



Finally, a “National Occupational Exposure Survey:” Let’s Prove or Disprove the Very Bleak Picture of Worker Risks shown in Existing Exposure Data

A “Stakeholder Perspective” for the
EPA TSCA Exposure Assessment Workshop
January 12, 2023

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[all opinions are my own and not necessarily those of UM-SPH, or anyone else!]

BRIEFEST OUTLINE OF PRESENTATION

1. Toxicant exposures and risks in the workplace absolutely dwarf what EPA is used to seeing.
2. “Compliance with OSHA requirements,” *even when such exists*, offers about a “square inch of comfort on a bed of nails.”
3. OSHA maintains a large database of > 2.6 million exposure measurements– accessible online although not all data fields are currently made available.
4. A couple of examples of mining these data to show “NON-compliance with existing standards.”
5. The only way to know what worker exposures are is to mount a study that should have been done decades ago. Perhaps EPA, at long last, can step forward. I offer a preliminary perspective on what such a nationwide survey would cost, and how to increase its cost-effectiveness.
6. A very brief cautionary statement about exposure DURATION (working lifetime assumptions).
7. I implore EPA to continue this dialogue by convening a follow-up meeting to discuss:
 - Dose-response controversies in occupational/environmental risk assessment (esp. thresholds and the clinging to the outdated/unhelpful RfC/RfD paradigm);
 - Causality;
 - A quantitative definition of “Acceptable Risk,” relevant to the workplace.

TABLE 2
Estimated Number of Disease Deaths, Nonfatal Cases, and
2007

Disease and Subcategories	Number of Deaths and Cases Percentage (of column) for Deaths Only
Fatal diseases	
Respiratory diseases	
Pneumoconiosis	985 (1.8%)
Asthma	591 (1.1%)
Chronic obstructive pulmonary disease (COPD)	18,411 (34.4%)
Pulmonary tuberculosis	25 (<0.1%)
Cancer	
Lung cancer	15,366 (28.8%)
Bladder cancer	1642 (3.1%)
Mesothelioma	2194 (4.1%)
Leukemia	369 (0.7%)
Laryngeal cancer	313 (0.6%)
Skin cancer	66 (0.1%)
Sinonasal cancer	116 (0.2%)
Nasopharynx cancer	148 (0.3%)
Kidney cancer	93 (0.2%)
Liver cancer	79 (0.1%)
All cancers combined	20,386 (38.1%)
Circulatory disease	
Coronary heart disease due to job control, shift work, or noise ^a	9,809 (18.4%)
Coronary heart disease due to environmental tobacco smoke ^a	2,415 (4.5%)
Stroke due to noise ^a	80 (0.1%)
All circulatory diseases	12,304 (23.0%)
All other diseases	
Renal disease	636 (1.2%)
Liver disease from hepatitis B and C	107 (0.2%)
Subtotal for fatal diseases	53,445

J. Paul Leigh, 2011, "Economic Burden of Occupational Injury and Illness in the United States, *Millbank Quarterly*, 89(4); 728-772.

(citing Steenland, K., C. Burnett, N. Lalich, E. Ward, and J. Hurrell. 2003. "Dying for Work: The Magnitude of US Mortality from Selected Causes of Deaths Associated with Occupation." *American Journal of Industrial Medicine* 43(5):461-82.)

Number of deaths for leading causes of death

- Heart disease: 614,348
- Cancer: 591,699
- Chronic lower respiratory diseases: 147,101
- Accidents (unintentional injuries): 136,053
- Stroke (cerebrovascular diseases): 133,103
- Alzheimer's disease: 93,541
- Diabetes: 76,488
- Influenza and pneumonia: 55,227
- Nephritis, nephrotic syndrome, and nephrosis: 48,146
- Intentional self-harm (suicide): 42,773

Source: [Health United States, 2015 Table 19 \[PDF- 9.8 MB\]](#) (Data are for 2014)

Global Estimates of the Burden of Injury and Illness at Work in 2012

Jukka Takala,¹ Päivi Hämäläinen,² Kaija Leena Saarela,³ Loke Yoke Yun,¹ Kathiresan Manickam,¹ Tan Wee Jin,¹ Peggy Heng,¹ Caleb Tjong,¹ Lim Guan Kheng,¹ Samuel Lim,¹ and Gan Siok Lin¹

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TABLE III. Work-related Injuries and Diseases in High-income Countries. (EU27 countries are included in the list and total for EU27 is given separately.)

Region	Economically Active Population	Fatal (Reported)	Four or more days absence	Fatal Injuries ILO estimates	Four or more days absence: ILO mid-point estimate	Fatal work-related diseases	Total work-related mortality
United Kingdom	61,110,000	5,214	1,078,140	5,370	5,594,188	95,808	101,179

OSHA (1970-present): quantitative exposure limits for EIGHTEEN substances

German “Maximale Arbeitsplatzkonzentration (MAK)” (1958-present): limits for over TWELVE HUNDRED substances



Asbestos
Vinyl chloride
Coke Oven Emissions
Benzene
Dibromochloropropane
Arsenic
Cotton Dust
Acrylonitrile
Lead
Ethylene Oxide
Formaldehyde
4,4-methylenedianiline
Cadmium
1,3-Butadiene
Methylene Chloride
Chromium (VI)
Silica (crystalline)
Beryllium

OSHA *RARELY* ISSUES “GENERAL DUTY CLAUSE” VIOLATIONS FOR HEALTH HAZARDS

From 1998-2008 (federal and state-run programs combined), OSHA issued **19,894** GDC violations. Of these, ...

- One (1) cited overexposure to a carcinogen (β -estradiol at a drug co.)
- Six (6) cited risk of cancer (2 for sunlight, 1 for wood dust, 1 for TCDD, 2 for cytotoxic drugs)
- Thirty (30) cited any exceedance of any TLV[®]
 - 8 of these were for heat stress
 - 6 were for ammonia
 - 1 each for CO, welding fume, FeSO_4 , R-123, MDI

[37/19,894 < 0.2%]

11. Toxicological Information

Exposure Effects:

Skin Contact:	Causes skin irritation.
Skin Absorption:	May be harmful if absorbed through skin.
Eye Contact:	Causes eye irritation.
Inhalation:	May be harmful if inhaled. Material is irritating to mucous membranes and upper respiratory tract.
Ingestion:	May be harmful if swallowed.

The ENTIRE health effects section of an August 2004 MSDS for diacetyl.

To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

The New England Journal of Medicine

CLINICAL BRONCHIOLITIS OBLITERANS IN WORKERS AT A MICROWAVE-POPCORN PLANT

KATHLEEN KREISS, M.D., AHMED GOMAA, M.D., Sc.D., GREG KULLMAN, Ph.D., KATHLEEN FEDAN, B.S.,
EDUARDO J. SIMOES, M.D., M.Sc., M.P.H., AND PAUL L. ENRIGHT, M.D.

ABSTRACT

Background In May 2000, eight persons who had formerly worked at a microwave-popcorn production plant were reported to have severe bronchiolitis obliterans. No recognized cause was identified in the plant. Therefore, we medically evaluated current employees and assessed their occupational exposures.

The relation between cumulative diacetyl exposure and changes in pulmonary function suggests that diacetyl may be a cause of respiratory disease or a marker of the causative exposures in this population.

I've been conducting "stated-preference" surveys of the "value of a statistical life" (VSL) for several years, and the idea that EPA should use "revealed-preference" VSL data—workers "demand" higher wages for riskier jobs because they understand the probabilities and can bargain—is, to use a technical term, "nuts."



“[AMF testimony] I have rarely seen a more brazen, more inaccurate, and more offensive statement in my 35 years in and around government as this one (a 2017 stakeholder comment to EPA on the first ten TSCA chemicals):”

“given that OSHA protocols are designed to regulate risk to worker populations, it should be the unusual case where an unreasonable risk may present to a worker population under conditions of use.”

“I am here to emphasize that in *every single case where OSHA has regulated and in every single case where OSHA has not regulated, unreasonable risks to workers do remain*. Fifty thousand annual premature deaths, and workplace concentrations tens of thousands of times higher than EPA limits, attest to the willful blindness of [this group’s] statement and to the need for Congress to make good on its legislative amendments.”

