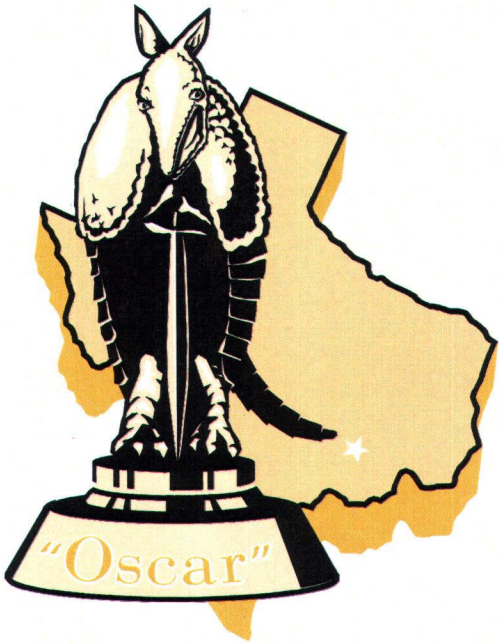
The Nineteenth Annual Texas Environmental Superconference
"An Oscar Winning Performance"



TO: Attendees

FROM: Planning Committee

DATE: August 2, 2007

On behalf of the Environmental and Natural Resources Law Section of the State Bar of Texas, the Air and Waste Management Association-Southwest Section, the Water Environment Association of Texas, the Texas Association of Environmental Professionals, the Auditing Roundtable, and the American Bar Association Section of Environment, Energy & Resources, welcome to the Nineteenth Annual Texas Environmental Superconference -- "An Oscar Wining Performance," a tribute to Oscar winning movies.

As always, there are evaluation forms for the program. We appreciate your taking the time to complete them. The organizers of this program take into account these forms in planning next year's conference. In addition, if you have an interest in having a particular topic presented or in speaking on a particular topic, the evaluation form is the appropriate place to provide that information. Suggestions for themes for next year also are being solicited. Next year's conference is scheduled for August 7-8, 2008. Please mark your calendars.

For the third year, we are having a Wednesday evening nuts-and-bolts session – Environmental Law 101. This year, we again are focusing on substantive areas of environmental law. Please let us know what you think about the concept of a Wednesday evening program. Should we continue doing it? What topics should we cover?

If you have any questions or comments, please do not hesitate to contact any member of the Planning Committee at the conference, or, thereafter, Jeff Civins at (512) 867-8477 or Jeff.Civins@haynesboone.com.

NINETEENTH ANNUAL

TEXAS ENVIRONMENTAL SUPERCONFERENCE

"An Oscar Winning Performance"

THURSDAY, AUGUST 2, 2007

TAB 1	**8:40-9:00**	**Welcoming Remarks –** *The Greatest Show on Earth* Jeff Civins, Texas Environmental Superconference Drew Miller, Environmental and Natural Resources Law Section, SBOT Cindy Smiley, Air & Waste Management Association, Southwest Section Carol Batterton, Water Environment Association of Texas Ed Fiesinger, Texas Association of Environmental Professionals Michael Byington, Auditing Roundtable Danny Worrell, ABA Section of Environment, Energy & Resources *Moderator:* Stephanie Bergeron Perdue, TCEQ
TAB 2	**9:00-9:20**	**Legislative Update –** *A Funny Thing Happened on the Way to the Forum* Geoff Connor, Jackson Walker
TAB 3	**9:20-9:40**	**Views of a New Commissioner –** *The Natural* Buddy Garcia, Commissioner, TCEQ
TAB 4	**9:40-10:00**	**Enforcement – What's Coming – TCEQ –** *Crouching Tiger Hidden Dragon* Carlos Rubinstein, TCEQ
TAB 5	**10:00-10:25**	**Enforcement – What's Coming - EPA –** *The Empire Strikes Back* Granta Nakayama, Assistant Administrator, Office of Enforcement and Compliance Assurance, EPA D.C.
	10:25-10:40	**Break –** *Breaking Away* **[First Skit]** *Moderator*: Elizabeth Hurst, Tronox
TAB 6	**10:40-11:25**	**Water Quality –** *Finding Nemo* Betty Jordan, Alan Plummer Associates, Inc. David Gillespie, EPA Region 6 Robert Martinez, TCEQ
TAB 7	**11:25-12:00**	**Public Nuisance –** *Close Encounters of the Third Kind* Kevin Colbert, Gardere Wynne Sewell LLP Paulette Wolfson, City of Houston **[Second Skit]** **[Turn in 2 written movie quizzes]**
	12:00-1:15	**Lunch –** *High Noon*

[Third Skit]

Moderator: Pam Travis, EPA Region 6

TAB 8	**1:15-1:40**	**State of State** – *Gone With the Wind* Kathleen White, Chairman, TCEQ
TAB 9	**1:40-2:00**	**Air Quality – Hot Issues** – *Lost Horizon* Jason Burnett, EPA D.C.
TAB 10	**2:00-3:00**	**Air Quality Panel** – *Patch of Blue* Suzanne Smith, EPA Region 6 David Schanbacher, TCEQ Jeff Holmstead, Bracewell & Giuliani, LLP Howard Hoffman, EPA D.C.
	3:00-3:15	**Break** – *Exodus*

[Fourth Skit]

Moderator: Carrick Brooke-Davidson, Andrews Kurth, LLP

TAB 11	**3:15-4:15**	**Climate Change – Scientific, Legal & Policy** – *Some Like it Hot* Julian Levy, Exponent Steve Susman, Susman Godfrey, LLP Randy Armstrong, Shell
TAB 12	**4:15-4:35**	**Carbon Sequestration** – *The Abyss* Ian Duncan, UT Bureau of Economic Ecology
TAB 13	**4:35-5:15**	**Revitalization of Brownfields** – *How Green Was My Valley* Scott Sherman, EPA D.C. Mike Craver, Hillwood Development Company LLC Tim King, The Dow Chemical Company

[Fifth Skit]
[Announcement of 2 Movie Quiz Winners]

	5:15-6:00	**SBOT ENRLS-Sponsored Reception** – *Swing Time* Sponsored by the Environmental and Natural Resources Law Section of SBOT

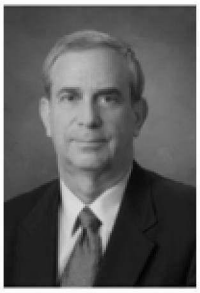
FRIDAY, AUGUST 3, 2007

	8:00-8:30	**Continental Breakfast –** *Breakfast at Tiffany's*
TAB 14	**8:30-8:45**	**Opening Remarks –** *Thank God It's Friday* Jeff Civins, Haynes and Boone, LLP
TAB 15	**8:45-9:00**	**Gregg Cooke Tribute –** *A Man for All Seasons* Larry Starfield, Deputy Regional Administrator, EPA Region 6 Bob Huston, Former Chairman, TCEQ *Moderator*: Cindy Smiley, Kelly, Hart & Hallman
TAB 16	**9:00-9:35**	**Nanotechnology – Scientific and Legal** – *Fantastic Voyage* Cris Williams, Tetra Tech EM Inc. Tracy Hester, Bracewell & Giuliani LLP
TAB 17	**9:35-10:00**	**Chemical Security –** *All Quiet on the Western Front* Rebecca Fink, NuStar Energy L.P.
	10:00-10:15	**Break –** *Hustle & Flow* **[Sixth Skit]** *Moderator:* Laurencia Fasoyiro, TCEQ
TAB 18	**10:15-10:45**	**Open Meetings –** *Lost in Translation* Trish Carls, Brown & Carls LLP **Open Records –** *Paper Chase* Jennifer Riggs, Riggs & Aleshire
TAB 19	**10:45-11:10**	**Bending Science –** *An Inconvenient Truth* Tom McGarity, The University of Texas School of Law
TAB 20	**11:10-11:35**	**Case Law Updates –** *Yesterday, Today, and Tomorrow* John Eldridge, Haynes and Boone, LLP
TAB 21	**11:35-12:00**	**Attorney Client Privilege – The McNulty Memo** – *Dangerous Liaisons* Walt James, Walter D. James III, PLLC **[Seventh Skit]** **[Turn In Skit Quiz Answers]**
	12:00-1:00	**Lunch –** *12 O'Clock High*
	1:00-1:15	**SBOT ENRLS Meeting** (for those who are interested) **[Announcement of Skit Quiz Winner]** *Moderator*: Pam Giblin, Baker Botts
TAB 22	**1:15-2:15**	**Corporate Sustainability –** *From Here to Eternity* David Rothbard, CFact

Phil Trowbridge, AMD
Brenda Harrison, Texas Instruments Incorporated
Jim Blackburn, Blackburn & Carter

TAB 23	**2:15-3:00**	**Risk Management In Business Transactions –** *Gentleman's Agreement* Eva O'Brien, Fulbright & Jaworski, LLP Tré Fischer, Connelly•Baker•Wotring•Jackson LLP
TAB 24	**3:00-3:30**	**Environmental Policy Issues in Corporate Acquisitions –** *Terms of Endearment* Jim Marston, Environmental Defense Bill Bumpers, Baker Botts
	3:30	**Adjourn –** *Lost Weekend*
		Ice Cream Sundae Reception
		[Turn in Comment Cards/Drawing for Prizes at 3:45]*

* You must be present to win.



Partner
Environmental

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Areas of Experience:
Environmental Law
- Transactions
- Counseling
- Litigation

Administrative Law

Jeff Civins

jeff.civins@haynesboone.com

Mr. Civins has practiced all aspects of environmental law since 1975. He advises clients on regulatory requirements, he assists them in the evaluation and negotiation of corporate transactions, and he represents them in environmental and toxic tort litigation.

As an adjunct professor at the University of Texas School of Law, Mr. Civins taught a seminar on Environmental Law Concerns to Business in 1987, and has taught a seminar on Environmental Litigation each Spring since 1992. He is co-editor of the Thomson West Texas Practice 2-volume treatise on Texas Environmental Law (1997 and 2005 editions).

Mr. Civins recently has represented:

- An airline in settling litigation with another airline regarding contamination at JFK Airport.
- A major energy company in private party Superfund litigation and in negotiating a settlement in a RCRA enforcement action brought by EPA Region 6 involving contaminated ground water.
- A major energy company in resolving regulatory issues relating to offshore operations.
- A national real estate company in its sale of office buildings in downtown Dallas and Houston and of a major development near Houston, and its acquisition of an apartment complex in Massachusetts and office building in Las Vegas.

Honors

- Top environmental lawyer in Texas (tied) -- Chambers USA America's Leading Lawyers (2003-present) ("Star" Classification -- 2006-present)
- Best Lawyers in America (1989-present)
- Texas Super Lawyer -- Texas Monthly (2003-present)
- Top 50 Lawyers in Central and West Texas -- Texas Monthly (2003-present)
- Austin Business Journal Best of Business Attorneys -- Environmental (2005)
- Who's Who Legal: USA – Environment (2006-present)

Education

J.D., University of Texas, 1975, with honors; Order of the Coif
M.S., in Chemistry, Pennsylvania State University, 1970
A.B., in Chemistry, Brandeis University, 1967

Memberships

Environmental and Natural Resources Law Section, State Bar of Texas, Past Chair, and Chair, Annual Texas Environmental Superconference; Administrative Law and Litigation Sections, State Bar of Texas; American Bar Association, Sections of Environment, Energy, and Resources, and of Litigation and Administrative Law; Air and Waste Management Association, Central Texas Chapter, Past Chair; American Chemical Society -- Environment Division; Environmental Law Institute; Texas Law Foundation; University of Texas Law School Alumni Association Executive Board, Keeton Fellow, and Dean's Roundtable; Past President, Communities-In-Schools, Central Texas Chapter

Selected Publications and Presentations

"Reconciling Shareholder Value Creation with Stakeholder Interests -- Corporate Sustainability," Panel Chair, Institute for Excellence in Corporate Governance -- 4th Annual National Conference, UT Dallas (October 26, 2006)

Conference Chair and Speaker on "All Appropriate Inquiry," The Eighteenth Annual Texas Environmental Superconference, the Environmental and Natural Resources Law Section of the State Bar of Texas, the Water Environment Association of Texas, the Texas Association of Environmental Professionals, the Air and Waste Management Association-Southwest Section, the Auditing Roundtable, and the American Bar Association Section of Environment, Energy and Resources (ABA-SEER) (August 3-4, 2006)

"All Appropriate Inquiry -- Limitations and Concerns Related to EPA's New Rules," Presentation, Air and Waste Management Association's Annual Conference & Exhibition, New Orleans, Louisiana (June 21, 2006)

"Doing Environmental Due Diligence," American College of Real Estate Lawyers Quarterly, (May 2006) and ABA-SEER Environmental Transactions and Brownfields Committee Newsletter (Nov. 2006)

"All Appropriate Inquiries -- Are They Appropriate?" with M. Mendoza, BNA Environmental Due Diligence Guide (Jan. 19, 2006, No. 167) and BNA EHS Strategies (Jan. 2006, No. 1)

"New Rule Affects Landscape For Real Estate Purchasers," Austin Business Journal (Jan. 6, 2006); Baltimore Business Journal (Mar. 17, 2006); Sacramento Business Journal (June 23, 2006)

"New AAI Rule: All A Matter of Perspective, Attorney Says," On The Cutting Edge: An Insider's Perspective, Interview, BNA Environmental Due Diligence Guide (Feb. 16, 2006)

"EPA's All Appropriate Inquiries Rule: How appropriate is it?" Participant, BNA national audio conference (February 21, 2006)

"Transactional Environmental Due Diligence -- What diligence is due?" with M. Mendoza, Natural Resources & Environment, ABA-SEER (Winter 2006)

"Public Participation in Environmental Permitting and Enforcement Proceedings," with Iris Gibson, University of Texas Administrative Law Conference (June 28-29, 2005)

"The Third Party and Transaction-Related Defenses," with M. Mendoza and C. Fernandez, ABA-SEER Environmental Litigation & Toxic Torts Committee Newsletter (July 2005)

"Environmental Management Systems," with A. Strong and C. Fernandez, Chapter 31, Volumes 45-46, Thomson West Texas Practice (2005)

"Environmental Aspects of Business Transactions," with B. Phillippi, Chapter 32, Volumes 45-46, Thomson West Texas Practice (2005-2007)

"Fundamentals of Environmental Law," State Bar of Texas Ten Minute Mentor

"Cleanup Help Not Aviall-able," with J. Eldridge, Texas Lawyer (Jan. 10, 2005)

"Proper environmental due diligence should be part of a stock acquisition," Austin Business Journal (Dec. 3-9, 2004), Dallas Business Journal; Birmingham Business Journal

"Who's Liable Now? New Federal Brownfields Legislation," with B. Phillippi, Texas Bar Journal (Dec. 2002), reprinted in Real Estate Issues (Winter 2003-2004)

"Practical Advice for Defense Counsel in Mass Toxic Tort Cases," with M. Mazzone and E. Kohn, Texas Lawyer (Nov. 2001)

"Water Issues for Oil & Gas Producers," Southwest Legal Foundation (2001)

Bio for Drew Miller

Drew Miller received a B.S. in biological science from Cornell University in 1984 and a J.D., with high honors, from George Washington University in 1989. Prior to attending law school, he served as an Urban Park Ranger in New York City and as a ferryboat manager on the East River. Mr. Miller began his legal career in 1989 at Piper & Marbury in Washington, D.C., where he represented and advised clients in environmental matters, and served as a member of the Love Canal litigation team. In 1993, Mr. Miller was recruited from Washington by Gregg Cooke and began a tenure in the Natural Resources Division of the Office of Attorney General of Texas. In that role, he did civil environmental enforcement on behalf of the State and defended and represented Texas' regulatory agencies in state and federal courts and before federal agencies. Mr. Miller returned to private practice in 1998, joining Kemp Smith, LLP, and currently focuses on matters involving contaminated property including brownfields redevelopment and cost-recovery litigation, environmental permitting and enforcement, and litigation involving groundwater rights and regulation. Mr. Miller serves as Chair of the Environmental and Natural Resources Law Section of the State Bar of Texas and has authored several articles on environmental and administrative law.

CYNTHIA C. SMILEY

BIOGRAPHY



Cindy Smiley is a partner in Kelly Hart & Hallman's Environmental and Administrative Law practice group. With more than 25 years of experience, Ms. Smiley focuses her current practice on counseling clients on federal, state, and local laws relating to water and waste issues. She represents individuals, corporations, and other business entities before the Texas Commission on Environmental Quality and other agencies in matters involving water rights, water quality, underground storage tanks, waste characterization and management, municipal setting designations, and other environmental and administrative law matters. Ms. Smiley also assists clients in matters before the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service. In addition, Ms. Smiley works with environmental consultants and clients who are evaluating potential environmental liabilities associated with property ownership, acquisition, and disposition.

EDUCATION & HONORS

- University of Texas, B.A., Plan II, *summa cum laude*, 1978
  - Phi Beta Kappa
  - Phi Kappa Phi
- University of Texas School of Law, J.D., 1981
- Outstanding Service Award presented by Environmental and Natural Resources Law Section, State Bar of Texas (August 2004)

ADMISSION & AFFILIATIONS

- State Bar of Texas, 1981
- U.S. District Court, Western District of Texas, 1988
- Austin Bar Association, Member of Administrative Law Section; Oil, Gas & Mineral Section; and Environmental, Natural Resources & Water Law Section
- Member of Executive Committee, Environmental and Natural Resources Law Section, State Bar of Texas, 2005-2008
- Board Member and Vice Chair, Industry Council on the Environment, 2007
- Chair, Southwest Section of Air & Waste Management Association, 2001-2002

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Austin, Texas 78701

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Email: cindy.smiley@khh.com

Firm website: www.khh.com

Carol V. Batterton, Executive Director, Water Environment Association of Texas

Carol Batterton currently serves as the Executive Director of the Water Environment Association of Texas. In this position, she is responsible for coordination of WEAT's legislative activities with a primary focus on promoting WEAT as a technical resource in the legislative process. She also coordinates WEAT's interaction with regulatory agencies involved with water issues.

Prior to serving as WEAT's Executive Director, Carol worked for the Texas Commission on Environmental Quality for 25 years. At TCEQ, she served in a variety of positions related to compliance and enforcement, including Director of Field Operations Division, Director of the Compliance Support Division, and Special Assistant to the Deputy Director of the Office of Compliance and Enforcement.

Carol is a past-president of WEAT, past chair of the National Environmental Laboratory Accreditation Conference, and past chair of the Institute for National Environmental Laboratory Accreditation.

Carol received a B. S. in biology from Baylor University and a M. A. in biological sciences from the University of Texas, Marine Science Institute.

Edward G. Fiesinger
TAEP

Edward G. Fiesinger is a Principal with Zephyr Environmental Corporation in its Houston, Texas office serving as Office Manager and specializing in air quality issues. He joined Zephyr following his retirement from the chemical industry where he was employed for over 36 years with service in manufacturing operations and later in the environmental arena where he assisted plant personnel with environmental compliance, permitting, and reporting. During this period he was an active member of the Texas Chemical Council (TCC) serving as Chair of various subcommittees and representing TCC in its interactions with Texas environmental regulatory agencies.

A registered Professional Engineer, he has been an active member of the Texas Association of Environmental Professionals (TAEP) since joining Zephyr and currently serves as the local chapter Treasurer. Fiesinger has been a member of A&WMA since 1985.

Fiesinger earned a B. S. degree in Chemical Engineering from Clarkson University in Potsdam, N.Y. and a M. S. in Chemical Engineering from the University of Delaware.

Michael Byington - Byington & Genuise LLC

P.O. Box 802006
Dallas, Texas 75380

Professional Profile

Competent individual with over 30-years of experience in environmental regulatory compliance, permitting, auditing and project management. Experience includes corporate coordinator and project manager for environmental regulatory compliance, permitting, and auditing in conjunction with solid waste, water, and air.

Areas of Expertise

Environmental Regulatory Compliance	Environmental Management Systems	Health and Safety
Environmental Auditing	Environmental Site Assessments	Research/Development
Environmental Permitting	Acquisition Due Diligence	Public Relations

Professional Experience and Responsibilities

- Currently (2003 to present) assisting in all environmental compliance programs and EMS implementation project at a major Federal installation in Texas. This involved all aspects of implementation from design and development through full system implementation and third party registration.
- Corporate coordinator and project manager for environmental regulatory compliance, permitting and auditing in conjunction with waste, water, and air; in response to U.S. EPA and State regulatory requirements. Developed corporate environmental auditing policies and procedures. Additional audit overviews of operational activities pertaining to MSHA and OSHA requirements.
- Conducted numerous Acquisition Due Diligence and Environmental Site Assessment activities and reporting; including asbestos sampling and reporting. Involved in developing several Asbestos Maintenance Plans.
- Performed numerous environmental compliance audits of industrial operations and third-party waste disposal facilities.
- Managed operational issues concerning solid waste, water, and air permitting compliance and reporting. Issues include waste disposal, Hazard Materials Communication Plans, Spill Prevention and Storm Water.
- Oversee corporate technical consultant requirements and coordinated efforts with Fortune 100 companies with a wide array of technical and industry requirements.

Environmental Consultant - Byington & Genuise, LLC	**2000-Present**
Environmental Consultant - J. McNutt and Associates	**1998-2000**
Senior Environmental Specialist - The North American Coal Corporation	**1991-1997**
Senior Environmental Engineer - Texas Municipal Power Agency	**1984-1991**

Education & Training

B.S. Zoology, Texas A&M University, 1977

Graduate Studies (MBA), Texas A&M University

Numerous regulatory seminars and training classes for Regulatory Compliance and Environmental Auditing

Professional Certifications and Affiliations

Level 5 Federal Security Clearance

Certified Professional Environmental Auditor (CPEA)

The Auditing Roundtable - Chairman, South Central Region

Previous Certifications Include:

Certified Hazardous Material Manager (CHMM)

Brown McCarroll L.L.P.

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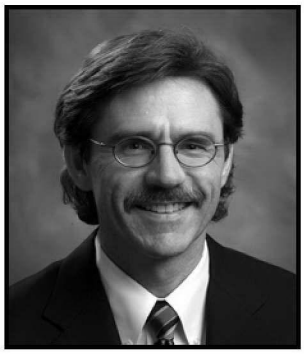

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Legal Experience

Mr. Worrell's practice is concentrated in the areas of environmental permitting and enforcement; Superfund litigation; litigation and transactions involving environmental matters; and on regulatory compliance involving hazardous and municipal solid waste, air quality, injection wells, *in situ* uranium mining, underground and aboveground storage tanks, asbestos, PCBs, water and wastewater utilities, and pipelines.

Recent Accomplishments

- Represented client in administrative contested case hearing involving amendment to production area authorization for *in situ* uranium mining permit before the Texas Commission on Environmental Quality ("TCEQ").
- Represented client in administrative contested case hearing and district court appeal, successfully obtaining renewal and new Class 1 hazardous waste injection well permits from the TCEQ.
- Represented and assisted client in administrative, district court and appeals court proceedings involving a contested case hearing, successfully obtaining major modifications to its Class 1 non-hazardous injection well permits from the TCEQ.
- Lead attorney in successful effort to obtain a Municipal Solid Waste Type I landfill permit for client in state administrative proceedings, including contested case hearing.
- Represented client in successfully negotiating settlement of administrative proceedings, involving a contested case hearing, on an application for renewal and major modification of Commercial Hazardous Waste Treatment, Storage and Disposal Facility permit.
- Assisted client in successfully obtaining first Regulatory Flexibility Order from the TCEQ for use of the EPA Comparable Fuels Rule allowing substitution of fuels at chemical manufacturing facility.
- Represented clients in successfully obtaining a Single Property Designations from the TCEQ for air quality regulatory purposes.
- Represented four different clients in settling claims associated with federal Superfund litigation involving former tin smelter.
- Assisted client in successful settlement of product liability litigation relating to oil well cementing operations.

Education

- Doctor of Jurisprudence, University of Houston Law Center, 1990. Houston Journal of International Law
- Master of Science, Geology, Louisiana State University, 1984
- Bachelor of Science, Geology (Major), Petroleum Engineering (Minor), University of Texas at Austin, 1980

Professional Licenses

- Attorney at Law, Texas, 1990

Court Admissions

- United States Court of Appeals for the Fifth Circuit
- Supreme Court of Texas

Prior Professional Experience

- ARCO Oil and Gas Company, Geologist, Specialized in oil and gas exploration, 1984-1986

Speeches and Publications

- *Environmental Law 101: Solid Waste*, In conference materials associated with the Texas Environmental Superconference, 2005, Article
- RCRA: Resource Conservation and Recovery Act, Co-Author with John W. Teets and Dennis P. Reis, American Bar Association, 2003, Book
- *Subsurface Trespass Claims Against Underground Injection Control Operations*, in conference materials for the Texas Natural Resource Conservation Commission 2002 Underground Injection Control Symposium, 2002, Article
- *Legal and Strategic Considerations in Risk-Based Closures,* in proceedings of Energy Week Conference and Exhibition, 1996, Article
- *Land Disposal Restrictions: Current Developments and The Corrective Action Management Unit (CAMU) Rule,* in conference materials for the Brown McCarroll & Oaks Hartline Annual Client Environmental Seminar, 1994, Article
- *Exploration and Production Wastes and Class II Injection Wells: Current Regulatory Developments (SPE 27706),* in Proceedings of the Permian Basin Oil & Gas Recovery Conference, sponsored by the Society of Petroleum Engineers, 1994, Article
- *Understanding the New Corrective Action Management Unit (CAMU) Rule and its Impact on CERCLA Projects,* in Operating Under RCRA and CERCLA Requirements, sponsored by Executive Enterprises, Inc., 1993, Article
- *Overview of Federal and Texas Class II Injection Well Regulatory Programs and New Developments in Efforts to Revise These Programs,* in proceedings of the Symposium on Class II Injection Well Management and Practices, sponsored by the Underground Injection Practices Search Foundation and the U.S. Department of Energy, 1992, Article
- *Producing Property Conveyances and Environmental Liabilities: A Mine Field for the Unwary,* with R. Kinnan Golemon, 43rd Annual Institute on Oil and Gas Law and Taxation, Mathew Bender 1992, Article
- *Permitting Injection Wells in the New Texas,* with Albert R. Axe, Jr., in Proceedings of the Underground Injection Practices Council, Winter and Summer 1991, Article
- *Recent Regulatory Changes Affecting Class I Injection Wells,* with Albert R. Axe, Jr. and R. Steven Morton, in Proceedings of the Underground Injection Practices Council, Winter and Summer 1991, Article
- *An Overview of the Use of Injection Wells for Industrial Waste Disposal,* with R. Steven Morton and Susan Thompson, 1990, Article
- *Issues and Policy Considerations Regarding Hazardous Waste Exports,* 11 Houston Journal of International Law 373, 1989, Article

Professional Memberships and Activities

- State Bar of Texas
- American Bar Association, Sections of Natural Resources, Energy, and Environmental Law
- Austin Bar Association

Honors

- Recognized in *Best Lawyers in America*
- "Leaders in Their Field," Environmental Law, Chambers USA 2005, 2006, and 2007 Guides

Community Involvement

- Austin United Capital Soccer Club, Team Manager, 2005-2007
- North Austin Soccer Alliance, Soccer Coach, 2003-2004
- West Austin Youth Association, Soccer Coach, 2000-2002
- Adult Services Council, President, Officer, and Board Member, 1991-1996

STEPHANIE BERGERON PERDUE

Stephanie Bergeron Perdue was appointed Deputy Director of the Texas Commission on Environmental Quality's (TCEQ) Office of Legal Services in May 2006 after serving as Acting Deputy Director since November 2005. She joined the Environmental Law Division as Director in September 2001. She previously served as Executive Assistant to former Chairman Robert J. Huston from August 1999 thru September 2001 which afforded her the opportunity to participate in the Sunset Review Process of what was then the Texas Natural Resource Conservation Commission. As a result, she also worked on a variety of Sunset-related legislative implementation rulemakings such as participation by the Executive Director in contested case hearings. She was also introduced to National Ambient Air Quality Standards/State Implementation Plan issues upon her arrival at the agency. Her introduction to water issues, including TMDLs, Section 401 Certification, creation of the North Harris County Regional Water Authority and State/Regional Water Plans, occurred in 1997 when she joined the staff of Senator Lindsay's Office. She worked for Senator Lindsay for two sessions prior to joining the agency.

