

NVE Stop Smart Meters
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February 19, 2012

PUC Commissioners

Docket #: 11-10007

Dear Commissioners:

Since we were restricted to five (5) minute presentations, I am submitting IRREFUTABLE evidence that the presentation by both NV Energy and their experts from Exponent at the December 2011 hearing, was intentionally skewed, biased and selectively presented to favor NVE.

Exhibit 1 is a Federal Lawsuit filed, which I have received written confirmation from the attorneys that is NOT sealed and allowed to be disbursed at will, regarding Sensus. It seems that Sensus hand picked a project manager who was retained to over see the installation in Alabama. When he discovered all the FLAWS and NON TESTING of the meters and attempted to notify them of said problems, they down played the severity of the issues.

NVE in their filings 'feigned' that the meters had a failure rate of .5%, these same meters that were installed in Alabama had a failure rate of 9%. He named names, dates and fully delineated his findings that were suppressed.

Mr. Baker the Plaintiff in the action has personally discussed me with his agreement to testify to this Commission on all the problems, lies and hazards associated with these meters.

This is the first time a hand picked insider of Sensus has gone public to warn the public of the dangers of these meters.

Exhibit 2 is a chapter (5) in a book entitled "Doubt is their Product-How Industry's Assault on Science Threatens Your Health" by David Michaels.

DAVID MICHAELS
Assistant Secretary of Labor for
Occupational Safety and Health

David Michaels, PhD, MPH, is an epidemiologist and a nationally recognized leader in the scientific community's efforts to protect the integrity of the science on which public health and regulatory policies are based. Before joining OSHA,

he was Professor of Environmental and Occupational Health at the George Washington University School of Public Health.

From 1998 to 2001, Dr. Michaels served as Assistant Secretary of Energy for Environment, Safety and Health. In that position, he was the chief architect of the Energy Employees Occupational Illness Compensation Program, the historic initiative to compensate nuclear weapons workers who contracted occupational illnesses as a result of exposure to radiation, beryllium and other hazards. The program has provided more than \$6 billion in payments to sick workers and the families of deceased workers.

In 2006, Dr. Michaels was awarded the American Association for the Advancement of Science's Scientific Freedom and Responsibility Award, and, in 2009, the John P. McGovern Science and Society Award given by Sigma Xi, the Scientific Research Society, for his work in scientific integrity and for gaining compensation for nuclear weapons workers.

Dr. Michaels is the author of studies examining the health of construction workers, printers, bus drivers and other occupations, as well as of numerous publications on science and regulatory policy, including *Doubt is Their Product: How Industry's War on Science Threatens Your Health* (Oxford University Press, 2008). He is a graduate of the City College of New York, and holds a Master of Public Health and PhD from Columbia University.

Journal Articles

- Michaels D and C Monforton. Beryllium's Public Relations Problem: Protecting Workers When There Is No Safe Exposure Level. *Public Health Rep* 2008 January-February; 123:79-88.
- Michaels D and C Monforton. How Litigation Shapes the Scientific Literature: Asbestos and Disease Among Automobile Mechanics. *J Law & Policy* 2007; 15(3). ([PDF](#))
- Welch L, Haile E, Dement J, Michaels D. Change in Prevalence of Asbestos-Related Disease Among Sheet Metal Workers 1986 to 2004. *Chest* 2007 March; 131 (3):863-9.
- Michaels D. Sarbanes-Oxley for Science. *Law & Contemp Prob* 2006; 69(3): 1-19.
- Michaels D. Manufactured Uncertainty: Protecting Public Health in the Age of Contested Science and Product Defense. *Ann NY Acad Sci* 2006; 1076: 149-162.
- Neutra RN, Cohen A, Fletcher T, Michaels D, Richter ED, Soskolne CL. Toward guidelines for the ethical reanalysis and reinterpretation of another's work. *Epidemiology* 2006; 17 (3): 335-338.
- Michaels D, C Monforton, and P Lurie. Selected Science: An Industry Campaign to Undermine an OSHA Hexavalent Chromium Standard. *Environmental Health: A Global Access Science Source* 2006, 5:5.

- Michaels M, Lurie P, Monforton C. (Letter) Lung Cancer Mortality in the German Chromate Industry, 1958 to 1998. *J Occup Environ Med*. 2006 Oct; 48(10):995-7.
- Michaels M, Monforton C. (Letter) The Beryllium Occupational Exposure Limit: Historical Origin and Current Inadequacy. *J Occup Environ Med*. 2006 Oct; 48(10):998-1000
- Michaels D. (Letter) Regarding "Phenylpropanolamine and hemorrhagic stroke in the hemorrhagic stroke project": mercenary epidemiology-data reanalysis and reinterpretation for sponsors with financial interest in the outcome. *Ann Epidemiol*. 2006 Jul;16(7):583-5.
- Dweck A, Lurie P, Michaels D. (Letter) Hexavalent chromium study's conclusions unjustified. *J Occup Environ Med*. 2005 Oct; 47(10): 980-1.
- Michaels D and C Monforton. Manufacturing Uncertainty: Contested Science and the Protection of the Public's Health and Environment. *Am J Public Health*. (Supplement 1, July 2005)
- Michaels D and C Monforton. Scientific Evidence and the Regulatory System: Manufacturing Uncertainty and the Demise of the Formal Regulatory System. *J Law and Policy*. 2005; XIII (1): 17-41. (PDF)
- Wagner W and DM Michaels. Equal Treatment for Regulatory Science: Extending the Controls Governing the Quality of Public Research to Private Research. 2004; 30(2&3): 119-54.

Speeches & Testimony

- David Michaels: Testimony before the Subcommittee on Public Sector Solutions to Global Warming, Oversight, and Children's Health Protection of the Senate Environment & Public Works Committee, "Oversight Hearing on Science and Environmental Regulatory Decisions." May 7, 2008.
- David Michaels: Testimony before the the Subcommittee on Employment & Workplace Safety of the Senate Committee on Health, Education, Labor & Pensions, "Is OSHA Working for Working People?" April 26, 2007.
- David Michaels: Speech for "Government Science Panels: Fair and Balanced?" hosted by the Center for Science in the Public Interest, July 24, 2006. (Read Michaels's remarks or an event transcript)
- David Michaels: Testimony (and attachment) before the House Education and Workforce Committee, Subcommittee on Workforce Protections, "Addressing Concerns about the U.S. Department of Labor's Use of Non-Consensus Standards in Workplace Health and Safety," June 14, 2006.
- David Michaels: Testimony before the House Subcommittee on Energy and Mineral Resources, "The Impact of Science on Public Policy," February 4, 2004.
- David Michaels: Testimony before the U.S. Senate Energy Committee Oversight Hearing on the Energy Employees Occupational Illness Compensation Program, November 23, 2001.

Reports & Book Chapters

- David Michaels. "Manufactured Uncertainty: Contested Science and the Protection of the Public's Health and Environment" in *Agnotology: The Making and Unmaking of Ignorance*, edited by Robert N. Proctor and Londa Schiebinger (Stanford University Press, forthcoming).
- David Michaels. "Politicizing Peer Review: The Scientific Perspective" in *Rescuing Science from Politics: Regulation and the Distortion of Scientific Research*, edited by Wendy Wagner and Rena Steinzor (Cambridge University Press, 2006).

Articles & Op-eds in Mainstream Publications

- Spin cycle. David Michaels's article for *Hazards* magazine, July-September 2008.
- It's Not the Answers That Are Biased, It's the Questions. David Michaels's article for the *Washington Post*, July 15, 2008.
- Why they didn't tell us these pills could kill our kids. David Michaels's *Chicago Tribune* op-ed, July 13, 2008.
- Transparency, strength at FDA. *Boston Globe* op-ed by Susan Wood and David Michaels, August 1, 2007
- Science-for-hire hazardous to health. David Michaels's op-ed in the *Baltimore Sun*, April 17, 2006 ([PDF](#))
- The Art of "Manufacturing Uncertainty." David Michaels's op-ed in the *Los Angeles Times*, June 24, 2005
- Doubt is Their Product. David Michaels's article in *Scientific American*, June 2005
- Disclosure in Regulatory Science. David Michaels's and Wendy Wagner's commentary in *Science*, December 19, 2003
- Advice Without Dissent. Editorial by SKAPP Planning Committee members and others in *Science*, October 25, 2002

As you have ascertained Dr. Michaels is far from a 'uncreditable' author and given his position, this book and it's **findings on Exponent, need to be given SERIOUS CONSIDERATION by the Commission.**

NVE with a concerted and wanton effort, retained Exponent to "create" a presentation in support of their harmful and illegally acquired approval for installation of these smart meters.

Both of the "doctors" acknowledged that they were from Exponent. In Dr. Michaels book he EXPOSES the history and current modius operandi of Exponent. How they 'create' science to fit what ever their clients needs them to reinforce.

To wit:

Should the public lose all interest in its health, these product defense firms would be out of luck. Exponent, Inc., one of the premier firms in the product defense

business, acknowledges as much in this filing with the Securities and Exchange Commission:

Public concern over health, safety and preservation of the environment has resulted in the enactment of a broad range of environmental and/or other laws and regulations by local, state and federal lawmakers and agencies. These laws and the implementing regulations affect nearly every industry, as well as the agencies of federal, state and local governments charged with their enforcement. To the extent changes in such laws, regulations and enforcement or other factors significantly reduce the exposures of manufacturers, owners, service providers and others to liability, the demand for our services may be significantly reduced.⁶

Exponent's scientists are prolific writers of scientific reports and papers. While some may exist, I have yet to see an Exponent study that does not support the conclusion needed by the corporation or trade association that is paying the bill.