**MISMANAGING CHEMICAL RISKS: EPA'S FAILURE
TO PROTECT WORKERS**

HEARING

BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE
CHANGE

OF THE

COMMITTEE ON ENERGY AND
COMMERCE

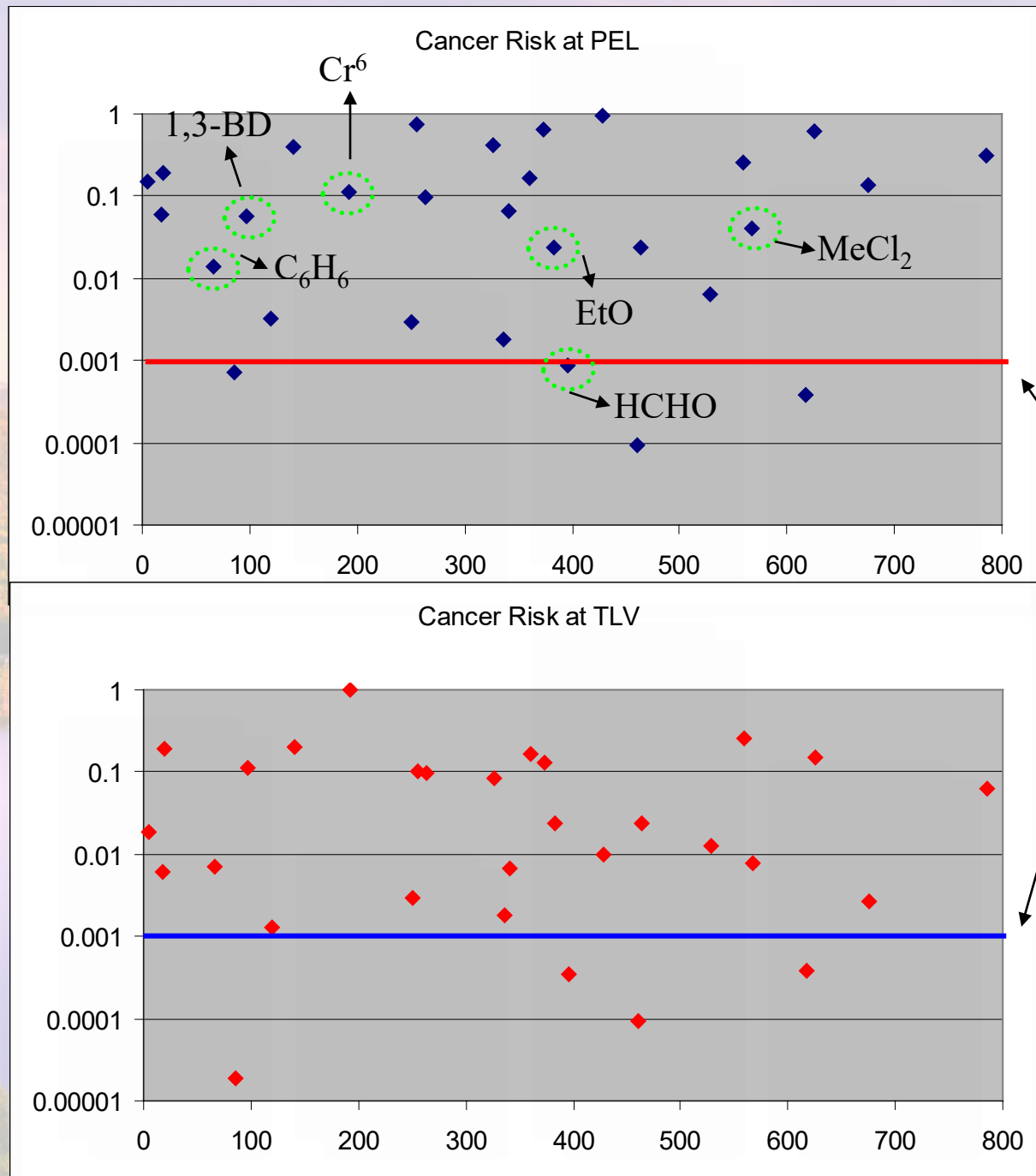
HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

