your eyes, skin and throat. In addition, long-term use of air fresheners may contribute to indoor pollution — which can sometimes trigger asthma and other lung problems." [22]

Impact of air fresheners and deodorizers on the indoor total volatile organic compounds:

Besides the chemical emissions from the building materials, daily use of household products may contribute at significant levels to the indoor volatile organic compounds (VOCs). In this study, we investigated the emission rate of VOCs and carbonyl compounds for 30 air fresheners and deodorizers by the standard small chamber test

method (JIS A 1901)……. The mean of the TVOC increment for the indoor air fresheners was 170 microg/m3, accounting for 40% of the current provisional target value, 400 microg/m3. These results suggest that daily use of household products can significantly influence the indoor air quality. [23]

New research shows that a chemical compound found in many air fresheners, toilet bowl cleaners, mothballs and other deodorizing products, may be harmful to the lungs. Human population studies at the National Institute of Environmental Health Sciences (NIEHS), a part of the National Institutes of Health, found that exposure to a volatile organic compound (VOC), called 1,4 dichlorobenzene (1,4 DCB) may cause modest reductions in lung function.

"Even a small reduction in lung function may indicate some harm to the lungs," said NIEHS researcher Stephanie London, M.D., lead investigator on the study. "The best way to protect yourself, especially children who may have asthma or other respiratory illnesses, is to reduce the use of products and materials that contain these compounds." …."Because people spend so much time indoors where these products are used, it's important that we understand the effects that even low levels might have on the respiratory system," said Leslie Elliott, Ph.D. a researcher on the NIEHS-funded study. "There has been very little research on the health effects of this particular compound in non-occupational settings." [24]

"During air-freshener use, d-limonene, dihydromyrcenol, linalool, linalyl acetate, and beta-citronellol) were emitted at 35-180 mg/day over 3 days while air concentrations averaged 30-160 microg/m3. While effective cleaning can improve the healthfulness of indoor environments, this work shows that use of some consumer cleaning agents can yield high levels of volatile organic compounds, including glycol ethers--which are regulated toxic air contaminants--and terpenes that can react with ozone to form a variety of secondary pollutants including formaldehyde and ultrafine particles. " [25]

"Furthermore, relatively few studies have analyzed the chemicals emitted from fragranced products- In perhaps the largest and most relevant studies, Wallace and coauthors (1991) and Cooper and co-authors (1992) analyzed 31 fragranced products such as perfumes,

deodorants, soaps, fabric softeners, and air fresheners, and identified approximately 150 unique VOCs. The most common VOCs, emitted from at least half of the products, were ethanol, limonene, linalool, ß-phenethyi alcohol, and ß-myrcene. Steinemann (2009) analyzed six top*selling fragranced products (air fresheners and laundry supplies), and identified more than 50 unique VOCs, The most common VOCs, emitted from al least half of the products, were ethanol, limonene, a-pinene, ß-pinene, carene isomer, 2,4-di methyl-3-cyclohexene-l-carboxaldehyde (Triplai 1), acetaldehyde, benzyl acetate, 3-hexen-l-ol, and linalool. Also emitted from 5/6 of the products were one or more "Hazardous Air Pollutants" (U.S. Environmental Protection Agency [U.S. E.P.A], 2002), including acetaldehyde, chloromethane, and 1,4'dioxane. In addition to primary pollutants, fragrance VOCs (e.g., limonene) can react readily with ozone to produce secondary pollutants such as formaldehyde, organic aerosols, ultrafine particles, and the hydroxyl radical (Nazaroff & Weschler, 2004; Sarwar, Olson, Corsi. & Weschlcr. 2004; Singer el al., 2006) [26]

INCENSE

Incense Use and Respiratory Tract Carcinomas

“Incense use is an integral part of daily life in large parts of Asia. The burning of incense is a powerful producer of particulate matter and the smoke contains a multitude of well-characterized carcinogens. However, to the authors’ knowledge, no convincing association has been reported between exposure to incense smoke and the development of cancer. Therefore, the relation between incense use and the risk of respiratory tract carcinomas was analyzed in a prospective cohort study.