Here are brief sketches of a few recent Exponent projects:

*_ The taste and smell of the gasoline additive MTBE are so foul that a tiny amount makes water undrinkable. This is bad because MTBE has contaminated drinking water sources across the country. (Moreover, it causes cancer in animals and may do so in people also, but this will be difficult to determine because the exposure levels are very low, exactly the sort of situation that epidemiology has the most difficulty addressing. **The state of California has categorized MTBE as a possible human carcinogen.**⁹) Communities across the country have sued the major oil companies and the MTBE manufacturers for the costs of cleaning up their water supplies. In response, a firm that provides the methanol used for making MTBE hired Exponent to produce a series of studies that concluded, not surprisingly, that MTBE is unlikely to pose a public health hazard and has not significantly impacted California's drinking water.¹⁰ **When the defendants in certain lawsuits tried to convince Congress to end the litigation by fiat and bail out the polluters, Exponent's economists produced a report for the American Petroleum Institute that concluded that the cost of the cleanup would be relatively low, which would make the proposed taxpayer bailout of the industry more acceptable to fiscal watchdogs.**¹¹*

_ An article in the Annals of Emergency Medicine suggested that the new generation of amusement park rides exposed thrill seekers to g-forces (a measure of acceleration) that exceed those experienced by astronauts and recommended that emergency physicians consider these rides as "a possible cause of unexplained neurologic events in healthy patients."¹² Six Flags Theme Parks, Inc., immediately commissioned Exponent to produce an "Investigation of Amusement Park Roller Coaster Injury Likelihood and Severity."¹³ The press

release on the report was headlined “Roller Coasters, Theme Parks Extraordinarily Safe.”¹⁴

_ Given the skyrocketing obesity rates among teenagers, many school systems and even some states have considered banning soda machines from high schools in order to discourage teenagers from consuming the empty calories. **In 2005 an Exponent scientist conducted a study on behalf of the American Beverage Association that concluded that the number of beverages consumed from school vending machines “does not appear to be excessive.”^{15,16} In this case, however, the public just could not be convinced. The soft drink industry jettisoned these findings and in 2006 agreed to stop selling soda in schools.¹⁷**

_ Defense giant Lockheed Martin turned to Exponent when faced with the huge potential cost of cleaning up underground water sources contaminated with perchlorate, a rocket fuel component that according to the National Academy of Sciences causes thyroid disease in infants.¹⁸ **Exponent’s studies minimized the risk associated with perchlorate exposure.^{19,20}**

_ **When a study by consulting epidemiologists discovered a high rate of prostate cancer cases at a Syngenta plant that produced the pesticide atrazine,²¹ Exponent’s scientists produced a study that found no relationship between the chemical and the disease.²²**

_ After numerous studies that linked pesticide exposure and Parkinson’s disease appeared in prestigious scientific journals, **Exponent’s scientists produced a literature review for CropLife America, the trade association of pesticide producers, whose conclusion maintained that “the animal and epidemiologic data reviewed do not provide sufficient evidence to support a causal association between pesticide exposure and Parkinson’s disease.”²³**

_ **Exponent specializes in literature reviews that draw negative conclusions.**

The company’s scientists have produced several reviews of the asbestos literature for use in litigation, all of which conclude that certain types of asbestos and certain types of asbestos exposure are far less dangerous than previously believed.²⁴⁻²⁶

These few examples, as you well know are MAJOR HEALTH issues. Even I was able to do a quick discrediting of the NON-association of pesticides and Parkinson’s, Exhibit 3, which I wrote a three years ago, from government sponsored research.

Since 2 of the 3 Commissioners are attorneys, albeit, on the inactive list, that does NOT preclude them from ignoring the facts versus NVE hyperbole and paid for ‘expert testimony’.

Since the Commission is REFUSING to allow the public to pay for their own experts to refute the ‘bought and paid for ‘experts’ of NVE, let this comment be a

warning, that we have notified the Commission of the 'skewing' and mendacious actions of both NVE and Exponent in their presentations and submissions to the Commission.

I am offering as also the President and Executive Director of the National Toxic Encephalopathy Foundation, our Neuro-Toxicology Consultant David Hopper, Ph.D., for the factual information on these meters.

NVE's expert Bailey stated that he had a Ph.D., in neuro-psychology, Dr. Hopper's educational background is far more impressive and knowledgeable than Bailey's. Bailey has a mere single Ph.D.

David Hopper, Ph.D., FAABM, FAAPH, FIABMCP, FABMP, FAAS, has nearly 30 years of clinical practice and over 40 years work experience in the health sciences. **He holds doctorates in neuroscience, psychophysiology, and psychology.** He is a licensed addiction specialist and has held board certifications in addiction, advanced cardiac life support, behavioral medicine, biofeedback, brain injury, disability, EEG neurofeedback, EMT, forensics, hypnotherapy, medical psychotherapy, neurotherapy, pain management, psychology, psychopathology, reiki, and somnology. His primary training is in behavioral medicine with a **specialty in brain injury.**

Dr. Hopper has taught for over 30 years and has served as an adjunct professor at various colleges and universities. He is also a licensed secondary education teacher and is board qualified in all sciences. Dr. Hopper helped establish the first high school EMT training program in Southern Nevada at the Academy of Medical and Allied Health Sciences located at Rancho High School in Las Vegas, Nevada. He helped model the Medical Academy after the four year medical school training of physicians and taught clinical anatomy and physiology, and pathophysiology in addition to EMT training.

He has received numerous awards, including Who's Who In Medicine, Who's Who for the Millennium, Who's Who in America, Who's Who in the West, Who's Who in the American West, Who's Who Among Distinguished Leaders, and CFIDS Physician Honor Roll. Dr. Hopper has been awarded Fellows by the American Academy of Behavioral Medicine, American Association of Professional Hypnotherapists, International Academy of Behavioral Medicine, Counseling and Psychotherapy, and the American Academy of Somnology. Dr. Hopper has been recognized for development of many innovative diagnostic and treatment techniques including neurosensory feedback coma stimulation, neurocognitive EEG rehabilitation, multi-modal electrophysiological dissociative identity disorder (multiple personality) assessment and treatment, Brain Fitness[®], neurocognitive rehabilitation, and Self-Help Through Hypnosis[®] (acclaimed as the "best" on the market by numerous hypnosis organizations). He also co-founded and served as clinical

director of the first traumatic brain injury unit, sleep center, and pain center in Southern Nevada.

Dr. Hopper is a **member of numerous scientific organizations and is a member of Mensa** and the International Society for Philosophical Enquiry. He has written numerous articles and has appeared on radio and television as well as featured in magazines, books, and newspapers nationwide. **Dr. Hopper has served as an expert witness for many nationally recognized court cases and has established precedence in many such cases.**

Bailey's resume is far less diverse and he stated that he does editing for journals. If in fact that was a truthful statement, he should have been up to date on research, especially when he presented that electro-magnetic hypersensitivity was not a 'valid' medical condition. Especially since the following article was published by the peer reviewed International Journal of Neuroscience in July of 2011.

ELECTROMAGNETIC HYPERSENSITIVITY: EVIDENCE FOR A NOVEL NEUROLOGICAL SYNDROME.

David E McCarty, Simona Carrubba, Andrew L Chesson, Clifton Frilot, Eduardo Gonzalez-Toledo, Andrew A Marino

Department of Neurology, LSU Health Sciences Center , Shreveport, LA , USA.
The International journal of neuroscience (impact factor: 0.86). 07/2011; DOI: 10.3109/00207454.2011.608139

Abstract

ABSTRACT Objective: We sought direct evidence that acute exposure to environmental-strength electromagnetic fields could induce somatic reactions (EMF hypersensitivity). Methods: The subject, a female physician self-diagnosed with EMF hypersensitivity, was exposed to an average (over the head) 60-Hz electric field of 300 V/m (comparable to typical environmental-strength EMFs) during controlled provocation and behavioral studies. Results: In a double-blinded EMF provocation procedure specifically designed to minimize unintentional sensory cues, the subject developed temporal pain, headache, muscle-twitching, and skipped heartbeats within 100 s after initiation of EMF exposure (P < 0.05). The symptoms were caused primarily by field transitions (off-on, on-off) rather than the presence of the field, as assessed by comparing the frequency and severity of the effects of pulsed and continuous fields in relation to sham exposure. The subject had no conscious perception of the field as judged by her inability to report its presence more often than in the sham control. Discussion: The subject demonstrated statistically reliable somatic reactions in response to exposure to subliminal EMFs under conditions that reasonably excluded a causative role for psychological

processes. Conclusion: EMF hypersensitivity can occur as a bona fide environmentally-inducible neurological syndrome.

Source: [PubMed](#)

As you noticed in the article, this was a physician who was tested and shown to prove there is an association with EMF and health concerns, **ESPECIALLY at 60 Hz exposures. Along with an ON/OFF type exposure which is ANALOGOUS to the meters on/off transmission.** Bailey SHOULD have referenced this study to show that there has been research by his PEERS on this new medical condition. But as Dr. Michaels stated in his book, this is what they do, they skew the science.

In conclusion, as Hearing Officer Wenzel said at the December hearing, “it’s a battle of experts”, well, the residents of Nevada have the RIGHT to have their experts join in the battle.

The only reason to NOT allow our experts to join in this battle is that the Commission doesn’t want anyone to refute their “favorite” utility to be shown to be wrong and their submissions to be fraudulent!

The litigation that will ensue over the Commissions erroneous approval of these meters, will result in the PUC being named as a Defendant in any actions. As their fiduciary duty was NOT enacted.

Thank you,

/s/

Angel De Fazio, BSAT

Founder

NVE Stop Smart Meters

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ALABAMA
SOUTHERN DIVISION

FILED

2010 MAY 25 P 4: 21

U.S. DISTRICT COURT
N.D. OF ALABAMA

UNITED STATES OF AMERICA)
ex rel. DON BAKER,)

Plaintiff,)

v.)