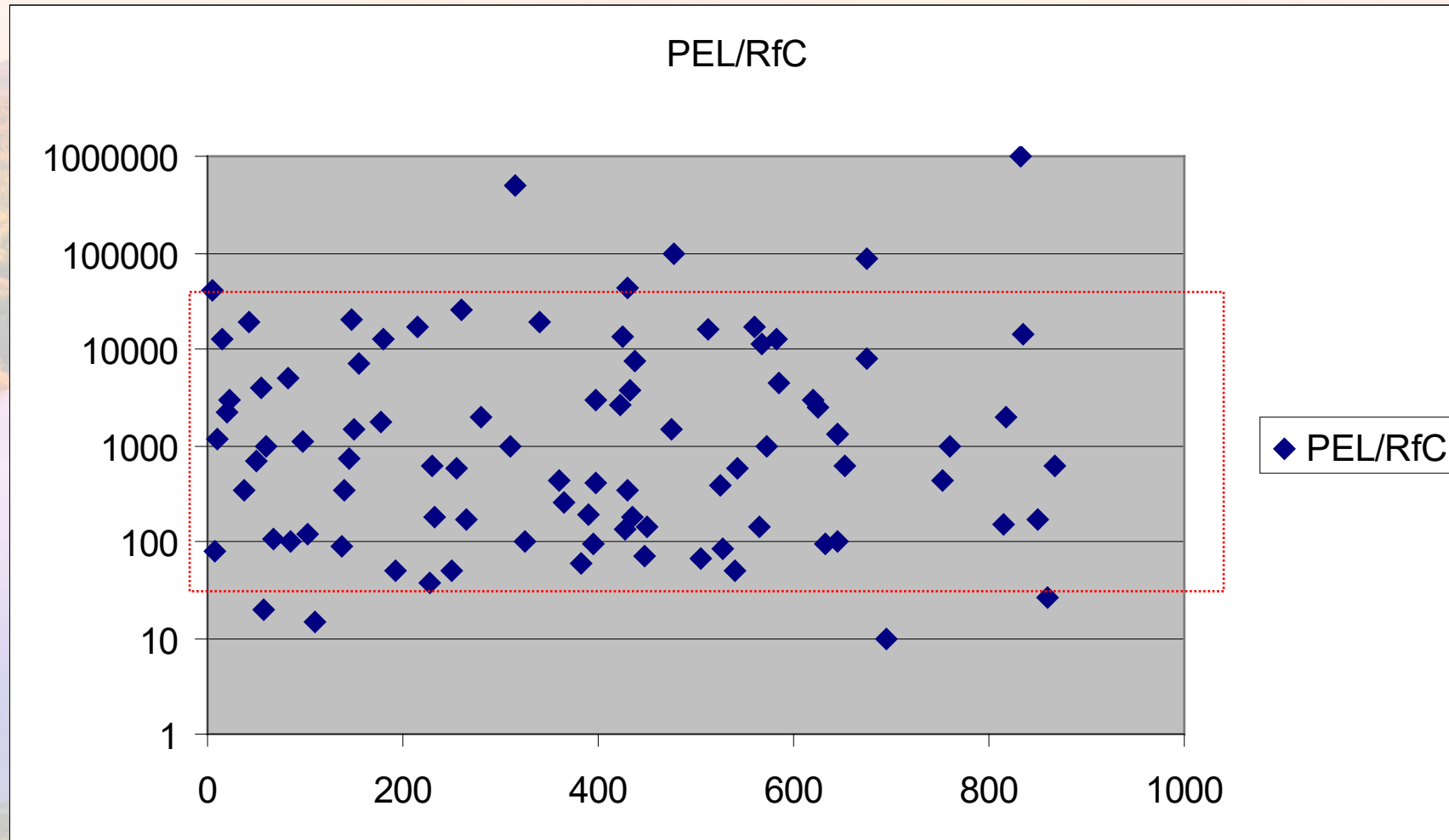
MARCH 13, 2019

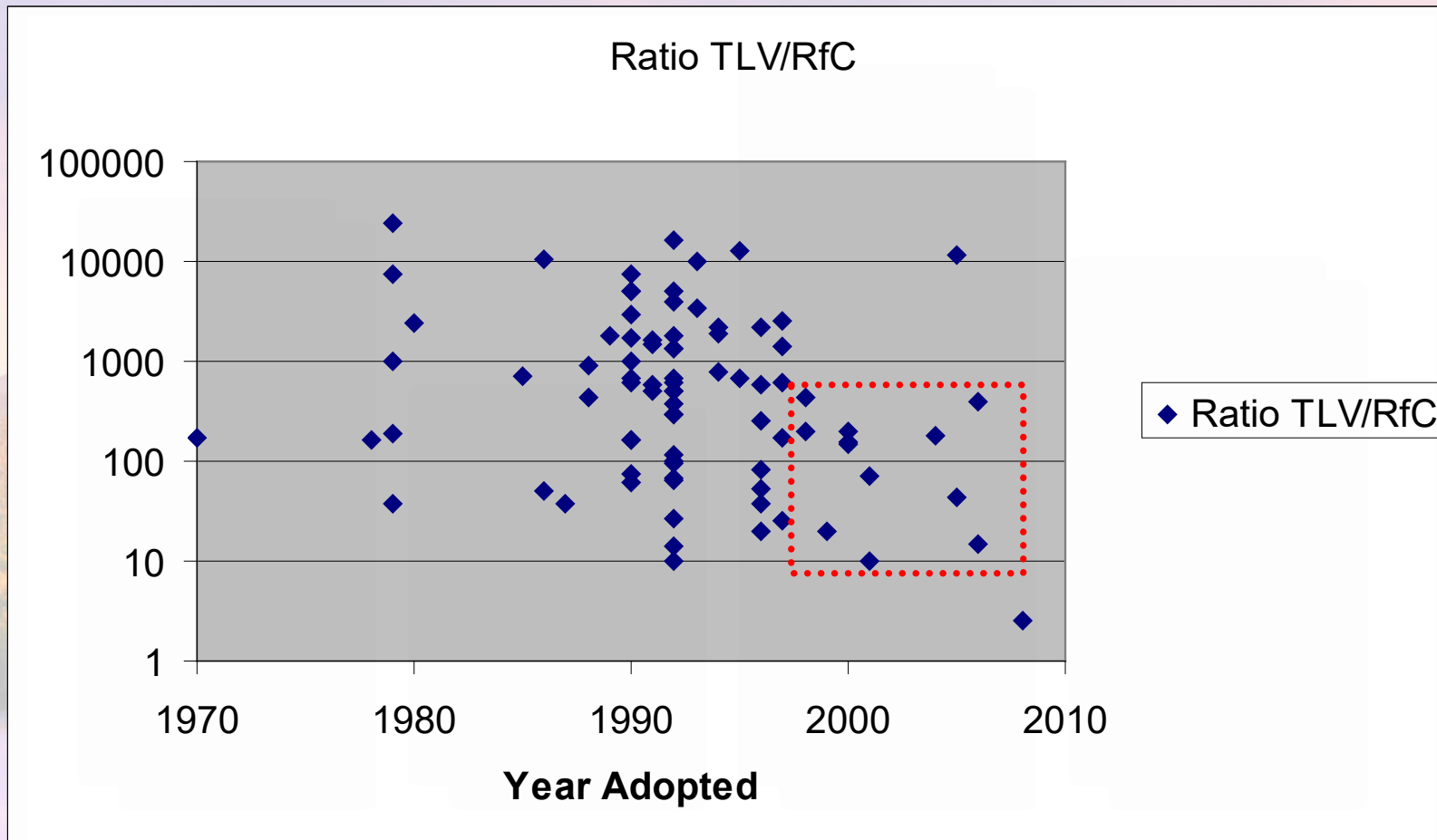
Serial No. 116-18



1/1000: uppermost end of
Supreme Court acceptable
risk range in *Benzene*

(most of the PELs are between 50 and 50,000 times the EPA RfC—
a factor of 1000 dispersion about this “gold standard” of non-cancer risk)





- 11 of the most recent 13 TLVs are within 10x to 400x of the RfC (**factor of 40 dispersion**)
- Of 5 TLVs from 1979, GM (TLV/RfC)= 1060;
of 6 TLVs since 2004, GM= 105



[http://iw-
files.s3.amazonaws.com/apps/2015/06/oshadata/embed.html?
initialWidth=1260&childId=newProject](http://iw-files.s3.amazonaws.com/apps/2015/06/oshadata/embed.html?initialWidth=1260&childId=newProject)

[https://publicintegrity.org/inequality-poverty-opportunity/workers-rights/worker-health-and-
safety/unequal-risk/methodology-of-unequal-risk-investigation/](https://publicintegrity.org/inequality-poverty-opportunity/workers-rights/worker-health-and-safety/unequal-risk/methodology-of-unequal-risk-investigation/)

Inspection #
Sample #
IMIS code (substance name)
Sample duration
OSHA office
CSHO
Instrument
Lab_number
Type (P, A, W, B)
Result
UOM (mg/m³, ppm. Etc)
SIC
8 TWA calculated (Yes/No)
Date_sampled
Date_received
Field_number
Blank (Y/N)
Air volume
Weight
Substance name
Qualifier (blank, ND)
Establishment name, street address, city, state, zip
Job title (sparse...)
Duns number
NAICS code



UNITED STATES
DEPARTMENT OF LABOR



Occupational Safety and Health Administration

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Data & Statistics / Chemical Exposure Health Data

Chemical Exposure Health Data

OSHA compliance officers often take industrial hygiene samples when monitoring worker exposures to chemical hazards. Many of these samples are submitted to the Salt Lake Technical Center (SLTC) for analysis. The sampling results included on this web page represent the records of the SLTC sampling information system from 1984 forward. They include data on personal, area, and bulk samples for various airborne contaminants. All inspection sampling results will be included here once the case is closed. OSHA does not publicly disclose information from the following types of cases: open inspections and citations currently under contest or under appeal to the Occupational Safety and Health Review Commission or the U.S. Courts of Appeals. After litigation has concluded, the sampling data from the related inspection will be added at the next scheduled update. OSHA updates the data on this web page semi-annually in January and July.

Personal sampling results represent the exposure to the individual who was actually wearing a sampling device. Area samples are taken in a fixed location and results may represent the potential risk from airborne contaminants or physical agents to workers in that area. Bulk samples were taken to verify if certain constituents are present and if so, in what concentration. Bulk samples are used individually or in conjunction with personal or area samples to help interpret the level of worker risk.

Please note that these results represent individual samplers that may be changed several times during the work shift. As a result, these values may not be directly comparable to levels listed in OSHA's Permissible Exposure Limits (PEL).