Stephanie received a Bachelor of Science in Communications from University of Texas at Austin in 1990 and Doctor of Jurisprudence from South Texas College of Law in 1995.

Geoff Connor, Of Counsel, Jackson & Walker L.L.P.

Environmental Bills: 80th Legislature Regular Session

Session Overview

- Texas Senate
  - 20 Republicans
  - 11 Democrats
- Texas House of Representatives
  - 81 Republicans
  - 69 Democrats
- Total Bills Filed = 6,190
- Total Bills Passed = 1,481 (24% of total bills filed)
- Total Bills Vetoed = 51
- Environmental Bills Filed = 127
- Environmental Bills Passed = 23 (18% of environmental bills filed)

Recap of Significant Environmental Bills

BILLS PASSED AND SIGNED BY GOVERNOR PERRY

SB 3 by Averitt (R-Waco): **PASSED**

- Omnibus water bill.
- Language tracks HB 3 and HB 4 concerning environmental flows, water conservation, and Edwards Aquifer Authority.
- Outlines reservoir designation, construction, and operation.

HB 3 by Puente (D-San Antonio): **PASSED**

- Directs TCEQ to provide for the freshwater inflows and instream flows necessary to maintain the viability of the state's streams, rivers, and bay and estuary systems in the commission's regular granting of permits for the use of state waters.
- Creates a basin-by-basin process to address in-stream flow issues.
- Creates the Environmental Flows Advisory Group to develop policy recommendations for conserving water resources while providing for the needs for a growing Texas.
- Creates a Watermaster Advisory Committee for each river basin or segment of river basin that has a watermaster. Committee members must be water rights holders within the respective basin.
- Addresses issues surrounding the protection, management, and permitting of groundwater in the area regulated by the Edwards Aquifer Authority and to the operations and oversight of the authority.

HB 4 by Puente (D-San Antonio): **PASSED**

- Water conservation legislation.
- Encourages voluntary land stewardship as a significant water management tool.
- Creates the Water Conservation Advisory Council as a public resource that has expertise in water conservation.
- Creates a statewide water conservation public awareness program to educate residents of this state about water conservation.
- Directs the Texas Higher Education Coordinating Board to encourage each institution of higher education to develop curriculum and provide related instruction regarding on-site reclaimed system technologies, including rainwater harvesting, condensate collection, or cooling tower blow down.
- Directs certain large water utilities to submit conservation plans to TCEQ and TWDB and annual progress reports under those plans.
- Authorizes and provides for TWDB to issue grants for water conservation programs.

SB 12 by Averitt (R-Waco): **PASSED**

- Increases the scope of the Texas Emissions Reduction Plan (TERP) and the Low Income Vehicle Repair, Retrofit, Accelerated Vehicle Retirement Program (LIRAP) to reduce emissions from mobile sources.
- Sets criteria requirements to vehicles to qualify for LIRAP.
- Sets the motor vehicle replacement amount under LIRAP at $3,000 for a replacement car of the current model year or the previous three model years, $3,000 for a replacement truck of the current model year or the previous two model years, and $3,500 for a replacement hybrid vehicle of the current model year or the previous model year.
- To qualify for LIRAP, a vehicle owner's income may not exceed 300% of the federal poverty level.
- Addresses requirements for dealers and dismantlers regarding emissions control equipment and engines, and stipulates that the only cost to be paid by a recycler for the residual scrap metal of a vehicle retired under this section shall be the cost of transportation of the residual scrap metal to the recycling facility.
- Each political subdivision, institution of higher education, or state agency shall implement all energy efficiency measures that meet the standards established for a contract for energy conservation measures in order to reduce electricity consumption, and shall establish a goal to reduce the electric consumption by 5% each year for 6 years, beginning September 1, 2007.
- Extends TxDot's reimbursement requirements to TERP until 2015.
- Caps TCEQ TERP grant amount at $15,000 per ton of NO_x emissions reduced in the nonattainment area or affected county for which the project is proposed.
- Provides for TCEQ notice requirements to the county judge and local officials regarding concrete batch plant permit applications.

- Addresses Title V enforcement and related penalty calculations when multiple violations exist. New language provides that only those violations that require initiation of formal enforcement will be included in any proposed enforcement action unless the violation is a repeat violation due to the same root cause from two consecutive investigations or a violation that has not been corrected within the time frame specified by the commission.

HB 624 by King (R-Weatherford): **PASSED**

- An electric utility or transmission and distribution utility must report to and obtain approval of the PUC before closing any transaction in which: 1) the electric utility or transmission and distribution utility will be merged or consolidated with another electric utility or transmission and distribution utility; 2) at least 50 percent of the stock of the electric utility or transmission and distribution utility will be transferred or sold; or 3) a controlling interest or operational control of the electric utility or transmission and distribution utility will be transferred.
- The PUC shall approve such transaction if the transaction is in the public interest.

HB 1090 by Swinford (R-Amarillo): **PASSED**

- Relating to the establishment of a program by the Department of Agriculture to make grants to encourage the construction of facilities that generate electrical energy with certain types of agricultural waste.
- The bill became the primary vehicle for repealing the existing subsection (m) in PURA 39.904 (renewable energy) to cure the REC market.

HB 1254 by Bonnen (R-Angleton): **PASSED**

- Allows TCEQ to adjust fees to encourage electronic reporting.

HB 1386 by King (R-Weatherford): **PASSED**

- Relating to regulation of the decommissioning costs of certain nuclear-powered commercial electric generating units.

SB 1461 by Seliger (R-Amarillo): **PASSED**

- Relates to Texas' bid for federal FutureGen funding including contracting authority and indemnification requirements, liability, representation of a state agency by the attorney general, and monitoring of sequestered carbon dioxide.

HB 1526 by W. Smith (R-Baytown): **PASSED**

- Directs the TCEQ to establish a program for the voluntarily use of alternative detection methods and technologies. The program must also provide regulatory incentives to encourage voluntary use of alternative leak detection technologies.

SB 1672 by Averitt (R-Waco): **PASSED**

- NO_x allowance allocation adjustments and incorporation of modifications to CAIR and Texas SIP.

SB 1673 by Averitt (R-Waco): **PASSED**

- Time frame for renewal of a preconstruction permit issued by TCEQ.

SB 1762 by Shapleigh (D-El Paso): **PASSED**

- Study conducted by TWDB concerning the possible impact of climate change on surface water supplies from the portion of the Rio Grande subject to the Rio Grande Compact.

HB 1967 by Farabee (D-Wichita Falls): **PASSED**

- Authorizes pipelines carrying feedstock to or products from carbon gasification to be classified as common carriers and, thus, have eminent domain authority.

HB 2018 by Brown (R-Athens): **PASSED**

- Eliminates the minimum city population requirement (20,000) for a Municipal Setting Designation (MSD) to be issued by the TCEQ

HB 2608 by Hughes (R-Marshall): **PASSED**

- Directs the Texas Higher Education Coordinating Board to use money available form legislative appropriations to support applied research related to lignite-based electric power generation and Integrated Gasification Combined Cycle (IGCC) projects.

HB 2703 by Woolley (R-Houston): **PASSED**

- Provides legal recourse for interference of duties of a public health professional.

HB 2714 by Bonnen (R-Angleton): **PASSED**

- Recycling of computer equipment.

HB 2994 Bonnen (R-Angleton): **PASSED**

- Enables local communities to offer incentives to owners of nuclear electric power-generating facilities or IGCC projects.

HB 3693 by Straus (R-San Antonio): **PASSED**

- Enhances existing energy efficiency programs, updates building energy codes, and requires state agencies to purchase more efficient equipment and appliances.

HB 3732 by Hardcastle (R-Vernon): **PASSED**

- Creates regulatory and financial incentives for "advanced clean energy projects," which are defined to be limited to a class of technology that can meet an air emissions profile that the federal government has targeted for the

year 2020. Feed stocks covered by this bill include coal, biomass, petroleum coke, solid waste, or fuel cells using hydrogen derived from such fuels to generate electricity.

- Although generally limited to power generation projects, the incentives also apply to liquid fuel projects so long as they co-generate their own electricity.

FAILED BILLS

SB 93 by Gallegos (D-Galena Park): **FAILED**

- Requires daily fence-line monitoring for air contaminant emissions.

SB 124 by Ellis (D-Houston): **FAILED**

- Implementation of a low-emission vehicle program consistent with Phase II of the California Low-Emission Vehicle Program.

HB 344 by Strama (D-Austin): **FAILED**

- Implementation of a low-emission vehicle program consistent with Phase II of the California Low-Emission Vehicle Program.

HB 375 by Anchia (D-Dallas): **FAILED**

- Directs the State Energy Conservation Office to development a state strategy for increasing the availability of low-emission automotive fuels for Texas.

HB 440 by Hernandez (D-Houston): **FAILED**

- Directs TCEQ to adopt by rule effects screening levels for air contaminants at a level that does not increase the risk of cancer in a person exposed to the air contaminant by greater than one chance in one million when compared to a person not exposed to the contaminant.

SB 529 by Watson (D-Austin): **FAILED**

- Clean School Bus Program.

HB 547 by Farrar (D-Houston): **FAILED**

- Requires daily fence-line monitoring for air contaminant emissions.

HB 548 by Farrar (D-Houston): **FAILED**

- Implementation of a low-emission vehicle program consistent with Phase II of the California Low-Emission Vehicle Program.

HB 601 by Thompson (D-Houston): **FAILED**

- Requires state agencies to identify and address adverse human health and environmental effects on minority populations and low-income populations.

SB 659 by Wentworth (D-San Antonio): **FAILED**

- Maximum permitted withdrawals and critical period management of groundwater in the area regulated by the Edwards Aquifer Authority.

HB 722 by Burnam (D-Fort Worth): **FAILED**

- Establishment of a Global Warming Task Force.

HB 760 by Dutton (D-Houston): **FAILED**

- Requires the TCEQ to consider the cumulative effects on the public's health and physical property of expected air contaminant emissions from the facility or proposed facility and from other facilities located less than three miles from the facility or proposed facility.

HB 911 by Callegari (R-Houston): **FAILED**

- Requirements for interbasin water transfers.

SB 945 by Ellis (D-Houston): **FAILED**

- The creation of the Texas Global Warming Solutions Act.

HB 1072 by Giddings (D-De Soto): **FAILED**

- Relates to compensation counties may authorize for the Low Income Vehicle Repair, Retrofit, Accelerated Vehicle Retirement Program.

SB 1177 by Brimer (R-Fort Worth): **FAILED**

- Directs the TCEQ to establish a pilot test to determine the effectiveness of a selective catalytic reduction technology as an advanced control technology for reducing the nitrogen oxides emissions.

HB 1291 by Hochberg (D-Houston): **FAILED**

- Relates to the Clean School Bus Program.

HB 1292 by Puente (D-San Antonio): **FAILED**

- Maximum permitted withdrawals and critical period management of groundwater in the area regulated by the Edwards Aquifer Authority.

SB 1317 by Jackson (R-Pasadena): **FAILED**

- Prohibits a municipality from enacting regulations on air pollution that might apply outside its corporate limits.

HB 1335 by Bohac (R-Houston): **FAILED**

- Allows TERP funds to be used to implement and administer a motor vehicle purchase or lease incentive program, and includes manufacturer requirements.

SB 1341 by Hegar (R-Katy): **FAILED**

- Management of groundwater in the area regulated by the Edwards Aquifer Authority and to the operations and oversight of the Edwards Aquifer Authority.

SB 1687 by Watson (D-Austin): **FAILED**

- Emission reduction strategies for greenhouse gases.

HB 1740 by Cohen (D-Houston): **FAILED**

- Requirements for preconstruction air permits related to the TCEQ's Air Pollution Watch List.

HB 1745 by Turner (D-Houston): **FAILED**

- Changes emission events notification from 24 hours to one hour, and establishes an excessive emissions events fee deposited to the credit of the school air monitoring account.

SB 1771 by Watson (D-Austin): **FAILED**

- As related to an insufficient SIP as determined by EPA, TCEQ first efforts shall be to adopt rules that require all technically feasible reductions of nitrogen oxides emissions from solid-fueled electric generating units that are permitted or constructed after January 1, 2007.

SB 1855 by Gallegos (D-Galena Park): **FAILED**

- Regulation of toxic hotspots under the Texas Clean Air Act.

SB 1906 by Ellis (D-Houston): **FAILED**

- Regulation of toxic hotspots under the Texas Clean Air Act.

SB 1916 by Shapleigh (D-El Paso): **FAILED**

- Directs the TCEQ to deny a permit, permit amendment, or special permit if it finds that the emissions from the proposed facility will contravene standards or intent of the statute, and directs the TCEQ to deny the permit, permit amendment, or special permit if the applicant fails or refuses to alter the permit after receiving TCEQ's specific objections.

HB 1917 by Gattis (R-Georgetown): **FAILED**

- Directs the TCEQ to ensure that the amount of the penalty is at least equal to the value of any economic benefit gained by the alleged violator through the violation.

SB 1924 by Gallegos (D-Galena Park): **FAILED**

- Establishes an Air Pollution Watch List.

SB 1958 by Shapleigh (D-El Paso): **FAILED**

- Restricts the TCEQ to issue or renew a permit if the applicant is not in compliance with cleanup obligations.

HB 2073 by Naishtat (D-Austin): **FAILED**

- Emission reduction strategies for greenhouse gases.

HB 2143 by Rodriguez (D-Austin): **FAILED**

- Texas Global Warming Solutions Act.

HB 2318 by W. Smith (R-Baytown): **FAILED**
- Changes to TCEQ compliance history enforcement evaluation.

HB 2362 by Hernandez (D-Houston): **FAILED**
- Cap and trade program for greenhouse gas emissions.

HB 2363 by Hernandez (D-Houston): **FAILED**
- Establishes an Air Pollution Watch List.

HB 2388 by Anchia (D-Dallas): **FAILED**
- Limits NO_x emissions of certain electric generating facilities during certain months.

HB 2475 by Hochberg (D-Houston): **FAILED**
- Regulation of toxic hotspots under the Texas Clean Air Act.

HB 2545 by Noriega (D-Houston): **FAILED**
- Directs the TCEQ to establish an electronic air permits database.

HB 2642 by Noriega (D-Houston): **FAILED**
- Incentive program for fence-line monitoring.

HB 2722 by Thompson (D-Houston): **FAILED**
- Establishes an Air Pollution Watch List.

HB 2890 by Vo (D-Houston): **FAILED**
- Directs the TCEQ to establish an Air Pollution Watch List, allows for the reopening of an entire permit if the facility is located in a geographic area included on the watch list and emits an air contaminant that contributes to the area's inclusion on the air pollutant watch list, and directs the TCEQ to impose requirements more stringent than those of the existing permit if the permitted facility relates to the watch list.

HB 2911 by A. Allen (D-Houston): **FAILED**
- Directs the TCEQ to consider the cumulative effects on the public's health and physical property of expected air contaminant emissions from the facility or proposed facility and from other facilities located less than 100 miles from the facility or proposed facility.

HB 2934 by Turner (D-Houston): **FAILED**
- Directs the TCEQ to adopt standards for certain air contaminants so that the allowed average concentration level of the contaminant does not result in an increased risk of cancer greater than one chance in one million for a person exposed to the contaminant over a specified period determined by commission

rule, and directs the TCEQ to implement a program under which the commission may designate certain geographic areas in this state as toxic air contaminant impact areas.

HB 3117 by Noriega (D-Houston): **FAILED**

- Directs the TCEQ to adopt by rule effects screening levels for air contaminants at a level that does not increase the risk of cancer in a person exposed to each air contaminant by more than one chance in one million when compared to a person not exposed to the contaminant, directs the TCEQ to document in an electronic database the process by which effects screening levels are adopted, and directs the TCEQ to establish requirements for assessing a penalty against a person who violates this section.

HB 3156 by Noriega (D-Houston): **FAILED**

- Establishes an Air Pollution Watch List.

HB 3157 by Noriega (D-Houston): **FAILED**

- Directs the TCEQ to annually hold a public meeting in each geographic area listed on the commission's air pollutant watch.

HB 3229 by D. Howard (D-Austin): **FAILED**

- Establishes permitting requirements that concern BACT, directs the TCEQ to consider ozone analysis prior to granting a permit or permit amendment, requires consideration of cumulative effects of the facility's expected emissions considered together with those of other facilities in this state that have been issued a permit by the Commission but which are not yet operational, and requires that a new or modified significant source located in an attainment area must meet the emissions limitations and other requirements of a nonattainment area if the source will cause or contribute to air pollution levels in excess of any national ambient air quality standard in any air quality control region in this state as identified by the EPA.

HB 3233 by Callegari (R-Houston): **FAILED**

- Establishes a procedure for authorizing the beneficial use or reuse of certain water, including the reservation of municipal return flows for instream flows and freshwater inflows.

HB 3528 by Anchia (D-Dallas): **FAILED**

- Clarifies Best Available Control Technology.

HB 3596 by Raymond (D-Laredo): **FAILED**

- Directs the TCEQ to establish a program for detecting and giving notice of unauthorized discharges of industrial, municipal, or other waste into any water in the State by use of a gas chromatograph, and directs TCEQ to maintain a database of information pertaining to such discharges.

HB 3657 by Dunnam (D-Waco): **FAILED**

- Directs the TCEQ to consider the cumulative effects on the public's health and physical property of the expected emissions from the proposed facility together with the expected emissions from any other proposed facilities for which an application for a permit or permit amendment under the section is pending with the commission.

HB 3892 by Burnam (D-Fort Worth): **FAILED**

- Directs the TCEQ to provide notice to county commissioners and certain members of local governing bodies upon receipt of an application for a construction permit or an amendment to a construction permit, a special permit, or an operating permit for a facility that may emit air contaminants and that is located or planned to be located in a nonattainment area.

HB 3911 by Burnam (D-Fort Worth): **FAILED**

- Directs the TCEQ to deny a permit, permit amendment, or special permit if it finds that the emissions from the proposed facility will contravene standards or intent of the statute, and directs the TCEQ to deny the permit, permit amendment, or special permit if the applicant fails or refuses to alter the permit after receiving TCEQ's specific objections.

HB 3912 by Burnam (D-Fort Worth): **FAILED**

- Directs the TCEQ to reduce DFW NO_x emissions from industrial or utility furnaces or boilers in the DFW nonattainment area if EPA disapproves the DFW SIP, and requires NO_x reductions before the commission requires automobiles, area sources, or other stationary sources to reduce their emissions of air contaminants that contribute to the area's nonattainment of the federal ozone ambient air quality standard.

GEOFFREY S. CONNOR

Geoffrey S. Connor is of counsel in the Business Transactions section of Jackson Walker. Mr. Connor's experience includes administrative law, regulatory law, environmental law, agricultural matters, energy and governmental affairs. While serving as Secretary of State in Texas, Mr. Connor developed expertise in international business and foreign affairs and maintains extensive commercial and political relationships around the world.

Mr. Connor has been Board Certified in Administrative Law by the Texas Board of Legal Specialization since 1995.



Geoffrey Connor practices transactional law.

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MEMBERSHIPS

Mr. Connor is a member of the State Bar of Texas and its Environmental Law, International Law, and Administrative and Public Law sections. He is on the Board of Trustees of Sigma Tau Gamma social fraternity and the Board of Advisors of the International Center of Texas State University. He is also a member of the Austin Council on Foreign Affairs; the Austin World Affairs Council; the Dallas World Affairs Council; the American Council of Young Political Leaders; and the British-American Business Council. He is on the Board of Directors of the Asia Society of Texas, the Texas Leadership Council of the World Congress on Information Technology 2006, and the International Affairs Committee of the National Association of Secretaries of State.

PUBLICATIONS & SPEAKING ENGAGEMENTS

Mr. Connor is a frequent speaker and writer for legal conferences and seminars, international business conferences, trade missions and official foreign dignitary visits.

COMMUNITY INVOLVEMENT

Mr. Connor has served as Secretary of State in Texas, Deputy General Counsel to the Governor, Assistant Commissioner and General Counsel to the Texas Department of Agriculture, and General Counsel to the Texas Commission on Environmental Quality. As Secretary of State, Mr. Connor served as the state's Chief Elections Officer and as a Senior

GEOFFREY S. CONNOR

Advisor to the Governor and his administration on border and Mexico affairs. Additionally, he represented the State of Texas as its Chief International Protocol Officer, leading trade missions and overseeing visits to Texas from foreign heads-of-state, political leaders and business executives seeking business relationships and market opportunities in the US.

Mr. Connor is an active member and leader in St. David's Episcopal Church. He is also an advisory board member of Trinity Center, a resource center for the homeless.

EDUCATION

Mr. Connor attended Birkbeck College, University of London and received his B.A. degree from Texas State University (1985). He received his J.D. degree from the University of Texas (1988).

H. S. Buddy Garcia



H. S. Buddy Garcia of Austin was appointed by Gov. Rick Perry on Jan. 25, 2007, to the Texas Commission on Environmental Quality. The Texas Senate confirmed his appointment on March 13, 2007. His term will expire on Aug. 31, 2011.

Prior to his appointment to the TCEQ, Garcia served as Texas' deputy secretary of state. He also served as senate liaison for the governor's office and as a special assistant to the governor on Texas border affairs with Mexico. In that capacity, he managed budget, policy and planning for all border matters and worked closely with the secretary of state's office on related issues.

Governor Perry appointed Garcia as the border commerce coordinator where he worked on trade issues with Mexico and Canada, dealt with water and wastewater issues, and coordinated sales of electricity from Texas to Mexico.

Previous to his service in the governor's office, Garcia was legislative director for Sen. Eddie Lucio, Jr. and later served as border advisor to then-Lt. Governor Perry.

Garcia is the recipient of the 2006 Ohtli Award from the Mexican Ministry of Foreign Affairs, received on the One Hundred Ninety-Sixth Anniversary of the Independence of Mexico. OHTLI, which means enlightened path or journey in the ancestral Aztec Nahuatl language, is the highest honor bestowed by the Mexican government to individuals who have distinguished themselves by working to build a stronger relationship with Mexico.

A native of Brownsville, Garcia graduated from St. Joseph Academy and received a bachelor's degree in political science from Southwest Texas State University, now Texas State University.

Carlos Rubinstein

Texas Border Area Director
Texas Commission on Environmental Quality

Mr. Rubinstein received his Bachelors of Science in Biology from the University of Texas - Pan American in May 1982.

Mr. Rubinstein began his professional career in 1983 as the City of Brownsville's Epidemiologist. He was appointed City Health Director in late 1983, a position he held until 1989. During this tenure Mr. Rubinstein also served as Director of EMS. Mr. Rubinstein joined the Texas Water Commission/Texas Commission on Environmental Quality Region 15 office in 1989 where he served as Regional Solid Waste, Water Quality and Emergency Response Program Manager. In 1995 Mr. Rubinstein returned to the City of Brownsville as Health and Permitting Director and City Operations Manager. He served in this capacity until March of 1997 when he was appointed City Manager of Brownsville, a position he held until January 2000. In February 2000 Mr. Rubinstein was appointed to the position of Rio Grande Watermaster for the Texas Commission on Environmental Quality, responsible for the effectiveness of the region's compliance, enforcement and monitoring activities relative to Rio Grande water rights, water use, storage accounts and assessments as required by applicable Texas Water and Administrative Codes.

On July 1, 2003 Mr. Rubinstein was selected as Regional Director for the TCEQ's Regional Office in Harlingen (Region 15). In November 2003 Mr. Rubinstein was also appointed Regional Director for TCEQ's Regional Office in Laredo (Region 16).

On June 1st, 2006 Mr. Rubinstein was appointed as Area Director for the Texas Border, responsible for monitoring and coordinating TCEQ activities operating out of the El Paso, Laredo and Harlingen regional offices.

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GRANTA Y. NAKAYAMA
ASSISTANT ADMINISTRATOR
OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE
U.S. ENVIRONMENTAL PROTECTION AGENCY

Granta Y. Nakayama is EPA's Assistant Administrator for the Office of Enforcement and Compliance Assurance. He oversees and serves as the Administrator's principal advisor on all matters concerning the Agency's enforcement and compliance assurance program.

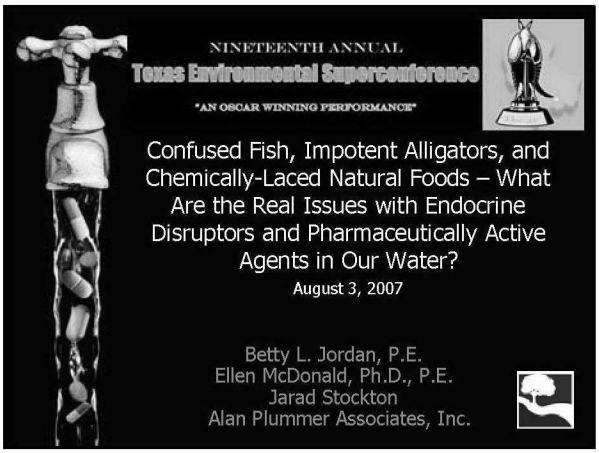
Before joining EPA, Mr. Nakayama was a partner with the law firm of Kirkland & Ellis, LLP., and served in the U.S. Navy's nuclear propulsion program. He was also an Adjunct Professor of Law at George Mason University School of Law.

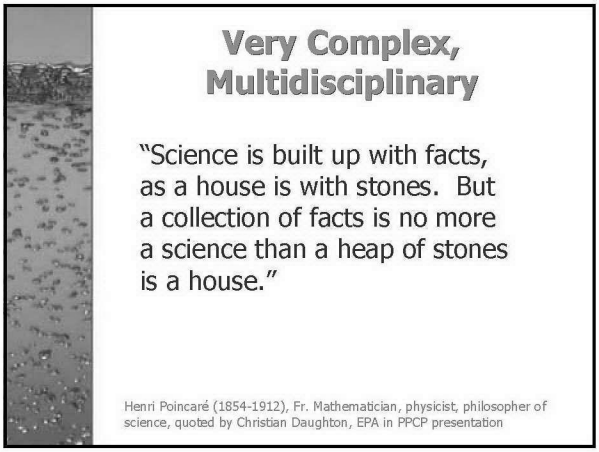
Mr. Nakayama holds bachelor's and master's degrees from Massachusetts Institute of Technology and a J.D. from the George Mason University School of Law.

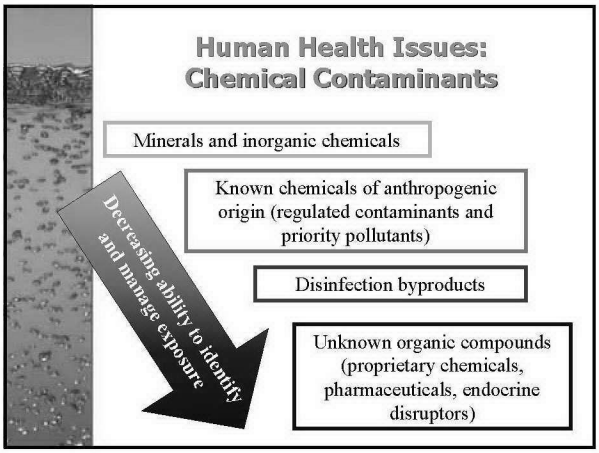
ELIZABETH A. HURST

Elizabeth manages the Environmental and Litigation Group for Tronox LLC. Tronox is the world's third-largest producer and marketer of titanium dioxide pigment. Prior to joining Tronox in November 2006, she spent 20 plus years in private practice, where she concentrated her practice in the area of environmental law. She has counseled and represented clients on a variety of administrative, legislative, and litigation matters under the Resource, Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund); and other federal and state hazardous waste laws. From 1984 to 1986, Ms. Hurst worked for the U.S. Environmental Protection Agency as an Assistant Regional Attorney in the Air, Toxics, and Pesticides Branch. At EPA, she represented the government in administrative and judicial adjudication proceedings concerning enforcement of the federal environmental statutes.