Case No: CV-10-CO-1337-S

SENSUS USA, INC., SENSUS)
METERING SYSTEMS, INC.,)
THE SOUTHERN COMPANY, and)
ALABAMA POWER)
COMPANY,)

FILED UNDER SEAL

DO NOT PLACE IN PRESS BOX

DO NOT ENTER ON PACER

Defendants.)

DEMAND FOR JURY

QUI TAM COMPLAINT

Plaintiff-Relator Don Baker, on behalf of himself and the United States of America, alleges and claims against Defendants Sensus USA, Inc. and Sensus Metering Systems, Inc., doing business as Sensus (“Sensus”); The Southern Company (“Southern Company”); and Alabama Power Company (“Alabama Power”); as follows:

JURISDICTION AND VENUE

1. This action arises under the False Claims Act, 31 U.S.C. §§ 3729-33 (the “False Claims Act”). Accordingly, this Court has jurisdiction pursuant to 28 U.S.C. § 1331. Jurisdiction is also authorized under 31 U.S.C. § 3732(a).

2. Venue lies in this judicial district pursuant to 31 U.S.C. § 3732(a), because Defendants qualify to do business in the State of Alabama, transact substantial business in the State of Alabama, transact substantial business in this judicial district, and can be found here. Furthermore, Defendants committed within this judicial district acts proscribed by 31 U.S.C. § 3729, to-wit: Defendants submitted, caused to be submitted, and conspired to submit to the United States false claims for payment of funds under the American Reinvestment and Recovery Act of 2009 (“ARRA”) for a project that Defendants new was hopelessly flawed and did not qualify for stimulus funding, and submitted false records to get such claims paid.

PARTIES

3. The Southern Company is an Atlanta, Georgia-based conglomerate of electricity providers. Through its subsidiaries, including Alabama Power, Southern Company provides electricity to 4.4 million customers across the southeastern United States. In 2007, Southern Company launched an initiative to upgrade its distribution system to include “smart meters” capable of recording and

transmitting information via radio signal, eliminating the necessity for manual meter reading. In or around May, 2009, Southern Company submitted an Application for Financial Assistance through the Department of Energy Smart Grid Investment Grant Program (SGIG). In October, 2009, Southern Company was awarded \$165 million in matching funds for its smart grid project. On April 28, 2010, Southern Company signed an agreement with the Department of Energy with regard to the funds.

4. Sensus is a North Carolina-based concern specializing in utility metering technology. A self-described “global leader in utility management,” Sensus designs and markets water, gas, and electric metering systems and develops and markets “Automatic Meter Reading” (“AMR”) and “Advanced Metering Infrastructure” (“AMI”) technologies designed to function in a “smart grid.” In December, 2007, Sensus signed a contract with Southern Company to supply “smart meters” for the company’s grid upgrade. Sensus had never before supplied the type of meter required by the Southern Company and Alabama Power and – based on their specifications – designed a new meter dubbed the “iConA.”

5. Plaintiff-Relator Baker is an engineer with over fifteen years experience in project management, programming, and scheduling. In 2008, Mr. Baker was hired by Sensus as Alabama Project Manager for Southern Company’s AMI Smart Grid project. Along with coordinating the project logistics, Mr. Baker

helped Sensus supply certain information for inclusion in Southern Company's SGIG grant application. In the course of his duties, and as more fully described herein, Mr. Baker became aware that the Sensus iConA meter was not properly tested and was seriously flawed. Among other issues, Mr. Baker discovered that the iConA had a tendency to drastically overheat and melt or burn. When Mr. Baker raised these issues with Sensus management and Alabama Power project managers, he was told to keep quiet. He was eventually terminated for refusing to do so. Mr. Baker has direct personal knowledge that Sensus and Southern Company have installed approximately one million iConA meters in Alabama homes with knowledge that the meters are seriously defective and pose a substantial fire hazard and that at least two Alabama homes have burned as a result. Mr. Baker also has personal knowledge that at the time Southern Company submitted its grant application to the United States, Sensus and Southern Company were well aware that the iConA was defective and that the entire project was seriously flawed and ineligible for an SGIG grant. On or about February 2, 2010, Mr. Baker disclosed the information underlying this complaint to the Office of the United States Attorney for the Northern District of Alabama and an agent of the Federal Bureau of Investigation. Mr. Baker now files this action as original-source Relator under the *qui tam* provisions of the False Claims Act. Plaintiff-Relator is

-serving upon the United States contemporaneously herewith a statement of the material evidence upon which his claims are based.

DEFENDANTS' FRAUDULENT CONSPIRACY

6. Defendants have perpetrated a fraudulent conspiracy to obtain \$165 million of federal stimulus funding for a project Defendants knew was hopelessly flawed and ineligible for a stimulus grant. Defendants' scheme has deceived the United States, thwarted the purpose of the American Reinvestment and Recovery Act of 2009, and endangered millions of Americans.

7. Mr. Baker was employed by Sensus in January, 2008. At that time, Sensus was already under contract with Southern Company to supply millions of smart meters for Southern Company's metering infrastructure upgrade. Sensus had never before manufactured a meter of the type called for by its Southern Company contract. Accordingly, Sensus' engineers designed the iConA. Sensus then subcontracted the manufacturing of the iConA to a Mexican concern.

8. Sensus began supplying iConA meters to Alabama Power on or about January 31, 2008. Despite contractual requirements, Sensus never tested the meters to evaluate their safety or performance as they arrived from the Mexican facility. Instead, it simply turned them over to Alabama Power for installation. Furthermore, over the course of its contract with Southern Company Sensus

continually changed and substituted meter components, firmware, and manufacturing processes without adequately testing their products.

9. Once the meters reached Alabama Power, approximately 1% were tested – only for their accuracy. They were never tested “on the system,” to determine how they would react when actually connected to the power grid on the side of a home. Hundreds of thousands of iConA meters were installed on Alabama and Georgia homes without ever undergoing “performance” testing. Sensus’ practices resulted in deployment of millions of highly unreliable, dangerous electricity meters.

10. It quickly became apparent that the meters were fundamentally unsound. Failures, defects, and flaws surfaced from the initial delivery until Mr. Baker was terminated in August, 2009. Sensus’ contract with Southern Company carried an acceptable failure rate for the iConA of .5% per year. As of August, 2009, the iConA was failing at a rate of approximately 9% per year. Approximately 150 meters per day failed. By August, 2009, approximately 25,000 meters installed that year required replacement. In an attempt to perform what he understood to be his job, Plaintiff-Relator made numerous reports to Sensus management regarding iConA quality and safety issues. He was completely ignored and eventually fired. At one point, Sensus Director of AMI Projects Joel Denney sent an email to all Sensus AMI project managers and other management

proclaiming that “[t]here are no other systemic issues on [the iConA meter]

Stop the rumors where they start Do not send me or others emails about this.”

In reality, the litany of defects is long:

a. Electrical Fast Transient Failures

11. Both Alabama Power and Sensus were aware and are aware that iConA meters installed on thousands of Alabama homes are materially deficient and unsafe in that they do not meet industry standards and may fail dangerously when subjected to a sudden surge of electricity (a relatively common occurrence). In May, 2008, Alabama Power became aware that Sensus had not performed certain tests required by the iConA supply contract. One critical test that had not been performed is designated the Electrical Fast Transient (EFT) test. Required by American National Standards Institute (ANSI), the EFT test measures the ability of a meter to handle a sudden surge of electricity. Alabama Power demanded that Sensus perform EFT tests on a sample of iConA meters. They all failed.

12. At that time, some 86,000 meters were already furnished for installation on Alabama homes. Thus, at least 86,000 meters incapable of handling electrical surges are part of Southern Company’s Alabama “smart grid.”

b. Flux Contamination and Inaccuracy Issues

13. Exacerbating Sensus’ failure to perform adequate testing on its new meter, iConA production and manufacturing processes have proved to be

completely unreliable. In December of 2008, Alabama Power began rejecting thousands of meters for failing simple accuracy testing. Sensus performed an investigation and found two serious issues with iConA production. First, approximately 130,000 meters were found to contain “flux” or loose solder residue that affected the proper functioning of the meter. Second, after approximately 400,000 meters had been delivered to Alabama Power, it was determined that the equipment used by the manufacturer to calibrate the meters was itself not properly designed, resulting in meters that produced incorrect readings. As the 400,000 meters already installed were never retested, their accuracy is doubtful. At least another 130,000 meters were rejected by Southern Company or recalled.

14. As a result of flux contamination and other factors, iConA meters have proven inaccurate. Plaintiff-Relator personally investigated several instances of over-reporting meters and found individual meters misreporting up to 700%.

c. Faulty Components

15. Along with Sensus’ deficient processes, Defendants had reason to gravely doubt the integrity of component parts incorporated into the iConA meter. At least two key component parts of the iConA have been determined to be faulty, on a large scale, with extremely high failure rates. In April, 2009, it was discovered that the “U9” component, an electrical resistor, was defective on at least 85,000 meters delivered by Sensus to Southern Company. Around the same

time, at least 170,393 meters delivered by Sensus to Alabama Power were discovered to contain faulty Epson “TCXO” components.

d. “Hot” Meters

16. Defendants were or should have been aware that the iConA meters they were installing in millions of Alabama homes were not only technically deficient but posed a risk of serious injury or death. On or about January, 2009, Sensus learned that 19,000 installed iConA meters were reporting a “hot socket alarm” – that is, the meters’ internal thermometers were registering and reporting temperatures in excess of 200° Fahrenheit. Plaintiff-Relator informed Alabama Power Project Manager Derl Rhodes of the hot sockets via email. Sensus and Alabama Power treated the situation as false alarm. In or around April, 2009, Plaintiff-Relator began receiving reports that Sensus iConA meters were drastically overheating to the point of catastrophic failure, melting, and burning. Plaintiff-Relator investigated and personally photographed numerous iConA meters reduced to little more than piles of misshapen, blackened plastic - though Sensus engineer Bill Mazza told Plaintiff-Relator that the iConA’s plastic cover should not melt at a temperature lower than 500° Fahrenheit. On July 14, 2009, Plaintiff-Relator reported his findings via email to Denney and Sensus AMI Regional Manager Chris Testa (Testa). Plaintiff-Relator attached a photograph of a burned meter and informed Testa and Denney that the iConA was suspected of causing at least one

Alabama house fire. Instead of seeking to mitigate this potential hazard, Sensus reprimanded Plaintiff-Relator for conducting the investigation. Plaintiff-Relator was terminated shortly thereafter.