<https://www.osha.gov/opengov/health-samples>

Job Safety

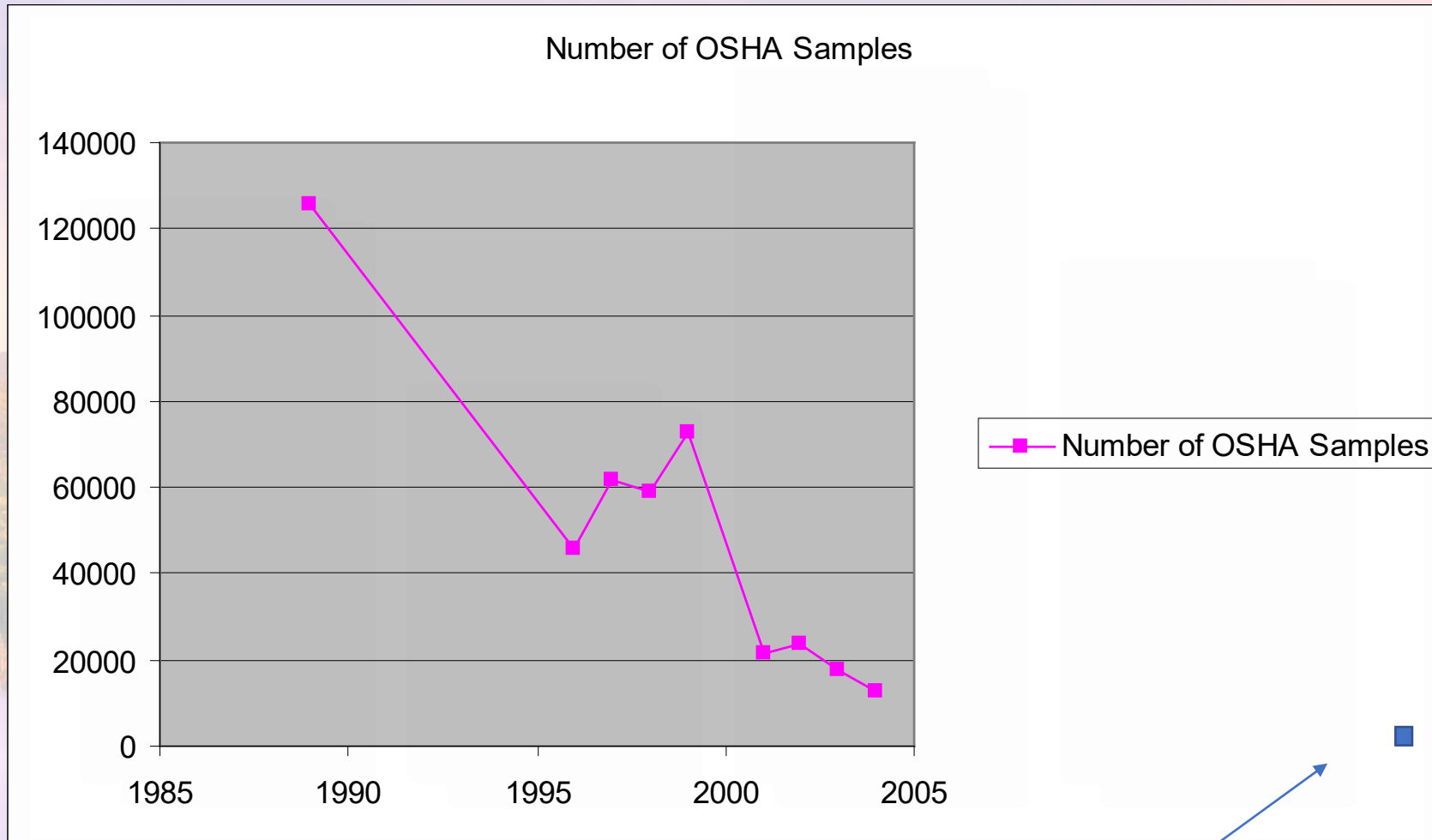
Ex-Employee Entitled to Exposure Records From Job Safety Agency, District Court Rules

A former Occupational Safety and Health Administration official is entitled to all of the agency's employer toxic exposure sampling records dating back to 1979, which he sought under the Freedom of Information Act, the U.S. District Court for the District of New Jersey ruled June 29 (*Finkel v. U.S. Dep't of Labor*, D. N.J., No. 05-5525 (MLC), 6/29/07).

The Freedom of Information Act requires federal agencies to make records available to the public upon request, the court said. Unless one of nine specific exemptions under the act applies, an agency is required to produce the requested records.

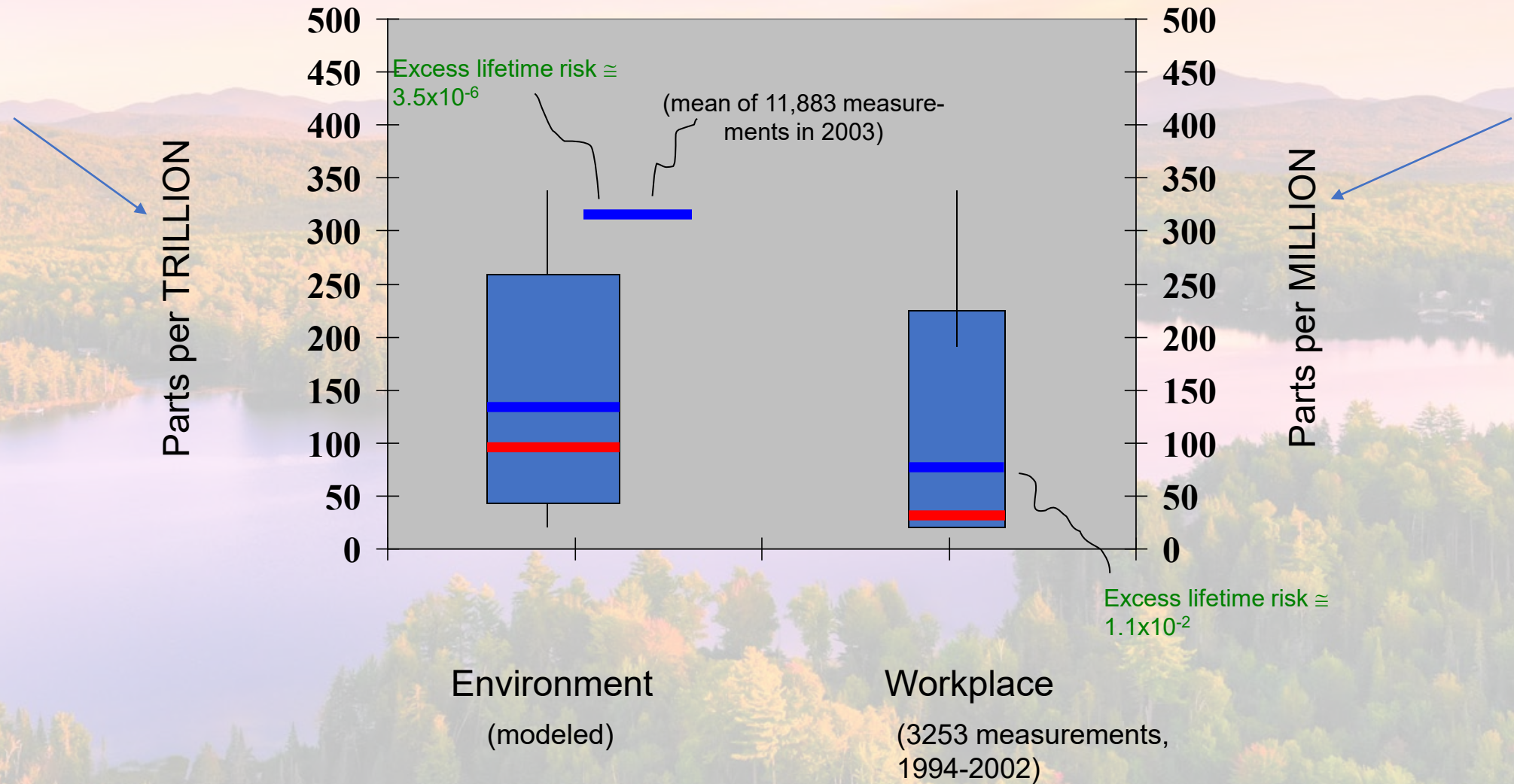
The Department of Labor did not meet its burden for denying the records to Adam Finkel, who requested the records on beryllium and other toxic exposures to conduct scientific research, the court said in a decision written by Judge Mary L. Cooper.