The incense used in Asian countries is made of plant material mixed with essential oils and forms a combustible mixture that releases fragrant smoke upon burning. The burning of incense is a powerful producer of particulate matter, and since the late 1960s incense smoke has been known to contain a multitude of possible carcinogens, including polyaromatic hydrocarbons (PAHs), carbonyls, and benzene.

Consistent with this finding, incense smoke condensates have been found to have mutagenic and genotoxic activity, and the genotoxicity of certain incense smoke condensates in mammalian cells is higher than that of tobacco smoke condensate.

Incense is sold without a warning label, and given the high prevalence of use and the often involuntary nature of the exposure, clarifying the role of incense smoke as a carcinogen is important from a public health perspective.

A dose-dependent, increased risk of non-NPC upper respiratory tract carcinomas was present in both never-smokers and ever-smokers, but the association was only found to be statistically significant among never-smokers (P for trend 5 .04). Among never-smokers, a 3-fold increased risk was observed for individuals who used incense during the day or at all times. Incense use was found to be unrelated to the risk of NPC or lung carcinoma, regardless of cigarette smoking status.

This association is consistent with a large number of studies identifying carcinogens in incense smoke, and given the widespread and sometimes involuntary exposure to smoke from burning incense, these findings carry significant public health implications. In addition to initiatives to reduce incense smoke exposure, future studies should be undertaken to identify the least harmful types of incense. [27]

Childhood leukemia and parents' occupational and home exposures. *Journal of the National Cancer Institute*, 79(1):39-46.

From comparing mutagenic potencies of incense, formaldehyde, and acetaldehyde to *Salmonellatyphimurium* T102, Chang et al. (1997) concluded that incense smoke contains highly active compounds with a higher mutagenic potency than formaldehyde. Sato et al. (1980) and Rasmussen (1987) have also found that incense smoke is mutagenic to *S. typhimurium* TA98, TA100, and TA104. Incense Smoke Condensates (ISCs), the particles released during incense burning, were found to be mutagenic and/or genotoxic in the Ames test, the SOS chromotest, and the SCE/CHO assays. The genotoxicity of certain ISCs in mammalian cells was also found to

behigher than particles produced from tobacco smoke condensates (TSCs) (Chen et al., 1990). Chang HL, Kuo ML, Lin JM. 1997. Mutagenic activity of incense smoke in comparison to formaldehyde and acetaldehyde in Salmonella typhimurium TA102. [28]

“As free radicals are also known to play a crucial role in these processes, we developed an electron spin resonance (ESR)-based methodology to quantify the radical-generating capacity of PM. We applied this methodology in order to evaluate the effect of burning candles and incense, known sources of indoor air PM, on the radical-generating capacity of PM in a Roman Catholic church (Onze Lieve Vrouwe Basiliek, Maastricht, The Netherlands).

Furthermore, a signal of an unidentified free radical is found after burning incense and, even more pronounced, after burning candles in the chapel. A search in the US National Institute of Environmental Health Sciences (NIEHS) spin trap database US National Institute of Environmental Health Services (NIEHS). Spin trap database. dir-apps.niehs.nih.gov/stdb/index.cfm. did not link this ESR signal to any known type of free radical. Pre-service PAH levels in both church and chapel were higher as compared with the outdoor measurements, and increased by a factor of four and 10 after burning incense and candles, respectively. In view of the exceptionally high particulate matter passing through a size-selective inlet with a 50% efficiency cut-off at a10-mm aerodynamic diameter and high polycyclic aromatic hydrocarbons levels found in this church, combined with a high radical-generating capacity, it cannot be excluded that regular exposure to candle- or incense-derived particulate matter results in increased risk of lung cancer or other pulmonary diseases. Further research is needed to characterize the genotoxic potential of the unidentified radicals and to evaluate the actual health risk associated with exposure to this mix of free radicals and carcinogenic polycyclic aromatic hydrocarbons.” [29]