17. At all times relevant to this Complaint and their false claims to the United States, Defendants actual knowledge that the iConA meter was deficient, faulty, and dangerous. Alabama Power and the Southern Company well knew that Sensus had failed to perform adequate testing on the iConA or to verify that the processes used in its manufacture were reliable. Subsequently, Defendants were confronted with irrefutable evidence that the iConA was completely unreliable and in fact posed a grave hazard to the Alabama residents. In short, the iConA was completely unsuited to form the basis for a “smart grid.” Yet, Defendants proposed that the United States supply hundreds of millions of dollars to fund a smart grid project entirely dependent upon the iConA and accepted United States funding for that project. Defendants’ conduct violated the False Claims Act and endangered the lives of millions of Americans.

COUNT ONE
FALSE CLAIMS UNDER 31 U.S.C. § 3729¹

18. Plaintiff-Relator adopts and incorporates the previous paragraphs as though fully set forth herein.

19. By and through the fraudulent schemes described herein, Defendants knowingly – by actual knowledge or in deliberate ignorance or with reckless disregard of the truth or falsity of the information – presented or caused to be presented false or fraudulent claims to the United States for payment or approval and knowingly made, used, or caused to be made or used, false records or statements material to a false or fraudulent claim or to get a false or fraudulent claim paid or approved by the United States, to wit: the Southern Company and Alabama Power submitted a fraudulent grant proposal to the United States Department of Energy through the Smart Grid Investment Grant Program and falsely certified that their smart grid project was eligible for ARRA funds, when in fact they knew it was not. Subsequently, the Southern Company and Alabama Power fraudulently requested and accepted disbursement of funds from the Department of Energy to pay for a project completely tainted by defective equipment and unfit for ARRA funding. Sensus caused these false claims and

¹ On May 20, 2009, the President of the United States signed the Fraud Enforcement and Recovery Act of 2009, amending the False Claims Act as set forth in 31 U.S.C. §§ 3729-3733. Defendants' fraudulent actions described herein implicate both the prior and amended statutory provisions and subject it to treble damages and penalties as set forth in the respective versions of the False Claims Act.

false records to be submitted by supplying defective electricity meters that it knew were to be employed in a project paid for in part out of United States funds.

20. The United States paid the false claims described herein and summarized in Paragraph 19.

21. Defendants' fraudulent actions described herein have resulted in damage to the United States equal to the amount paid or disbursed to Defendants by the United States through the Department of Energy, together with the cost of time and resources diverted as a result of Defendants' fraud.

WHEREFORE, Plaintiff-Relator demands judgment in his favor on behalf of the United States and himself and against Defendants in an amount equal to treble the damages sustained by reason of Defendants' conduct, together with civil penalties as permitted by 31 U.S.C. § 3729, attorneys' fees, costs, interest, and such other, further, or different relief to which Plaintiff-Relator may be entitled.

COUNT TWO
CONSPIRACY UNDER 31 U.S.C. § 3729

22. Plaintiff-Relator incorporates all previous paragraphs as though fully set forth herein.

23. Defendants, in concert with their principals, agents, employees, and other institutions did agree to submit the false claims described herein to the United States, and the United States in fact paid those false claims.

24. Defendants and their principals, agents, and employees acted, by and through the conduct described *supra*, with the intent to defraud the United States by submitting false claims to the United States and by submitting false records to get such claims paid.

25. Defendants' fraudulent actions, together with the fraudulent actions of their principals, agents and employees, have resulted in damage to the United States equal to the amount paid by the United States to Defendants and the cost of time and resources diverted as a result of Defendants' fraud.

WHEREFORE, Plaintiff-Relator demands judgment in his favor on behalf of the United States and himself and against Defendants in an amount equal to treble the damages sustained by reason of Defendants' conduct and the conduct of their principals, agents, employees, and other institutions, together with civil penalties as permitted by 31 U.S.C. § 3729, attorneys' fees, costs, interest, and such other, different, or further relief to which Plaintiff-Relator may be entitled.

COUNT THREE
SUPPRESSION, FRAUD, AND DECEIT

26. Plaintiff-Relator adopts and incorporates the previous paragraphs as though fully set forth herein.

27. Defendants misrepresented or suppressed the material fact that the iConA electricity meter forming the basis for Defendants' smart grid infrastructure is dangerously defective and unfit.

28. Defendants were legally obligated to communicate these material facts to the United States.

29. Such misrepresentations were made willfully to deceive or recklessly without knowledge.

30. The United States acted on Defendants' material misrepresentations described herein to its detriment.

31. Defendants' fraudulent actions described herein have resulted in damage to the United States equal to the amount paid by the United States to Defendants a result of Defendants' fraudulent claims, together with the cost of resources diverted as a result of Defendants' conduct.

WHEREFORE, Plaintiff-Relator demands judgment in his favor on behalf of the United States and himself and against Defendants pursuant to 31 U.S.C. § 3732 and Ala. Code §§ 6-5-101, 6-5-102, and 6-5-103 in an amount sufficient to compensate the United States for Defendants' fraud, suppression, and deceit, together with punitive damages in an amount calculated to deter Defendants from engaging in such conduct in the future, along with attorneys' fees, costs, interest, and any other, further, or different relief to which Plaintiff-Relator may be entitled.

Date: May 25, 2010.



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RELATOR DEMANDS A TRIAL BY STRUCK JURY

Certificate of Service

On this the 25th day of May, 2010, Plaintiff-Relator hereby certifies that in compliance with Rule 4 of the Federal Rules of Civil Procedure, service of the *Qui Tam* Complaint has been executed as follows:

By Hand-Delivery to:

United States Attorney Joyce White Vance
Attn: AUSA Lloyd C. Peebles
1801 Fourth Avenue North
Birmingham, AL 35203

By Certified Mail to:

Attorney General of the United States of America
Department of Justice
950 Pennsylvania Avenue, NW
Washington, DC 20530-0001



OF COUNSEL

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The Enronization of Science

Lead...Hill and Knowlton. Vinyl chloride...Hill and Knowlton. Asbestos...Hill and Knowlton. Tobacco...Hill and Knowlton. Are we beginning to see a pattern here? Given where we are today, it is hard to believe that the cigarette manufacturers did not even have a trade association until 1953, when public relations guru John Hill warned the industry to get organized before it was too late and offered his firm's services for that dubious purpose. In 1966 Hill and Knowlton set up its Division of Scientific, Technical, and Environmental Affairs, which in later years would brag in solicitation brochures that this founding was "years before the first 'Earth Day' or the establishment of the Environmental Protection Agency."¹ Regarding the vinyl chloride story, the firm boasted that it assisted the producers of this carcinogen "to help fight and finally bring under control one of the most violent media and government regulatory firestorms ever experienced by a single industry," with the result that the final OSHA standards "were significantly less onerous than had been originally proposed."² When three scientists linked chlorofluorocarbon gas—Freon—to the destruction of the ozone layer³ and users of the chemicals began to look for alternatives, Hill and Knowlton went into action. On behalf of the Freon manufacturers, the firm attacked the science as uncertain and later boasted that its work helped DuPont gain "two or three years before the government took action to ban fluorocarbons."⁴ In fact, the science was of the highest quality: The three researchers subsequently won a Nobel Prize.

While Hill and Knowlton continues to provide public relations services to polluters, since the 1970s the sophistication of the “product defense industry” has grown apace with the federal regulatory apparatus established by Congress. For thirty years, therefore, it has been pretty much smooth sailing—that is, lots of lucrative work—for the key players in the new industry who specialize in helping corporations fight regulation. Ironically, more work is assured them with every advance in our ability to identify the deleterious health effects of toxic exposures. Only in the last few decades have we perfected the techniques that allow us to recognize and measure the illness and premature death toll associated with specific components of air pollution. New laboratory techniques have enabled scientists to examine the endocrine-disrupting properties of chemicals at almost unthinkably low levels of concentration. As a general rule, the more we know, the more regulation is required. Industry and free-market ideologues despise this logic, but what is the alternative? *Ignore* the health impact of these toxins? Yes, or better yet, let’s debate the impact!

As the product defense work has gotten more and more specialized, the makeup of the business has changed; generic public relations operations like Hill and Knowlton have been eclipsed by product defense firms, specialty boutiques run by scientists. Having cut their teeth manufacturing uncertainty for Big Tobacco, scientists at ChemRisk, the Weinberg Group, Exponent, Inc., and other consulting firms now battle the regulatory agencies on behalf of the manufacturers of benzene, beryllium, chromium, MTBE (methyl tertiary-butyl ether), perchlorates, phthalates, and virtually every other toxic chemical in the news today. Their business model is straightforward. They profit by helping corporations minimize public health and environmental protection and fight claims of injury and illness. In field after field, year after year, this same handful of individuals and companies comes up again and again.