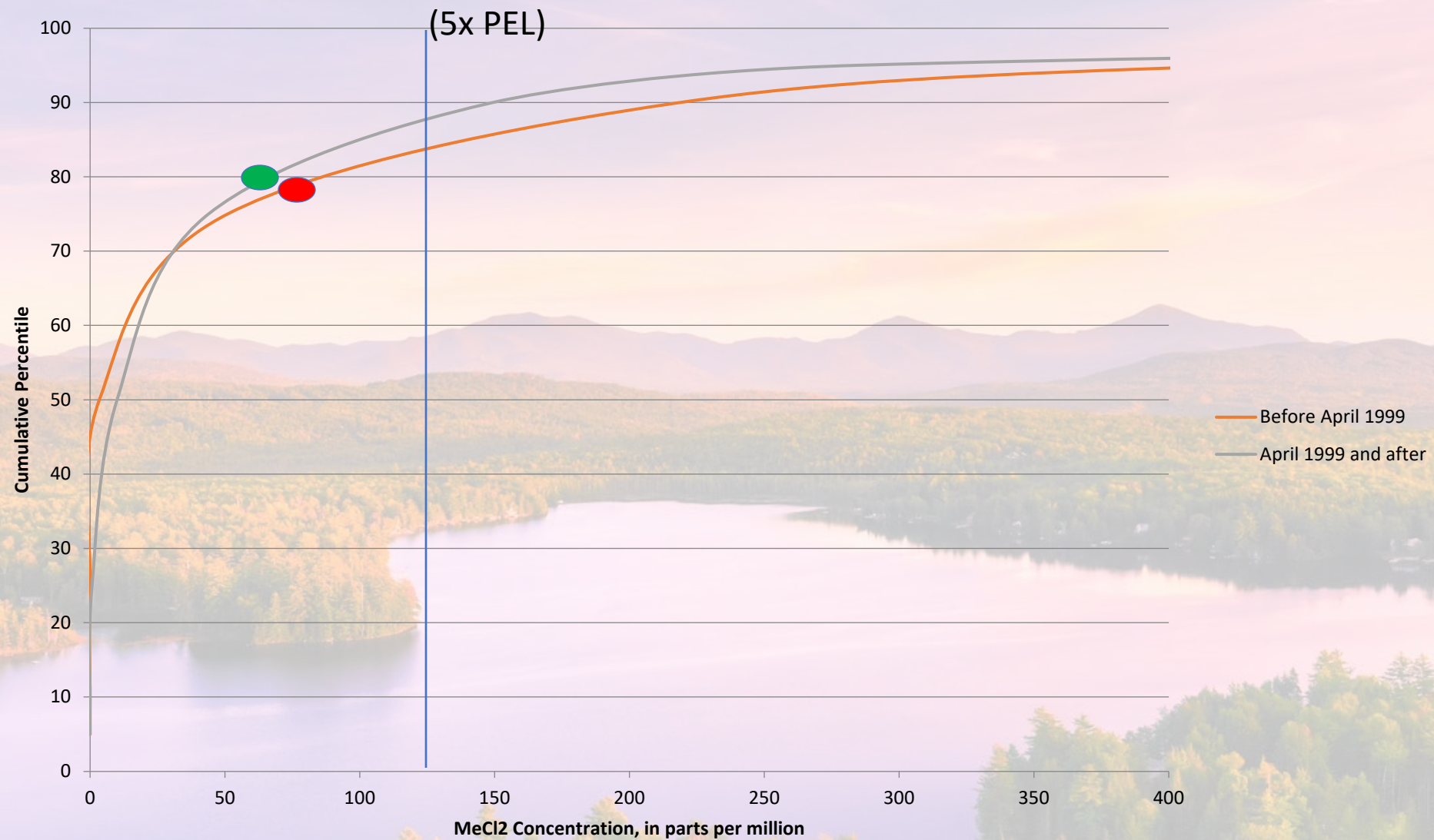
"The Court finds the public interest in disclosing information that will increase understanding about beryllium sensitization and OSHA's response thereto is significant," Cooper said.



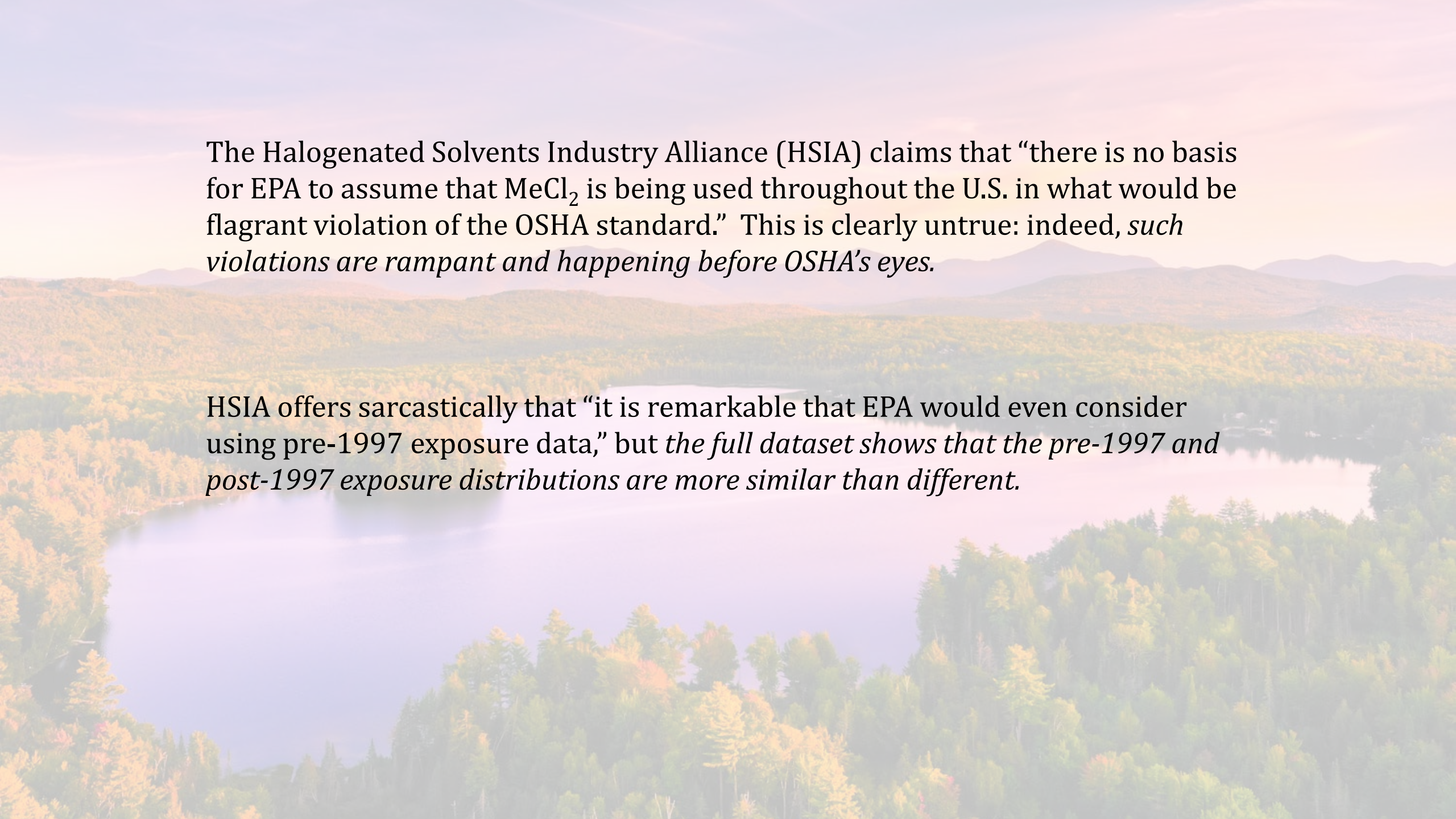
Note: In calendar 2021, OSHA took 7,687 samples in 1,408 establishments...