Exposure to pollution at these levels is almost certainly not good for human health. "Incense and candles can emit ultrafine, lung-damaging particulate matter that's capable of penetrating deep into the lungs," Loupa told *environmentalresearchweb*. "From our personal communication with more than a hundred priests they have health problems that possibly are work related, such as asthma

aggravation, allergy-like symptoms, irritation of the respiratory tract and lung cancer." [30]

“Several studies found associations between exposure to incense smoke and many illnesses, including cancer, asthma, and contact dermatitis. Incense burning was found to be a contributing factor in the occurrence of asthma for Quatar children’” [31] “Burning incense produces volatile fragrances that, once airborne, can reach exposed skin, causing dermatitis” [32] “An elevated risk for leukemia was found in children whose parents burned incense during pregnancy or while nursing.” (Lowengart et al., 1987). [33]

OZONE:

Ozone Generators that are Sold as Air Cleaners

“When inhaled, ozone can damage the lungs. Relatively low amounts of ozone can cause chest pain, coughing, shortness of breath and, throat irritation. It may also worsen chronic respiratory diseases such as asthma as well as compromise the ability of the body to fight respiratory infections.” [34]

“When terpenes and related compounds in cleaning products and air fresheners were exposed to ozone, we consistently observed a high degree of reactive chemistry. The effects included reduced concentrations of primary constituents of the products, reduced ozone concentrations, enhanced concentrations of formaldehyde, measurable levels of the OH radical, and substantial secondary production of particulate matter.” [35]

“The use of certain common cleaning products and air fresheners indoors can cause an increase in the indoor airborne concentrations of gaseous and particulate species. When these increases occur in occupied spaces, human inhalation exposures to the species will result. In the event that harmful species are directly released from a product, there may be increases in adverse health risks. Because of the large fraction of time people spend indoors, such increases are of potential concern.”[35]

“In a study that examined the inhalation concentrations of constituents found in a surrogate air freshener, fragrance constituents associated with airborne 6 particles accounted for approximately 47% of the adult and 72% of the child exposures in the breathing zone during the first minute after product use of an aerosol spray (Rogers et al., 2005).” [36]

“The autoxidation of glycol ethers produces peroxides and hydroperoxides as primary products and alkyl poly(ethylene glycol) aldehydes, alkyl poly(ethylene glycol) formates, hydroxyaldehydes, and even formaldehyde as secondary products (Bodin et al., 2003). These processes have been the subject of considerable study since some of the products are irritants and skin sensitizers (Bodin et al., 2000; 2001; 2002; 2003).” [37]

“Formaldehyde is of particular interest as a toxic air contaminant with a relatively low reference exposure level. Formaldehyde yields, expressed as the moles of formaldehyde generated per mole of ozone consumed, were in the range 16-28% for the experiments involving the volatile constituents of the cleaning products. With the air freshener, formaldehyde yields were 29-90%.” [36]

“Different air fresheners have different constituents. The ozone-reactive constituents, primarily the terpenoids, vary with the scent of the air freshener.” [37]

“In considering this example, it is important to remember that the formaldehyde generated by the ozone/air freshener chemistry will be added to formaldehyde emitted into the room from other sources (e.g., furniture, plywood and other pressed wood products, fiberglass insulation, etc.).”[37]

“Fragrances are inherent to air fresheners and may improve the aesthetic character of a cleaning product. A challenge is to employ fragrances that are less likely to produce hazardous secondary products.”[37]

”In order to test the hypothesis that ozone (O3)-induced changes in lung function and respiratory tract injury/inflammation are greater in subjects with asthma than in normal subjects, we exposed 18