The range of their work is impressive. They have on their payrolls (or can bring in on a moment’s notice) toxicologists, epidemiologists, biostatisticians, risk assessors, and any other professionally trained, media-savvy experts deemed necessary. They and the larger, wealthier industries for which they work go through the motions we expect of the scientific enterprise, salting the literature with their questionable reports and studies. Nevertheless, it is all a charade. The work has one overriding motivation: advocacy for the sponsor’s position in civil court, the court of public opinion, and the regulatory arena. Often tailored to address issues that arise in litigation, they are more like legal pleadings than scientific papers. In the regulatory arena, the studies are useful not because they are good work that the regulatory agencies have to take seriously but because they clog the machinery and slow down the process.

Public health interests are beside the point. Follow the science wherever it leads? Not quite. This is science for hire, period, and it is extremely lucrative. Court records show that the big three U.S. auto companies paid product defense scientists \$23 million between 2001 and 2006 to help defend them against disease claims by mechanics and other workers exposed to asbestos contained in automobile brakes.⁵

The coterie of consulting firms that specialize in product defense have done a great job—so great that manufacturing uncertainty has become a big business in itself. The scientific studies these firms do for their clients are like the accounting work that some Arthur Andersen Company accountants did for Enron (until both companies went bankrupt): They appear to play by the rules of the discipline, but their objective is to help corporations frustrate regulators and prevail in product liability litigation.

* * *

Should the public lose all interest in its health, these product defense firms would be out of luck. Exponent, Inc., one of the premier firms in the product defense business, acknowledges as much in this filing with the Securities and Exchange Commission:

Public concern over health, safety and preservation of the environment has resulted in the enactment of a broad range of environmental and/or other laws and regulations by local, state and federal lawmakers and agencies. These laws and the implementing regulations affect nearly every industry, as well as the agencies of federal, state and local governments charged with their enforcement. To the extent changes in such laws, regulations and enforcement or other factors significantly reduce the exposures of manufacturers, owners, service providers and others to liability, the demand for our services may be significantly reduced.⁶

Exponent, Inc., began its existence as an engineering firm, calling itself Failure Analysis Associates and specializing in assisting the auto industry in defending itself in lawsuits involving crashes.⁷ “Failure analysis” is a standard methodology for investigating the breakdown of a system or machine, but the firm must have realized that “Failure” in its name might not work well outside the engineering world and switched to the more palatable Exponent, Inc., when it went public in 1998.⁸

Exponent’s scientists are prolific writers of scientific reports and papers. While some may exist, I have yet to see an Exponent study that does not support the conclusion needed by the corporation or trade association that is paying the bill. Here are brief sketches of a few recent Exponent projects:

- The taste and smell of the gasoline additive MTBE are so foul that a tiny amount makes water undrinkable. This is bad because MTBE has contaminated drinking water sources across the country. (Moreover, it causes cancer in animals and may do so in people also, but this will be difficult to determine because the exposure levels are very low, exactly the sort of situation that epidemiology has the most difficulty addressing. The state of California has categorized MTBE as a possible human carcinogen.⁹) Communities across the country have sued the major oil companies and the MTBE manufacturers for the costs of cleaning up their water supplies. In response, a firm that provides the methanol used for making MTBE hired Exponent to produce a series of studies that concluded, not surprisingly, that MTBE is unlikely to pose a public health hazard and has not significantly impacted California's drinking water.¹⁰ When the defendants in certain lawsuits tried to convince Congress to end the litigation by fiat and bail out the polluters, Exponent's economists produced a report for the American Petroleum Institute that concluded that the cost of the cleanup would be relatively low, which would make the proposed taxpayer bailout of the industry more acceptable to fiscal watchdogs.¹¹
- An article in the *Annals of Emergency Medicine* suggested that the new generation of amusement park rides exposed thrill seekers to g-forces (a measure of acceleration) that exceed those experienced by astronauts and recommended that emergency physicians consider these rides as "a possible cause of unexplained neurologic events in healthy patients."¹² Six Flags Theme Parks, Inc., immediately commissioned Exponent to produce an "Investigation of Amusement Park Roller Coaster Injury Likelihood and Severity."¹³ The press release on the report was headlined "Roller Coasters, Theme Parks Extraordinarily Safe."¹⁴
- Given the skyrocketing obesity rates among teenagers, many school systems and even some states have considered banning soda machines from high schools in order to discourage teenagers from consuming the empty calories. In 2005 an Exponent scientist conducted a study on behalf of the American Beverage Association that concluded that the number of beverages consumed from school vending machines "does not appear to be excessive."^{15,16} In this case, however, the public just could not be convinced. The soft drink industry jettisoned these findings and in 2006 agreed to stop selling soda in schools.¹⁷
- Defense giant Lockheed Martin turned to Exponent when faced with the huge potential cost of cleaning up underground water sources contaminated with perchlorate, a rocket fuel component that ac-

cording to the National Academy of Sciences causes thyroid disease in infants.¹⁸ Exponent's studies minimized the risk associated with perchlorate exposure.^{19,20}

- When a study by consulting epidemiologists discovered a high rate of prostate cancer cases at a Syngenta plant that produced the pesticide atrazine,²¹ Exponent's scientists produced a study that found no relationship between the chemical and the disease.²²
- After numerous studies that linked pesticide exposure and Parkinson's disease appeared in prestigious scientific journals, Exponent's scientists produced a literature review for CropLife America, the trade association of pesticide producers, whose conclusion maintained that "the animal and epidemiologic data reviewed do not provide sufficient evidence to support a causal association between pesticide exposure and Parkinson's disease."²³
- Exponent specializes in literature reviews that draw negative conclusions. The company's scientists have produced several reviews of the asbestos literature for use in litigation, all of which conclude that certain types of asbestos and certain types of asbestos exposure are far less dangerous than previously believed.²⁴⁻²⁶

Another major player is the Weinberg Group, which was founded in 1983 by Dr. Myron Weinberg, formerly of Booz, Allen, and Hamilton. "Asbestos, Tobacco, Pharmaceuticals—We're All Next!" shouts the PowerPoint presentation of one Weinberg executive. Here is his bottom line: "Without the science you cannot win, but having it carries no guarantee."²⁷ In one promotional brochure the firm touts its work for a company that was confronted with a Superfund problem. On behalf of this client Weinberg's scientists "analyzed existing studies to find any design flaws to support legal defense. . . . [B]y reanalyzing the raw data from this study, a biostatistician from THE WEINBERG GROUP helped to demonstrate the study's numerous design and analysis flaws."²⁸

In 2003 DuPont hired the Weinberg Group to address "the threat of expanded litigation and additional regulation by the EPA" of perfluorooctanoic acid (PFOA),²⁹ a chemical used in the production of Teflon. (The majority of members on an EPA scientific advisory board have labeled PFOA a "likely" carcinogen.³⁰) Paul Thacker, a reporter, uncovered a letter from Terry Gaffney, Weinberg's vice president for Product Defense, to a DuPont vice president, explaining that "DUPONT MUST SHAPE THE DEBATE AT ALL LEVELS." (This firm appears to favor uppercase exhortations.) Gaffney lays out a comprehensive strategy, including "analyzing existing data, and/or constructing a study to establish not only that

PFOA is safe . . . but that it offers real health benefits.”^{29,31} At the time, Gaffney was also running the campaign of a major manufacturer of ephedra-based dietary supplements to stop the FDA from banning ephedra, a product that the agency had already linked to 164 deaths.³²

In my work on beryllium, I first came across the work of Dr. H. Daniel Roth. This was a reanalysis by Dr. Roth and Dr. Paul Levy on behalf of the beryllium industry, and it yielded the usual result: By changing some of the parameters, the researchers had managed to demonstrate that the statistically significant elevation of lung cancer risk was no longer statistically significant.³³ Such reanalyses are a specialty of some of the product defense firms, whereby one epidemiologist reanalyzes another’s raw data in ways that almost always exonerate the chemical, toxin, or product in question. The studies are carefully designed to do just this. Statistically significant differences disappear; estimates of risk are reduced. Such alchemy is rather easily accomplished, whereas the opposite—turning insignificance into significance—is extremely difficult.

Intrigued by the work of Levy and Roth on behalf of the beryllium industry, I wanted to see whether the two had bestowed similar benefits on other industries, so I Googled them. Among the many exhibits I found were a number of tobacco documents showing how both men had worked for this industry. Dr. Levy was hired by R. J. Reynolds (RJR) to conduct a reanalysis of a study examining the link between lung cancer and workplace exposure to secondhand smoke; in 1998 he presented his findings to a National Toxicology Program panel that was considering whether to designate environmental tobacco smoke (ETS) as a carcinogen. No link existed, he concluded.³⁴ Dr. Roth’s work with tobacco was more extensive. In 1985 he was one of the experts hired by Philip Morris to assist with its litigation, especially to develop ways to attribute lung cancer among smoking asbestos workers to asbestos rather than to smoking.³⁵ In 1987 he applied for the position of executive director of the Center for Indoor Air Research (CIAR), a creation of the Tobacco Institute. The evaluation of Dr. Roth by CIAR’s executive search firm was very positive. “Simply put,” it concluded, he “believes in the mission of the Center and in his ability to achieve its objectives.”³⁶ The tobacco documents do not reveal whether he was offered the job, but it is clear he later played a key role in Big Tobacco’s efforts to stop OSHA’s proposed indoor air quality standard in 1994.³⁷

The tobacco relationship did not surprise me, but the coal connection did. For the past thirty years Dr. Roth has worked for producers and users of coal, turning out reanalysis after reanalysis refuting studies of the health effects of airborne pollutants from coal-burning power plants. On behalf of the North Dakota Lignite Research Council, which represents companies that produce coal with a high mercury content, he reviewed the literature on

the effects of human exposure to mercury and, taking a page from the tobacco playbook, told the coal producers that most of the studies were “highly questionable” and that the overall picture was inconclusive. Even so, he recommended that “it would be valuable to reanalyze the raw data.”³⁸