Elizabeth has spoken on a broad range of hazardous waste issues and has been on the council of the State Bar of Texas Environmental and Natural Resources Law Section, the Dallas Chamber of Commerce Air Quality Subcommittee, and the Subcommittee Revising Opinion Letters for the Real Estate, and the Probate and Trust Law Section of the State Bar. She was an officer with the Dallas Bar Association's Environmental Section and was a member of the Board of Directors of the Semiconductor Safety Association, an environment, health and safety organization composed of electronics and semiconductors companies. She has written numerous articles and papers on various environmental issues.


NINETEENTH ANNUAL
Texas Environmental Superconference
"AN OSCAR WINNING PERFORMANCE"
Confused Fish, Impotent Alligators, and Chemically-Laced Natural Foods – What Are the Real Issues with Endocrine Disruptors and Pharmaceutically Active Agents in Our Water?
August 3, 2007
Betty L. Jordan, P.E.
Ellen McDonald, Ph.D., P.E.
Jarad Stockton
Alan Plummer Associates, Inc.


Very Complex, Multidisciplinary
"Science is built up with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house."
Henri Poincaré (1854-1912), Fr. Mathematician, physicist, philosopher of science, quoted by Christian Daughton, EPA in PPCP presentation


Human Health Issues: Chemical Contaminants
Minerals and inorganic chemicals
Known chemicals of anthropogenic origin (regulated contaminants and priority pollutants)
Disinfection byproducts
Unknown organic compounds (proprietary chemicals, pharmaceuticals, endocrine disruptors)
Decreasing ability to identify and manage exposure

Rachel Carson

Biologist, Writer, Ecologist
1907-1964







Presentation Outline

- What are these compounds and where do they come from?
  - Endocrine disruptors
  - Pharmaceutically active compounds
  - Personal care products
- What do they impact?
- How do you get rid of them?













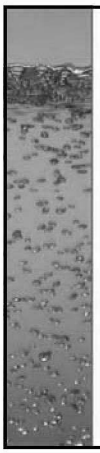


Target Compounds for National Reconnaissance of Emerging Contaminants in US Streams

Veterinary and Human Antibiotics

- Doxycycline
- Oxytetracycline
- Tetracycline
- Erythromycin-H2O (metabolite)

source: U.S. Department of the Interior, U.S. Geological Survey; Toxic Substances Hydrology Program



Target Compounds for National Reconnaissance of Emerging Contaminants in US Streams

Human Drugs

- Metformin (antidiabetic agent)
- Cimetidine (antacid)
- Ranitidine (antacid)
- Enalaprilat (antihypertensive)
- Digoxin
- Diltiazem (antihypertensive)
- Fluoxetine (antidepressant)
- Paroxetine (antidepressant, antianxiety)
- Warfarin (anticoagulant)
- Salbutamol (antiasthmatic)
- Gemfibrozil (antihyperlipidemic)
- Dehydronifedipine (antianginal metabolite) Digoxigenin (digoxin metabolite)
- Acetaminophen (analgesic)
- Ibuprofen (anti-inflammatory, analgesic)
- Codeine (analgesic)
- Caffeine (stimulant)
- 1,7-Dimethylxanthine (caffeine metabolite)
- Cotinine (nicotine metabolite)

source: U.S. Department of the Interior, U.S. Geological Survey; Toxic Substances Hydrology Program



Target Compounds for National Reconnaissance of Emerging Contaminants in US Streams

Industrial and Household Wastewater Products

Pesticides

- **N,N-diethyltoluamide (DEET)**
- **Methyl parathion**
- **Triphenyl phosphate**

Detergent metabolites

- **Nonylphenol monoethoxylate (NPEO1)**
- **Nonylphenol diethoxylate (NPEO2)**
- **Octylphenol monoethoxylate (OPEO1)**
- **Octylphenol diethoxylate (OPEO2)**

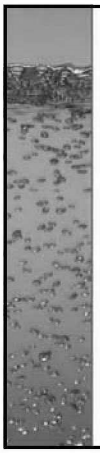
Fire retardants

- **Tri(dichlorisopropyl)phosphate**

Polycyclic aromatic hydrocarbons (fossil fuel and fuel combusion indicators)

- **Butylatedhydroxyanisole (BHA)**
- **Butylatedhydroxytoluene (BHT)**
- **Tetrachloroethylene (solvent)**
- **Phenol (disinfectant)**
- **1,4-Dichlorobenzene (fumigant)**
- **Acetophenone (fragrance)**
- **p-Cresol (wood preservative)**
- **Phthalic anhydride (used in plastics)**
- **Bisphenol A (used in polymers)**
- **Triclosan (antimicrobial disinfectant)**

source: U.S. Department of the Interior, U.S. Geological Survey; Toxic Substances Hydrology Program



Target Compounds for National Reconnaissance of Emerging Contaminants in US Streams

Sex and Steroidal Hormones

- **17a-Estradiol**
- **Estrone**
- **Estriol**
- **Testosterone**
- **Progesterone**
- **cis-Androsterone**
- **-Ethynylestradiol (ovulation inhibitor)**
- **Mestranol (ovulation inhibitor)**
- **19-Norethisterone (ovulation inhibitor)**
- **Equilenin (hormone replacement therapy)**
- **Equilin (hormone replacement therapy)**
- **Cholesterol (fecal indicator)**
- **3b-Coprostanol (carnivore fecal indicator)**
- **Stigmastanol (plant sterol)**

source: U.S. Department of the Interior, U.S. Geological Survey; Toxic Substances Hydrology Program

GWRC Priority List

- Hormones
  - 17β-Estradiol
  - Estriol
  - Estrone
  - 17α-Ethinylestradiol

GRWC Priority List

- Pesticides
  - DDT, DDE, DDD
  - Methoxychlor
  - Dieldrin, Aldrin, Endrin
  - α-Endosulfan
    β-Endosulfan
  - Endosulfan-sulfate
  - Heptachlor
    Heptachlor epoxide
  - Lindane
  - Parathion
  - Atrazine
  - Simazine
  - Terbutylazine
  - 2,4-D
  - Vinclozoline
  - Amitrole
  - Metribuzine
  - Tributyltin

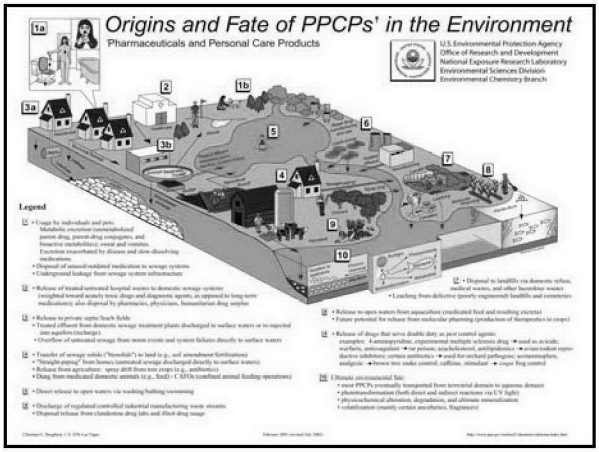
GRWC Priority List

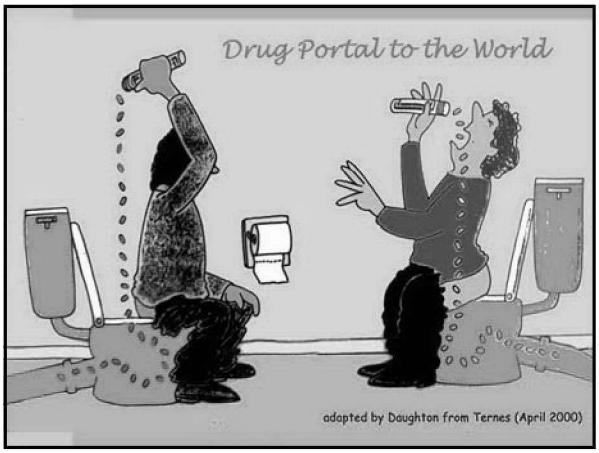
- Industrial Chemicals
  - PCB (total)
  - Glycol esthers
  - P-Nonylphenol
  - P-Octylphenol
  - Phthalates: DEPH, DBP
  - Bisphenol A

Endocrine Disruptors

- 87,000 compounds (potentially)
- Hormones (natural, synthetic)
- Plasticizers
- Pesticides/Insect repellant
- Detergents/Disinfectants
- Petroleum byproducts/solvents
- Antibiotics
- Nonprescription drugs
- Fragrances
- Fire retardants
- Antioxidants

Endocrine Disruptor Screening and Testing Advisory Committee



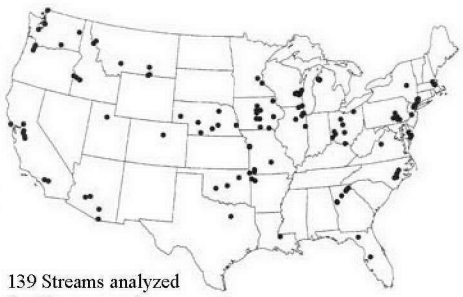


Nonylphenols in foods

Food Source	NPs (µg/kg)
Apples	19.4
Tomatoes	18.5
Pineapple	2.6
Bread	1.6
Spinach	1.3
Pasta	1.0
Potatoes	0.6
Orange Juice	0.1

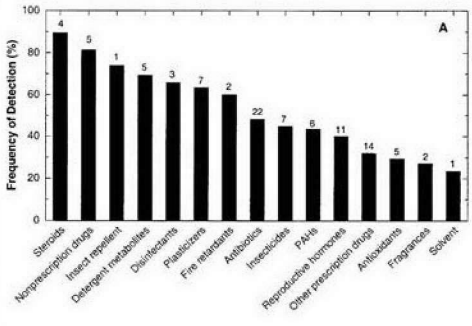
G.G. Ying, et.al. CSIRO Land and Water, Adelaide

USGS 1999-2000 Stream Sampling Sites

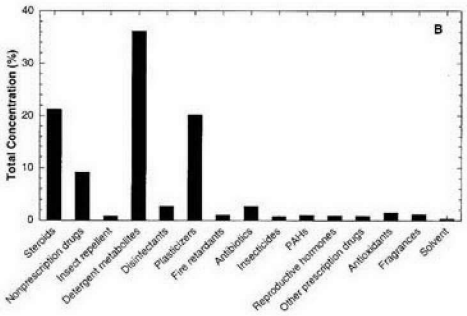


139 Streams analyzed for 80 compounds

Frequency of Detection of Organic Wastewater Contaminants



Percent of Total Measured Concentration of Organic Wastewater Contaminants



What Is the Endocrine System?

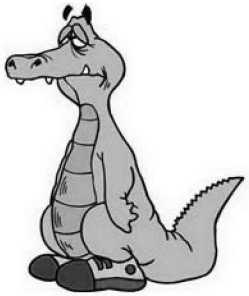
- Immunity
- Reproduction
- Growth
- Control other hormones
- Work at astonishingly small concentrations -- in parts per billion or trillion

Modes of Action

- Antogonism
- Mimicking
- Altering
- Interfering with synthesis
- Interfering with transport and elimination

Lake Apoka, LA, Alligators

- Decline in population
- Small penis size interfered with reproduction
- High egg mortality
- Female reproductive abnormalities



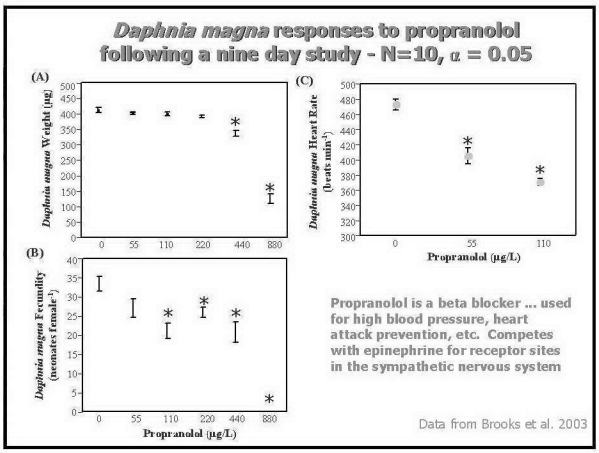
BBC World: Europe
Norway's Androgynous Polar Bears

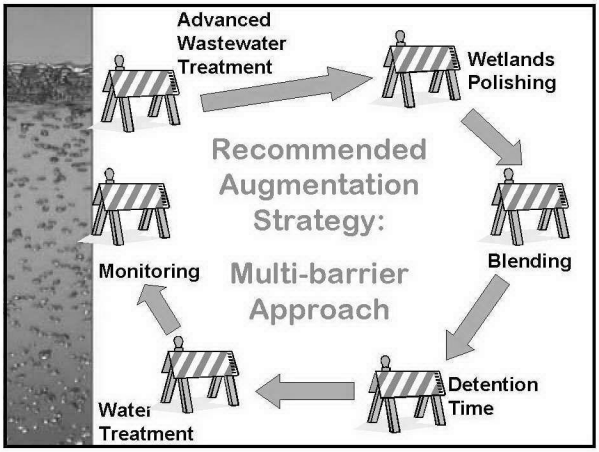


Sea Life Changing Sex



'Gender bender' chemicals are impairing otters' fertility


Daphnia magna responses to propranolol following a nine day study - N=10, α = 0.05
(A)
Daphnia magna Weight (µg)
(B)
Daphnia magna Fecundity (neonates female⁻¹)
Propranolol (µg/L)
(C)
Daphnia magna Heart Rate (beats min⁻¹)
Propranolol (µg/L)
Propranolol is a beta blocker ... used for high blood pressure, heart attack prevention, etc. Competes with epinephrine for receptor sites in the sympathetic nervous system
Data from Brooks et al. 2003


Advanced Wastewater Treatment
Wetlands Polishing
Recommended Augmentation Strategy:
Multi-barrier Approach
Blending
Detention Time
Monitoring
Water Treatment

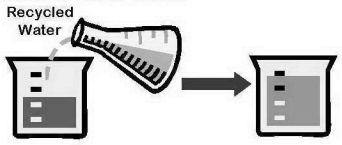

Advanced Wastewater Treatment
• California and Washington require use of RO; reclaimed water must be treated to drinking water standards
• Texas
– No specific treatment requirements
– Advanced processes for nutrient removal likely to be necessary
– Evaluate on case-by-case basis in combination with other barriers

Constructed Wetlands

- Provide polishing treatment
  - Nutrient removal
  - Other constituent removal
- Provide community amenity
  - Educational opportunities
  - Recreational opportunities
- Provide public relations benefits

Blending

- Process of mixing recycled water with "natural" lake water



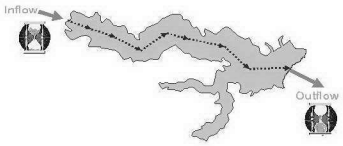
- Blending dilutes recycled water in drinking water supplies

Blending

- California regulations specify maximum percent blend of 50% (with very highly treated reclaimed water)
- Recommend maximum percent blend of approximately 30% with typical levels of treatment (including nutrient removal) and other barriers specified here
- Blending criteria should be re-evaluated as research/knowledge advance

Detention Time

- Average amount of time a drop of water spends in a reservoir before being withdrawn or released downstream



- Longer detention times give natural processes more time to act on constituents in the recycled water

Detention Time

- California regulations specify minimum detention time of 12 months (with very highly treated reclaimed water)
- Recommend minimum detention time of 6-12 months
- Detention time criteria should be reevaluated as research/knowledge advance

Water Treatment

- Final treatment barrier prior to introduction of reclaimed water to potable water supply system
- Designed to meet or exceed federal and state drinking water standards
- Existing treatment processes typically adequate for indirect augmentation projects; however should be evaluated on case-by-case basis



Monitoring

- Periodic testing of reclaimed water and drinking water supplies to assess water quality
- Provides data to guide decisions related to changes in treatment or operational strategies



Are humans at risk?





Areas of Concern

- Sperm counts
- Birth defects
- Low birth weights
- Reproductive abnormalities
- Lower male/female ratio
- Disproportionate vulnerability of children

To date – no direct correlation found between these areas of concern and the presence of EDCs or PPCPs in our water.

Slowly Poisoning Ourselves?

"The atrocious system of poisoning, by poisons so slow in their operation, as to make the victim appear, to ordinary observers, as if dying from a gradual decay of nature, has been practiced in all ages."

from *The Slow Poisoners* in *Extraordinary Popular Delusions and the Madness of Crowds* by Charles MacKay, 1841

source: Daughton, Christian G. *Pharmaceuticals and Personal Care Products (PPCPs) as Environmental Pollutants: Pollution for Personal Actions*

Toxicity versus Therapeutic Effect

"All substances are poisons; there is none which is not a poison. The right dose differentiates a poison from a remedy. . .The dose makes the poison." *Paracelsus (1493-1541)*



source: Daughton, Christian G. *Pharmaceuticals and Personal Care Products (PPCPs) as Environmental Pollutants: Pollution for Personal Actions*

Issues

- Dose/response
- Continual reintroduction (pseudo-persistence)
- Analytical techniques
- Identifying the problem compounds
- Problem in ecosystem, not shown to be problem in humans
- Removable using existing treatment technologies
- Global in impact
- Mixes may create different responses than individual compounds
- Treat at the WTP or WWTP????

Human Health Issues: Chemical Contaminants

- Treatment effectiveness can be highly variable
- "Emerging" constituents not well understood

Research Projects

Year	Project Description	Sponsor
1999	Occurrence Survey of Pharmaceutically Active Compounds	AwwaRF
2000	Endocrine Disruptors and Pharmaceuticals in Drinking Water	AwwaRF
2002	Cooperative Research on Endocrine Disruptors	AwwaRF
2002	Global Assessment of the State of Science of Endocrine Disruptors	WHO
2003	Environmental Analysis of Wastewater Effluents and Biosolids-derived Endocrine Disrupting Chemicals in the Willamette River	USGS
2004	Pharmaceuticals, Personal Care Products and Endocrine Disruptors--Occurrence, Fate and Transport in the Great Lakes Water Supplies and the Effect of Advanced Treatment Processes on Their Removal	AwwaRF

Research Projects (continued)

Year	Project Description	Sponsor
2005	Occurrence of Estrogenic Endocrine Disruptors in Groundwater	USGS
2006	Oxidation and Removal of Pharmaceutically Active Compounds (PhACs) During Water Treatment with Permanganate and Ferrate	AWWARF
2006	Toxicological Relevance of Endocrine Disruptors and Pharmaceuticals in Water	WateReuse Foundation
2006	Attenuation of Emerging Contaminants in Streams Augmented with Recycled Water	WateReuse Foundation
2006	Microbial and Phytoplankton Impacts on Endocrine Disrupting Contaminants: Las Vegas Wash and Lake Mead, NV	USGS
2007	Removal of Endocrine Disrupting Compounds in Water Reclamation Systems	WERF
2007	Tools for Analyzing Estrogenicity in Environmental Waters	WERF

Research Projects (continued)

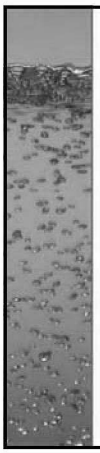
Year	Project Description	Sponsor
Various	Ecological detection (~25) and Exposure effects (~20) of Endocrine Disruptors	NOAA
Various	Human Neurotoxicity and Ecological Effects of Endocrine Disruptors	EPA
Various	Detection and Ecological/ Effects of Endocrine Disruptors (~30)	Environment Canada
Various	Ecological and Exposure Effects of Endocrine Disruptors (~30)	Science and Technology Agency, Japan
Various	Ecological and Exposure Effects of Endocrine Disruptors (~15)	Federal Environmental Protection Agency of Germany
TBD	Identifying Hormonally Active Compounds, Pharmaceutical Ingredients, and PCPs of Most Health Concern From Their Potential Presence in Water Intended for Indirect Potable Reuse	WateReuse Foundation

"While research has established the occurrence and treatability of many representative EDCs, PhACs, and PPCPs in drinking water, additional research is needed to enable water utilities and regulators to determine the toxicological significance of these emerging contaminants and the appropriate level of treatment to reduce the associated risk."

-AWWARF, 2007

"If water utilities choose to (or are compelled to) implement additional treatment measures for these compounds based solely on occurrence data, without regard to toxicological significance, there is a risk of spending tremendous amounts of public funds for very little public health benefit."

-AWWARF, 2007



Contact Information

Betty L. Jordan
Alan Plummer Associates, Inc.
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ABSTRACT

Confused Fish, Impotent Alligators and Chemically-laced Natural Foods – What are the Real Issues with Emerging Contaminants of Concern in our Water?

Betty L. Jordan, P.E.
Ellen McDonald, Ph.D., P.E.
Jarad Stockton
Alan Plummer Associates, Inc.

The term "emerging contaminants of concern" (ECCs) strikes fear into the hearts of many public utility officials. Stories of their presence in our streams and water supplies make for sensational press. Our analytical techniques now allow us to detect compounds present at the parts per trillion level. It is unlikely that, as our analytical techniques continue to improve, there will be any waters in which a number of these compounds are not found. Does presence indicate a problem? Do these contaminants really pose a threat at the levels at which they are being detected? Are the exposures afforded by their presence in drinking water of any consequence compared to those to which we choose to expose ourselves? Difficult questions.

The term ECCs includes endocrine disrupting compounds, pharmaceuticals, and personal care products – all of which are byproducts of our lifestyles. The first topic this paper will address is the list of specific compounds which are included in the ECC category and the difficulties encountered in trying to determine which of the more than 80,000 potential compounds should be addressed in an attempt to begin to evaluate and ultimately control the influx of these chemicals into the environment. Sources will be discussed followed by a brief comparison between the anthropomorphic sources of the ECCs and natural sources.

There is a lot of information available on the impacts of these contaminants in the ecosystem, but very little linking the presence of these compounds with human health effects. The organisms in which the impacts have been observed live in the water and are in constant contact with the ECCs. The impacts observed in the ecosystem may or may not be reflective of the long term impacts on humans. The fact that there are impacts in the ecosystem, however, does indicate a need to investigate carefully the potential impacts on humans as well as to take steps to mitigate and eliminate the impacts in rivers and streams.

The final section of the paper will present the areas in which research should be invested and the key questions to which answers should be sought.

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS - DESIGNERS - SCIENTISTS

Betty L. Jordan, P.E.

Principal, Manager of Technology, Alan Plummer Associates, Inc.

Education:

University of Texas at Arlington,
B.S., Biology, 1976
B.A., Chemistry, 1977
M.S. Civil Engineering, 1979

Professional Registration:

Professional Engineer, Texas

Professional Affiliations:

Chi Epsilon
Tau Beta Pi
Water Environment Association of Texas (WEAT)
Secretary 2001-2003
Director 2004-2007
Vice President 2007-2008
Program Committee Since 1986
Annual Conference Committee Since 1997
WEF Long-range Planning Committee Since 2005
NTS Section WEAT
Secretary 1997-1999
Vice President 1999-2000
President Elect 2000-2001
President 2001-2003
Past President 2002-2003
Water Environment Federation
American Water Works Assoc.
Texas Section AWWA
Water Environment Federation's Aurthur Sidney. Biddell Award 2001
Water for People's Kenneth J. Miller Founder's Award

Corporate Responsibilities

- *Develop new work through the identification of potential projects, preparation of proposals, and participation in interviews.*
- *Mentor engineers, particularly in the area of treatment process engineering.*
- *Identify and evaluate new technologies appropriate for wastewater and water treatment, odor control, and other environmental engineering applications. Incorporate the new technologies into the corporate skill base.*
- *Serve as a technical resource for APAI on all aspects of water and wastewater processes, including training, trouble-shooting, design, facility start-up, and facility evaluations and optimization.*
- *Supervise the process design of APAI wastewater and water treatment projects, including modeling of treatment processes, development and operation of process pilot and bench-scale testing, and design of treatment processes.*
- *Promote APAI through participation in professional organizations in local, state, and national venues.*

Since joining the firm in 1980, Ms. Jordan has taken an active role in the development of the firm through creative approaches to a variety of challenging engineering projects. In particular, Ms. Jordan has focused on water and wastewater process engineering. In this area, she has worked closely with clients in optimizing the capacity ratings for their treatment plants, often obtaining significant increases in capacity based on performance evaluations rather than construction of new facilities. Her specialties include process trouble-shooting and training in addition to the design of wastewater and water treatment processes.

In addition to process engineering, Ms. Jordan has worked in many areas of environmental engineering including: industrial wastewater treatment, odor control, biological studies, toxicity reduction evaluations, permitting, and water quality analysis and assessment. Ms. Jordan has designed and operated numerous bench-scale pilot units and several full–scale pilot units including one for innovative treatment of a coal slurry wastewater. Currently, Ms. Jordan is focusing on the field of emerging contaminants of concern.

Ms. Jordan is a popular speaker and frequently presents papers at local, state, and national conferences. She works with Dr. Qasim at the University of Texas at Arlington as an instructor at the UTA short-courses on water and wastewater treatment plant theory and design. Ms. Jordan has played an active role in developing the technical program for the Water Environment Association's state conferences since the 1980s and has served in leadership roles in both the local and state organization and has recently been elected as one of the directors to represent the state organization at the national level of the Water Environment Federation.

Ms. Jordan also takes an active role in her church, frequently teaching Sunday School classes and Bible studies. She is also an avid participant and supporter of the arts through season subscriptions to performances of Dallas and Fort Worth opera companies and symphonies. One of Ms. Jordan's great interests and hobbies is travel. She has organized a number of international trips for friends within the engineering community and spends much of her vacation time visiting foreign cities and making friends around the world. Ms. Jordan enjoys people and likes to help them discover and develop their own skills to the best of their ability.

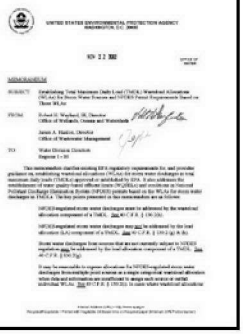
TMDLs and Stormwater

David Gillespie, Esq

July 22, 2007

LRG TMDL Allocations for Phase II Cities / Urbanized Areas

- The municipal separate storm sewer system (MS4) permit for Las Cruces urbanized area (UA) was issued on _____
- The LRG TMDL encompasses urbanized area therefore, UA will receive WLA.
- EPA issued a joint NPDES / TMDL memo which specifically addresses how NPDES regulated stormwater should be addressed in TMDLs.



EPA TMDL Stormwater Policy

(Nov. 22, 2002 Memo)

TMDL Allocation

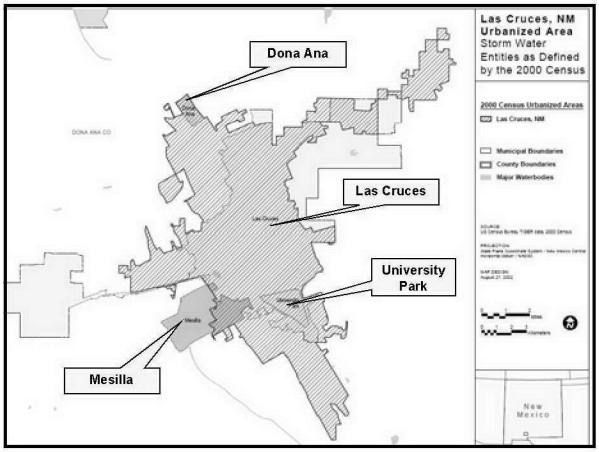
- NPDES Stormwater must have WLA (40 CFR § 130.2(h))
  - Sources with a NPDES permit
- Allocation for NPDES Stormwater may be expressed as an "*categorical*" wasteload allocation or as an *individual* allocation (40 CFR § 130.2(i))
- Allocations for WLA and LA must be expressed in numeric form (40 CFR §130.2(h) & (i))
- Non-NPDES Stormwater may be address as LA (40 CFR §130.2(g))
  - Nonpoint Source runoff



EPA TMDL Stormwater Policy (Nov. 22, 2002 Memo)

NPDES Permits

- **NPDES permits must be consistent with assumption & requirements of WLA in a TMDL** (40 C.F.R. § 122.44(d)(1)(vii)(B)).
- **WQBEL for Stormwater WLA may be expressed as BMPs** (40 C.F.R. §122.44(k)(2)&(3)) *[If BMPs alone will adequately implement the WLA]*
  - EPA expect that most WQBELs for NPDES-regulated municipal will be in the form of BMPs, and that numeric limits will be used only in rare instances. This must be document in permit fact sheet (40 CFR §124.8, 124.9 & 124.1).
  - Permit must specify the monitoring necessary to determine compliance with effluent limitation (40 CFR §122.144(i)).
  - Where effluent limitation is expressed as BMP, permit must specify monitoring necessary to determine if load reduction are achieved



What happens if I don't receive WLA?