asthmatic subjects, on separate days, to O3 (0.2 ppm) and filtered air for 4 h during exercise. Symptom questionnaires were administered before and after exposure, and pulmonary function tests (FEV1, FVC, and specific airway resistance [SRaw]) were performed before, during, and immediately after each exposure. Fiberoptic Bronchoscopy, with proximal airway lavage (PAL) of the isolated left main bronchus and bronchoalveolar lavage (BAL; bronchial fraction, **the first 10 ml of fluid recovered) of the right middle lobe, was performed 18 h after each exposure.** The PAL, bronchial fraction, and BAL fluids were analyzed for the following endpoints: total and differential cell counts; total protein, lactate dehydrogenase (LDH), fibronectin, interleukin-8 (IL-8), granulocyte-macrophage colony-stimulating factor (GM-CSF), myeloperoxidase (MPO), and transforming growth factor-beta (TGF beta 2) concentrations. **We found a significant O3 effect on FEV1, FVC, SRaw ($p < 0.04$) and lower respiratory symptoms ($p < 0.001$) for the asthmatic subjects. Ozone exposure also significantly increased the percent neutrophils in PAL ($p < 0.01$); percent neutrophils, total protein, and IL-8 in the bronchial fraction ($p < 0.001$, $p < 0.05$, and $p < 0.01$, respectively); and the percent neutrophils, total protein, LDH, fibronectin, IL-8, GM-CSF, and MPO in BAL ($p < 0.001$, $p < 0.01$, $p < 0.01$, $p < 0.001$, $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively) for the asthmatic subjects.** There were no significant differences in the lung function responses of the asthmatic subjects in comparison with a group of normal subjects (n = 81) previously studied using an identical protocol, although there was a trend toward a greater O3-induced increase in SRaw in the asthmatic subjects ($p < 0.13$)**. In contrast, the asthmatic subjects showed significantly greater ($p < 0.05$) O3-induced increases in several inflammatory endpoints (percent neutrophils and total protein concentration) in BAL as compared with normal subjects who underwent Bronchoscopy (n = 20). Our results indicate that asthmatic persons may be at risk of developing more severe O3-induced respiratory tract injury/inflammation than normal persons, and may help explain the increased asthma morbidity associated with O3 pollution episodes observed in epidemiologic studies.**" [38]

"Although ozone (O3) has been shown to induce inflammation in the lungs of animals, very little is known about its inflammatory effects on

humans. In this study, **11 healthy nonsmoking men, 18 to 35 yr of age (mean, 25.4 +/- 3.5),** were exposed once to 0.4 ppm O3 and once to filtered air for 2 h with intermittent exercise. Eighteen hours later, bronchoalveolar lavage (BAL) was performed and the cells and fluid were analyzed for various indicators of inflammation. **There was an 8.2-fold increase in the percentage of polymorphonuclear leukocytes (PMN) in the total cell population, and a small but significant decrease in the percentage of macrophages after exposure to O3. Immuno-reactive neutrophil elastase often associated with inflammation and lung damage increased by 3.8-fold in the fluid while its activity increased 20.6-fold in the lavaged cells. A 2-fold increase in the levels of protein, albumin, and IgG suggested increased vascular permeability of the lung. Several biochemical markers that could act as chemotactic or regulatory factors in an inflammatory response were examined in the BAL fluid (BALF). The level of complement fragment C3 alpha was increased by 1.7-fold.** The chemotactic leukotriene B4 was unchanged while prostaglandin E2 increased 2-fold. In contrast, three enzyme systems of phagocytes with potentially damaging effects on tissues and microbes, namely, NADPH-oxidase and the lysosomal enzymes acid phosphatase and beta-glucuronidase, were increased neither in the lavaged fluid nor cells. In addition, the amounts of fibrogenic-related molecules were assessed in BALF. “ [39]

EPA on ozone

Introduction and Purpose

“Ozone generators that are sold as air cleaners intentionally produce the gas ozone. Often the vendors of ozone generators make statements and distribute material that lead the public to believe that these devices are always safe and effective in controlling indoor air pollution. For almost a century, health professionals have refuted these claims (Sawyer, et. al 1913; Salls, 1927; Boeniger, 1995; American Lung Association, 1997; Al-Ahmady, 1997). The purpose of this document is to provide accurate information regarding the use of ozone-generating devices in indoor occupied spaces. This information is based on the most credible scientific evidence currently available.

Some vendors suggest that these devices have been approved by the federal government for use in occupied spaces. To the contrary, no agency of the federal government has approved these devices for use in occupied spaces. Because of these claims, and because ozone can cause health problems at high concentrations, several federal government agencies have worked in consultation with the U.S. Environmental Protection Agency to produce this public information document.