In 1977 Dr. Roth produced a report for the electrical power industry that attacked the EPA’s research on the relationship between exposure to fine particles in the air and the risk of asthma attacks. This reanalysis was required, he wrote, because the acceptance by the public and policy makers of the original EPA study was “making it most difficult to generate wise policy decisions on such matters as the rapid expansion of the use of coal.”³⁹ Interestingly, both of Dr. Roth’s coauthors on this study went on to become key scientists in Big Tobacco’s campaign to manufacture uncertainty about the health effects of secondhand smoke. One of them, Dr. Anthony Colucci, was appointed director of RJR’s Scientific Litigation Support Division.⁴⁰

A jack of all trades within the product defense business, Dr. Roth also turned up in a book, *The Expert Witness Scam*, written by Leon Robertson, a retired professor of epidemiology from Yale and one of the two or three leading injury epidemiologists of the twentieth century. Dr. Robertson was appalled that for at least a decade Dr. Roth had been presented as an expert in vehicle rollovers although, according to Robertson, Roth had never published a research paper on any aspect of motor vehicle injuries.⁷

Dr. Roth also collaborated with Dr. Levy in refuting the risks associated with liquor; the Distilled Spirits Council of the United States hired them to critique the studies on alcohol consumption and breast cancer.^{41,42}

Yet another major product defense consultant is ChemRisk, founded in the 1980s by Dennis Paustenbach, perhaps the leading figure in the field. Dr. Paustenbach has an unassailable scientific background. He is the author of two textbooks on risk assessment and hundreds of scientific articles and book chapters. At first, ChemRisk was part of a larger consulting firm, McLaren/Hart Environmental Engineering Corporation, of which Dr. Paustenbach eventually became president and chief executive officer. In 1998, when McLaren/Hart was facing bankruptcy, Dr. Paustenbach and several ChemRisk colleagues moved to Exponent, Inc.

In 2003 Dr. Paustenbach left Exponent and revived the name ChemRisk for his firm, which has prospered, quickly opening six offices around the country. He and his colleagues are important players in this book and are featured in upcoming discussions of benzene, beryllium, and chromium. In each case they have developed arguments that could have the effect of delaying or weakening public health regulation of a powerful toxin. Paustenbach is a veteran of the Love Canal and Times Beach, Missouri, catastrophes, and has been a key participant in the attempted rehabilitation of dioxin.⁴³ He has worked for the initiative funded by the auto industry that

attempts to show that asbestos liberated from automobile brakes does not cause disease,^{44,45} and he was also among the scientists used by the tobacco industry to question the EPA's risk assessment of secondhand tobacco smoke.⁴⁶

According to a report in the *Wall Street Journal*, Dr. Paustenbach and his colleagues at ChemRisk pulled off a particularly audacious stunt on behalf of Pacific Gas and Electric (PG&E).⁴⁷ The California utility was fighting several lawsuits, including the one portrayed in the movie *Erin Brockovich*, in which chromium-contaminated groundwater was alleged to have caused a range of illnesses. In mounting its defense, PG&E turned to ChemRisk, which had already been working for the chromium industry in New Jersey (trying to convince that state's regulators that the metal was not so dangerous as to require cleaning up a massive toxic waste dump.⁴⁸) According to a report in the *Wall Street Journal*, ChemRisk's product defense experts, through an affiliate in Shanghai, obtained the raw data of a 1987 study that had implicated chromium-polluted water in high cancer rates.⁴⁹ This study was a major problem for the defendants. The *Wall Street Journal* reported that ChemRisk paid Dr. Zhang JianDong, the lead author, two thousand dollars, reanalyzed his data, and obtained different results that appeared to exonerate chromium. The reanalysis was then published under the names of Dr. Zhang and a Chinese colleague, without any mention or acknowledgment of ChemRisk's role.^{47,50,51}

This initiative was remarkably successful; for almost a decade, the fabricated study was promoted in courts and regulatory proceedings. Fortunately, the questionable history of the article is now public knowledge. After much uproar, the editor of the journal in which the paper was published withdrew the work,⁵² and a California state epidemiologist has re-examined the original data and determined that Dr. Zhang's first analysis was the accurate one: Drinking chromium in your water increases your risk of stomach cancer.⁵³ (Paustenbach has said that his involvement in the paper was relatively minor and has defended the "underlying science." ChemRisk has also claimed that its scientists "wanted to be co-authors on the paper."⁵⁴ A year after the *Wall Street Journal* reported the story, the Chinese paper's second author claimed that the newspaper's coverage was inaccurate.⁵⁵ But the *Wall Street Journal* has not corrected or retracted its story.)

This episode was outrageous but not all that out of line with the standards of the industry. When product defense specialists cannot get the raw data required for a reanalysis, they have even been known to make them up. I learned this when I came across an abstract that described the reanalysis of the data of a study of older adults that had found reduced performance on neuropsychological tests associated with polychlorinated biphenyl (PCB) levels. The reanalysts did not have access to the raw data, so they came up

with a simulated data set based on the overall distribution of subjects in the original study. Not surprisingly, their results called into doubt the validity of the original findings.⁵⁶ My curiosity piqued, I called the author of the original study, toxicologist Susan Schantz of the University of Illinois. Dr. Schantz had never heard of the reanalysis. She had never been asked to provide her raw data, and when I read her the abstract, she laughed. Dr. Schantz told me the new work was simply wrong, as she could have explained to the reanalysts if they had asked her. (One of those reanalysts was the same scientist who would later defend the cause of selling soda in schools for the American Beverage Association.)

* * *

Peer review is a complex issue, one that is widely misunderstood by the public and by some individuals in the regulatory and legal systems. Even rigorous peer review by honest scientists does *not* guarantee a study's accuracy or quality. Peer review is just one component of a larger quality control process through which scientific knowledge is developed and tested—a process that never ends. Nevertheless, it has been granted an important role in both the regulatory and legal systems. Some agencies, including the International Agency for Research on Cancer (IARC), will not consider using a paper in its deliberations if it has not undergone peer review.⁵⁷ Articles that have been published in peer-review journals are assumed, often mistakenly, to be of high quality. This is not necessarily so.

The credibility given peer-reviewed studies encourages product defense firms to manipulate and distort the process. They play the peer-review card beautifully. They understand that their studies and reanalyses need this imprimatur, but how do they get this seal of approval? Easy. They establish vanity journals that present themselves to the unwary as independent sources of information and science, but the peer reviewers are carefully chosen, like-minded corporate consultants sitting in friendly judgment on studies that are exquisitely structured to influence a regulatory proceeding or court case.

There is now a slew of these “captured” journals. The tobacco industry, for example, secretly financed the journal *Indoor and Built Environment* to promote (and position for legal purposes) the idea that indoor air pollution was a problem caused not by secondhand smoke but by inadequate ventilation.⁵⁸ The best-known of these publications is *Regulatory Toxicology and Pharmacology*, the official mouthpiece of the International Society for Regulatory Toxicology and Pharmacology (ISRTP)—an impressive name, but really just an association dominated by scientists who work for industry trade groups and consulting firms.⁵⁹ The sponsors of the ISRTP include many of the major tobacco, chemical, and drug manufacturing companies. Its leadership consists of corporate and product defense scientists and

attorneys, along with a small number of government scientists who have apparently bought in or who do not know better. The immediate past president was Terry Quill, an attorney who became senior vice president for product defense of the Weinberg Group.⁶⁰ Quill also has roots in the tobacco wars but not as a scientific expert. Rather, he served as outside counsel to Philip Morris in the secondhand-smoke litigation.⁶¹

The editor of *Regulatory Toxicology and Pharmacology* is Gio Gori, well known in the public health community as one of the tobacco industry's most prominent and long-standing defenders—after serving from 1968 to 1980 as director of the National Cancer Institute's highly regarded Smoking and Health Program. Then he changed sides and embarked on a lucrative career defending Big Tobacco on the secondhand smoke issue.⁶²

Does the peer-review process at these journals play a role in improving the published papers or do studies of questionable validity move to publication unchallenged? Here is a recent story that speaks volumes. One well-known epidemiologist and corporate consultant recently conducted what is called a meta-analysis, in which several studies on the same exposure were combined into a single large study, theoretically at least more powerful than several smaller ones. The study, which was paid for by PG&E for use in the chromium-contaminated drinking water suits, concluded that, contrary to fifty years of epidemiologic studies, chromium was “only weakly carcinogenic for the lungs.”⁶³

Published in *Regulatory Toxicology and Pharmacology*, the study makes the most basic (and fatal) mistake of combining all types of exposure and cancer rates and treating them as comparable. Heavy exposures to airborne chromium among the workers in pigment factories were combined with light exposures among residents of towns with contaminated water. Of course, there was no increased lung cancer risk among the community residents—they were not *breathing* chromium. However, since there were several times more community residents than workers, they were weighted more heavily in the analysis, thereby diluting the effects seen in the worker study and making it appear that chromium was “only weakly carcinogenic for the lungs.” That is an elementary error. The peer reviewers evidently did not mind, though, since the study achieved its product defense purpose for the industry.