Methylene Chloride



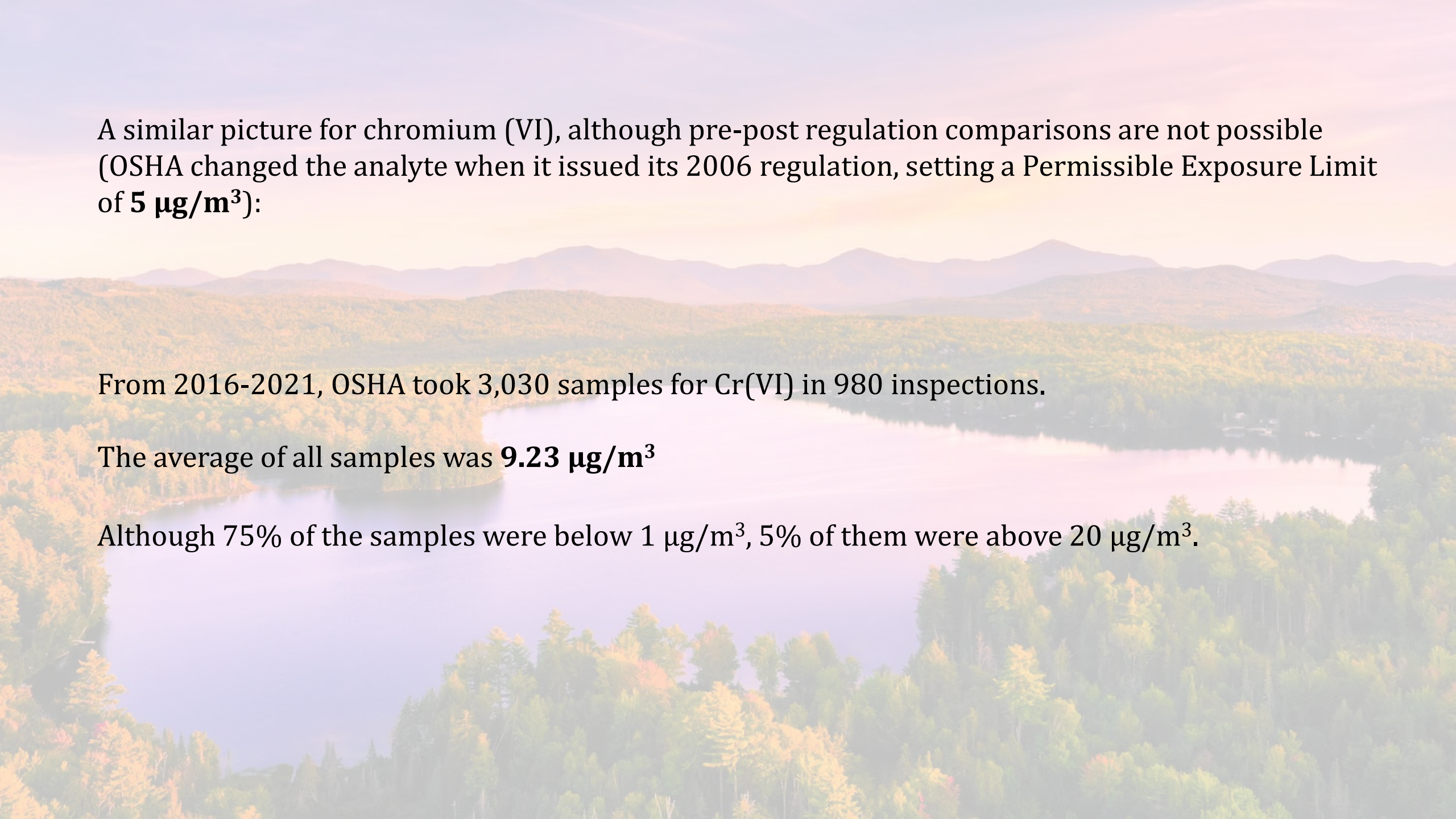


There were 12,400 OSHA samples from 1984-2018 (EPA only used 100 of these). Average exposure dropped only slightly (from 85 ppm to 69 ppm) after 4/1999 when OSHA standard took full effect. Twelve percent of all samples exceed 125 ppm.



The Halogenated Solvents Industry Alliance (HSIA) claims that “there is no basis for EPA to assume that MeCl_2 is being used throughout the U.S. in what would be flagrant violation of the OSHA standard.” This is clearly untrue: indeed, *such violations are rampant and happening before OSHA’s eyes.*

HSIA offers sarcastically that “it is remarkable that EPA would even consider using pre-1997 exposure data,” but *the full dataset shows that the pre-1997 and post-1997 exposure distributions are more similar than different.*



A similar picture for chromium (VI), although pre-post regulation comparisons are not possible (OSHA changed the analyte when it issued its 2006 regulation, setting a Permissible Exposure Limit of **5 $\mu\text{g}/\text{m}^3$**):

From 2016-2021, OSHA took 3,030 samples for Cr(VI) in 980 inspections.

The average of all samples was **9.23 $\mu\text{g}/\text{m}^3$**

Although 75% of the samples were below 1 $\mu\text{g}/\text{m}^3$, 5% of them were above 20 $\mu\text{g}/\text{m}^3$.

Richard Morford, General Counsel for EnviroTech International (at a public hearing in Philadelphia, Aug. 2010):

“where you will find problems with 1-BP is in the adhesives coatings and inks where they spray it all over the place coming up with doses up to 300 - 400 parts per million.” ... [this exposure level] is a criminal dose in my book.”

This is an admission, by the very company arguing most stridently against this listing, that 1-BP is in fact a hazardous air pollutant that causes adverse human health effects when emitted. Enviro Tech merely argues that at some exposure level below 300-400 ppm, the harm that 1-BP causes ceases to be “criminal” and becomes something else. ***Note that current exposures to U.S. workers range up to 422.7 ppm, with a mean of 30 ppm.***

EPA is not permitted to keep 1-BP off the HAPs list on the grounds that it is “criminally” hazardous at some exposure levels and—purportedly—is less hazardous at some lower level: that is not what the Clean Air Act Amendments call for.

Gradient Corp. comments to EPA:

“the exposure concentrations used by NTP (62.5-500 ppm) are several orders of magnitude greater than those modeled for ambient air ... [and therefore] may be qualitative with regard to potential carcinogenic effects, but not reliable for *quantitative extrapolation* from animals to humans.”

[AMF comments] “I have to ask: what species are the U.S. workers for whom **no extrapolation** from bioassay concentrations is needed because they are currently being exposed **above** 62.5 ppm? EPA needs only to **interpolate** between the 62.5 and the 125 ppm exposures to see that the positive cancer bioassay is *prima facie* “relevant to humans”!

[note: 261 OSHA air samples for 1-BP collected between 1998 and 2015]

The average concentration is just under 30 ppm, but ranged up to more than 422 ppm. **More than 14 percent of all the samples exceeded the 62.5 ppm rodent bioassay dose.** Exposures in the 10-75 ppm range are simply unconscionable, and there is no doubt that such exposures are occurring as I write these comments and have been occurring daily over the 7 years EPA has been contemplating making this listing decision.

A National Occupational Exposure Survey:

- Most “recent” survey was conducted by NIOSH 1981-1983.
- And that survey didn’t take any ambient measurements but estimated the number of workers exposed to *any concentrations* of each of more than 10,000 substances.
- EPA could fund, with assistance from OSHA and NIOSH, a true measurement-based survey, probably concentrating on 20-40 priority substances (HAPs plus a few others like silica and metalworking fluids), and over-sampling from smaller establishments.
- It would be crucial to ensure that no citations or penalties could be issued by OSHA or EPA, but also that employers could not refuse entry.
- A VERY rough estimate of the cost of such a survey would be \$25 million.



Article

Intake of Potatoes Is Associated with Higher Diet Quality, and Improved Nutrient Intake and Adequacy among US Adolescents: NHANES 2001–2018 Analysis

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² Nutrition Impact, LLC, Battle Creek, MI 49014, USA; VIC3RD@aol.com

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Table 1. Cont.