Table 1. Ozone Heath Effects and Standards

Health Effects	**Risk Factors**	**Health Standards***
Potential risk of experiencing: Decreases in lung function Aggravation of asthma Throat irritation and cough Chest pain and shortness of breath Inflammation of lung tissue Higher susceptibility to respiratory infection	**Factors expected to increase risk and severity of health effects are:** Increase in ozone air concentration Greater duration of exposure for some health effects Activities that raise the breathing rate (e.g., exercise) Certain pre-existing lung diseases (e.g., asthma)	The **Food and Drug Administration** (FDA) requires ozone output of indoor medical devices to be no more than 0.05 ppm. The **Occupational Safety and Health Administration** (OSHA) requires that workers not be exposed to an average concentration of more than 0.10 ppm for 8 hours. The **National Institute of Occupational Safety and Health** (NIOSH) recommends an upper limit of 0.10 ppm, not to be exceeded at any time. EPA's National Ambient Air Quality Standard for ozone is a maximum 8 hour average outdoor concentration of 0.08 ppm (see - the Clean Air Act - www.epa.gov/air/caa/title1.html#ib)
(* ppm = parts per million)		

Available scientific evidence shows that at concentrations that do not exceed public health standards, ozone has little potential to remove indoor air contaminants.

First, a review of scientific research shows that, for many of the chemicals commonly found in indoor environments, the reaction process with ozone may take months or years (Boeniger, 1995). For all practical purposes, ozone does not react at all with such chemicals. And contrary to specific claims by some vendors, ozone generators are not effective in removing carbon monoxide (Salls, 1927; Shaughnessy et al., 1994) or formaldehyde (Esswein and Boeniger, 1994).

Second, for many of the chemicals with which ozone does readily react, the reaction can form a variety of harmful or irritating by-products (Weschler et al., 1992a, 1992b, 1996; Zhang and Lioy, 1994). For example, in a **laboratory experiment that mixed ozone with chemicals from new carpet, ozone reduced many of these chemicals, including those which can produce new carpet odor. However, in the process, the reaction produced a variety of aldehydes, and the total concentration if organic chemicals in the air increased than decreased after the introduction of ozone (Weschler, et. al., 1992b)**. In addition to aldehydes, ozone may also increase indoor concentrations of formic acid (Zhang and Lioy, 1994), both of which can irritate the lungs if produced in sufficient amounts. Some of the potential by-products produced by ozone's reactions with other chemicals are themselves very reactive and capable of producing irritating and corrosive by-products (Weschler and Shields, 1996, 1997a, 1997b). Given the complexity of the chemical reactions that occur, additional research is needed to more completely understand the complex interactions of indoor chemicals in the presence of ozone.

Third, ozone does not remove particles (e.g., dust and pollen) from the air, including the particles that cause most allergies. However, some ozone generators are manufactured with an "ion generator" or "ionizer" in the same unit. An ionizer is a device that disperses negatively (and/or positively) charged ions into the air. These ions attach to particles in the air giving them a negative (or positive) charge so that the particles may attach to nearby surfaces such as

walls or furniture, or attach to one another and settle out of the air. In recent experiments, ionizers were found to be less effective in removing particles of dust, tobacco smoke, pollen or fungal spores than either high efficiency particle filters or electrostatic precipitators. (Shaughnessy et al., 1994; Pierce, et al., 1996). However, it is apparent from other experiments that the effectiveness of particle air cleaners, including electrostatic precipitators, ion generators, or pleated filters varies widely (U.S. EPA, 1995).

There is evidence to show that at concentrations that do not exceed public health standards, ozone is not effective at removing many odor-causing chemicals.

In an experiment designed to produce formaldehyde concentrations representative of an embalming studio, where formaldehyde is the main odor producer, ozone showed no effect in reducing formaldehyde concentration (Esswein and Boeniger, 1994). Other experiments suggest that body odor may be masked by the smell of ozone but is not removed by ozone (Witheridge and Yaglou, 1939). Ozone is not considered useful for odor removal in building ventilation systems (ASHRAE, 1989)."