Another story also illustrates how polluters use these journals-for-hire to impede public health measures. The International Agency for Research on Cancer is the branch of the World Health Organization devoted to cancer prevention. In February 2006 an IARC advisory panel met to consider whether carbon black, an important industrial chemical that is the foundation for many new “nanoproducts,” should be categorized as a carcinogen. One of the papers that the panel planned to consider was a study that had

found that workers who had been exposed to carbon black had twice the expected risk of lung cancer.⁶⁴ The weekend before IARC's meeting was to start, a scientist who was working for the International Carbon Black Association (ICBA) breathlessly delivered to the IARC panel three manuscripts⁶⁵⁻⁶⁷ that reanalyzed data from that first study. All three of these papers had been first presented at a conference sponsored by the ICBA and held less than *one month* before the IARC meeting.⁶⁸ The three new re-analyses had been put into a fast-track (two week) peer review and accepted for publication in the *Journal of Occupational and Environmental Medicine (JOEM)*, whose work appears all too frequently in these pages. I should explain that peer review in a scientific journal generally takes at least several months, sometimes more than a year, and that authors generally revise articles based on reviewers' feedback. As we would surmise, the fast-track papers disputed the causal relationship between carbon black and lung cancer.

The IARC advisory panel voted that carbon black was "possibly carcinogenic" and concluded that, although sufficient evidence for carcinogenicity in animal studies existed, the human evidence was inadequate.⁶⁹ Did the three new reanalyses help shape the panel's conclusion? It is hard to say, but it is clear that most of the negative evidence from human studies was provided by the industry. No new independent studies have been undertaken, let alone fast-track peer-reviewed.

Skewed studies produced for the most mercenary of purposes are now accepted as part of the game. I saw this at the Department of Energy. Regarding the beryllium industry's advocacy briefs masquerading as scientific papers (they had been published in peer-review journals, after all), my career colleagues in the department shrugged. "It's all part of the game," they said. "We know what these papers are worth." The lack of outrage by honest scientists and regulators is distressing. The late senator Daniel Patrick Moynihan had a phrase for it—he called it "defining deviancy down."⁷⁰ Conduct that was once considered unacceptable and that *should* be considered unacceptable is no longer stigmatized or even acknowledged as being corrupt. Moreover, some scientists and certainly most nonscientists (including reporters, judges, juries, and members of Congress) do *not* know what those papers are worth. They are often fooled—which is the whole idea.

* * *

Polluters and manufacturers of dangerous products also fund think tanks and other front groups that are well known for their antagonism toward regulation and devotion to "free enterprise" and "free markets." There are dozens of these organizations working on behalf of just about every significant industry in this country. Some of the ones leading the fight on behalf of corporate interests against public health and environmental regulation are familiar: the Heritage Foundation, Washington Legal Foundation, American

Enterprise Institute for Public Policy Research, Cato Institute, Competitive Enterprise Institute, Hudson Institute, Progress and Freedom Foundation, and Citizens for a Sound Economy, to name a few. Each year these think tanks, along with a host of smaller, lesser-known ones, collect millions of dollars from regulated companies to promote campaigns that weaken public health and environmental protections.

These broad public-policy groups rarely pretend to do science themselves; they generally focus on major regulatory issues. Therefore, the polluting corporations and their trade associations have also set up a different stratum of think tanks and front groups they can rely on to churn out predictable, authoritative-looking reports that cull the friendly science commissioned by the companies themselves. These reports are aimed at legislators, the press, and the public. They always question the science regarding specific hazards (generally those created by their funders). For example, the Council on Water Quality pretends to ensure that the “best available science drives government actions on setting standards for perchlorate in water.”⁷¹ As previously mentioned, this rocket fuel additive is now contaminating groundwater supplies around the nation. Lockheed Martin and other polluters that are facing the huge cost of cleaning up contaminated aquifers provide the council’s funding.⁷² The group is run by staff at APCO Worldwide, the public relations giant that has done similar work for Big Tobacco, so consider the source when judging the claim that “[s]cientific research shows low levels of perchlorate are harmless.”⁷¹ In fact, an analysis by the National Academy of Sciences found that perchlorate causes thyroid damage, especially in infants, at fairly low exposure levels.¹⁸

The Center for Media and Democracy keeps tabs on these front groups on the web⁷³ and in a series of invaluable books written by Sheldon Rampton and John Stauber.^{74–75} One of the groups they are following is the Center for Consumer Freedom, which uses funding from the food and restaurant industries to attack studies that link fat consumption to obesity.⁷⁶ The same group started FishScam to promote the idea that mercury in fish does not pose a danger to pregnant women.⁷⁷

Another of these cleverly named organizations is the Foundation for Clean Air Progress. This group issues regular reports showing how pristine our environment is, questioning why anyone would want to strengthen the laws responsible for such excellent air. The organization is run by Burson-Marsteller, the PR firm, using funds provided by the petroleum, trucking, and other polluting industries.⁷⁸

The Annapolis Center for Science-Based Policy was started by a vice president of the National Association of Manufacturers for, among other purposes, fighting the EPA’s Clean Air standards.⁷⁹ It is heavily funded by ExxonMobil (\$688,575 between 1998 and 2005)^{80,81} and large coal-burning

utilities like the Southern Co. (\$325,00 in 2003–2004).^{82,83} A “key finding” of one Annapolis Center report states that “No one knows whether controlling [airborne particles] will actually yield net benefits to public health. Further regulation of PM is thus premature.”⁸⁴ This has become the mantra of the big coal-burning power companies as they oppose further regulation of these particulates.^{85,86} It is an indefensible assertion. While we cannot ethically set up a study in which we expose some people to high levels of these particulates (called PM, or particulate matter), the equivalent natural experiment happens all of the time. One of the most famous was studied by Arden Pope, a researcher at Brigham Young University who was conducting a long-term study of air pollution in Provo, Utah, in the 1980s. As his luck would have it, his research period covered a full year in which the big steel mill in Provo, which accounted for 80 percent of the region’s airborne PM, was idled by a labor strike. In that year, the mortality rate and hospitalizations dramatically *decreased*. Once the strike was settled and the PM pollution from the steel mill resumed, mortality and hospitalization rates went back up.⁸⁷ The cause-effect relationship could not have been clearer.

So many studies have linked exposure to airborne PM levels and increased risk of death, hospitalization, and emergency room and clinic visits that the editor of the journal *Epidemiology*, Dr. Jonathan Samet, a distinguished scientist and chairman of the Department of Epidemiology at the Johns Hopkins Bloomberg School of Public Health, told scientists to stop submitting new studies on this topic. So many had already been published that new ones would add little of value to the scientific literature; the pages of Dr. Samet’s journal could better be devoted to other topics.⁸⁸ We do not know everything about PM, but we know enough to be very confident that reducing the concentrations will prevent tens of thousands of deaths each year.^{89–91}

* * *

Let’s face it, the work product of the product defense industry is impressive. Carefully manicured reports and reanalyses, captured journals full of “peer-reviewed” articles, and captured think tanks hiring out their ad hoc advocacy sow uncertainty across a range of issues. Perhaps the sleaziest behavior of all, though, is their practice of denigrating scientists and studies whose findings do not serve the corporate cause. Today the most prominent and effective public face and front for this component of the attack on science is the “junk science” movement, whose sole purpose is to ridicule research that threatens powerful interests, irrespective of the quality of that research. Peter Huber, based at the Manhattan Institute, is often credited with coining the term, as I mentioned in the introduction. I would like to repeat Huber’s rough-and-ready description of junk science in his book *Galileo’s Revenge: Junk Science in the Courtroom*: “Junk science is the mirror image of real science, with much of

the same form but none of the substance. . . . It is a hodgepodge of biased data, spurious inference, and logical legerdemain. . . . It is a catalog of every conceivable kind of error: data dredging, wishful thinking, truculent dogmatism, and, now and again, outright fraud.”⁹²

Orwellian indeed, as I stated in the introduction, but unquestionably the corporations and the product defense industry they fund have done a superb job in marketing the “sound science” slogan and thereby undermining the use of scientific evidence in public policy. The junkscience.com website lists a roster of “junk scientists,” including six elected members of the Institute of Medicine and four recipients of the highest honor bestowed by the American College of Epidemiology, so it appears that scientists who are asked to identify *their* most outstanding colleagues do not share the opinions of the promoters of the “junk science” label.⁹³

The opposite of junk science is, of course, “sound science.” Rarely is the one invoked as bad without an immediate reference to the other as the ideal. The first entity to carry the official “sound science” flag was The Advancement of Sound Science Coalition (TASSC), which was “dedicated to ensuring the use of sound science in public policy decisions.”^{94,95} This front organization was set up by APCO Associates, one of Philip Morris’s PR firms.⁹⁶ (Elisa Ong and Stanton Glantz described the founding role of tobacco in the sound science movement in the November 2001 issue of the *American Journal of Public Health*.⁹⁷) Steven Milloy, the first executive director of TASSC, had formerly worked for Multinational Business Services, a firm run by Jim Tozzi, perhaps the premier antiregulatory tactician. Ultimately TASSC served its purpose and is now defunct, and Milloy has moved on to his own website, www.junkscience.com.

A representative “sound science” credo is this one from a TASSC press release, which quotes Dr. Margaret Maxey, director of the Clint W. Murchison Chair of Free Enterprise and professor of bioethics at the University of Texas: “More and more [science is] being used to justify preconceived agendas. Too often, public policy decisions that are based on inadequate science impose enormous economic costs and other hardships on consumers, businesses and government.”⁹⁵ The usual figure provided for the annual cost of “regulations” has been in excess of \$40 billion.⁹⁸ One of industry groups’ favorite examples of costly policy is the Clean Air Act. Another TASSC authority, Floy Lilley, also of the University of Texas, had this to say in denouncing that regulation: “The Clean Air Act is a perfect example of laboratory science being superficially applied to reality. If it were reflective of reality, based on current government studies, medical examiners would find evidence of effects in lungs that are irreversible and life-threatening. This simply has not happened. And now we must wonder if the cost of the Clean Air Act is justified by alleged health benefits.”⁹⁵

In the fact-based world, the Clean Air Act has been one of the most successful modern public health regulations by preventing tens of thousands of illnesses and premature deaths and millions of asthma attacks.⁹⁹ Even the cost-benefit doyens of the second Bush administration, perhaps the most fervent opponents of regulation ever to occupy the White House, have estimated that its benefits outweigh its costs by somewhere between \$50 billion and \$400 billion.⁹⁸ But is anyone really surprised that it is subjected to ridiculous attacks? As comedian Lily Tomlin said, “No matter how cynical you become, it’s never enough to keep up.”¹⁰⁰

Pesticides implicated in Parkinson's? Government, researchers and foundations know it, but, the public is not fully apprised of this association.