	Case 1 (Baked, Boiled, and Mashed and Mixtures)			Case 2 (Baked, Boiled, Mashed and Mixtures, and Fried Potatoes)			Case 3 (Baked, Boiled, Mashed and Mixtures, Fried Potatoes, and Potato Chips)		
	Non-Consumer	Consumer	<i>p</i> Value	Non-Consumer	Consumer	<i>p</i> Value	Non-Consumer	Consumer	<i>p</i> Value
Other Hispanic (%)	6.69 ± 0.58	4.79 ± 0.64	0.0036	6.90 ± 0.64	5.64 ± 0.56	0.0306	7.17 ± 0.68	5.73 ± 0.52	0.0106
non-Hispanic White (%)	56.0 ± 1.4	65.0 ± 2.0	<0.0001	56.6 ± 1.5	58.9 ± 1.6	0.0760	56.7 ± 1.6	58.2 ± 1.6	0.2819
non-Hispanic Black (%)	14.6 ± 0.8	12.2 ± 1.1	0.0060	13.0 ± 0.8	15.8 ± 1.0	0.0001	11.8 ± 0.8	16.1 ± 1.0	<0.0001
Other (%)	8.45 ± 0.51	6.50 ± 0.77	0.0130	8.67 ± 0.56	7.37 ± 0.56	0.0296	8.78 ± 0.63	7.59 ± 0.5	0.0459
Poverty Income Ratio									
<1.35 (%)	32.2 ± 1.1	30.4 ± 1.8	0.3077	32.1 ± 1.2	31.6 ± 1.2	0.6925	31.9 ± 1.3	31.9 ± 1.2	0.9704
1.35–1.85 (%)	10.8 ± 0.5	11.3 ± 1.0	0.6185	10.8 ± 0.6	10.9 ± 0.6	0.9480	10.6 ± 0.7	11.1 ± 0.6	0.5288
>1.85 (%)	57.0 ± 1.2	58.3 ± 1.7	0.4642	57.0 ± 1.3	57.5 ± 1.3	0.7167	57.5 ± 1.4	57.1 ± 1.3	0.7703
Education									
<High School (%)	98.6 ± 0.2	98.1 ± 0.5	0.3469	98.8 ± 0.2	98.1 ± 0.3	0.0204	98.9 ± 0.2	98.2 ± 0.2	0.0277
High School < Bachelor Degree (%)	1.42 ± 0.16	1.91 ± 0.49	0.3469	1.19 ± 0.16	1.92 ± 0.27	0.0204	1.15 ± 0.17	1.78 ± 0.23	0.0277
Physical Activity									
Sedentary (%)	14.5 ± 0.5	14.2 ± 1.0	0.8119	14.4 ± 0.6	14.4 ± 0.6	0.9965	14.7 ± 0.7	14.2 ± 0.6	0.5265
Moderate (%)	24.6 ± 0.6	24.9 ± 1.3	0.8601	24.6 ± 0.7	24.7 ± 0.8	0.9820	24.4 ± 0.9	24.8 ± 0.8	0.7157
Vigorous (%)	60.9 ± 0.7	60.9 ± 1.5	0.9982	60.9 ± 0.8	60.9 ± 0.9	0.9809	60.9 ± 1.0	61.0 ± 0.9	0.9163
Smoking Never (%)	79.1 ± 0.6	82.3 ± 1.7	0.0702	79.9 ± 0.8	79.4 ± 0.9	0.6578	79.3 ± 0.8	79.9 ± 0.8	0.5726
Smoking Current (%)	3.78 ± 0.35	3.01 ± 0.60	0.2444	3.88 ± 0.42	3.33 ± 0.37	0.2695	4.03 ± 0.51	3.34 ± 0.34	0.2338
Overweight (%)	16.9 ± 0.4	14.7 ± 1.0	0.0439	16.7 ± 0.5	16.3 ± 0.7	0.6819	16.9 ± 0.6	16.2 ± 0.6	0.4541
Obese (%)	19.3 ± 0.7	18.3 ± 1.0	0.3711	18.4 ± 0.7	20.2 ± 0.9	0.0788	18.4 ± 0.7	19.8 ± 0.8	0.1729

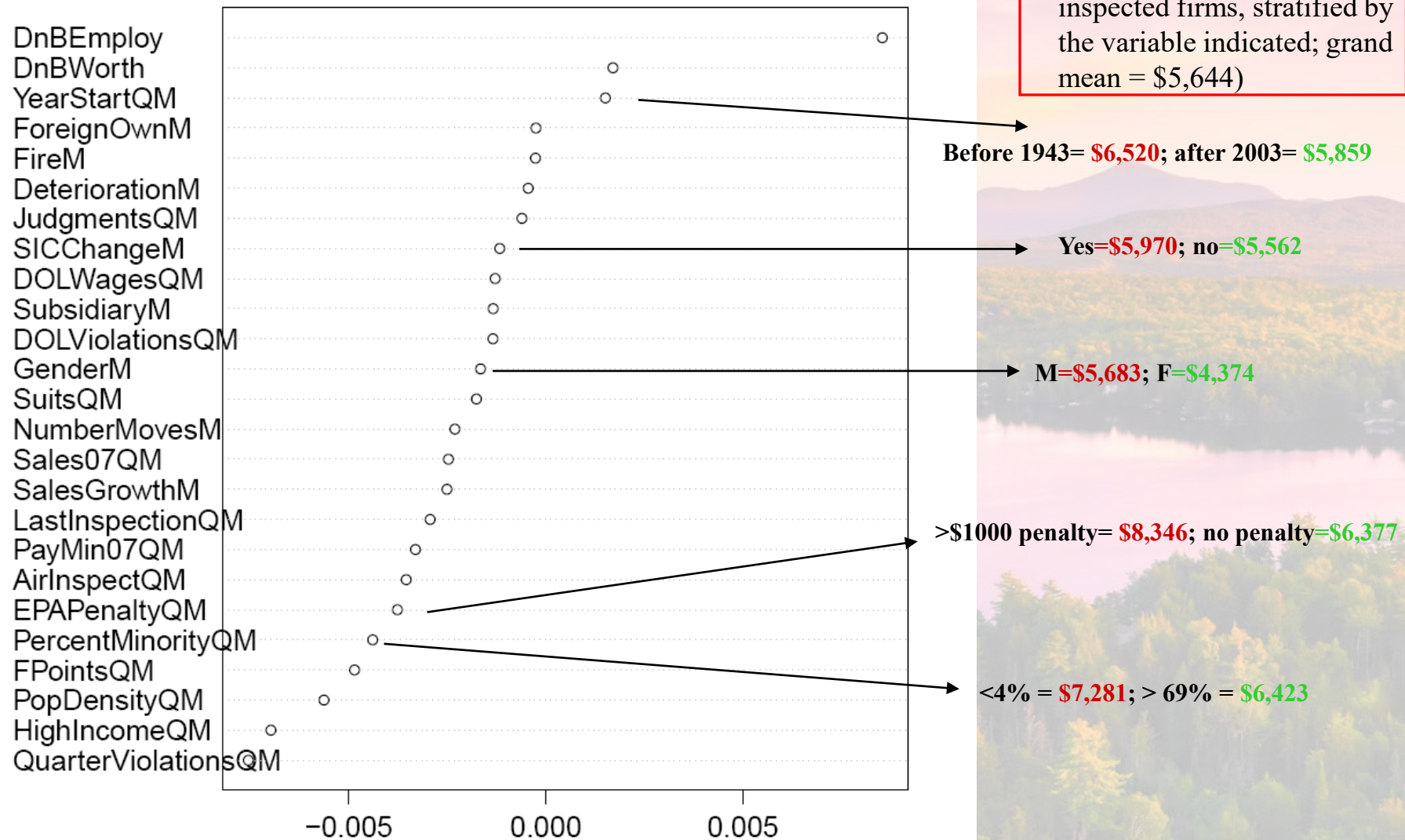
Data is presented as Mean ± Standard Error. “Other Hispanic” and “Other” are not sampled in a way to be nationally representative.

Chapter 9—Intake of Fruits and Vegetables

Age Group (years)	Sample Size	Citrus Fruits and Juices				Other Fruits, Mixtures, and Juices					
		Total	Total	Juices	Dried Fruits	Total	Apples	Bananas	Melons and Berries	Other Fruits and Mixtures (mainly fruit)	Noncitrus Juices and Nectars
Male and Female											
Under 1	1,126	131	4	4	-b,c	126	14	10	1 ^b	39	61
1	1,016	267	47	42	2	216	22	23	8	29	134
2	1,102	276	65	56	2	207	27	20	10	20	130
1 to 2	2,118	271	56	49	2	212	24	22	9	24	132
3	1,831	256	61	51	1	191	27	18	13	24	110
4	1,859	243	62	52	1	177	31	17	14	22	92
5	884	218	55	44	-b,c	160	31	14	13	24	78
3 to 5	4,574	239	59	49	1	176	30	16	13	23	93
≤5	7,818	237	52	44	1	182	26	17	10	26	103
Male											
6 to 9	787	194	58	51	-b,c	133	32	11	21	20	50
6 to 11	1,031	183	67	60	-b,c	113	28	11	16	19	40
12 to 19	737	174	102	94	1 ^b	70	13	8	11 ^b	10	29
Female											
6 to 9	704	180	63	54	1 ^b	113	23	10	10	25	46
6 to 11	969	169	64	54	-b,c	103	21	8	8	23	42
12 to 19	732	157	72	67	-b,c	83	13	5	15	14	35
Male and Female											
≤9	9,309	217	55	47	1	159	27	15	12	24	81
≤19	11,287	191	70	62	1	118	21	11	12	19	56

Note: Consumption amounts shown are representative of the first day of each participant's survey response.