- **If facility (or MS4 urbanized area) does not receive a WLA in the TMDL, then,**
  - **The facility or MS4 urbanized area would receive a "zero" WLA, and**
  - **Because NPDES permits must be consistent with assumption & requirements of WLA in a TMDL, the facility would not be allowed to discharge. (40 C.F.R. § 122.44(d)(1)(vii)(B)).**


Questions

T. David Gillespie, Esq.

Mr. Gillespie is an Assistant Regional Counsel in the Region 6 office of the United States Environmental Protection Agency (EPA) in Dallas, TX. His current assignments include defensive litigation and counseling for legal matters in water law and the Resource Conservation and Recovery Act. Before joining Region 6, Mr. Gillespie was an attorney in Little Rock, Arkansas, concentrating on environmental litigation and counseling. Mr. Gillespie holds a J.D. from Vermont Law School and a B.A. in economics and English literature from the University of Michigan.

Robert Martinez graduated from the University of Texas in 1984 with a BBA in Accounting. After a short foray in accounting, he decided to become a lawyer and earned his JD from the UT Law School in 1989. After clerking with the law firm of Robinson, Felts, Starnes, Angenend and Mashburn in Austin, he joined the Texas Water Commission (now the Texas Commission on Environmental Quality) in 1990 as a Staff Attorney in the Legal Division. At the Commission, Robert has had extensive contested case hearing experience representing the Executive Director in a variety of water quality and water right permit applications. In June 2003, he was selected as the Senior Attorney in the Commission's Environmental Law Division for water rights and water utilities and in that capacity supervised the attorneys practicing in those areas. In November 2005, Robert was also appointed as Acting Division Director for the Environmental Law Division. He was subsequently selected as the Division Director effective August 1, 2006. Away from work, Robert enjoys jogging, which he tries to do every day, and he has his wife Becki keep busy raising their 3 sons, David (13 years), Anthony (11), and Steven (9).

Close Encounters: Public Nuisance-Alien Nation?

Kevin L. Colbert
Environmental Practice Group Leader, Gardere Wynne Sewell, LLP

What is a Public Nuisance?

A public nuisance is "an act or omission which obstructs or causes inconvenience or damage in the exercise of rights common to all."[1] According to the Restatement (Second) of Torts, "[a] public nuisance is an unreasonable interference with a right common to the general public."[2] The key element of a public nuisance claim is the "interference" must be to a public right; this requires proof that the injury is common to the general public.

> A person's conduct does not become a public nuisance merely because it interferes with the use and enjoyment of land by a large number of persons. There must be some interference with a public right. A public right is one common to all members of the general public. It is collective in nature and not like the individual right that everyone has not to be assaulted or defamed or defrauded or negligently injured.[3]

This interference with the public right must be "substantial;" it cannot be a "mere annoyance," "petty annoyance," a "trifle" or a "disturbance of everyday life."[4] Additionally, the harm must also be unreasonable.

Typically, the conduct associated with a public nuisance claim was quasi-criminal in nature. Prosser described it as "a criminal interference with a right common to all members of the public" and its application should be limited to violations of a criminal statute. Conduct is considered quasi-criminal when it is unreasonable under the circumstances and could cause injury to someone who is exercising a common, societal right. Ultimately, the Restatement (Second) of Torts lowered the requisite conduct from that of a "criminal interference" to just an "unreasonable interference" with a public right. The factors to be considered when deciding whether the conduct was/is unreasonableness include: a significant interference with public health, safety, peace comfort or convenience; conduct proscribed by statute; and continuing, long-lasting nature and the defendant knows it has a "significant effect" on this ongoing harm.[5]

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1 WILLIAM L. PROSSER, HANDBOOK OF THE LAW OF TORTS § 72, at 566 (1st ed. 1941);

2 RESTATEMENT (SECOND) OF TORTS §821B(1) (1979); *see also, e.g., City of Philadelphia v. Beretta U.S.A.*, 126 F. Supp. 2d 882, 907 (E.D. Pa. 2000), aff'd,, 277 F.3d 415 (3d Cir. 2002); *Camden County Bd. of Chosen Freeholders v. Beretta, U.S.A. Corp.*, 273 F.3d 536, 540 (3d Cir. 2001); *Citizens for Pres. of Waterman Lake v. Davis*, 420 A.2d 53, 59 (R.I. 1980).

3 RESTATEMENT (SECOND) OF TORTS §821B cmt. g (1979)

4 WILLIAM L. PROSSER, HANDBOOK OF THE LAW OF TORTS § 71, at 557-58 (1st ed. 1941);

5 RESTATEMENT (SECOND) OF TORTS §821B(2) (1979); *see also, Chicago v. Am. Cyanamid Co.*, No. 02 CH 16212, 2003 WL 23315567 (Ill. Cir. Ct. Oct. 7, 2003).

The Creation and Development of Public Nuisance Law

The tort of nuisance developed as a common law crime in England about 900 years ago to allow governments to use the tort system to stop quasi-criminal conduct.[6] The conduct was considered quasi-criminal because, although not illegal, it is unreasonable given the circumstances because it could injure someone exercising a common, societal right. Public nuisance traditionally covered things like illegal gambling, houses of ill repute, blocking of a public roadway or the dumping of sewage into a public river.[7] To stop the public nuisance, the government could either seek an injunction enjoining the activity causing the public nuisance or it could force the party to abate the public nuisance.

Early American cases typically dealt with obstruction of public highways or navigable waterways. The absence of environmental and industrial regulations resulted in public nuisance being used where the government "could not anticipate and explicitly prohibit or regulate through legislation all the particular activities that might injure or annoy the general public."[8] Beginning in the 1950s and 1960s, public nuisance theory was more commonly used to enjoin companies from air and water pollution. A classic example of the use of public nuisance law in this regard was the filing of a public nuisance class action in 1970 against hundreds of companies alleged to have contributed to air pollution in Los Angeles seeking injunctive relief as well as compensatory and punitive damages.[9] The California court denied class certification because public nuisance theory was ill-suited for this type of litigation because the defendants were manufacturing lawful products whose emission were governed by Federal and State air pollution regulations.[10]

Other uses of public nuisance theory included seeking injunctions against adult book stores, brothels, garbage heaps, and failure to maintain vacant lots. During this period, public nuisances were defined as those that "result from the violation of public rights, and, producing no special injury to one more than another of the people, may be said to have a common effect, and to produce common damage."

Province of the Legislature

Most states have a codified definition of public nuisance. The two most populous states in the union define public nuisance rather broadly. . For example, California defines nuisance as:

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[6] See *Ala.-Coushatta Tribes of Tex. v. Texas*, 208 F.Supp. 2d 670 (E.D. Tex. 2002) (injunction against operation on tribal lands).

[7] RESTATEMENT (SECOND) OF TORTS §821A cmt. b (1979).

[8] See *Lexington & Ohio R.R. Co. v. Applegate*, 38 Ky. (8 Dana) 289 (Ky. 1839); *Bordentown & S. Amboy Tpk., Rd. v. Camden A.R. & Transp. Co.*, 17 N.J.L. 314 (N.J. 1839)).

[9] *Diamond v. General Motors Corp.*, 97 Cal. Rptr. 639, 639 (Ct. App. 1971) (seeking an injunction against 293 named corporations and municipalities, as well as 1,000 unnamed defendants, for air pollution).

[10] *Id.* at 642-46. The court noted that regulating activities of lawful industries was the province of the legislature, not the judiciary. It stated that the "plaintiff is simply asking the court to do what the elected representatives of the people have not done: adopt stricter standards over the discharge of air contaminants in this county, and enforce them with the contempt power of the court." *Id.* at 645. The court noted that if it granted the relief the plaintiffs' requested, "[t]he immediate effect of . . . an injunction would be to halt the supply of goods and services essential to the life and comfort of the persons whom plaintiff seeks to represent." *Id.* at 644.

> Anything which is injurious to health, including, but not limited to, the illegal sale of controlled substances, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake, or river, bay, stream, canal, or basin, or any public park, square, street, or highway, is a nuisance.[11]

Texas has defined public nuisance in the Health and Safety Code. Section 343.011 defines what a public nuisance is, and, more importantly, what it is not. It says:

§ 343.011. PUBLIC NUISANCE. (a) This section applies only to the unincorporated area of a county.

(b) A person may not cause, permit, or allow a public nuisance under this section.

(c) A public nuisance is:

(1) keeping, storing, or accumulating refuse on premises in a neighborhood unless the refuse is entirely contained in a closed receptacle;

(2) keeping, storing, or accumulating rubbish, including newspapers, abandoned vehicles, refrigerators, stoves, furniture, tires, and cans, on premises in a neighborhood or within 300 feet of a public street for 10 days or more, unless the rubbish or object is completely nclosed in a building or is not visible from a public street;

(3) maintaining premises in a manner that creates an unsanitary condition likely to attract or harbor mosquitoes, rodents, vermin, or disease-carrying pests;

(4) allowing weeds to grow on premises in a neighborhood if the weeds are located within 300 feet of another residence or commercial establishment;

(5) maintaining a building in a manner that is structurally unsafe or constitutes a hazard to safety, health, or public welfare because of inadequate maintenance, unsanitary conditions, dilapidation, obsolescence, disaster, damage, or abandonment or because it constitutes a fire hazard;

(6) maintaining on abandoned and unoccupied property in a neighborhood, or maintaining on any property in a neighborhood in a county with a population of more than 1.1 million, a swimming pool that is not protected with:

(A) a fence that is at least four feet high and that has a latched gate that cannot be opened by a child; or

(B) a cover over the entire swimming pool that cannot be removed by a child;

(7) maintaining a flea market in a manner that constitutes a fire hazard;

(8) discarding refuse or creating a hazardous visual obstruction on:

(A) county-owned land; or

(B) land or easements owned or held by a special district that has the commissioners court of the county as its governing body;

(9) discarding refuse on the smaller of:

(A) the area that spans 20 feet on each side of a utility line; or

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[11] CAL. CIV. CODE § 3479 (1997); *see also* IOWA CODE § 657.1 (1998) providing:
Whatever is injurious to health, indecent, or unreasonably offensive to the senses, or an obstruction to the free use of property, so as essentially to unreasonably interfere with the comfortable enjoyment of life or property, is a nuisance, and a civil action by ordinary proceedings may be brought to enjoin and abate the same and to recover damages sustained on account thereof.

(B) the actual span of the utility easement; or

(10) filling or blocking a drainage easement, failing to maintain a drainage easement, maintaining a drainage easement in a manner that allows the easement to be clogged with debris, sediment, or vegetation, or violating an agreement with the county to improve or maintain a drainage easement.

(d) This section does not apply to:

(1) a site or facility that is:

(A) permitted and regulated by a state agency; or

(B) licensed or permitted under Chapter 361; or

(2) agricultural land.

(e) In Subsection (d), "agricultural land" means land that qualifies for tax appraisal under Subchapter C or D, Chapter 23, Tax Code.

California's definition is very broad and covers what has historically been considered activities that could lead to a public nuisance if carried out. Texas appears to define activities that could result in a public nuisance as those that pose a hazard generally to the public, or those of "tender years," of the type generally defined as public nuisance in early common law. What is equally clear is the certain activities are not a public nuisance such as any site or facility "permitted and regulated by a state agency."

Close Encounters – Public Nuisance Alien

Despite the historical origins of public nuisance and the typical common law uses of the doctrine, public nuisance has become the *tort de jour* for rectifying perceived societal ills. The most famous public nuisance claims have been against makers of products such as: asbestos, lead pigment and paint, firearms and MTBE. Public nuisance claims are very enticing because if they are successfully plead they act as a "super tort." Like product liability claims, public nuisance offers strict liability. But, by filing claims under public nuisance theory, a number of products liability requirements are avoided: defect, statute of limitations and the rule against recovery for purely economic loss. If these requirements can be avoided, chances of recovery are greatly increased. Most courts have rejected these new claims but some have been willing to accept them. The following is a brief description of some of these claims.

Asbestos

In the 1980s and 1990s, municipalities and school districts seeking to recover the costs of removing asbestos from their buildings asserted public nuisance claims against manufacturers of asbestos-containing products. This was the first use of public nuisance theory in a products liability context where the allegations where that a product itself constituted a public nuisance, not that the product was used to create a public nuisance.

Most courts agreed that the creation of a product is not the same as the creation of a nuisance.[12] One court stated that "manufacturers, sellers, or installers of defective products may

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[12] *See San Diego v. U.S. Gypsum Co.*, 30 Cal.App.4th 575, 585 (1994); *Tioga Public School Dist. v. U.S. Gypsum,* 984 F.2d 915, 920-21 (8th Cir. 1993); *Hooksett School Dist. v. W.R. Grace & Co.*, 617 F. Supp. 126, 133

not be held liable on a nuisance theory for injuries caused by [a product] defect." It also noted that "all courts that have considered the question have rejected nuisance as a theory of recovery for asbestos contamination."[13] Some courts observed that the element of "control" could not be satisfied because "a nuisance claim may only be alleged against one who is in control of the nuisance creating instrumentality."[14] Courts also recognized that if the plaintiffs' public nuisance theory was accepted, it would "give rise to a cause of action ... regardless of the defendant's degree of culpability or of the availability of other traditional tort law theories of recovery."[15] Thus, despite plaintiffs' best efforts to interject public nuisance into asbestos litigation, courts maintained the common law boundaries of the public nuisance.

Tobacco

Most people are familiar with the tobacco litigation of the 1990s in which state attorneys general sought reimbursement of state expenditures for Medicaid and other medical programs for smokers. Before the mid 1990s, public nuisance lawsuits against tobacco companies were unsuccessful because they were based on traditional products liability theories and courts found that tobacco companies could not have foreseen the harmful effects of smoking at the time that plaintiffs began smoking and that the manufacturer is not the insurer against the unknowable. This changed following the disclosure that tobacco companies systematically and deliberately concealed their knowledge about the hazards of smoking and the entry of states and municipal governments into the litigation as plaintiffs seeking to recover their costs associated with tobacco related illness. To overcome the tobacco companies' defenses against product liability claims, states turned to several novel legal theories, including public nuisance and unjust enrichment claiming the defendants had harmed the states and had profited from that harm. By using public nuisance and other equitable theories of recovery, states argued that they were not required to prove specific causation in any individual case and that defenses based upon a smoker's own conduct were not applicable to their case.

Because of the tobacco settlement, the viability of the public nuisance claim was ruled upon in only one case, *Texas v. American Tobacco Co.*[16] In that case, the state alleged that the tobacco companies "intentionally interfered with the public's right to be free from unwarranted injury, disease, and sickness and have caused damage to the public health, the public safety, and the general welfare of the citizens."[17] The court rejected this claim, stating that "[t]he overly broad definition of the elements of public nuisance urged by the State is simply not found in Texas case law and the Court is unwilling to accept the State's invitation to expand a claim for public nuisance."[18]

(D.N.H. 1984), *Johnson County, Tenn. v. U.S. Gypsum Co.*, 580 F. Supp. 284, 294 (E.D.Tenn. 1984) (stating that allowing such a nuisance action "would convert almost every products liability action into a nuisance claim").

13 *Detroit Bd. of Educ. v. Celotex Corp.*, 493 N.W.2d 513, 521 (Mich. Ct. App. 1992).

14 *Corp. of Mercer Univ. v. Nat'l Gypsum Co.*, No. 85-126-3-MAC, 1986 WL 12447, at *6 (M.D. Ga. Mar. 9, 1986) (noting that even if asbestos were considered a nuisance, "[t]he 'nuisance' creating property ... was in possession and control of the plaintiff from the time it purchased the asbestos-containing products"); *see also, Manchester v. Nat'l Gypsum Co.*, 637 F. Supp. 646, 656 (D.R.I. 1986); *Hooksett Sch. Dist. v. W.R. Grace & Co.*, 617 F. Supp. 126, 133 (D.N.H. 1984).

15 *Tioga Pub. Sch. Dist. v. U.S. Gypsum Co.*, 984 F.2d 915, 921 (8th Cir. 1993).

16 14 F. Supp. 2d 956, 973 (E.D. Tex. 1997).

17 *Id.* at 972.

18 *Id.* at 973.

Guns

In adapting public nuisance to firearm litigation, the claims where distinguished by limiting the nuisance to the marketing and distribution practices and policies of the manufacturers; that gun manufacturers created an unreasonable threat to public safety by following distribution practices that permit criminals to acquire guns. Specifically, the plaintiffs alleged that the manufacturers facilitated the illegal secondary market for firearms, thereby interfering with the public health of the community.[19]

Most, but not all, courts rejected these public nuisance claims on the following grounds: (1) the sale of lawful products (*i.e.*, handguns) does not inherently interfere "with a right common to the general public;"[20] (2) the defendants lacked the requisite control over the source of the alleged public nuisance,[21] (3) the government's injuries are too indirect or remote from the gun makers conduct to allow recovery,[22] and (4) that balancing the harm and utility of the sale and marketing of guns is a policy question better suited for the legislature, not the courts, particularly because these activities already are well regulated.[23] An Indiana Court that allowed the case to proceed, acknowledged that it was acting without precedent.[24] It defined a public nuisance as an "interference with a public right" which includes "lawful activit[ies] conducted in such a manner that it imposes costs on others."[25] The court justified its decision by stating "[i]f the marketplace values the product sufficiently to accept that cost, the manufacturer can price it into the product."[26] Public nuisance suits against gun manufacturers have been restricted, if not precluded, by the enactment of the Protection of Unlawful Commerce in Arms Act of 2005.[27]

Lead Paint

Lawsuits against lead pigment manufacturers for negligence and products liability began in the late 1980s in an attempt to place the responsibility for poorly maintained lead paint on these companies. The majority of current cases against lead pigment manufacturers are based on new research that alleges that subtle neurological and psychological impairments in children are

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19 *See, e.g., Gary v. Smith & Wesson Corp.*, 801 N.E.2d 1222, 1231 (Ind. 2003); *City of Cincinnati v. Beretta U.S.A. Corp*, 768 N.E.2d 1136, 1141 (Ohio 2002); *Ganim v. Smith & Wesson Corp.,* 780 A.2d 98, 115 (Conn. 2001).

20 *See, e.g., Camden County Bd. of.Chosen Freeholders*, 273 F.3d at 539 (holding that "the scope of nuisance claims has been limited to interference connected with real property or infringement of public rights"); *City of Philadelphia*, 126 F.Supp. 2d 882 (E.D. Pa. 2000), *aff'd* 277 F.3d 415 (3rd Cir. 2002); *see also* Restatement (Second) of Torts § 821B (1998). *But see*, *Young v. Bryco Arms* 765 N.E.2d 1 (Ill. App. Ct. 2001) (concluding that the defendants' distribution of handguns did interfere with such a public right).

21 *See, e.g., Camden County Bd. of.Chosen Freeholders*, 273 F.3d at 541; *City of Philadelphia*, 126 F. Supp. 2d at 886.

22 *Camden County Bd. of Chosen Freeholders*, 273 F.3d at 541; *Ganim*, 780 A.2d at 118-28.

23 *City of Chicago*, 821 N.E.2d at 1121 ("We are reluctant to interfere in the lawmaking process in the manner suggested by plaintiffs, especially when the product at issue is already so heavily regulated by both the state and federal governments.").

24 *Gary,* 801 N.E.2d at 1231 (acknowledging that under Indiana law, courts have recognized public nuisance claims only when the claims involve land use or illegal activities).

25 *Id.* at 1233-34.

26 *Id.* at 1234.

27 Pub. L. No. 109-92, 119 Stat. 2095 (2005) (to be codified at 15 U.S.C. §§7901–7903, 18 U.S.C. §§922, 924). To prohibit civil liability actions from being brought or continued against manufacturers, distributors, dealers, or importers of firearms or ammunition for damages, injunctive or other relief resulting from the misuse of their products by others. *Id.*

associated with elevated blood lead levels. Federal and state governments began enacted laws and regulations banning or limiting the use of lead in many products in the 1970s. Lead-based paint only becomes a health hazard if it is allowed to deteriorate. To combat this deterioration, many states and municipalities enacted regulations requiring landlords to maintain existing lead paint in a manner that does not create a hazard.

One of the first uses of public nuisance law in lead paint litigation occurred in 1999 when the Attorney General of Rhode Island commenced a government public nuisance action against the former lead companies. The alleged public nuisance is the mere presence of lead paint in homes and buildings.[28] Defendants responded with general defenses; lack of control over the instrumentality (the building), lead pigment was legally made and sold anywhere from 40 to 300 years ago, control over lead pigment was relinquished decades ago, they were not the parties that applied it to the building, and no public right common to all people is being interfered with. Similar lawsuits have been filed in Wisconsin, California, Missouri and New Jersey, with the later two state's Supreme Court's rejecting the application of public nuisance law in this context.

Close Encounters

The transformation of public nuisance law from use against quasi-criminal activities to use against lawfully manufactured products or permitted and regulated activities is upon us. When examining conduct, "the role of 'creator' of a nuisance, upon whom liability for nuisance-caused injury is imposed, is one to which manufacturers and sellers [of products] seem totally alien."[29] Traditionally, public nuisance law has not supported recovery simply because the "manufacture and sale of a product [was] later discovered to cause injury."[30] Additionally, one must ponder if operators and owners of regulated and permitted sites and facilities will find themselves in the alien role of public nuisance "creator."

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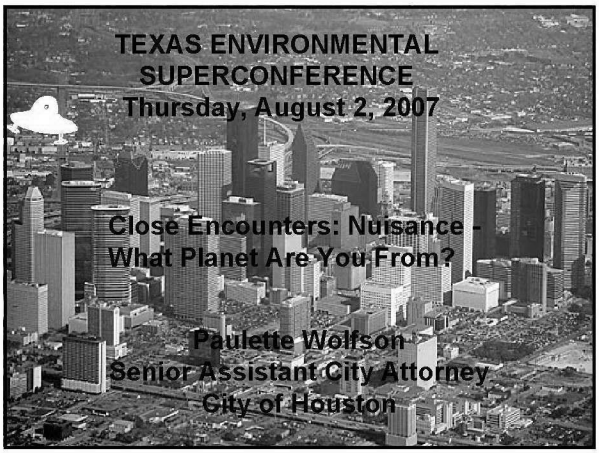
[28] *See, e.g., State v. Lead Indus. Ass'n, Inc.*, No. 99-5226, 2001 R.I. Super. LEXIS 37 (R.I. Super. Ct. Apr. 2, 2001). It is widely accepted that when the paint is allowed to crack or peel, young children that ingest the lead paint chips can contract lead poisoning. Lead poisoning can impair cognitive function, stunt growth and lead to behavioral problems. *See, e.g., In re Lead Paint*, No. MID-L-2754-01, 2002 WL 31474528, at *2 (N.J. Super. Ct. Law Div. Nov. 4, 2002).

[29] *Detroit Bd. of Educ. v. Celotex Corp.*, 493 N.W.2d 513, 521 (Mich. Ct. App. 1993) (quoting 63 AM. JUR. 2D Products Liability §593).

[30] *Id.*

Kevin Colbert is the Environmental Practice Group Leader at Gardere Wynne Sewell LLP in Houston. Over the past 17 years, Mr. Colbert has developed a practice concentrated in complex mass tort, products liability and environmental litigation. Mr. Colbert has significant experience in coordinating multi-state mass tort actions, product liability actions and chemical exposure cases. Mr. Colbert has defended claims for a variety of injuries and illnesses, including medical monitoring claims. Mr. Colbert is also experienced in environmental litigation, including groundwater contamination cases, cost recovery and contribution action under CERCLA and state environmental laws, and "neighborhood" exposure cases alleging toxic exposure and property value diminution from alleged pollution released by manufacturing facilities, terminals and other storage facilities, including underground storage tanks. Mr. Colbert is a member of the American Bar Association, Committee Vice Chair of the Tort Trial and Practice Section, Toxic Tort and Environmental Litigation, and the Houston Bar Association. Mr. Colbert received his B.S. from the University of South Carolina, his J.D. from the University of Tulsa College of Law, his LL.M. in Energy, Environmental and Natural Resources Law from the University of Houston Law Center and has attended graduate courses in biostatistics and epidemiology..



Nuisance

- "Codified"
  - City Ordinance
  - State Law
- Common Law

2

CITY ORDINANCE

Chapter 10 Buildings and Neighborhood Protection
ARTICLE XI. NEIGHBORHOOD NUISANCES

Sec. 10-451. Nuisances, generally.

(a) Whatever is dangerous to human health or welfare, or whatever renders the ground, the water, the air, or food a hazard to human health is hereby declared to be a nuisance.

3

(b) The following specific acts, conditions, and things are declared to constitute public nuisances and are hereby prohibited and made unlawful:

(1) The deposit or accumulation of any foul, decaying, or putrescent substance or other offensive matter in or upon any lot, street, or in or upon any public or private place in such a way as to become offensive or objectionable; the overflow of any foul liquids, or the escape of any gases, dusts, fumes, mists, and sprays to such an extent that the same, or any one of them, shall become or be likely to become, hazardous to health or a source of discomfort to persons living or passing in the vicinity thereof.

4

REMEDIES UNDER CITY ORDINANCE

- ABATE THE NUISANCE
- FINES IN MUNICIPAL COURT

5

STATE LAW: TEXAS CLEAN AIR ACT 30 TAC § 101.4 - NUISANCE

No person shall discharge from any source whatsoever one or more air contaminants or combinations thereof, in such concentration and of such duration as are or may tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation, or property.

6

REMEDIES UNDER TEXAS CLEAN AIR ACT

- $25,000.00 PER DAY
- INJUNCTIVE RELIEF

7

•COMMON LAW

RECENT EXPERIENCE

- Private parties

  Schneider v. Bates, 147 S.W. 3d 264 (Tex. 2004)
  - Injury can be symptoms typical of discomfort
  - In spite of "lawful" operations
  - Statute of limitations
    - Permanent
    - Temporary

8

PUBLIC NUISANCE – GOVERNMENT PLAINTIFF

- Act or circumstance harms the general public
- Broad based health concerns of particulate matter and toxic substances
- Additional health care costs
- Public right
- Change in "harm" because of the *Massachusetts v. EPA* case?
- Permitted conduct but not meeting the conditions of those permits?

9

Short Resume: Paulette Wolfson

Paulette is currently Senior Assistant City Attorney, Special counsel for Air, in the City of Houston's legal department. A native of Los Angeles, she received her undergraduate degree from the University of California, Los Angeles and her law degree from the George Washington University Law School. Paulette began her legal environmental career with the USEPA in Washington, DC and has also practiced as in-house counsel and in private practice. She likes to say her experience allows her to see all sides of environmental law. She frequently speaks and writes on environmental law topics and she recommends to you an article in the winter edition of the State Bar Environmental Law Journal, winter 2006, vol. 36, no. 2 entitled "Watch out for the City: Local Governments Can Enforce".

Pam Travis

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Pam Travis is Practice Group Leader for Superfund Litigation in the Office of Regional Counsel, U.S. EPA Region 6, Dallas, Texas.