While there are few scientific studies to support the claim that ozone effectively removes odors, it is plausible that some odorous chemicals will react with ozone. For example, in some experiments, ozone appeared to react readily with certain chemicals, including some chemicals that contribute to the smell of new carpet (Weschler, 1992b; Zhang and Lioy, 1994). Ozone is also believed to react with acrolein, one of the many odorous and irritating chemicals found in secondhand tobacco smoke (US EPA, 1995).

If used at concentrations that do not exceed public health standards, ozone applied to indoor air does not effectively remove viruses, bacteria, mold, or other biological pollutants.
Some data suggest that low levels of ozone may reduce airborne concentrations and inhibit the growth of some biological organisms while ozone is present, but ozone concentrations would have to be 5 - 10 times higher than public health standards allow before the ozone could decontaminate the air sufficiently to prevent survival and

regeneration of the organisms once the ozone is removed (Dyas, et al.,1983; Foarde et al., 1997).

Even at high concentrations, ozone may have no effect on biological contaminants embedded in porous material such as duct lining or ceiling tiles (Foarde et al, 1997). In other words, ozone produced by ozone generators may inhibit the growth of some biological agents while it is present, but it is unlikely to fully decontaminate the air unless concentrations are high enough to be a health concern if people are present. Even with high levels of ozone, contaminants embedded in porous material may not be affected at all.

But many factors affect the indoor concentration of ozone so that under some conditions ozone concentrations may exceed public health standards.

In one study (Shaughnessy and Oatman, 1991), a large ozone generator recommended by the manufacturer for spaces "up to 3,000 square feet," was placed in a 350 square foot room and run at a high setting. The ozone in the room quickly reached concentrations that were exceptionally high--0.50 to 0.80 ppm which is 5-10 times higher than public health limits

None of the studies reported above involved the simultaneous use of more than one device. The simultaneous use of multiple devices increases the total ozone output and therefore greatly increases the risk of excessive ozone exposure.” [34]

“The public is advised to use proven methods of controlling indoor air pollution. These methods include eliminating or controlling pollutant sources, increasing outdoor air ventilation, and using proven methods of air cleaning.” [40]

“Also, it may be prudent to limit use of products containing ozone-reactive constituents when indoor ozone concentrations are elevated either because of high ambient ozone levels or because of the indoor use of ozone-generating equipment.” [41]

It would be prudent to quickly summarize how these items can be replaced with safer and effective remedies currently available.

Currently, the Catholic Church has electric or LED candles in some of their parishes. These already implemented alternatives, come in various sizes, shapes, that complete replacement would be both safer for attendees and cost effective. As they are a one time expenditure and candles require constant financial outlays to replace them

When air fresheners are utilized because of a musty odor, that requires immediate building attention, as the musty odors are produced by the mycotoxins from mold, mildew and water damaged areas. To decrease the perception of second hand smoke, increased air exchanges will dilute the smoke with a neutral effect upon the occupants of the structure.

When someone has to go outside for a breath of fresh air, the building's indoor air environment warrants attention.

Hotels and casinos must comply with fire code regulations regarding candles in hotel rooms. They have alternatives to flame burning candles, it would not be a financial hardship to replace the candles in the restaurants. The wick type table candles, use kerosene, which should not be inhaled by anyone in a closed environment.

Wedding chapels can provide both candlelight ceremonies, with LED tapers, candles or other shape mood lighting at a minimal cost. Additionally, they can sell the candles to the bride and groom as a remembrance of their ceremony. These would actually increase their net profits.

There are LED lights/candles that fit into religious symbols such as a the Menorah.

Ozone has been shown to be ineffective at safe levels and it's use has no purpose in any public accommodation.

If you have any further questions, I would be pleased to answer them or testify at any committee meeting addressing the necessity of this bill's passage.

Respectfully submitted.

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President/Executive Director

Jack Dwayne Thrasher, Ph.D.,
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Technical Director

Cc: Assemblyman Paul Aizley

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