With various organizations consistently fundraising for research, the public should be demanding that they provide education and prevention as part of their fundraising efforts.

We feel that the public has a right to be protected from this debilitating disease and the pesticide association, therefore, we have created this condensed summary of research and funding that confirms this association.

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. [1]

Although the average age of diagnosed onset for Parkinson's disease is in the early 60s, approximately 10% of the 1.5 million people with the disease are thought to be below the age of 40. [2]

The National Institute of Environmental Health Sciences (NIEHS), part of the National Institutes of Health (NIH):

- ❖ announced today that it will award three new grants totaling \$21.25 million over a five-year period to study how environmental factors contribute to the cause, prevention and treatment of Parkinson's disease and other related disorders.
- ❖ "Given the growing body of literature that is identifying environmental stressors such as pesticides as risk factors for Parkinson's disease, it is more important than ever that we bring clinical and basic scientists together to clarify the causes of this disease," said Cindy Lawler, Ph.D., program administrator at NIEHS.
- ❖ Marie-Françoise Chesselet, M.D., Ph.D., University of California, Los Angeles
The researchers at UCLA have previously shown associations between high levels of exposure to specific environmental pesticides and Parkinson's disease
- ❖ Their work is expected to shed light on the pathological processes involved in sporadic Parkinson's disease, the most frequent form of the disorder, and could have public health implications for precautions in the use of some pesticides. [3]

More Evidence for Parkinson's Disease and Pesticide Link:

- ❖ A large epidemiologic study shows that individuals reporting regular exposure to pesticides had a 70 percent higher incidence of Parkinson's disease than those reporting no exposure.
- ❖ The study, funded by NIEHS and conducted by researchers at the Harvard School of Public Health, is the first large scale prospective study to examine the possible links between chronic pesticide exposure and Parkinson's disease.
- ❖ The current study included more than 143,000 subjects; 7,800 reported exposure to pesticides.
- ❖ No increased risk for Parkinson's disease was found from other occupational hazards including exposure to other chemicals or solvents.
- ❖ Research utilizing twins has established that genetics probably plays a minor role in Parkinson's disease and thus has made environmental exposures the focus of much interest.
- ❖ A compound known as MPTP, a byproduct of the production of a heroinlike illicit drug and structurally similar to the herbicide paraquat, causes death of neurons in the substantia nigra, the part of the brain affected by Parkinson's disease.
- ❖ For that reason pesticides and herbicides exposures are considered likely to cause or contribute to the development of Parkinson's disease. [4]

Government orders an inquiry into pesticide links to Parkinson's Disease

- ❖ Professor David Coggon, the professor of occupational and environmental medicine at the Medical Research Council, said his committee wanted to commission a team of expert epidemiologists. "If we were confident that there was nothing in it at all, we wouldn't be paying taxpayers' money to carry out a review. It's about being responsible about these things and looking if it's appropriate," he said. "If new evidence suggests there might be a problem we have to look at it."
- ❖ He said that overall, the results "support the idea" that exposure to pesticides increases the chance of getting Parkinson's. His study came out in November 2000.
- ❖ However, a far more damning one was published earlier that year by a team at Stanford University in California who had studied more than 1,000 people, half of whom had Parkinson's.
- ❖ They found that those who had been frequently exposed to pesticides were twice as likely to develop the disease. [5]

Emory Awarded \$6 Million to Study Causes of Parkinson's

- ❖ Parkinson's disease has been linked to pesticide exposure, mitochondrial damage and altered storage of the neurotransmitter dopamine. [6]

Parkinson's Disease: Environment Plays a Larger Role than Genetics in Swedish Twins

- ❖ The cause of Parkinson's disease is considered to involve both genetic and environmental factors as well as interactions between these-the so called, gene-environment interaction.
- ❖ Mutations in several genes have been linked to Parkinson's disease. Although they are important for understanding the mechanism and process of the disease, they do not appear to explain most late-onset Parkinson's cases.
- ❖ Of the 382 pairs of twins, 7 pairs were found in which both had evidence of Parkinson's disease.
- ❖ These data agree with other twin studies that determined that "genetic effects are of little importance in Parkinson's disease."
- ❖ The results of almost no genetic influence for Parkinson's are quite notable in this study, given the considerably higher heritability estimates reported for other disorders such as Alzheimer's disease, asthma, and Type I diabetes.
- ❖ In other words, specific genes may increase the risk of Parkinson's disease only in individuals exposed to a certain risk factor.
- ❖ This study's results suggest that if genetic effects are important, they are only expressed once sufficient environmental factors are present.
- ❖ As Dr. Ken Olden, Director, NIEHS has said, "Genes load the gun. The environment pulls the trigger." [7]

Pesticide-Parkinson link explored

- ❖ The initiative has given new impetus to the field. William Langston, founder and CEO of the Parkinson's Institute, says, "What the NIEHS is saying [with the latest initiative] is that the research is far enough along to become proactive." NIEHS estimates that it will provide \$12 million in funding for PD research in 2002, a doubling of its FY2001 support.
- ❖ A number of large population studies suggest that people with jobs that expose them to pesticides have a higher risk of developing PD, a neurodegenerative illness marked by the death of the brain cells that produce and release dopamine.
- ❖ However, "there has not been a specific class of pesticides or specific pesticide linked to PD," says Harvey Checkoway, an epidemiologist at the University of Washington. "There is no smoking gun."
- ❖ This "gun" is what several projects that will receive funding are trying to find. UCLA epidemiologist, Beate Ritz, is conducting "the largest prospective study, looking at both occupational and residential exposure."
- ❖ The work will take advantage of the fact that California law requires that all agricultural application of pesticides are reported, thereby providing a detailed record of what people have used and where. [8]

Center for Gene-Environment Studies in Parkinson's Disease-Grant from NIEHS

- ❖ The UCLA-CGEP will explore mechanisms by which genetic and environmental influences combine to increase the risk for Parkinson's disease (PD) in susceptible individuals through interplay between neurotoxic pesticides and biologic mechanisms regulating the neurotransmitter dopamine in brain cells.
- ❖ There is extensive evidence that pesticides, a suspected risk factor for Parkinson's Disease, interact with multiple mechanisms that regulate the intra- and extracellular levels of the dopamine, which itself is a powerful oxidant that can be highly toxic to cells.
- ❖ Critical factors in this interaction of dopamine homeostasis and pesticides may be oxidative stress and the function of the proteasome, an organelle involved in protein degradation in cells.
- ❖ Both dopamine and pesticides can produce oxidative stress; pesticides can directly affect dopamine transporters, thus causing alterations in dopamine homeostasis, and possibly interfere with proteasomal function. [9]

Association of Pesticide Exposure with Neurologic Dysfunction and Disease

- ❖ An extensive literature suggests that pesticide exposure may increase risk of Parkinson disease
- ❖ Recent studies with more detailed exposure assessment have generally found an association of pesticide exposure with Parkinson disease, with 1.5- to 7-fold increases in risk.
- ❖ Case-control studies found increased risk associated with possession of a pesticide use license cumulative pesticide exposure based on complete occupational histories, or occupational or other pesticide use
- ❖ A cross-sectional study found an association of parkinsonism with exposure to any pesticide, although not with specific pesticides or pesticide classes, and an ecologic study found that Parkinson disease mortality was higher in California counties where pesticides were used than in counties where they were not
- ❖ Two cohort studies with detailed exposure information confirmed these findings: Risk was related to years of plantation work and to self-reported pesticide exposure in men enrolled in the Honolulu Heart Program cohort, and occupational exposure to pesticides assessed with a job-exposure matrix was strongly associated with Parkinson disease risk (5.6-fold increase in risk) in an older cohort living in a vineyard-growing region of France
- ❖ Most studies of pesticide exposure and Parkinson disease risk have been unable to implicate specific pesticides. Several studies found increased risk associated with exposure to either insecticides or herbicides, and one study indicated that risk was elevated by exposure to organochlorines, OPs, or carbamates
- ❖ Several studies have implicated the herbicide paraquat, which produces selective degeneration of neurons involved in Parkinson disease
- ❖ Case reports have described Parkinson disease in individuals exposed to Ops, to herbicides including glyphosate, paraquat, and diquat; and to fungicides including maneb and other dithiocarbamates
- ❖ Higher concentrations of organochlorines, particularly dieldrin, have been found in postmortem brains of Parkinson disease patients compared to patients with other neurologic diseases tests
- ❖ There is also evidence suggesting that other types of pesticides, including organochlorines, carbamates, fungicides, and fumigants, are neurotoxic.
- ❖ No study has evaluated the association of herbicides with symptom prevalence or neurobehavioral performance, but these chemicals have been implicated as risk factors for Parkinson disease.
- ❖ Although it is important to identify classes of pesticides and even specific chemicals associated with neurotoxicity, it is also important to recognize that most workers are exposed to complex mixtures of pesticides, which may contribute synergistically to neurotoxicity.
- ❖ In conclusion, there is mounting evidence that chronic moderate pesticide exposure is

neurotoxic and increases risk of Parkinson disease. [10]

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