Joining the Agency in 1988, she initially represented EPA in administrative and judicial enforcement actions under the Clean Air Act, Toxic Substances Control Act, the Resource Conservation and Recovery Act, and the Federal Insecticide, Fungicide, and Rodenticide Act.

Since 1991, Ms. Travis's practice has focused on two primary aspects of Superfund work: advising EPA response personnel on legal issues arising in the course of Agency response work and conducting enforcement litigation and negotiation to secure response costs and injunctive relief from responsible parties. She has also undertaken occasional forays into special assignments including Clean Air Act counseling, interagency agreements, Brownfields and redevelopment of contaminated properties, state environmental program review, Oil Pollution Act issues, and most recently, disaster response under the Stafford Act. She has extensive experience as lead counsel for EPA in Superfund case-specific matters. She also advises Regional management on CERCLA issues and mentors junior attorneys on all aspects of Superfund work.

Ms. Travis holds a Bachelor of Arts Degree with honors from Trinity University and a Juris Doctor from Southern Methodist University Law School. She is admitted to practice in Texas and is a member of the Environmental Law Sections of the State Bar of Texas and the Dallas Bar Association.

KATHLEEN HARTNETT WHITE

Kathleen Hartnett White of Valentine was appointed by Gov. Rick Perry as chair of the Texas Commission on Environmental Quality on October 20, 2003. She was appointed to the Commission on October 15, 2001, and confirmed by the Texas Senate on March 6, 2003. Her term will expire on August 31, 2007.

White is co-owner of White Herefords and a partner with her husband in a 115-year-old ranching operation in Jeff Davis and Presidio counties. She was appointed to the Texas Water Development Board in 1999 and left that position after her appointment to the TNRCC. She also sits on the board of the Texas Water Foundation and the Texas Natural Resource Foundation.

A writer and consultant on environmental laws, natural resource policy, and ranching history, White received her bachelor and master degrees from Stanford University. She also studied comparative religion at Princeton University and law at Texas Tech University.

White was Director of Private Lands and the Environment for the National Cattlemen's Association in Washington, D.C. She has served as director of the Ranching Heritage Association, and was a special assistant in the White House Office of the First Lady Nancy Reagan.

She is a member of the Texas and Southwestern Cattleraisers Association, the Texas Hereford Association, and the American Hereford Association. She is a former commissioner of the Texas Strategic Economic Development Planning Commission and a former board member of the Texas Wildlife Association and the National Cattlemen's Legal Defense Fund.

Education: STANFORD UNIVERSITY - B.A. cum laude and M.A. degrees in Honors Humanities and Religion

Jason Burnett is an Associate Deputy Administrator of the Environmental Protection Agency. In this role he assists the Administrator and Deputy Administrator in the Agency's priority area of climate change and clean energy. In particular, Jason is helping to develop the Agency's response to the Supreme Court's decision in Massachusetts v. EPA regarding greenhouse gases under the Clean Air Act. Part of the EPA response involves working with the Department of Transportation, the Department of Energy, and the Department of Agriculture on regulations addressing greenhouse gas emissions from motor vehicles and transportation fuels.

Jason previously worked in the Office of Air and Radiation where he advised the Assistant Administrator on various regulatory approaches under a variety of Clean Air Act programs. In particular, Jason has assisted in the development of a framework for guiding the final decision for the Clean Air Mercury Rule, several air toxic rules, the particulate matter National Ambient Air Quality Standard (NAAQS), and the top-to-bottom review of how the Agency sets NAAQS.

Before joining EPA, Jason worked at Evolution Markets where he consulted for industry, state governments, foreign governments, and the UN on the development of market-based regulatory systems to improve air quality. Previously he worked at the AEI-Brookings Joint Center where he analyzed the regulatory impact analyses that EPA and other agencies performed and co-authored several papers on individual regulations and the regulatory process. Jason has a BA in Economics and a MA in Earth Systems, both from Stanford University.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAY 18 2006

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Supporting Innovative Strategies to Keep Communities' Air Clean 8-Hour Ozone Flex (8-O_3 Flex) Program

FROM: Stephen D. Page, Director
Office of Air Quality Planning and Standards

TO: Regional Administrators, Regions I-X

In continuing the Agency's commitment to work cooperatively with State, Tribal and local governments, I am pleased to announce the 8-Hour Ozone Flex (8-O_3 Flex) program. The 8-O_3 Flex program is a voluntary agreement between the Environmental Protection Agency (EPA), State, Tribal, and local communities to encourage 8-hour ozone attainment areas nationwide to reduce ozone emissions so they can continue to meet the National Ambient Air Quality Standard (NAAQS) for ozone. This program will support and reward innovative, voluntary, local strategies to reduce ground-level ozone, thereby improving air quality and helping areas maintain attainment. In addition, the program will allow States and locals to receive "credit" for these efforts in the State/Tribal Implementation Plans, and help them to avoid a violation of the 8-hour ozone standard. Through the 8-O_3 Flex program, we are encouraging communities to make decisions that will improve air quality.

With this memorandum, I am transmitting to you the guidelines for the 8-O_3 Flex program, and request that you and your staff work with States, Tribes, and local agencies that may wish to take advantage of this opportunity. This program was a natural outgrowth of previous programs including the Flexible Attainment Region (FAR) and the 1-Hour Ozone Flex program. The purpose of the 8-O_3 Flex guidance is to provide a structure and framework for local actions to reduce ozone emissions and thus maintain the 8-hour ozone NAAQS. It also provides a means for local communities to take the initiative in maintaining and improving their air quality.

The 8-O_3 Flex program will be implemented through an intergovernmental agreement (Memorandum of Agreement) between EPA, the State/Tribe, and the local community. Areas eligible to participate in the 8-O_3 Flex program are those designated as attainment or unclassifiable/attainment for the 8-hour ozone standard, as published on April 30, 2004, (69 FR 23858) and not designated nonattainment for the 1-hour ozone NAAQS or with an approved 1-

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hour ozone maintenance plan. In addition, the areas cannot have been redesignated to nonattainment of the 8-hour ozone standard, their current design values must show attainment of the 8-hour ozone standard, and they must have air monitors in place that meet state implementation plan requirements.

I would like to thank Region 6 for taking the lead in developing this guidance. If you have any questions on the 8-O_3 Flex Program, you may contact Barbara Driscoll of my staff at (919) 541-1051, or Carrie Paige, EPA Region 6 at (214) 665-6521.

Attachment

cc: Regional Air Division Directors, Regions I-X
Leah Weiss, NESCAUM
John Paul, ALAPCO
Eddie Terrill, STAPPA
Bill Becker, STAPPA/ALAPCO
Janice Nolan, American Lung Association

May 2006

8-hour Ozone Flex Program

Introduction

The 8-Hour Ozone Flex (8-O_3Flex) program is a voluntary agreement between Federal, State/Tribal and local communities to encourage 8-hour ozone attainment areas nationwide to reduce ozone emissions as needed to maintain the National Ambient Air Quality Standard (NAAQS) for ozone. This program will support and reward innovative, voluntary, local strategies to reduce ground-level ozone, thereby improving air quality and helping areas maintain attainment. In addition, the program will allow States and locals to receive "credit" for these efforts in the State/Tribal Implementation Plans, and help them avoid a violation of the 8-hour ozone standard. The 8-O_3Flex program could be considered the third generation of flexible, ozone attainment initiatives, as its predecessors include the Flexible Attainment Region (FAR) and the 1-Hour Ozone Flex program, which focused on taking proactive steps to reduce emissions of ozone-generating pollutants to improve an area's air quality. Areas that participated in the 1-Hour Ozone Flex program are: Austin and Corpus Christi, TX; Little Rock, AR; Shreveport-Bossier City, LA; and Tulsa, OK. Readers may notice components of the earlier flexible ozone attainment programs herein.

This document provides guidance on the 8-O_3Flex program, including general applicability, regulatory issues and the agreement development process. This program guidance has been discussed and reviewed by stakeholders that include EPA, State and local government as well as environmental groups.

Throughout this document are references to websites and guidance documents that support the 8-O_3Flex program. Should one experience difficulty accessing any of these resources, or have additional questions on the 8-O_3Flex program, please contact Carrie Paige, EPA Region 6, at (214) 665-6521, paige.carrie@epa.gov or Barbara Driscoll, EPA Office of Air Quality Planning and Standards, (919) 541-1051, driscoll.barbara@epa.gov.

General Applicability

1. What is the purpose of this guidance?

The purpose of this guidance is two-fold: to provide a structure and framework for local actions that reduce ozone emissions and thus maintain the 8-hour ozone NAAQS; and to provide a means for local communities to take the initiative in maintaining and improving their air quality. This guidance is our response to requests for an 8-O_3Flex program, similar to the previous 1-hour ozone flex program.

2. What is the 8-O_3Flex program?

The 8-O_3Flex program is a collaborative, voluntary program intended to preserve or maintain 8-hour ozone attainment areas and reverse deterioration of air quality in 8-hour ozone attainment

areas that are nearing nonattainment. The program includes contingency measures that will reduce local emissions of ozone precursors, implemented through an intergovernmental agreement (Memorandum of Agreement) between EPA, the State/Tribe, and the local community. The 8-O_3Flex program may allow future State Implementation Plan (SIP) credit for new ozone reduction efforts. The program may assist an area in maintaining existing ozone control measures, and help an area avoid redesignation to nonattainment for the 8-hour ozone NAAQS.

3. Sections 110 (a)(1) and 175A of the Clean Air Act (the Act) require maintenance plans with contingency measures. How does the 8-O_3Flex program differ from these maintenance plans?

Section 110(a)(1) of the Act requires that each State adopt and submit to EPA within three years after the promulgation of a NAAQS (in this case, the 8-hour NAAQS for ozone), a plan which provides for implementation, maintenance and enforcement of the 8-hour ozone NAAQS for all areas within the state. The EPA has not required that these plans include specific, detailed contingency measures for attainment areas, unless the area had also at the time of its 8-hour designation been designated as either (1) nonattainment for the 1-hour ozone NAAQS; or (2) attainment for the 1-hour ozone NAAQS with an approved 1-hour ozone maintenance plan. Should the area fall into either of these categories, they would not be eligible to participate in the 8-O_3Flex program, as discussed below. Areas eligible to participate remain subject to the requirements of Section 110(a)(1) of the Act.

Section 175A of the Act requires maintenance plans for areas that are applying for redesignation from nonattainment to attainment of the NAAQS for any air pollutant. Areas applying for redesignation to attainment for the 8-hour ozone NAAQS are not eligible for the 8-O_3Flex program, as explained below.

4. What areas are eligible to participate in the 8-O_3Flex program?

Areas eligible to participate in the 8-O_3Flex program are those designated as attainment or unclassifiable/attainment for the 8-hour ozone standard, as published on April 30, 2004 (69 FR 23858) and were neither designated at the time of 8-hour designations nonattainment for the 1-hour ozone NAAQS nor designated attainment for the 1-hour ozone standard with an approved 1-hour ozone maintenance plan. In addition, the areas cannot have been redesignated to nonattainment for the 8-hour ozone standard; their current design values must show attainment of the 8-hour ozone standard; and these areas must have air monitors in place that meet the requirements of 40 CFR 58 Appendix A, or the QA Handbook for Air Pollution Measurement System, Volume II (http://www.epa.gov/air/oaqps/qa/index.html). Any area interested in developing an 8-O_3Flex agreement should engage with appropriate stakeholders, State/Tribal agencies and EPA about the prospect.

a. Are 8-hour ozone nonattainment areas eligible to participate in the 8-O_3Flex program?

No. The 8-O_3Flex program is not intended for areas designated nonattainment, even those that include counties that meet the 8-hour National Ambient Air Quality Standard (NAAQS) for ozone. Such counties are encouraged to work with the State in considering and developing

strategies under the applicable SIPs required by the Act to achieve attainment of the 8-hour ozone standard.

b. Are areas that have been redesignated to attainment eligible to participate in the 8-O_3Flex program?

No, the 8-O_3Flex program is not intended for areas that have been redesignated to attainment for the 8-hour ozone standard, as those areas already have maintenance and contingency plans. This program is also not intended for areas that are required to or have already adopted detailed contingency plans as part of their 110(a)(1) maintenance plans.

c. Are Early Action Compact (EAC) areas eligible?

The EAC areas that are currently designated attainment for the 8-hour ozone NAAQS and meeting the eligibility requirements listed under question 4 above are eligible to participate in the 8-O_3Flex program. The 14 EAC areas that are currently receiving a deferral of the effective date of nonattainment designation are not eligible. If these "deferred" areas are designated attainment in April 2008, then these areas would be eligible.

If an eligible EAC area chose to participate in the 8-O_3Flex program, the existing EAC requirements would continue to apply, in addition to new requirements resulting from participation in the 8-O_3Flex program. For example, the EAC protocol required an analysis for future attainment maintenance through 2012 or "Maintenance for Growth." Such requirements in the approved EAC plans would continue to remain in place. Details of the section on Maintenance for Growth can be found in the June 19, 2002 guidance, "Protocol for Early Action Compacts Designed to Achieve and Maintain the 8-hour Ozone Standard" and the specific SIP requirements are in the final EPA-approved rulemaking for each EAC area[1].

5. What is the timing for participation in the 8-O_3Flex program?

We encourage attainment areas to participate in the 8-O_3Flex program as early as possible, but will not require an area to commit to the program by a specific date. There is currently no expiration date for enrollment in the program. We recommend that an area commit to the program for a five-year term, with the option to renew at the end of the first term and each successive term. On-going program evaluation, in the form of periodic reports (page 11), will be required of each area. With the exception of catastrophic events, failure to abide by the agreement will result in an area's forfeiture of participation in the program.

6. How does an area apply for participation in the 8-O_3Flex program?

We recommend that areas submit a commitment letter or local resolutions to EPA at least four months preceding their plans to have such an agreement approved by the local/State government

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[1]The EAC protocol, as well as the proposed and approved FR notices are posted on the EAC webpage: http://www.epa.gov/ttn/naaqs/ozone/eac/

and EPA. Areas should submit an 8-O_3Flex Memorandum of Agreement (MOA), including inventory and chosen control measures, to EPA, within one year of submitting the commitment letter. The EPA will review the submittal to ensure the requirements of the program are met. Approval is achieved when the local/State participants and EPA agree with the submitted program plans and sign the MOA[2].

To minimize the potential for ozone concentrations in excess of the 8-hour standard, areas should evaluate voluntary and mandatory control options, and implement them to the extent possible for the ozone season immediately following the commitment letter. For the 8-O_3Flex program, areas must choose at least one measure (voluntary and/or mandatory) with quantifiable emission reductions for implementation within the first year of signing the MOA.

Regulatory Issues

7. Does the 8-O_3Flex program establish new or avoid existing regulatory requirements?

No, this program neither creates nor avoids regulatory requirements. Until applicable measures are incorporated into the SIP or imposed under state or local authorities, the program does not result in enforceable requirements on any party. If measures are imposed in the SIP or under state or local authority, they are binding under the SIP or state or local authority. Should an area fail to meet program requirements after signing the MOA, the immediate consequence would be the area's forfeiture of participation in the program. We encourage interested communities to carefully consider participation, reviewing pertinent issues including, but not limited to, projected industrial and population growth, trends and concerns regarding air quality, and support of such a program by the State/Tribal and local community. As a voluntary program, an area can choose to end its participation at any time.

Areas in the 8-O_3Flex program will commit to design and implement contingency measures that will be effective in preventing violations of the 8-hour ozone standard. Or, these measures will promptly bring an area back into attainment should a violation of the O_3 NAAQS occur. Participants in the program commit to a firm schedule for implementation of the contingency measures.

Regulations that apply to an area would still apply under the 8-O_3Flex program. The 8-O3Flex program does not shield an area from being redesignated nonattainment for the 8-hour ozone standard if the area is in violation of that standard. Should a violation occur, EPA would consider factors in section 107(d)(3)(A) of the Act. These include "air quality data, planning and control considerations, or any other air quality-related considerations the Administrator deems appropriate," including time to allow the implemented contingency measures to work. As long as the 8-O_3Flex agreement and control measures in the MOA are being fully implemented, EPA

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[2]The Memorandum of Agreement (MOA) is an intergovernmental agreement between the EPA, State/Tribe, and local community. The document specifies actions the signatories have agreed to implement to reduce ozone precursor emissions and thereby improve local air quality. The MOA is not a federally enforceable document.

would consider that circumstance in exercising its discretion in making a decision to redesignate the area to nonattainment.

8. Will areas receive SIP credit for emission reductions?

To the extent authorized by the Act and per established guidelines and criteria, yes. Many States and localities will initiate controls to maintain the 8-hour ozone standard and want to receive "credit" for these efforts if and when complete State/Tribal Implementation Plans need to be submitted to EPA for approval. EPA supports flexible approaches that account for the complex nature of ozone formation and has provided SIP credit for communities that adopt quantifiable measures for ozone reduction plans that may be required in the future[3].

There are two memos that support EPA's commitment to allowing SIP credit for voluntary emission reductions, and additional memos that provide guidance on incorporating voluntary measures into SIPs. Two memoranda from John Seitz, dated October 12, 2000, and January 29, 2001, state that EPA will do all it can within its authority to support States, Tribes and local entities which obtain near-term, or early, emission reductions. When considering voluntary measures for adoption into the SIP, please refer to the memo from Richard Wilson, dated October 24, 1997, and its attached guidance on incorporating voluntary mobile source emission reduction programs in SIPs, as well as the memo from John Seitz, dated January 19, 2000, and its attached Stationary Source Voluntary Measures Policy. Finally, a memo from Steve Page and Margo Oge, dated August 16, 2005, provides guidance on Incorporating Bundled Measures into a SIP. These documents are available electronically at http://www.epa.gov/ttn/oarpg/t1pgm.html and, http://www.epa.gov/otaq/transp/publicat/pub_volu.htm. See Attachment B for a list of guidance documents; this list is not exhaustive of all guidance on SIP credit.

Agreement Development Process

9. What are the steps in developing an 8-O_3Flex agreement?

Step 1 - Commitment Letter

The 8-O_3Flex agreement process is initiated by sending a commitment letter from the local community and State/Tribal air quality agency to EPA. The letter should express the local area's commitment to develop an 8-O_3Flex agreement and willingness to coordinate with the State/Tribe and EPA. The letter should be signed by the highest appropriate local officials, with the authority to implement the program and assist in leveraging staff and program funds, as needed. Resolutions or other official documents can be helpful in demonstrating local commitment. The more definitive and specific the letter, the easier it will be for EPA to assess the likelihood of a successful program. A letter may serve as the blueprint for mobilizing area resources and support. The letter should identify the strategy for developing and implementing

[3]The criteria for SIP credit generally require that the measures be enforceable, quantifiable, surplus and permanent. Additional criteria may be required to be met, depending on the measure and applicable guidance.

the area's Action Plan. We also recommend including a realistic schedule for soliciting stakeholder support and involvement, and for the development of the Action Plan.

For areas seeking funding, we recommend http://www.grants.gov, which enables organizations to electronically find and apply for competitive grant opportunities from all Federal grant-making agencies. This website provides access to over 900 grant programs offered by the 26 Federal grant-making agencies, and some of these may be useful in the context of this program.

Step 2 - Secure Stakeholder Participation

It is important to identify, contact, and secure the participation of key stakeholders. This is most commonly accomplished by the formation of a local air quality committee consisting of representatives from local government, industry, environmental and citizens groups, and other interested parties. Stakeholders may need to be added as emissions sources and control strategies are identified.

Step 3 - Coordinate Agreement Development

The MOA is intended to form a structure for efforts and actions to improve air quality in a well-defined geographic area, and is not a Federally enforceable document. However, the control measures an area chooses to implement may require that businesses, industries, and citizens comply with ordinances, codes, or other binding State or local regulations. The geographic area covered within the MOA should be based on the location and nature of sources, or other factors important to the community. Since EPA recognized that the process will likely offer opportunities for discussion and debate, we encourage all participants to allocate adequate time to reach consensus on the content and working of the final MOA. Stakeholders will have different knowledge, strengths and time constraints. Local officials can determine the best review process for their stakeholder group or local air quality committee.

State/Tribal and EPA representatives can provide valuable technical information for local communities. Local plans should complement current or potential future State/Tribal or Federal efforts for the area. It may be helpful to have conference calls or meetings with the State/Tribal and EPA representatives to discuss specific portions of the draft proposal before a final draft is submitted for review. The EPA will review and provide comment on the draft agreement and will work with local technical or policy committees and the State/Tribe.

10. What are the agreement components?

Each agreement submitted to EPA should include the following elements:

- Executive Summary
- Action Plan
- Contingency Measures
- Coordination and Public Participation
- Schedules/Reporting
- Signature Page and Date

A. Executive Summary

In the executive summary, please include information about the area to be covered by the MOA, including a rationale for choosing the geographic boundaries. At a minimum, the geographic area should include the urbanized attainment area[4]. Please submit a map showing the geographic boundaries. It is important to include brief information about the participating and signatory groups and agencies, and the general commitments and objectives of the MOA. The executive summary should also include the agreement's duration as well as the conditions for modification or early termination of the agreement.

A summary of the background information on the air quality in the area should be included in this section. Please include indications of the status of air quality in the area and the suspected or confirmed sources of pollutants which may contribute to ozone formation.

Please include an air quality data summary, including the number and location of ozone monitors, the number and extent of ozone concentrations above the standard, the types of air dispersion modeling conducted, if any, and observed trends in emissions and ozone concentrations.

Information on the sources (i.e., point, area, nonroad and mobile) and the total amounts of emissions should be summarized here. It is important to note the extent and availability of information about nitrogen oxide (NOx) and volatile organic compound (VOC) emissions which contribute to ozone formation in the area. Specify the types of sources of these pollutants and extent to which each type or specific source contributes to the release of the total emissions in the area. It is also important for major sources in adjacent counties (especially those subject to the NOx SIP Call and/or the Clean Air Interstate Rule) to be identified since the control of emissions transported from these sources is important for attainment in the 8-O3Flex area.

B. Action Plan

In the Action Plan, please describe the specific air quality planning, discretionary control measures and/or mandatory control measures that local governments commit to undertake as a result of the 8-O3Flex program. The description for each measure will state how, where, when, and by whom the measure will be implemented. At a minimum, the Action Plan should be designed to keep ozone levels below the current 8-hour ozone standard. More stringent air quality targets can be agreed to by the signatories and interested parties. The Action Plan should work to achieve the 8-hour ozone standard or more stringent target as expeditiously as practicable to provide maximum benefits.

We expect that the action plan will include a description of technical tools. A key planning resource that must be part of the agreement is the emissions inventory for NOx and VOCs. And,

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[4]An urban area generally consists of a large central place and adjacent densely settled census blocks that together have a total population of at least 2,500 for urban clusters, or at least 50,000 for urbanized areas. An urban area can be in a metropolitan or non-metropolitan area.

although not required, air dispersion modeling would also be helpful. These items can be used to identify or assess and analyze the sources of emissions in the area. Such information will inform which control strategies may be effective in reducing ozone formation. Voluntary measures that may be undertaken by the general public or specific entities should be identified. The effectiveness of these measures may vary depending on the extent of participation or other circumstances. In the Action Plan, please include details about the means of ensuring the implementation of any mandatory measures selected by the local area, such as regulations, agreed orders, and verification mechanisms. Also include a discussion of mechanisms or approaches for assessing the effectiveness of voluntary measures.

EPA encourages use of the latest planning assumptions and emissions models available to evaluate and accurately estimate the benefits that control measures provide. Examples of assumptions include estimates of current and future population, employment, activity, projections and growth factors, and vehicle age and fleet mix. For mobile source emission estimations, the currently available emissions model is MOBILE6.2 (http://www.epa.gov/otaq/m6.htm). For nonroad mobile sources, the currently available model is the draft NONROAD2004 (http://www.epa.gov/otaq/nonrdmdl.htm).

All measures should be new, not previously implemented, and above and beyond what is required under State/Tribal or Federal law prior to the MOA period. The Action Plan must include a mechanism for identifying triggers (e.g., a violation, increase in emissions, etc.) and when such measures will need to be implemented (for detailed discussion on contingency measures, see page 10). There should also be a commitment to revise or update measures in the MOA accordingly if State/Tribal or Federal law changes during the MOA period. To the extent possible, the amount of NOx and/or VOC emission reduction anticipated from each measure or combination of measures should be estimated.

Again, areas in the 8-O_3Flex program should develop or update emission inventories, and design and implement contingency measures that will be effective if violations of the 8-hour standard occur. Photochemical modeling would be helpful in this effort but is not required. If modeling is not used by the 8-O_3Flex area, the Action Plan should explain what means were used to select the control measures in the Action Plan. Failure to abide by the terms of the MOA could lead to deterioration in air quality and EPA exercising its discretion to redesignate the area to nonattainment for the 8-hour standard if a violation occurs. Failure to abide by the terms of the MOA will result in the area's forfeiture of participation in the program.

Attachment A contains more detailed information about the emissions inventory, modeling, control measures and selection, as well as triggers for implementing a control measure. A general overview follows:

1. Emissions Inventories

All participants must have or must develop a baseline emission inventory for NOx and VOCs, to identify the level of emissions that would represent attainment for the area and from which to monitor growth. This emission inventory should be based on actual, typical summer day emissions of NOx and VOCs. In developing contingency measures for the Action Plan, emission

reductions from efforts or controls should be identified and readily quantifiable. Emission reductions from some measures may be difficult to quantify (e.g., voluntary measures due to unknown levels of participation) but it may be possible to specify a range of anticipated emission reductions from each or a combination of these "hard to estimate" measures. A percentage, range, or a time-adjusted sequence of total emission reductions should be included in the agreement. Each 8-O3Flex area is required to follow EPA's protocol for developing an emission inventory; the protocol and additional information on emission inventories is available at http://www.epa.gov/ttn/chief/.

2. Modeling

While not required for participation in the 8-O3Flex program, air dispersion modeling predicts the effectiveness of a proposed control strategy or a proposed control measure in reducing local ozone concentrations. Therefore, modeling would be used as a tool in this context (rather than as an attainment demonstration.) Before beginning any optional modeling effort, an area should contact the State or EPA for suggestions on what types of modeling needs to be conducted, and if models for the area already exist. A review of any existing modeling could add credence to the selection of control measures and conserve both time and money. If the area intends to perform modeling, it should follow EPA or State approved modeling protocol; the EPA modeling protocol is available at http://www.epa.gov/scram001/tt25.htm.

3. Control options

Once the types and amount of the emissions and associated sources are generally known, a list of potential air quality improvement and/or emission control options can be developed. These options may include public awareness, notification, and participation in local programs; control devices or procedures for stationary sources; or mobile source control options. These options should be different from any action required by State/Tribal or Federal law prior to or during the agreement term. Other options may include voluntarily adopting State/Tribal or Federal measures like those designed and mandated for ozone nonattainment areas. These measures could be implemented on a voluntary basis and adapted as necessary.

New State/Tribal or Federal requirements may impact the emissions in an area during the agreement period. EPA expects 8-O3Flex proposals to go beyond Federal and State/Tribal requirements in place or expected during the agreement period. Consequently, local areas should become informed of requirements that will become applicable to their sources or area during the anticipated agreement period as they evaluate potential air quality control measures. Even if Federal and State controls are expected to be sufficient to keep an area in attainment, local measures may provide the extra reductions needed to maintain the standard. A list of ideas and measures implemented by the Early Action Compact areas can be found at http://www.epa.gov/ttn/naaqs/ozone/eac/index.htm#EACsummary.

4. Selection of control measures

Emissions, modeling, source, and control information can be analyzed to select appropriate control measures that will help achieve desired emission reductions and prevent high ozone levels. Specific 8-O3Flex plans can tailor the use, combination, and timing of specific measures to meet local needs and may contain public notification and emission reduction provisions, either

as primary or contingency measures. The timing of control measures and the period of years that the MOA is in effect will be agreed upon by the signatories. EPA recommends that an area commit to the program for a 5-year term, with an option to renew it at the end of the term and each successive term. However, while EPA recommends that an area commit to the program for a five year term, contingency measures must be adopted and implemented as soon as possible, but no later than two years after the event that triggered the measure.