Reduction in Forecasting Accuracy for Outcome Class 1



[a survey could be made more efficient by using machine learning/ big data to target establishments based on their characteristics (Finkel et al. 2015)]

“Sandblasters who report a change of employer very often remain sandblasters, and are unlikely to become stockbrokers. Hence the conclusion of Burmaster (2000) that “the assumption often dictated by federal and state environmental agencies that all people work in all jobs for 30 years is false and misleading” misses the mark badly. A worker who merely changes employer several times during a working lifetime (which is all that the data Burmaster analyzed can reveal) may well be exposed to 30, 45, or more years of exposure to the same (or functionally equivalent) chemical exposures.”

The Joy Before Cooking: Preparing Ourselves to Write a Risk Research Recipe

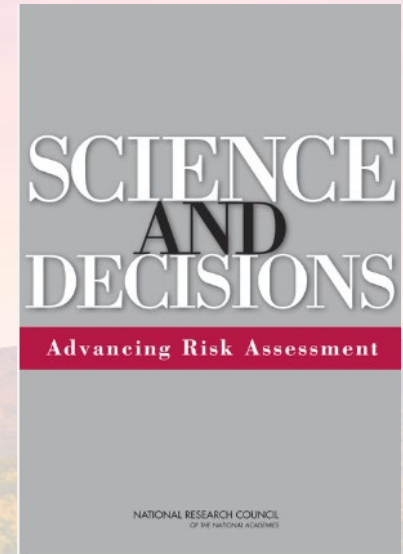
Adam M. Finkel
Directorate of Health Standards,¹ U.S. Occupational Safety and Health Administration, Room N- 3718, 200 Constitution Avenue, NW, Washington, DC 20210; Tel(voice):202-693-2256; Tel(fax):202-693-1658; adam.finkel@osha.gov



Problems Created by the Failure of Congress and EPA to Define “Unreasonable Risk” in TSCA, and by EPA’s Refusal to even Estimate Risks for Non-Cancer Effects:

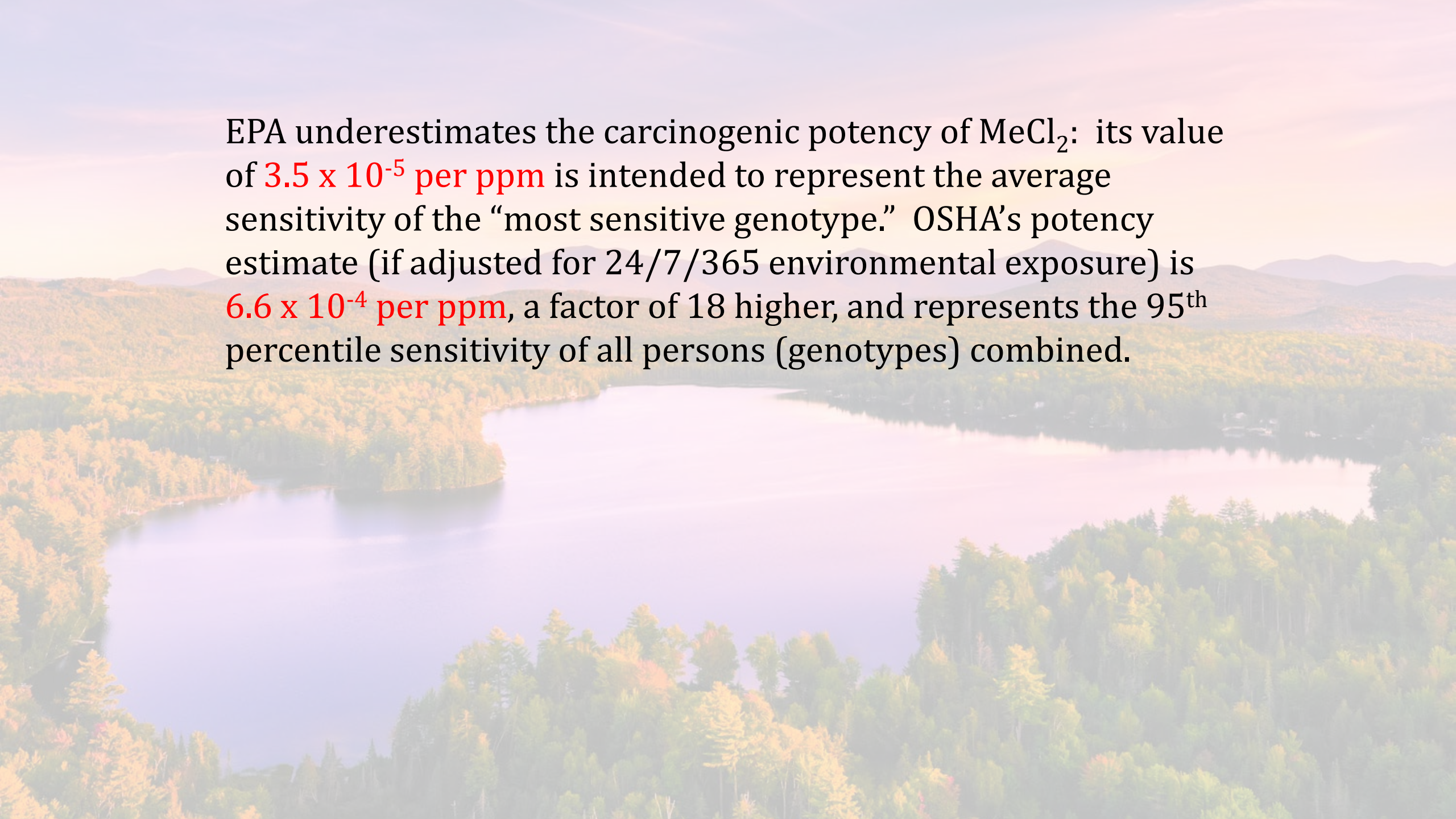
“Historically, dose-response assessments at EPA have been conducted differently for cancer and non-cancer effects, and the methods have been criticized for not providing the most useful results. Consequently, non-cancer effects have been underemphasized, especially in benefit-cost analyses. A consistent approach to risk assessment for cancer and non-cancer effects is ***scientifically feasible and needs to be implemented.***

-from NAS *Science and Decisions* report, 2008



We cannot achieve 10^{-3} risk (OSHA) or 10^{-5} to 10^{-6} risk (EPA) if we declare victory at 3×10^{-2} !

We are blinding ourselves to an entire category of (monetized) human health benefits if we evaluate regulatory proposals that could reduce numbers of premature deaths and disease (numbers that we *can assess*), but use a method (RfC or BMD) that can only declare something “safe” or not. *The monetized benefit of reducing thousands or millions of personal exposures from “way above the RfC” to “still above the RfC” is mistakenly counted as ZERO under this inferior paradigm.*



EPA underestimates the carcinogenic potency of MeCl_2 : its value of 3.5×10^{-5} per ppm is intended to represent the average sensitivity of the “most sensitive genotype.” OSHA’s potency estimate (if adjusted for 24/7/365 environmental exposure) is 6.6×10^{-4} per ppm, a factor of 18 higher, and represents the 95th percentile sensitivity of all persons (genotypes) combined.

Straw man proposal: For health effects that are serious or grave, a risk cannot be “reasonable” unless with at least 90% confidence, at least 95% of the exposed population shall face a lifetime excess risk of 1/50,000 or less.

*This definition assumes “unreasonable risk” is a ceiling value: in other words, EPA shall ensure in the risk-management phase of TSCA that these risks are **never** to be exceeded—but when risk-reduction costs are low, it shall be EPA policy to lower unreasonable risks **further**.*

Discussion could ensue about whether and to what extent workers “deserve” or must “live with” a larger amount of “reasonable” risk.