C. Contingency Measures

The Action Plan should contain control measures that are sufficient to prevent violations of the 8-hour ozone standard. In addition, it must include contingency measures designed to allow areas to respond to unplanned increases in local concentrations of ozone. The signatories will agree in advance on what will trigger a contingency measure, what action to take in response to each trigger and how to proceed to avoid a possible violation of the 8-hour ozone standard. Areas will respond to a violation of the standard by implementing one or more mandatory measures and these measures, once triggered, must be adopted into the SIP. Recorded concentrations above the ozone NAAQS may also trigger the state to include the contingency measures in the SIP. Depending on the area's most recent ozone design value, for example, the plan may direct implementation of one or more voluntary and/or contingency measures in response to two or three recorded concentrations that exceed the 8-hour standard; the goal would be to prevent the area's design value from reaching a violation of the standard. Numerous recorded concentrations that exceed the standard and result in an increase in the area's design value but do not cause the area to violate the standard, should be addressed in the contingency plan.

Each Action Plan will be unique, depending on the area's design value and other characteristics discussed in this document. Each plan will identify specific events that will trigger one or more contingency measures. The plan must describe when each action will be taken, a description (can be a list or menu) from which the contingency measures or SIP contingency measures will be chosen, and time frame in which that action will be adopted and implemented. As is the case for areas subject to the memo from Lydia N. Wegman, dated May 20, 2005, and its attached Maintenance Plan Guidance Document for Certain 8-hour Ozone Areas Under Section 110(a)(1) of the Act, the schedule for adoption and implementation of contingency measures should be as expeditious as practicable, but no longer than 24 months from the date of violation or other trigger.

Once a contingency measure is triggered, there should be no delay in the implementation of the measure. And once implemented, we would not recommend that a contingency measure be modified or discontinued, unless the area can demonstrate that such change(s) will not interfere with the continued attainment and maintenance of the 8-hour ozone NAAQS. For an analogous set of guidelines, the guidance on 110(a)(1) maintenance plans is posted at http://www.epa.gov/ttn/oarpg/t1pgm.html.

D. Coordination and Public Participation

A consensus of support for the proposed control measures in the 8-O_3Flex Action Plan is vital. Local officials can determine the best means to seek, obtain and respond to input from groups or individuals interested in, or affected by, the control measures proposed in the Action Plan. We recommend that the 8-O_3Flex Action Plan be developed by a local air quality committee that includes environmental and citizens groups, as well as representatives from local industry and government. The Action Plan should specify how signatories will coordinate efforts, share information, and review data.

Input on proposed control measures from environmental groups, citizens groups, industry representatives, the general public, the States/Tribes, and EPA should be given thoughtful consideration by the committee. Efforts to obtain consensus and consider all input will be part of this section of the Agreement.

E. Schedules/Reporting

Please include a schedule of activities and milestones for each measure in the Agreement so signatory and interested parties will know when proposed measures will be implemented. Significant actions that are necessary or may affect control measure implementation, such as required reviews/approvals, acquisition of equipment, etc., should be included in the schedule.

Initially, participants should develop a semi-annual program report for stakeholders containing the latest information on implementation of control measures, ozone monitoring data, and the success of current measures. If an areas's design value is maintained at 80 ppb or lower, or if an area's design value is not increasing or is on the decline each year, the area may request approval from EPA to submit reports annually, following submittal of the first semi-annual report. Semi-annual reports must be submitted for all other scenarios.

F. Signature Page and Date

All major contributors should sign the MOA. Signatories to the MOA will include at a minimum, local community leaders, the State environmental agencies, and the EPA. During the course of 8-O_3Flex agreement development, other parties significantly responsible for the implementation of the agreement may be added to the signatory list. The signature date of the MOA will be considered the start date of the agreement's term.

Attachment A
O3Flex Action Plan Components
Details of **Emissions Inventory**, **Modeling**, and **Controls**

Emissions Inventory
One of the first steps in determining how to improve air quality in an area is to gather information on the sources and amounts of emissions. This process is known as emissions inventory (EI) development. The extent of the geographic area this inventoried will vary by community. The EPA recommends evaluating the Metropolitan Statistical Area/ Consolidated Metropolitan Statistical Area (MSA/CMSA) (or the county or parish if there is no MSA) and enlarging the area if necessary. Local EIs can help an area identify, target, and obtain achievable and beneficial emission reductions to prevent ozone formation.

Emissions are generated by stationary sources (industrial or commercial facilities), mobile sources (on and off-road vehicles, aircraft, ships and locomotives), and area sources (gas stations, dry cleaners, auto body paint shops, etc). Emissions of nitrogen oxides (NOx) and volatile organic compounds (VOC) contribute to ozone formation and should be the focus of EI efforts.

Information should be gathered on the number and types of emission sources in the area and the types and amounts of pollutants emitted. It is important to summarize the extent and availability of information on NOx and VOC emissions which contribute to ozone formation in the area. To the degree it is known, specify the types of sources of these pollutants and extent to which each type or specific source contributes to the release of the total emissions in the area.

The following steps outline the process:
Step 1: Determine if inventory information currently exists
The State/Tribe develops a formal EI for SIP/TIP development and may have information on the sources and emissions in the area. EPA may have additional information. Identify other information sources and compile all information.

Step 2: Determine the limit and extent of available information
The extent of EI information available varies from area to area. The State/Tribe or EPA should be able to provide guidance on the types of EI information that has been collected for your area and which may be beneficial to your local efforts.

Step 3: Gather additional information as necessary
In addition to specific local EI data from the State/Tribe or EPA, the following information may be of use to local emission inventory development:
Stationary source data:
- VOC/NOx sources/emissions not included in the State/Tribe emissions inventory
- determination/reporting of excess facility emissions during start-up, shutdown, malfunction
- development of a 2002 emission inventory to compile and utilize the most recent data available

Mobile source data:

- mobile source information included/not included in the State/Tribal EI
- off-road vehicle types, numbers, emissions, hours/frequency of operation
- on-road vehicle types, numbers, emissions, vehicle miles traveled (possible data sources include local Metropolitan Planning Organizations and the local Department of Transportation)

Finally, additional useful information regarding emissions inventories is available electronically through http://www.epa.gov/ttn/chief/.

Modeling

If an area chooses to perform air quality modeling, then in addition to general or specific modeling needs or recommendations from the State/Tribe or EPA (http://www.epa.gov/scram001/tt25.htm), a modeling protocol should be developed and followed. Other considerations will include:

A. Purpose of the Modeling

If used, Photochemical Grid Modeling should be SIP quality and developed according to the current ozone modeling guidance[5]. This modeling can help answer questions such as:
- Is it more effective for the 8-O_3Flex plan to concentrate on reductions of VOCs, NOx, or both?
- If indications point to a combination of reductions, what percentage of each - VOCs and NOx?
- What kinds of reductions are necessary to make a difference in ozone concentrations?
- Is there a relationship between VOCs and NOx that contributes to ozone formation?
- Which primary or contingency control measure will be most effective?

If used in this program, modeling would be a tool rather than a demonstration of attainment with the 8-hour ozone NAAQS. However, photochemical grid modeling may also be used to assess a control strategy for compliance with the 8-hour ozone NAAQS. In such a demonstration, there may be a need for assessing some future year(s) for a compliance demonstration and development of additional controls. Development of future emission inventories will be needed.

B. Data and Time Periods to be Modeled

To an extent, the purpose of the modeling will determine the emissions data that should be used, but other decisions need to be made such as:
- How many and which sources should be modeled?
- What types of pollutants and amounts of emissions from each source should be evaluated?
- Are the emissions inventory and other necessary data (i.e., meteorological data) available?
- Should modeling be done for the whole agreement term or specific periods, such as each year?

C. Election/Use of an Appropriate Model

There are different models available to predict air quality impacts. Consult with the State/Tribe and EPA regarding any existing models and which models would be appropriate for the purpose intended as well as the area, pollutants and sources to be evaluated. As stated earlier, a review of

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[5]US EPA (February 17, 2005) Draft Final Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS, http://www.epa.gov/scram001/guidance/guide/, see "draft-final-o3.pdf" on website.

existing models could simplify the selection of control measures and conserve resources.

Control Measures

Control measures can include public notification and emission reductions, and can be either primary or contingency measures. Notification measures include activities to inform the public of the impact of their daily activities and to encourage them to participate in efforts to improve local air quality. Emission reduction measures are specific emission reduction commitments from specific facilities or industrial sources as well as broader measures applicable to the entire area, or which target a specific group of emission sources or category of emissions (i.e., sources with VOC emissions greater than 25 tons per year). Such measures may take the form of facility-specific commitments to install emission control devices, to shut down production units, or to change operating procedures, frequencies or time.

Control technology information sources for a list of air quality improvement options. These include, for example, the Reasonably Available Control Technology/Best Available Control Technology/ Lowest Achievable Emission Rate (RACT/BACT/LAER) Clearinghouse (http://cfpub.epa.gov/RBLC/htm/bl02.cfm); the New and Emerging Environmental Technologies (NEET) database (maintained under a cooperative agreement with EPA/OAQPS (http://neet.rti.org); and the EAC website (http://www.epa.gov/ttn/naaqs/ozone/eac/). Consider contacting other States/Tribes or local communities, particularly those with similar sources and air quality issues, may be contacted for information on control measures they have considered or implemented. A list of some general categories of control measures follows, but the 8-O3Flex areas are not limited to these categories for sources of controls. Additional information or emission control options for specific sources can be obtained by contacting the State/Tribe or EPA.

A. Public Awareness Activities
- Ozone awareness information
- Ozone action day activities and notifications

B. Commute/Transportation options
- Mass transit use incentives
- Car pooling/ridesharing
- Telecommuting
- Flexible work/commute hours
- HOV lanes
- Commuter choice programs
- Parking cash out
- Smart growth development
- Addition of bike lanes and bike storage

C. Stationary Sources Measures
- Vapor recovery at gasoline service stations (including marine servicing facilities)
- Discretionary implementation of measures required for nonattainment areas, such as:
    - adopting more stringent VOC/NOx control requirements than currently required

- implementation of EPA source emission control technique guidelines (CTGs)
- offsets for new source emissions or increases in emissions from existing sources
- specific emission reduction commitments from local commercial/industrial facilities
- broader mandatory stationary source control measures (i.e., limits, regulations, offsets) than currently in place in the area

D. Mobile Source Measures
- Availability, sale, and use of low Reid vapor pressure (RVP) fuels during ozone season, with due consideration to the impact on fuel distribution
- Automotive inspection and maintenance (I&M) programs
- Alternative fuel vehicles/fleets
- Restrictions in off-road vehicle equipment use hours
- Retrofit of diesel engines
- "Cash for Clunkers"
- Lawn/garden equipment buy-back programs (replace with electric or manual equipment)
- Truck stop electrification

E. Other Ozone Prevention Activities
- Restricting auto refueling, lawn mowing and landscaping equipment use hours
- Energy efficiency/renewable energy
- Land use planning

Control Measure Selection
Factors which may be considered in selecting control measures include, but are not limited to:

A. Determination of desired emission reductions
The types and amounts of emission reductions desired may impact the selection of controls. An area with predominantly mobile sources needing NOx emission reductions may need different control measures than an area with many large stationary sources of VOCs. Emissions inventory and modeling data may be beneficial in making these determinations. Considerations include:
- Is ozone formation in the area driven by NOx or VOC emissions or a combination of the two?
- To what degree do VOC or NOx emissions contribute to potential ozone exceedances?
- What are the primary types of VOC and NOx emissions sources in the area?
- Are there primarily mobile or stationary sources emitting most of the VOC or NOx in the area?
- Are there a few very large emitters of VOC or NOx, many smaller ones, or a combination?
- Are there additional air quality improvements, such as toxic emissions reductions, that result from implementation of the controls under consideration for this program?

B. Analysis of available control measures
Even if the desired types and amounts of emission reductions are known, the availability and ease of implementation of emission control options may impact selection of a particular measure. Considerations include:
- Is an appropriate control technology/measure available?
- What is the effectiveness of achieving emission reductions?

- What are the timeframes necessary to implement the measure and see results?
- Can contingency measures provide sufficient protection from further exceedances?
- What is the cost in either dollars or resources necessary to implement the measure?
- Challenges to "sell" the measure to specific companies, decision makers or citizens?

C. Selecting the proposed control measures

The State/Tribe and EPA can assist in evaluating data and in reviewing the modeling for control options. Cooperative discussions with other stakeholders can help determine the most appropriate control measures. Other States/Tribes or local communities with similar sources and air quality issues, could be contacted for additional ideas or measures to consider.

Attachment B
EPA Guidance on SIP and NSR Credits from Innovative Programs

A. Websites

1. "Innovative Air Connections" http://www.epa.gov/ttn/airinnovations/

2. "Guidelines for States on Establishing SIP Credits from Heavy-Duty Engine Retrofit Projects" http://www.epa.gov/dieselretrofit/aqsipcalc.htm

3. "Voluntary Diesel Retrofit Program – SIP" http://www.epa.gov/dieselretrofit/aqsip101.htm

4. Heat Island Effect http://www.epa.gov/heatisland/

5. Voluntary Emission Reduction Program for Airport Ground Support Equipment http://www.epa.gov/otaq/transp/vmweb/vmairgnd.htm

6. Guidance on Best Workplaces for Commuters Programs in SIPs and Conformity http://www.epa.gov/otaq/transp/conform/policy.htm#bwc-conform

B. Documents

1. Mobile Source Voluntary Measures Policy" (10/27/97) http://www.epa.gov/oms/transp/trancont/vmep-gud.pdf

2. "Improving Air Quality with Economic Incentive Programs," EPA-452/R-01-001 (1/01) http://www.epa.gov/ttn/oarpg/t1/memoranda/eipfin.pdf

3. "Stationary Source Voluntary Measures Final Policy" (1/19/01) http://www.epa.gov/ttn/oarpg/t1/memoranda/coverpol.pdf
NOTE: The above guidance document has been subsumed in 4, below.

4. "Incorporating Emerging and Voluntary Measures in a State Implementation Plan (SIP)" (9/04) http://www.epa.gov/ttn/oarpg/t1/memoranda/evm_revm_g.pdf

5. "Guidance on Incorporating Bundled Measures in a State Implementation Plan" (8/16/05) http://www.epa.gov/ttn/oarpg/t1/memoranda/10885guidebminsip.pdf

6 "Guidance on SIP Credits for Emission Reductions from Electric Sector Energy Efficiency and Renewable Energy Measures" (8/5/04) http://www.epa.gov/ttn/oarpg/t1/memoranda/ereseerem_gd.pdf

7. "A Toolkit for States: Using Supplemental Environmental Projects (SEPs) to Promote Energy Efficiency (EE) and Renewable Energy (RE)" (1/27/05) http://www.epa.gov/cleanenergy/pdf/sep_toolkit.pdf

8 "Locomotive and Truck Idling Reductions for NSR Offsets" (1/14/04) http://www.epa.gov/ttn/oarpg/t1/memoranda/nsr-idling.pdf

9. "Reducing Idling Emissions: Quantifying and Using Long Duration Switch Yard Locomotive Idling Emission Reductions in State Implementation Plans and Transportation Conformity: Technical Guidance" (1/14/04) http://www.epa.gov/ttn/oarpg/t1/memoranda/rei_guidsyl_tg.pdf

10. "Reducing Idling Emissions: Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity: Technical Guidance" (1/14/04) http://www.epa.gov/ttn/oarpg/t1/memoranda/rie_gvidti_tg.pdf

11. "Heavy-Duty Emission Reduction Retrofit/Rebuild Component" (June 1999) http://www.epa.gov/otaq/retrofit/documents/epafinalrep.pdf

12. "SIP Development Guidance: Using Emission Reductions from Commuter Choice Programs to Meet Clean Air Act Requirements" (December 1998) http://www.epa.gov/oms/transp/comchoic/sipguide.pdf

13. "Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines: Final Technical Report" (2/03) http://www.epa.gov/otaq/models/analysis/r03002.pdf

14 "Guidance on Quantifying NOx benefits for Cetane Improvement Programs for Use in SIPs and Transportation Conformity" (7/04) http://www.epa.gov/otaq/guidance/420b04005.pdf

15. "Granting Air Quality Credit for Land Use Measures: Policy Options" (9/99) http://www.epa.gov/otaq/transp/trancont/lupol.pdf

16. "Background Information for Land Use SIP Policy" (9/30/98) http://www.epa.gov/otaq/transp/trancont/siprptv3.pdf

17. "Improving Air Quality through Land Use Activities" (1/01) http://www.epa.gov/otaq/transp/trancont/siprptv3.pdf

18 "Evaluation of Modeling Tools for Assessing Land Use Policies and Strategies" (8/97) http://www.epa.gov/otaq/transp/trancont/lum-rpt.pdf

19 "Comparing Methodologies to Assess Transportation and Air Quality Impacts of Brownfields and Infill Development" (8/01) http://www.epa.gov/dced/pdf/comparing_methodologies.pdf

20. Carl Moyer Program - Example of State Retrofit Program http://www.epa.gov/dieselretrofit/excarbcarlmoyer.htm

21. "Guidance for Implementation of Accelerated Retirement of Vehicles Program" (2/93) http://www.epa.gov/otaq/transp/trancont/scraperd.pdf

22. "Opportunities to Improve Air Quality through Transportation Pricing Programs" (9/97) http://www.epa.gov/otaq/market/pricing.pdf

23 "Technical Methods for Analyzing Pricing Measures to Reduce Transportation Emissions" (8/98) http://www.epa.gov/otaq/transp/anpricng.pdf

24 "Guidance on Airport Emission Reduction Credits for Early Measures through Voluntary Airport Low Emission Programs" (9/04) http://www.epa.gov/ttn/oarpg/conform/aerc9-30-04final_and_cover_memo.pdf

25 "Guidance for Quantifying and Using Emission Reductions from Best Workplaces for Commuters Programs in State Implementation Plans and Transportation Conformity Determinations" (10/05) http://www.epa.gov/otaq/transp/conform/420b05016.pdf

C. Forthcoming EPA Guidance

1. "SIP Credit for Emission Reductions from Highway and Off-Road Diesel Vehicles and Retrofits" - Paul Bubbosh

2. "SIP Credit for Emission Reductions from Stationary Diesel Internal Combustion Engines" – Jaime Pagan

3. "Guidance on Quantifying and Using Emission Reductions from Voluntary Woodstove Changeout Programs in SIPs" – Gary Blais http://www.4cleanair.org/members/committee/criteria/GuidanceforQuantifyingMay10draft.pdf

OFFICE OF THE GOVERNOR

RICK PERRY
GOVERNOR

June 15, 2007

Stephen L. Johnson, Administrator
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Dear Administrator Johnson:

On May 23, 2007, the Texas Commission on Environmental Quality (TCEQ), adopted the revisions of the State Implementation Plan pertaining to the Houston-Galveston-Brazoria (HGB) ozone nonattainment area and the Dallas-Fort Worth ozone nonattainment area. Because the HGB area is classified as a *moderate* nonattainment area for the eight-hour National Ambient Air Quality Standard (NAAQS) under the Federal Clean Air Act, the HGB area is required to attain the eight-hour ozone NAAQS by June 2010. Through extensive analysis, the TCEQ has determined that it is practicably impossible for the HGB area to meet the 2010 attainment date. In letters dated April 17, 2007 and May 21, 2007 from Administrator Greene and Acting Administrator William Wehrum to the TCEQ Chairman, EPA encouraged Texas to pursue a reclassification and described minimum requirements to fulfill SIP submittal obligations for the HGB area.

Therefore, concurrent with our SIP revisions, consistent with EPA's current guidance, and pursuant to Federal Clean Air Act § 107 (d)(3)(D), I request a reclassification of the HGB nonattainment area. Although preliminary technical data indicates that TCEQ's significant improvement is expected through 2013, more time is needed to demonstrate attainment. I request that the HGB area's ozone designation be reclassified to *severe*, with an attainment date of June 15, 2019.

Given the huge population, one of the largest and most comprehensively controlled petrochemical complexes in the world, and subtropical climate, the HGB area faces great challenges in meeting the eight-hour ozone standard. Modeling indicates that not even a complete shut down of the Houston Ship Channel industrial area would bring about sufficient reductions to bring the HGB area into attainment by 2010. Nevertheless, Texas has developed stringent and innovative regulations for the HGB area that aggressively address nitrogen oxides and volatile organic compounds. Estimated costs of implemented industry controls are currently at $3 billion.

As acknowledged by Administrator Greene's letter, Texas has made tremendous progress over the past 15 years in addressing ozone in the HGB area. The one-hour ozone rules, which will not be fully implemented until 2008, have already decreased the ozone design value from around 220 parts per billion (ppb) in 1991 to 169 ppb in 2005. TCEQ analysis predicts the area of exceedance of the eight-hour standard will decrease over 80 percent from 2000 to 2009 (from 23,400 square kilometers to 4416 square kilometers). These decreases are expected to continue despite a rapid growth in the area's economy and population.

Within the next several years, major mobile source reductions and updated ozone model episodes are needed for HGB to demonstrate attainment. Since mobile sources are estimated to account for 54 percent of the overall nitrogen oxide emissions in HGB by 2009, reductions in this area are critical. Emissions from mobile sources will continue to decrease every year as new federal fuel and engine standards are implemented. Nitrogen oxide emissions from on-road mobile sources will decrease around 10% per year without any further state regulation. Texas has addressed mobile source emissions, not pre-empted by federal law, as much as possible through programs such as the Texas Emission Reduction Program (TERP) and Texas low emission diesel (TxLED). Over $200 million has been spent on TERP alone in HGB since 2001. Additionally, Texas has just completed Texas Air Quality Study II (TexAQS II) which was in part funded with $9 million in state funds since 2004. The data from TexAQS II will be used to develop new episodes for 2005 and 2006 that will result in a more robust, technically-sound, and economically-feasible SIP that will get the HGB area into attainment as soon as practicable.

Texas will work with the EPA to establish an appropriate deadline for SIP submission. We understand that the deadline for a SIP submission should be as soon as practicable but not later than June 15, 2010. I can assure you that Texas will do everything feasible to achieve attainment in HGB as soon as practicable in order to protect public health, while maintaining a strong economy.

Sincerely,

Rick Perry

Rick Perry
Governor of Texas

RP:zc

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 0 8 2007

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Area Designations for the Revised 24-Hour Fine Particle National Ambient Air Quality Standard

FROM: Robert J. Meyers
Acting Assistant Administrator

TO: Regional Administrators, Regions I-X

This memorandum provides information on the timeline for designating areas for the purpose of implementing the revised 24-hour fine particle ($PM_{2.5}$) national ambient air quality standard (NAAQS). In addition, this memorandum identifies important factors for States and Tribes to consider in making recommendations for area designations. Please share this information with the State and Tribal agencies in your Region.

The EPA promulgated a revised NAAQS for $PM_{2.5}$ on October 17, 2006 (71 Federal Register 61144). The effective date for the new standard was December 18, 2006. The EPA retained the annual $PM_{2.5}$ standard of 15 $\mu g/m^3$ and revised the 24-hour $PM_{2.5}$ standard, changing it from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. The 24-hour $PM_{2.5}$ standard was revised based on a number of health studies showing that short-term exposure to $PM_{2.5}$ is associated with increased mortality and a range of serious health effects, including aggravation of lung disease, asthma attacks, and heart problems. This memo describes the designation process for the revised 24-hour $PM_{2.5}$ standard. It outlines the next step in developing and implementing emission control programs for attaining and maintaining this standard – a standard that addresses an important public health problem.

Section 107(d) of the Clean Air Act (CAA) governs the process for area designations following the establishment of new or revised NAAQS. Under section 107(d), States are required to submit recommendations to EPA not later than one year after the promulgation of a new or revised standard. Therefore, each State must provide recommendations to EPA by December 18, 2007. Areas should be identified as attaining, or not attaining, the revised 24-hour $PM_{2.5}$ standard, or as not classifiable on the basis of available information. If, after careful consideration of the recommendations, EPA intends to promulgate a designation that deviates from the State recommendation, EPA must notify the State at least 120 days prior to

promulgating the modified designation, and EPA must provide the State an opportunity to comment on the potential modification. The Clean Air Act requires EPA to complete the designation process within two years of the effective date of the standard unless the Administrator finds that additional information is needed to make these decisions. In such a case, EPA may take up to an additional year to make the designations, i.e., no later than three years after the effective date of the standard. While the language of Section 107 specifically addresses States, EPA will follow the same process for Tribes to the extent practicable, pursuant to Sections 110(o) and 301(d) of the Act and the Tribal Authority Rule, or TAR (see 63 FR 7254).

EPA recommends that States and Tribes identify violating areas using the most recent three years of air quality data. In most cases, we expect these to be data from calendar years 2004-2006 that are stored in the EPA Air Quality System (AQS). In general, violations are identified using data from Federal reference method (FRM) and Federal equivalent method (FEM) monitors that are sited and operated in accordance with 40 CFR Part 58, as revised on October 17, 2006 (see 71 FR 61236). Procedures for using these data to determine whether a violation has occurred are given in 40 CFR Part 50 Appendix N, as revised on October 17, 2006 (see 71 FR 61144).

Air quality monitoring data affected by exceptional events may be excluded from use in identifying a violation if they meet the criteria for such an exclusion, as specified in the Final Rule on the Treatment of Data Influenced by Exceptional Events (72 FR 13560). For determining violations of the 24-hour $PM_{2.5}$ NAAQS, States must ensure that any 2004-2006 monitoring data affected by an exceptional event are flagged in AQS by October 1, 2007. Further, documentation to support the determination that the data were influenced by exceptional events must be noticed for public comment and submitted to EPA no later than the submittal of the Governor's recommendation letter on nonattainment areas, which is due no later than December 18, 2007.

EPA believes that, in making their boundary recommendations for nonattainment areas, States and Tribes should evaluate each area on a case-by-case basis. The CAA requires that a nonattainment area must include not only the area that is violating the standard, but also nearby areas that contribute to the violation. Thus, for each monitor or group of monitors that indicate violations of a standard, EPA will establish nonattainment boundaries that cover a sufficiently large area to include both the area that violates the standard and the areas that contribute to the violations. EPA recommends that States and Tribes base their boundary recommendations for violating areas on an evaluation of the nine factors used in the prior $PM_{2.5}$ designations process, as well as on any other relevant factors or circumstances specific to a particular area.

Two attachments provide additional information. Attachment 1 is a time line of important dates in the revised 24-hour $PM_{2.5}$ NAAQS designation process. Attachment 2 includes a list of the nine factors that EPA plans to consider in evaluating and making decisions on nonattainment area boundaries. When determining boundaries in urban areas for the annual $PM_{2.5}$ NAAQS, EPA applied a presumption that the boundaries for urban nonattainment areas

should be based on metropolitan area boundaries as defined by the U.S. Office of Management and Budget. For the $PM_{2.5}$ 24-hour NAAQS, EPA is establishing no such presumption. EPA anticipates that the same boundaries established for implementing the annual $PM_{2.5}$ standard may also be appropriate for implementing the 24-hour $PM_{2.5}$ NAAQS in areas where both standards are violated. Adopting this approach may more easily facilitate overall air quality planning for attaining the suite of $PM_{2.5}$ standards.

Staff in EPA's Office of Air Quality Planning and Standards are available for assistance and consultation throughout the designation process. Questions on this guidance may be directed to Amy Vasu at 919-541-0107, or Rich Damberg at 919-541-5592.

Attachments: 2

cc: Stephen D. Page, OAQPS
Air Division Directors, Regions I-X
Margo Oge, OTAQ
Brian McLean, OAP
Elizabeth Cotsworth, ORIA

ATTACHMENT 1

TIME LINE FOR REVISED 24-HOUR $PM_{2.5}$ NAAQS DESIGNATION PROCESS	
Milestone	**Date**
Effective date of revised 24-hour $PM_{2.5}$ NAAQS	December 18, 2006
State and Tribal recommendations due for 24-hour $PM_{2.5}$ designations.	December 18, 2007
EPA notifies States and Tribes concerning any modifications to their recommendations.	No later than August 20, 2008 (120 days prior to final designations)
EPA issues final 24-hour $PM_{2.5}$ designations.	No later than December 18, 2008*

* In the event the Administrator has insufficient information to promulgate the designations by December 18, 2008, the date of final designations may be extended up to one year, but no later than December 18, 2009.

ATTACHMENT 2

Factors EPA Will Consider as the Basis for Nonattainment Area Boundaries

EPA believes that certain factors are appropriate to consider in making nonattainment area boundary recommendations and final boundary determinations. EPA will consider these same factors,[1] along with any other relevant information, in evaluating modifications to the boundary recommendations from States and Tribes. EPA recommends that States and Tribes consider the following nine factors in assessing whether to include an area in the designated nonattainment area boundary:

- Emission data
- Air quality data
- Population density and degree of urbanization (including commercial development)
- Traffic and commuting patterns
- Growth rates and patterns
- Meteorology (weather/transport patterns)
- Geography/topography (mountain ranges or other air basin boundaries)
- Jurisdictional boundaries (e.g., counties, air districts, Reservations, metropolitan planning organizations (MPOs))
- Level of control of emission sources

This list of recommended factors is not intended to be exhaustive, and States and Tribes may submit additional information on factors they believe are relevant for EPA to consider. In general, a State's or Tribe's demonstration supporting the boundary recommendation for an area should show that: 1) violations are not occurring in the excluded portions of the recommended area, and 2) the excluded portions do not contain emission sources that contribute to the observed violations. A State or Tribal submittal that only addresses whether monitored violations are occurring in an area will not suffice as the sole justification for designating the boundaries of a nonattainment area.

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[1] An explanation of each of these nine factors is provided in Chapter 5 of the Technical Support Document for December 17, 2004 designations and April 2005 modifications, available at: http://www.epa.gov/pmdesignations/tech.htm

Guidance for Determining Boundaries of 24-hour Fine Particle Attainment and Nonattainment Areas

FACT SHEET

ACTION

- On June 8, 2007, the Environmental Protection Agency (EPA) issued guidance for states and tribes to use in identifying areas that meet or do not meet EPA's recently revised national air quality standards for fine particle ($PM_{2.5}$) concentrations over a 24-hour period. The designation process for the revised 24-hour $PM_{2.5}$ standards that is outlined in this memo is the next step toward developing and implementing emission control programs for attaining and maintaining the revised standards.

- EPA will consider the state and tribal recommendations as it designates areas as "attainment" or "nonattainment" for the 24-hour fine particle standards. The term "nonattainment" means an area is violating the fine particle standards or contributing to violations of the standards. This guidance outlines how states should determine appropriate boundaries for the attainment and nonattainment areas.

- Under the process outlined in this guidance, states and tribes should submit their initial recommendations to EPA by December 18, 2007. States and tribes should make their recommendations using the data for the years 2004 – 2006, where possible.

- Areas should be identified as attaining, or not attaining, the revised 24-hour $PM_{2.5}$ standards, or as not classifiable on the basis of available information. If, after careful consideration of the recommendations, EPA intends to make a final designation that is different from a state or tribal recommendation, EPA must notify the state or tribe at least 120 days prior to final designation and provide them an opportunity to comment on the potential modification.

- The Clean Air Act requires EPA to complete the designation process within two years of the effective date of a revised standard unless the Administrator finds that there is insufficient information to make these decisions. In such a case, EPA may take up to an additional year to make the designations, i.e., no later than three years after the effective date of the standard. EPA intends to base final designations on the most recent three years of data available at the time of final designations.

- When determining boundaries in urban areas for the annual $PM_{2.5}$ standards, EPA applied a presumption that the boundaries for urban nonattainment areas should be based on metropolitan area boundaries as defined by the U.S. Office of Management and Budget. For the $PM_{2.5}$ 24-hour standards, EPA is establishing

no such presumption.

- In developing boundary recommendations for nonattainment areas for the 24-hour $PM_{2.5}$ standards, this guidance encourages states and tribes to evaluate each area on a case-by-case basis. For each monitor or group of monitors that indicate violations of the standard, nonattainment area boundaries should cover a sufficiently large area to include both the area that violates the standard and the areas that contribute to the violations.

- EPA recommends that states and tribes base their boundary recommendations for violating areas on an evaluation of the following nine factors:
    1. Emission data
    2. Air quality data
    3. Population density and degree of urbanization (including commercial development)
    4. Traffic and commuting patterns
    5. Growth rates and patterns
    6. Meteorology (weather/transport patterns)
    7. Geography/topography (mountain ranges or other air basin boundaries)
    8. Jurisdictional boundaries (e.g., counties, air districts, Reservations, metropolitan planning organizations)
    9. Level of control of emission sources

- Today's guidance also notes that the same boundaries established for implementing the annual $PM_{2.5}$ standards may also be appropriate for implementing the 24-hour $PM_{2.5}$ standards in areas where both standards are violated. Adopting this approach may more easily facilitate overall air quality planning for attaining the suite of $PM_{2.5}$ standards.

WHAT A NONATTAINMENT DESIGNATION MEANS

- The Clean Air Act requires state and local governments to take steps to reduce fine particle pollution in nonattainment areas. State and local governments must detail these steps in plans demonstrating how they will meet the fine particle standards. Those plans are known as state implementation plans, or SIPs. States must submit their SIPs to EPA within three years after the Agency makes final designations.

- Nonattainment areas also are subject to a measure known as "transportation conformity," which requires local transportation and air quality officials to coordinate planning to ensure that transportation projects, such as road construction, do not affect an area's ability to reach its clean air goals. Transportation conformity requirements become effective one year after an area is designated as nonattainment.

- Once designated, nonattainment areas also are subject to new source review requirements. New Source Review is a permitting program for industrial facilities to ensure that new and modified sources of pollution do not impede progress toward cleaner air.

HOW THE DESIGNATIONS PROCESS WILL WORK

- States will have until December 18, 2007, to recommend to EPA areas that should be designated as attainment and nonattainment.

- EPA will review and consider those recommendations, and will notify states and tribes of any modifications EPA wishes to make to state or tribal recommendations. If new air quality data are available (e.g., for the year 2007), EPA will take these data into consideration when making final designations.

- EPA intends to complete final designations by December 18, 2008. In the event the Administrator has insufficient information to complete designations by December 18, 2008, the date of final designations may be extended up to one year, but no later than December 18, 2009.

- Tribes that have their own air quality programs may submit recommendations for designations; however, they are not required to do so. Because air quality data is lacking in some tribal areas, EPA will work with tribes to determine the appropriate designations. EPA will address all state and tribal lands during the designations process.

BACKGROUND

- EPA's revised National Ambient Air Quality Standards for $PM_{2.5}$ became effective on December 18, 2006. EPA retained the annual $PM_{2.5}$ standards of 15 $\mu g/m^3$ and revised the 24-hour $PM_{2.5}$ standards, changing them from 65 $\mu g/m^3$ to 35 $\mu g/m^3$.

- The 24-hour $PM_{2.5}$ standards were revised based on a number of health studies showing that short-term exposure to $PM_{2.5}$ is associated with increased mortality and a range of serious health effects, including aggravation of lung disease, asthma attacks, and heart problems.

Fine Particles

- Particulate matter is a complex mixture of extremely small particles and liquid droplets. Particles smaller than 2.5 microns in diameter are known as "fine particles."

- Fine particles can be emitted directly or formed secondarily in the atmosphere. Particles emitted directly (also known as primary emissions) come from sources

- Other secondary particles include organic carbon particles, which can be formed when certain volatile organic compounds react with other gases in the atmosphere. Sources of organic particles include burning activities, motor vehicle emissions, and other combustion activities.

PARTICLE POLLUTION AND PUBLIC HEALTH

- Health effects associated with short-term exposure to fine particles include:
  - Premature death in people with heart and lung disease
  - Non-fatal heart attacks
  - Increased hospital admissions, emergency room visits and doctor's visits for respiratory diseases
  - Increased hospital admission and ER visits for cardiovascular diseases
  - Increased respiratory symptoms such as coughing, wheezing and shortness of breath
  - Lung function changes, especially in children and people with lung diseases such as
  - asthma.
  - Changes in heart rate variability
  - Irregular heartbeat

- The nationwide benefits of meeting the revised 24-hour $PM_{2.5}$ standards include an estimated reduction of:
  - 2,500 premature deaths in people with heart or lung disease;
  - 2,600 cases of chronic bronchitis;
  - 5,000 nonfatal heart attacks;
  - 1,630 hospital admissions for cardiovascular or respiratory symptoms;
  - 1,200 emergency room visits for asthma;
  - 7,300 cases of acute bronchitis;
  - 97,000 cases of upper and lower respiratory symptoms;
  - 51,000 cases of aggravated asthma;
  - 350,000 days when people miss work or school; and
  - 2 million days when people must restrict their activities because of particle pollution related symptoms.

FOR MORE INFORMATION

- Today's guidance can be obtained from EPA's Particulate Matter web site at: http://www.epa.gov/pm.

- For more information about today's guidance, call Amy Vasu (919-541-0107) or Rich Damberg (919-541-5592) at the Office of Air Quality Planning & Standards.

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

Filed June 8, 2007

No. 04-1200

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT,
PETITIONER

v.

ENVIRONMENTAL PROTECTION AGENCY,
RESPONDENT

NATIONAL ENVIRONMENTAL DEVELOPMENT ASSOCIATION'S
CLEAN AIR REGULATORY PROJECT, ET AL.,
INTERVENORS

Consolidated with
No. 04-1201, et al.

On Petitions for Rehearing

David S. Baron, *Barbara B. Baird*, *Adam Babich*, *Ann B. Weeks*, and *Jonathan F. Lewis* were on the petition for rehearing filed by the Environmental Petitioners and South Coast Air Quality Management District and the response to the petition for rehearing filed by the Environmental Protection Agency.

John C. Cruden, Deputy Assistant Attorney General, U.S.

Department of Justice, *David J. Kaplan* and *Natalia T. Sorgente*, Attorneys, and *Jan M. Tierney*, Attorney, U.S. Environmental Protection Agency were on the petition for rehearing filed by the Environmental Protection Agency.

Martha Coakley, Attorney General, Attorney General's Office of Commonwealth of Massachusetts, *William L. Pardee*, Assistant Attorney General, *Richard Blumenthal*, Attorney General, Attorney General's Office of the State of Connecticut, *Kimberly Massicotte* and *Matthew Levine*, Assistant Attorneys General, *Joseph R. Biden, III*, Attorney General, Attorney General's Office of the State of Delaware, *Valerie S. Csizmadia*, Deputy Attorney General, *G. Steven Rowe*, Attorney General, Attorney General's Office of the State of Maine, *Gerald D. Reid*, Assistant Attorney General, *Andrew M. Cuomo*, Attorney General, Attorney General's Office of the State of New York, *Barbara Underwood*, Solicitor General, *David A. Munro* and *Lisa S. Kwong*, Assistant Attorneys General, *Robert A. Reiley*, Counsel, Commonwealth of Pennsylvania, Department of Environmental Protection, *Linda Singer*, Attorney General, Attorney General's Office of the District of Columbia, *Todd S. Kim*, Solicitor General, *Edward S. Schwab*, Deputy Solicitor General, and *Donna M. Murasky*, Senior Litigation Counsel, were on the response of petitioner Commonwealth of Massachusetts, et al., to the petition for rehearing filed by the Environmental Protection Agency.

Charles H. Knauss, *Robert V. Zener*, and *Robert S. Taylor* were on the petition for rehearing filed by the Industry Petitioners.

Norman W. Fichthorn and *Lucinda Minton Langworthy* were on the petition for rehearing filed by Intervenor-Respondents American Chemistry Council, et al.

Before: HENDERSON, ROGERS and BROWN, *Circuit Judges*.

ROGERS, *Circuit Judge*: Before the court are five petitions for rehearing[1] with regard to the vacatur and remand of a final rule implementing the eight-hour national ambient air quality standard ("NAAQS") for ozone under the Clean Air Act ("the CAA"), 42 U.S.C. § 7401 *et seq.* *See* Final Phase 1 Rule To Implement the 8-Hour Ozone NAAQS, 69 Fed. Reg. 23,951 (Apr. 30, 2004) (codified at 40 C.F.R. parts 40, 51, 81) ("2004 Rule"). The petitions overlap in part, challenging principally the court's interpretation of the statutory gap, described in *Whitman v. American Trucking Ass'ns*, 531 U.S. 457 (2001), that arises from the decision of the Environmental Protection Agency ("EPA") to change from a one-hour to an eight-hour measurement system for ozone, and the court's construction of the CAA's anti-backsliding provision. *See S. Coast Air Quality Mgmt. Dist. v. EPA*, 472 F.3d 882 (D.C. Cir. 2006). None of these challenges has merit and we deny the petitions. However, we grant the joint request of EPA and the Environmental Petitioners to clarify the description of the required conformity determinations and to modify the scope of the vacatur of the 2004 Rule.

I.

In *Whitman*, the Supreme Court acknowledged that Subpart 2 of the CAA "unquestionably" provides for classifying nonattainment ozone areas even after EPA changed the system for measuring ozone levels from the highest annual one-hour average concentration to the fourth-highest annual eight-hour

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[1] Separate petitions for rehearing were filed by a group of Environmental Petitioners, the Chamber of Greater Baton Rouge et al. ("Baton Rouge"), National Petrochemical & Refiners Association ("NPRA"), American Chemistry Council et al. ("ACC"), and EPA.

average concentration. 531 U.S. at 482. However, because Congress had defined the classification system in 1990 in terms of one-hour ozone, there were several limited gaps in the CAA. *See id.* at 484. This court concluded that EPA had misconstrued the extent of the gaps to exercise its interpretative discretion more broadly than the Supreme Court had authorized. *See S. Coast Air Quality Mgmt. Dist.*, 472 F.3d at 892-94. In its petition for rehearing, EPA disagrees with our interpretation of the following passage in *Whitman*:

> [T]o the extent that the new ozone standard is stricter than the old one, *see* 62 Fed. Reg. 38856, 38858 (1997) (8-hour standard of 0.09 ppm rather than 0.08 ppm would have "generally represent[ed] the continuation of the [old] level of protection"), the classification system of Subpart 2 contains a gap, because it fails to classify areas whose ozone levels are greater than the new standard (and thus nonattaining) but less than the approximation of the old standard codified by Table 1.

531 U.S. at 483 (citation omitted). EPA maintains that "the approximation of the old standard codified by Table 1" does not refer to the previous citation, which repeats EPA's assertion in the 1997 Rule that 0.09 ppm under the eight-hour measurement scheme is roughly equivalent to the old standard of 0.12 ppm of one-hour ozone. Instead, according to EPA, the "approximation" being referenced is 0.121 ppm of one-hour ozone, the lowest nonattaining design value in Table 1. *See* EPA Pet'n at 4.

EPA's interpretation is irreconcilable with the CAA and *Whitman*. First, every other ozone level referenced in the sentence is in eight-hour terms and there is no signal that the final ozone level (the "approximation") used a different metric. Second, 0.121 is not an "approximation" of 0.12, because an

approximation is typically less precise than the true value. Here, Congress started the statutory Table 1 with the value 0.121 because it is the smallest design value that qualifies as nonattaining. An area with a design value of precisely 0.12 would "meet[]" the NAAQS under section 107 of the CAA, 42 U.S.C. § 7407. Third, nowhere in *Whitman* does the Supreme Court signal that "the approximation of the old standard" is shorthand for 0.121 ppm of one-hour ozone.

EPA also maintains that there can be no eight-hour approximation of the one-hour ozone level because there is no one-to-one correspondence between the two metrics. EPA Pet'n at 5-6. But the lack of a precise equivalence is precisely why an approximation is necessary. The approximation referenced by the court, 0.09 ppm, is not, as EPA suggests, an arbitrary expression of the court's scientific prowess; as acknowledged by the Supreme Court, the approximation comes directly from the rulemaking record, which stated that 0.09 ppm of eight-hour ozone "generally represent[ed] the continuation of the [old] level of protection." *See* 1997 Rule, 62 Fed. Reg. at 38,858. In short, there is every reason to believe that the gap intended by *Whitman* is the gap described by the court in *South Coast Air Quality Management District*, 472 F.3d at 892-93.

EPA next objects to the court's failure to defer, under *Chevron* Step 2, to EPA's application of Subpart 1 to gap areas. The court merely recognized that under *Chevron* agency action that does not constitute a reasonable interpretation of the statute must be vacated. *See id.* at 894. Because Congress sought to reduce EPA discretion by enacting Subpart 2 as part of the 1990 amendments to the CAA, EPA could not reasonably rely upon its preference for regulatory flexibility in setting the boundary between Subpart 1 and Subpart 2. EPA's claim that the court nullified the discretion recognized by the Supreme Court in *Whitman* is meritless. *See Whitman*, 531 U.S. at 484.

II.

Four petitioners seek rehearing on which aspects of EPA's regulation of one-hour ozone must be retained under the eight-hour ozone NAAQS. *See* 42 U.S.C. § 7502(e).[2] EPA determined that "if Congress intended areas to remain subject to the same level of control where a NAAQS was relaxed, [Congress] also intended that such controls not be weakened where the NAAQS is made more stringent." 2004 Rule, 69 Fed. Reg. at 23,972. Contrary to the rehearing petitions of the Industry Petitioners (NPRA, Baton Rouge, and ACC), EPA's determination that section 172(e) supports the introduction of anti-backsliding measures is reasonable. EPA's interpretation does not violate the plain text of section 172(e), which does not specify how to proceed when the NAAQS is strengthened but the related reclassification would result in weakened controls. The Industry Petitioners would require a negative inference, but their interpretation would have an absurd result, *cf. Hartford Underwriters Ins. Co. v. Union Planters Bank, N.A.*, 530 U.S. 1, 5 (2000), because then EPA could continually "strengthen" a NAAQS by the smallest margin and avoid ever implementing the time-delayed controls mandated by the CAA. *See S. Coast Air Quality Mgmt. Dist.*, 472 F.3d at 902-03. The Industry

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[2] Section 172(e) of the CAA provides that

> [i]f the Administrator relaxes a national primary ambient air quality standard . . . the Administrator shall . . . promulgate requirements applicable to all areas which have not attained that standard as of the date of such relaxation. Such requirements shall provide for controls which are not less stringent than the controls applicable to areas designated nonattainment before such relaxation.

42 U.S.C. § 7502(e).

Petitioners present nothing to suggest that Congress intended such a glaring loophole and, accordingly, the court properly deferred to EPA's reasonable interpretation.

EPA and the Industry Petitioners claim, however, that in applying EPA's interpretation of section 172(e), the court treated the provision as legally binding and usurped EPA's discretion. Not so. In the rulemaking, EPA concluded that "Congress would have intended that control obligations that applied for purposes of the 1-hour NAAQS should remain in place." Phase 1 Implementation of the 8-Hour Ozone NAAQS: Reconsideration, 70 Fed. Reg. 30,592, 30,593 (May 26, 2005). While the Industry Petitioners renew their arguments that the term "controls" in section 172(e) is ambiguous and that EPA's interpretation eliminating certain controls is entitled to *Chevron* deference, they provide no basis to doubt the court's conclusion that the "controls" at issue had a settled meaning. *See S. Coast Air Quality Mgmt. Dist.*, 472 F.3d at 900-05.

III.

We grant the joint request by EPA and the Environmental Petitioners to make explicit that the court's reference to conformity determinations speaks only to the use of one-hour motor vehicle emissions budgets as part of eight-hour conformity determinations until eight-hour motor vehicle emissions budgets are available. *See id.* at 904-05.

We also grant their request that the 2004 Rule be vacated only to the extent that the court has sustained challenges to it. Although certain states and the District of Columbia object to partial vacatur on the ground that this will inequitably exempt Subpart 1 areas from regulation while the remand is pending, complete vacatur of a partially valid rule would only serve to stall progress where it is most needed. EPA is urged to act

promptly in promulgating a revised rule that effectuates the statutory mandate by implementing the eight-hour standard, which was deemed necessary to protect the public health a decade ago.

Fact Sheet - Proposal to Revise the National Ambient Air Quality Standards for Ozone

ACTION

- On June 20, 2007, EPA proposed to strengthen the national ambient air quality standards for ground-level ozone, the primary component of smog. The proposed revisions reflect new scientific evidence about ozone and its effects on people and public welfare.

- Breathing air containing ozone can reduce lung function, thereby aggravating asthma or other respiratory conditions. Ozone exposure has also been associated with increases in respiratory infection susceptibility, medicine use by asthmatics, doctors' visits, emergency department visits and hospital admissions. Ozone exposure also may contribute to premature death in people with heart and lung disease.

- Scientific evidence indicates that adverse public health effects occurs following exposure to ozone at levels below the current standard, particularly in those with respiratory illnesses.

- In addition, new scientific evidence since the last review shows that repeated exposure to low levels of ozone damages vegetation, trees and crops leading to increased susceptibility to disease, damaged foliage, and reduced crop yields.

- EPA's proposal would revise both ozone standards: the *primary* standard, designed to protect human health; and the *secondary* standard, designed to protect welfare (such as vegetation and crops). The existing primary and secondary standards, set in 1997, are identical: an 8-hour standard of 0.08 parts per million (ppm). (In practice, because of rounding, an area meets the standard if ozone levels are 0.084 ppm or lower.)

Proposed revisions to the primary standard

- EPA proposes to set the primary (health) standard to a level within the range of 0.070-0.075 ppm (70 -75 ppb) The Agency also requests comments on alternative levels of the 8-hour primary ozone standard, within a range from 0.060 ppm up to and including retention of the current standard (0.084 ppm). (EPA also proposes to specify the level of the primary standard to the third decimal place, because today's monitors can detect ozone that accurately.)

Proposed revisions to the secondary standard

- EPA is proposing two options for the secondary standard:
  - One option would establish a new form of standard designed specifically to protect sensitive plants from damage caused by repeated ozone exposure throughout the growing season. This cumulative standard would add daily ozone concentrations across a three-month period. EPA is proposing to set the level of the cumulative standard within the range of 7 to 21 ppm-hours.
  - The other option would follow the current practice of making the secondary standard identical to the proposed primary 8-hour standard.

- EPA will take public comment for 90 days following publication of the proposal in the Federal Register. The agency also will hold four public hearings on the proposal in: Los Angeles and Philadelphia on Aug. 30, and Chicago and Houston on Sept. 5.

- EPA will issue final standards by March 12, 2008.

OZONE AND PUBLIC HEALTH

- Exposures to ozone can:
  - Reduce lung function, making it more difficult for people to breathe as deeply and vigorously as normal,
  - Irritate the airways, causing coughing, sore or scratchy throat, pain when taking a deep breath and shortness of breath,
  - Increase frequency of asthma attacks,
  - Inflame and damage the lining of the lung,
  - Increase susceptibility to respiratory infection, and
  - Aggravate chronic lung diseases such as asthma, emphysema and bronchitis.

- In some people, these effects can lead to:
  - Increased medicine use among asthmatics,
  - More frequent doctors visits,
  - School absences, and
  - Increased emergency room visits and hospital admissions.

- Ozone may continue to cause lung damage even when the symptoms have disappeared.

- Breathing ozone may contribute to premature death in people with heart and lung disease.

OZONE AND THE ENVIRONMENT

- Ground-level ozone can have harmful effects on plants and ecosystems. When sufficient ozone enters the leaves of a plant, it can:
    - Interfere with the ability of sensitive plants to produce and store food, making them more susceptible to certain diseases, insects, other pollutants, competition and harsh weather.
    - Visibly damage the leaves of trees and other plants, harming the appearance of urban vegetation, national parks, and recreation areas.
    - Reduce forest growth and crop yields.

DETERMINING COMPLIANCE: THE FORM OF THE STANDARDS

- When EPA sets air quality standards, it also must specify the measurement unit, or "form" of each standard, that the Agency will use to determine whether an area is meeting the standards.

- For the primary ozone standard, an area meets the standard if the three-year average of the annual fourth-highest reading at a particular monitor is less than or equal to the level of the standard.

- EPA is proposing a new and distinct form for the secondary standard. The form, called W126, is designed to account for the cumulative effects of ozone on vegetation during the three months of the year when ozone concentrations are highest. The form focuses on the highest exposure during the growing season.

- If EPA finalizes the W126 option, an area would meet the secondary standard if the W126 value is less than or equal to the level of the standard. If the agency finalizes the section option proposed, compliance with the secondary standard would be based on compliance with the primary 8-hour standard.

BENEFITS AND COSTS

- While the Clean Air Act prohibits EPA from considering costs in setting or revising National Ambient Air Quality Standards, the Agency analyzes the benefits and costs of meeting the standards in order to provide states and other stakeholders with the information necessary to assess the implications of meeting alternative standards. The analysis, which is required by Executive Order 12866, is based on guidance from the White House Office of Management and Budget. These analyses of benefits and costs will be detailed in a Regulatory Impact Analysis to be released in the next few weeks.

- To estimate the benefits of meeting a standard, EPA utilizes a sophisticated peer-reviewed approach to modeling the relationship between air quality and health and welfare effects, the air quality impacts of implementing future control technologies, and the dollar values of public health improvements.

- To estimate the costs of meeting a standard, EPA uses several peer-reviewed approaches for modeling the cost of using both existing controls and controls that may be developed in the future for reducing NOx and VOCs .

ESTIMATED TIMELINE FOR IMPLEMENTING THE PROPOSED STANDARDS

- EPA will issue final standards by March 12, 2008. Based on that date, EPA estimates the following implementation schedule:
    - *By June 2009*: States make recommendations for areas to be designated attainment and nonattainment.
    - *By June 2010*: EPA makes final designations of attainment and nonattainment areas. Those designations would become effective 60 days after publication in the Federal Register.
    - *2013*: State Implementation Plans, outlining how states will reduce pollution to meet the standards, are due to EPA (three years after designations).
    - *2013 to 2030:* States are required to meet the standard, with deadlines depending on the severity of the problem.

WHAT IS OZONE?

- Ozone is found in two regions of the Earth's atmosphere – at ground level and in the upper regions of the atmosphere. Both types of ozone have the same chemical composition (O3). While upper atmospheric ozone forms a protective layer from the sun's harmful rays, ground level ozone is the primary component of smog.

- Ground-level ozone is not emitted directly into the air, but forms through a reaction of nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the presence of sunlight.

- Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are the major man-made sources of NOx and VOCs.

- Because sunlight and hot weather accelerate its formation, ozone is mainly a summertime air pollutant. Both urban and rural areas can have high ozone levels, often due to transport of ozone or its precursors (NOx and VOCs) from hundreds of miles away.

BACKGROUND ON THE NATIONAL AIR QUALITY STANDARDS FOR OZONE

- The Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment.

National standards exist for six pollutants: ozone, particulate matter, nitrogen oxides, carbon monoxide, sulfur dioxide, and lead.

- The law also requires EPA to periodically review the standards and their scientific basis to determine whether revisions are appropriate.

- EPA last updated the ozone standards in 1997. The decision to revise the standards was challenged in court by a number of parties and ultimately reached the U.S. Supreme Court. The Court unanimously upheld the constitutionality of the 1970 Clean Air Act provision that authorizes EPA to set NAAQS to protect public health and welfare. The Court also affirmed that the Clean Air Act requires EPA to set ambient air quality standards, at levels necessary to protect the public health and welfare, without considering the economic costs of implementing the standards.

HOW TO COMMENT

- EPA will accept public comments for 90 days after the proposed revisions to the ozone standards are published in the Federal Register.

- Comments should be identified by Docket ID No. EPA-HQ-OAR-2005 -0172 and submitted by one of the following methods:
    - Federal eRulemaking Portal (http://www.regulations.gov),
    - e-mail (a-and-r-docket@epa.gov),
    - Mail (EPA Docket Center, Environmental Protection Agency, Mail code 6102T,
    - 1200 Pennsylvania Avenue, NW, Washington, DC 20460), or
    - Hand delivery (EPA Docket Center, Environmental Protection Agency, Room
    - 3334, 1301 Constitution Avenue, NW, Washington, DC).

FOR MORE INFORMATION

- To download the Federal Register notice about the proposed revisions to the ozone standards, visit www.epa.gov/groundlevelozone.

- Today's proposal and other background information are also available either electronically at http://www.regulations.gov, EPA's electronic public docket and comment system, or in hardcopy at the EPA Docket Center's Public Reading Room.
    - The Public Reading Room is located in the EPA Headquarters Library, Room Number 3334 in the EPA West Building, located at 1301 Constitution Ave., NW, Washington, DC. Hours of operation are 8:30 a.m. to 4:30 p.m. eastern standard time, Monday through Friday, excluding federal holidays.

- Visitors are required to show photographic identification, pass through a metal detector, and sign the EPA visitor log. All visitor materials will be processed through an X-ray machine as well. Visitors will be provided a badge that must be visible at all times.
- Materials for this action can be accessed using Docket ID No. EPA-HQ-OAR- 2005- 0172.

Fact Sheet -- New Source Review: Emission Increases for Electric Generating Units

ACTION

- On April 25, 2007, the Environmental Protection Agency (EPA) proposed further options to change the emissions increase test used to determine if the New Source Review (NSR) permitting program would apply when an existing power plant makes a physical or operational change.

- The proposed changes would affect only the application of the NSR program to existing electric generating units at power plants. The units generally are fossil fuel-fired and produce electricity for sale.

- On October 20, 2005, EPA proposed to replace the annual emissions increase test with an hourly emissions test. The hourly emissions increase test would be used to determine whether planned changes at an existing power plant would be subject to emissions control requirements under the major NSR program. The proposed hourly emissions test was similar to the hourly emissions test in the New Source Performance Standards (NSPS) program.

- The October 2005 proposal included three alternatives to the annual emissions test.

- This action builds upon the October 2005 proposal by:
  - refining the originally proposed test options;
  - proposing a new test option;
  - analyzing the impacts on control device installation, emissions, and air quality that would result were we to finalize either of the proposed options; and
  - including proposed rule language.

<u>Refining Test Options Proposed in October 2005</u>

- The October 2005 proposal requested comment on three alternatives for the hourly test to determine if a change at an existing unit would cause an emissions increase including:
  - a maximum *achievable* hourly emissions test,
  - a maximum *achieved* hourly emissions test, and
  - an output-based hourly emissions test.

- This supplemental proposal recasts these proposed alternatives so that the output-based test, instead of being an alternative to the maximum achievable or maximum achieved hourly tests, is a way to measure the hourly emission rate.

- EPA requests comment on whether the regulations should include an input-based test – one that sets emission limits based on the amount of fuel burned – or an output-based test – emission limits per unit of electricity produced. The output-based emissions increase test encourages fuel efficiency and pollution prevention, which are key Agency goals.

Proposing a New Test Option

- EPA is now requesting comment on two options to be used when determining if NSR requirements would apply to an existing EGU making a physical or operational change, including a new option that was not included in the October 2005 proposed rule.

- In its October 2005 proposal, EPA proposed an hourly emissions increase test alone, where EPA would remove the annual emissions increase test in the current regulations and an EGU would be subject to NSR if the hourly emissions would increase.

- In this supplemental, EPA is including a new (and preferred) option. Under the new option (referred to as Option 1 in this Supplemental Proposal) the current annual emissions increase test that is presently used is retained and applied in those situations where an EGU's hourly emissions would increase.

- In other words, under the new option, if a physical or operational change would not increase an EGU's hourly emission, major NSR would not apply. If an EGU's hourly emissions would increase, then projected annual emissions would be reviewed using the annual emissions increase provisions in the current rules and an EGU would be subject to major NSR if the annual emissions would increase but not if annual emissions do not increase.

- Under both options EPA is proposing several alternatives for measuring hourly emissions.

- These proposed modifications to the NSR program would promote the safety, reliability, and efficiency of EGUs. The proposed hourly emissions test for EGUs would allow changes that improve facility safety, reliability, and efficiency while maintaining national and local air quality.

Analyses

- The analyses compare expectations for EGUs to install pollution control equipment to comply with EPA's Clean Air Interstate Rule, Clean Air Mercury

Rule, and Clean Air Visibility Rule (CAIR/CAMR/CAVR) in 2020 with the proposed hourly emissions tests. The analyses also compare emissions and air quality impacts under these two scenarios.

- These analyses show that by 2020, either of the proposed options would result in:
  - more EGUs installing emissions control equipment than they would to comply with CAIR/CAMR/CAVR. The hourly emissions test would allow units to operate more hours each year. The more hours a unit operates, the more likely it will be to control emissions.
  - essentially no changes in national emissions of the major pollutants emitted by coal-fired power plants – sulfur dioxide and nitrogen oxides.

- The analyses project very little impact on local emissions. There would be a shift in where local emission increases and decreases would occur compared to what EPA project's without the proposed rule. These shifts would be small and widely distributed. The small shifts would not affect local air quality compared to what EPA projects under CAIR/CAMR/CAVR for 2020.

- EPA will accept comment on this supplemental proposal for 60 days after this notice is published in the *Federal Register*. See below for more details on how to comment.

BACKGROUND

- Congress established the NSR program as part of the 1977 Clean Air Act Amendments and modified it in the 1990 Amendments. NSR is a preconstruction permitting program that assures the dual goals of maintaining and attaining air quality and providing for economic growth. These goals are achieved through installation of state-of-the-art control technology at new plants and at existing plants that undergo a major modification.

- For existing major stationary sources, there is a two-step test to determine whether the modification is subject to preconstruction permit review. The first step is whether there is a physical change or change in the method of operation. The second step is whether there is an emissions increase. The current NSR program measures an emissions increase by comparing actual annual emissions to projected annual emissions.

- When EPA proposed revising the NSR emissions test for existing EGUs in October 2005, it was in part in response to a decision of the U.S. Court of Appeals for the Fourth Circuit Court in United States v. Duke Energy Corp., in which the Fourth Circuit held that EPA must read the 1980 Prevention of Significant Deterioration (PSD) regulations to contain an hourly test, consistent with the New Source Performance Standards regulations.

- On April 2, 2007, the U.S. Supreme Court vacated that decision, finding that such a reading of the 1980 PSD regulations "was inconsistent with their terms." The Supreme Court, however, indicated that EPA may be able to revise the regulations to contain such a test when, as here, it has a rational reason for doing so.

- The Clean Air Interstate Rule (CAIR) and other programs will lead to significant further reductions in sulfur dioxide and nitrogen oxides emissions from the power sector. Both the October 2005 proposal and today's supplemental proposed changes to the NSR program would complement the CAIR requirements by allowing efficient implementation of these programs and eliminating administrative barriers.

ADDITIONAL INFORMATION

- Interested parties can download today's final rule from EPA's NSR web site at: www.epa.gov/nsr.

- The notice and technical support document are also available electronically through the EPA's Air and Radiation Docket and Information Center (Docket Number Docket ID No. EPA-HQ-OAR-2005-0163), at www.regulations.gov. Alternatively, you can request material from our Air and Radiation Docket and Information Center by calling (202) 260-7548, or by fax request to (202) 260-4000 (a reasonable fee may be charged for copying).

- Submit comments on this supplemental proposal, identified by Docket ID No. EPA-HQ-OAR-2005-0163 by one of the following methods:
    - http://www.regulations.gov: Follow the on-line instructions for submitting comments.
    - E-mail: a-and-r-docket@epa.gov.
    - Mail: Attention Docket ID No. EPA-HQ-OAR-2005-0163, U.S. Environmental Protection Agency, EPA West (Air Docket), 1200 Pennsylvania Avenue, NW, Mail code: 6102T, Washington, DC 20460. Please include a total of 2 copies. In addition, please mail a copy of your comments on the information collection provisions to the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB), Attn: Desk Officer for EPA, 725 17th Street, NW, Washington, DC 20503.
    - Hand Delivery: U.S. Environmental Protection Agency, EPA West (Air Docket), 1301 Constitution Avenue, Northwest, Room B102, Washington, DC 20004, Attention Docket ID No. EPA-HQ-OAR-2005-0163. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

- For general information about this final rule, contact Janet McDonald of EPA's Office of Air Quality Planning and Standards at (919) 541-1450, mcdonald.janet@epa.gov .

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

JUL 10 2007

The Honorable Rick Perry
Governor of Texas
Austin, TX 78711

Dear Governor Perry:

Thank you for your letter dated June 15, 2007, requesting that Houston-Galveston-Brazoria (Houston) be reclassified to a "severe" 8-hour ozone nonattainment area based on your determination that it will not be able to meet its "moderate" area attainment date of June 15, 2010. Section 181(b)(3) of the Clean Air Act provides that the U.S. Environmental Protection Agency shall grant the request of any State to reclassify a nonattainment area in that State to a higher classification. We will begin the process to reclassify the Houston nonattainment area to severe based on your request.

Severe areas must attain the 8-hour ozone National Ambient Air Quality Standard no later than June 15, 2019. In the attainment demonstration State Implementation Plan (SIP) that is to be submitted for Houston, the State must demonstrate that the attainment date that it adopts for the Houston area is as expeditious as practicable. We request that the Texas Commission on Environmental Quality (TCEQ) provide information to show the amount of time needed for the State to submit its plan as soon as practical. We will work with the TCEQ on setting a date for submission of the new SIP obligations and ensuring interim progress in reducing emissions prior to attainment, consistent with Clean Air Act requirements.

Again, thank you for your letter and for your commitment to achieving attainment in the Houston area. If you have any questions, please contact me or your staff may call Carl Young of my staff at (214) 665-6645.

Sincerely yours,

For Richard E. Greene
Regional Administrator

cc: Kathleen Hartnett White, Chairman
Texas Commission on Environmental Quality

Suzanne J. Smith
Assistant Regional Counsel, Office of Regional Counsel
U.S. EPA Region 6 (6RC-M)
Dallas, Texas 75202

Suzanne has been a staff attorney at the EPA's regional office in Dallas since 1998. Most recently (since 2002), Suzanne represents the Region on issues under the Clean Air Act. Specifically, she works on defensive litigation and other matters arising from areas such as Early Action Compacts, Ozone Flex Program, state implementation plans, 8-hour ozone implementation, and fuels programs. She also represented the Region as an enforcement attorney with an emphasis on the following statutes: Resource Conservation and Recovery Act (RCRA), Emergency Planning and Community Right to Know Act (EPCRA), Clean Water Act (CWA), and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). Suzanne clerked for the Honorable Gene Thibodeaux, Third Circuit Court of Appeal, State of Louisiana, prior to coming to EPA.

Suzanne received an A.B. in Political Science from the University of California, Berkeley in 1991. She received her J.D. from Tulane Law School in 1996.

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A graduate of Baylor University in Waco, Texas with liberal arts degrees in English and French, Mr. Tate was graduated from the University of Houston Law School and received his license to practice law in the state of Texas in 1980. He has been an Assistant Regional Counsel at EPA's Dallas Regional office since 1992. Since 2000 he has served as Chief of the Multimedia Counseling Branch in the Office of Regional Counsel, advising Regional program counterparts and management in permitting, authorization, delegation, interpretation and defense of Clean Air, Clean Water and RCRA actions by the Agency. From July, 2006 to January, 2007, while on a detail assignment to EPA's Office of General Counsel, Washington, D.C. he worked on such matters as CAIR and Ozone Phase II litigation, Ozone Phase II implementation, PM 2.5 implementation and rulemaking and CAA §183(e) and CTG proposals. As a staff attorney in Regional Counsel's office, his duties included representation of the Region in Clean Air Act permitting and implementation (NSR/PSD), other permitting, program implementation, and state delegations in numerous statutory and regulatory areas with emphasis in the Resource Conservation and Recovery Act (RCRA), Project XL, RCRA Delisting program, Underground Storage Tank (UST) and Emergency Planning and Community Right-to-Know (EPCRA) enforcement work. He has also served as Special Assistant to the Regional Counsel assisting with special projects. Before coming to the EPA, he was a partner in the Fort Worth, Texas law firm Gandy Michener Swindle & Whitaker representing clients in Superfund litigation, private party clean-ups, permit disputes, actions relating to underground storage tanks, negotiation of construction and remediation contracts, claims against insurance carriers for environmental damages, purchase and sale documentation & environmental assessments. His government contracts and construction litigation experience while there included claims relating to asbestos, asphalt construction and facilities, pollution control monitoring, waste water plant construction projects, mechanics' and materialmen's liens, state and federal bond claims, design and construction defects, delay/disruption claims and surety representation.

David C. Schanbacher, P.E.

Texas Commission on Environmental Quality
Chief Engineer

David C. Schanbacher serves as the Chief Engineer for the Texas Commission on Environmental Quality, providing oversight and guidance on engineering standards of the agency and coordinating major engineering initiatives and studies. He has received certification as a registered professional engineer in the State of Texas. The Chief Engineer also serves as Deputy Director of the Chief Engineer=s Office, which consists of engineering and technical experts, the Toxicology Section, the Air Quality Planning and Implementation Division (responsible for the State Implementation Plans), the Total Maximum Daily Load (TMDL) Program, the Coastal Bend Bays and Estuaries Program, and the Galveston Bay Estuary Program.

Mr. Schanbacher has served as special assistant to the Office of Air Quality and the Office of the Executive Director at the TCEQ, and as a permit engineer in the New Source Review Program before becoming Chief Engineer. Mr. Schanbacher previously spent several years in various engineering positions in the chemical industry and the oil and gas industry before joining the Texas Air Control Board, a predecessor agency of the TCEQ, in 1992.

Mr. Schanbacher received a Bachelor of Science Degree in Chemical Engineering from the University of Missouri and a Master=s Degree in Engineering from the University of Texas at Austin.

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PROFILE



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Practices

- Environmental Strategies
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- District of Columbia Bar
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Education

- J.D., Yale Law School, 1987
- B.A., summa cum laude, Brigham Young University, 1984

Experience

Jeff Holmstead, former Assistant Administrator for Air and Radiation at the U.S. Environmental Protection Agency, is one of the nation's preeminent air quality lawyers and heads the Environmental Strategies Group (ESG) at Bracewell & Giuliani. This innovative “think tank” practice group includes veteran Bracewell environmental and energy attorneys, public policy advocates, and strategic communications experts. The ESG advises companies and business groups confronting major environmental and energy development challenges, both domestically and globally.

From his time in both the government and the private sector, Mr. Holmstead is very familiar with the compliance challenges facing the business community. He advises clients dealing with an increasingly complex regulatory and legal landscape using his expertise in policy development, legislative and administrative advocacy, litigation, and strategic communications. Among the most vexing environmental issues facing the business community are climate change, Clean Air Act policy and enforcement, and energy policy. Mr. Holmstead represents clients on all these issues, and is particularly active in the public debate about climate change policy.

Mr. Holmstead headed the Office of Air and Radiation longer than anyone in EPA history. During his tenure, he championed several of the agency’s most important initiatives, including the Clean Air Interstate Rule, the Clean Air Diesel Rule, the Mercury Rule for power plants and the reform of the New Source Review program. He also oversaw the development of the Bush Administration's Clear Skies Legislation and key parts of its Global Climate Change Initiative.

Between 1989 and 1993, Mr. Holmstead served as Associate Counsel to the President in the White House of President George H.W. Bush, and was involved in the passage of the Clean Air Act Amendments of 1990 and the key steps taken to implement that Act. From 1987 to 1988, he served as a law clerk to Judge Douglas H. Ginsburg on the U.S. Court of Appeals for the District of Columbia.

Howard J. Hoffman is an Attorney-Advisor with EPA's Office of General Counsel, the Air and Radiation Law Office, where he is a 21-year veteran. His most recent major assignments include rulemakings involving power plants, including the Clean Air Interstate Rule, the mercury rulemakings, and the ongoing new source review rulemaking; as well as new source review and Title V permits involving power plants. He is the incoming co-chair of the Air Quality Committee of the ABA Section of Environment, Energy, and Resources. He is one of the organizers of the ABA-EPA Law Office Climate Challenge, a program to encourage law offices to reduce their carbon footprint. Earlier in his career, he was an associate in the tax practice at Morgan Lewis (Washington, D.C.), earned a Master of Laws degree in Taxation, taught state and local taxation as an adjunct professor at Villanova University, and chaired the Product and Services Tax Committee (which focused primarily on environmental tax issues) of the ABA Section of Taxation. He is a frequent speaker before bar associations and a guest lecturer at law schools. He is a graduate of the University of Pennsylvania and Georgetown University Law Center.

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Practice Areas:

Carrick focuses his practice on environmental litigation and counseling. He is also involved in the firm's clean and renewable energy group and also works on climate change issues. Carrick's experience includes representation in federal and state court and before regulatory agencies on property contamination cases, cost-recovery matters, and enforcement actions. His current representation includes defense of government enforcement actions for ground water and surface water contamination. Before entering private practice, Carrick served for 12 years in the Environmental Enforcement Section of the US Department of Justice, as a trial attorney and a supervising attorney, litigating civil enforcement matters under all the major environmental statutes. He has practiced in state court in Texas and in federal district courts in Texas, Louisiana, Oklahoma, Arkansas, Connecticut, Rhode Island, and New Jersey. Carrick's experience includes matters involving petrochemical plants, refineries, swine facilities, poultry processing plants, creosoting plants, pipelines, lead smelters, cement kilns, manufactured wood product plants, and aluminum plants. His environmental career includes experience as an environmental consultant, specializing in air quality issues.

Education:

The University of Texas School of Law
J.D., 1985
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Massachusetts Institute of Technology
M.S., Technology and Policy, 1980

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B.S., Aeronautics and Astronautics, 1978

Professional Licenses and Associations:

State Bar of Texas 1985
US District Court for the Western District of Texas 1998
US District Court for the Northern District of Texas 2002
US District Court for the Southern District of Texas 2002
US District Court for the Eastern District of Texas 2002
US Court of Appeals for the Fifth Circuit 1998
US Court of Appeals for the Seventh Circuit 2001
US Court of Appeals for the Tenth Circuit 2001
US Patent and Trademark Office 2001
American Bar Association
Federal Bar Association
Environmental Law Institute
Air and Waste Management Association
Travis County Bar Association
Houston Bar Association

Presentations:

"Working with Expert Witnesses," Seventeenth Annual Texas Environmental Superconference (August 5, 2005)

"Environmental Case Law Update," Dallas Bar Association Environmental Law Section (February 27, 2003)

"Environmental Case Law Update," Houston Bar Association Environmental Section (December 11, 2002)

"Environmental Case Law Update," Fourteenth Annual Texas Environmental Superconference (August 2002)

"Current Issues in EPA Regulation of CAFOs," Dallas Bar Association Environmental Law Section (May 23, 2002)

"The Care and Feeding of Attorneys: An Environmental Engineer's Guide to Working with Lawyers," Steve Morton and Carrick Brooke-Davidson, Environmental Engineer (October 2001)

"Indoor Air Quality in Texas: The Legal Framework," Carrick Brooke-Davidson, Texas Association of Environmental Professionals/Air and Waste Management Association Joint Meeting (December 12, 2000)

Mold and Indoor Air Quality: A Conference on Health, Technical and Legal Issues, Legal Aspects of Indoor Air and Insurance Issue (also responsible for organizing conference) (October 10, 2000)

Twelfth Annual Texas Environmental Superconference, Indoor Air Quality: Texas Legal Framework (August 3, 2000)

"Expert Witness Examination," Ninth Annual Texas

Environmental Superconference (July 31, 1997)

"Environmental Compliance Disputes: Alternatives to Litigation," International Petroleum Environmental Conference (September 1996)

"Status and Feedback on the Auditing Privilege," ABA Natural Resources Section, Key Environmental Issues in USEPA Region 6 (May 1996)

"Litigating a CERCLA Case with Federal PRPs," ABA Natural Resources Section, Multi-Site Brown Bag Program (December 1995)

"Litigating a Civil Environmental Enforcement Case – Motions, Liability, Experts, and Trials," United States Department of Justice, Office of Legal Education Civil Environmental Enforcement Seminar (September 1994)

Julian Levy, Senior Managing Scientist with Exponent, Inc., is a meteorologist who has been working in air quality for over three decades, first with the U.S. EPA and, for the past 29 years, as a consultant. He is a Fellow of the Air & Waste Management Association (AWMA), was the General Conference Chair of AWMA's 95th Annual Conference in Baltimore, and is currently on the AWMA's Editorial Advisory Committee. He has worked with the Utility Air Regulatory Group, Synthetic Organic Chemical Manufacturers Association, Pharmaceutical Research and Manufacturers Association, American Chemistry Council, Coalition for Mercury Management, and other trade groups, as well many individual industries, law firms, and other clients.

Mr. Levy has been working on global climate change issues since 1999, when he prepared an analysis of the impacts of potential greenhouse gas emission (GHG) regulations on coal usage for a major coal-hauling railroad. Since that time, he has been continuously involved in the issues of global climate change and GHG regulation. He is a member of the Maryland Regional Greenhouse Gas Initiative (RGGI) Stakeholder Group. In 2006, he testified on behalf of Maryland Industry before the Maryland General Assembly on bills to regulate GHGs. As Chairman Emeritus of the Maryland Industrial Technology Alliance, Mr. Levy has the lead role in working with state regulators and legislators on the issue. He is a member of the AWMA's Technical Council Committee on Global Climate Change and Sustainability. He is the guest editor of the August AWMA issue of *EM Journal*, which will provide the perspectives of various entities (EPA, New Jersey, and others) on the impact of the Supreme Court's recent opinion in Massachusetts v. EPA.

A native Houstonian from a highly respected family of lawyers, Stephen Susman worked his way through Yale University, graduating magna cum laude. Returning to his home state and the University of Texas Law School, he starred as Editor-in-Chief of the Law Review and graduated first in his class, with the highest grade point average in the school's history. After serving as law clerk to The Honorable John R. Brown of the Fifth Circuit Court of Appeals, Susman spent a formative year in Washington as one of a select, honored group of law graduates chosen to clerk for the United States Supreme Court. A recent biography of then Justice Hugo Black states that Susman was the first law clerk whom Black trusted to draft opinions for him. In his early career path, Susman joined a large Houston firm and became a partner, took a year's leave of absence to teach law at the University of Texas, and hit on the magic niche that led to a new style of law practice representing plaintiffs in complex commercial disputes. In 1980, he founded Susman Godfrey, the first firm in this part of the country to limit its specialty to commercial litigation. Susman pioneered innovative fee arrangements that compensate trial counsel for results, not hours. Susman Godfrey has over 80 lawyers in offices in Houston, Dallas, Seattle, Los Angeles, and New York City. In 2005, the firm was chosen by the *American Lawyer* as one of the top two litigation boutiques in the country, while *Who's Who Legal: The International Who's Who of Business Lawyers* named Susman the 2006 and 2007 **Leading Commercial Litigator in the World** just as *The National Law Journal's* June 5, 2006 edition featured him as one of the nation's top ten litigators, and the 2006 edition of *The Best Lawyers in America* recognized him as being included in the distinguished group of attorneys who have made the list for 20 years or longer. With grandchildren in both cities, Stephen Susman now splits his time between the Houston and New York offices.

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James Randolph (Randy) Armstrong, Jr., Manager Compliance Assurance for Shell Oil Company, began his career with Shell 1975. Randy has over 30 years environmental experience and has held various technical assignments in operations, engineering, health, safety and environmental.

Armstrong has compliance and engineering experience in air, water and waste He has been involved in environmental issues ranging from the Great Lake's Basin study in the mid 70's to his present role of coordinating Shell's US activities on Climate Change. Past activities have included hazardous waste incinerator testing, biotreater design, groundwater recovery activities, landfill operations, and the implementation of Clean Air Act requirements.

Randy is a graduate of Case Western Reserve University with a B.S. in Chemical Engineering. Randy is married, has two sons and resides in Kingwood Texas.

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Current Responsibilities and Experience

Ian leads the Earth Systems and Environment group at BEG. In this role he is responsible for research in coastal and wetlands studies, water resources, carbon sequestration, remote sensing, and geological mapping. As a professor, Ian taught geology and environmental science at SMU, Dallas, and Washington University in St. Louis. Ian has done geologic research in Papua New Guinea, Greenland, Egypt, Saudi Arabia, and Canada. He has also worked as an economic geologist, an environmental consultant, and a consultant to the quarry industry. Ian currently has research interests in: science based regulatory frameworks for CO2 sequestration; economic modeling of CO2 sequestration in the Gulf Coast; geomechanical and fluid flow modeling of faults and seals in engineered brine reservoirs; and risk assessment of CO2 sequestration projects in engineered brine reservoirs.

Education

B.A. (First Class Honors), Earth Sciences, Macquarie University, Sydney, Australia, 1974
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April 23, 2007 * Marina del Rey, CA

Urban economists often discuss the drivers for real estate development in the context of three primary categories. The first two are typically defined as "a site looking for a use" and "a use looking for a site". Over the past ten-plus years working on the cleanup and redevelopment of brownfield sites, I have had the good fortunate of sitting at the table with property owners, developers, environmental regulators, and policy makers – all seeking to find the best match of a "site" and a "use".

And over the past decade, we have developed and implemented significant reforms to facilitate and promote the redevelopment of brownfields: technical reforms allowing for the use of risk-based cleanup efforts; liability reforms giving developers and investors assurances that they will not be held liable for historic contamination in most circumstances; and tax and financial incentives helping to close the gap – from a financial perspective – between urban, brownfield sites and suburban-exurban properties. With these reforms in place, the potential of brownfields redevelopment has moved from the collective dreams of environmental policy makers and urban pioneers to the site plans of real estate developers and the spreadsheets of their lenders.

But it is the third urban economic category - "capital looking for an investment opportunity" – that brings us here today. Yes, the reforms of the past decade have been successful in giving comfort to a concerned marketplace of America's Main Streets.

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However, the real estate and financial professionals at this meeting are in the best position to analyze the investment opportunities presented by brownfields and bring them to Wall Street and private funds across the county. In fact, it is the resources and expertise of Wall Street and private funds that just may just be the key to success in cleaning up and redeveloping the former military bases and currently mothballed industrial facilities that are entering the stream of commerce today and in the coming years.

As we consider these projects over the next two days , I would like to share some perspective on the role of environmental regulators in fostering the revitalization of brownfield sites, highlight several projects that capitalized on a variety of resources, and offer some thoughts on overcoming obstacles through due diligence and project management strategies.

Obviously I am optimistic about the opportunities before us. And not just because it's my job. Rather, I see -

- a cooperative federal culture mindful of the needs of the private sector in transforming distressed properties into assets, and
- the culmination of logistical breakthroughs and resources available to assist property owners, developers, real estate investors, and other project partners in these projects.

As such, I can comfortably say there has never been a better time to be involved in the revitalization and reuse of contaminated land and urban properties.

In particular, the demand for developable property in metropolitan areas is high, and there is no shortage of brownfields with which to meet that demand. I see several key reasons for this growing supply of sites available for reuse and investment:

- As we continue to shift from manufacturing to a knowledge-based economy, our inventory of land available for reuse expands.
- As our industrial facilities close, they often provide large sites with dynamic potential, as they can be parceled out for multiple reuses.

- Corporations that once mothballed their sites due to liability concerns now have the assurances and incentives to bring these properties into the marketplace.
- Federal programs like BRAC (Base Realignment And Closure) and Formerly Used Defense Sites (FUDS) have been crafted to move these exceptionally large and typically well-located sites into the hands of the private sector quickly and with the full intent that they become commercially viable.
- And the combination of Sarbanes-Oxley and new FIN 47 financial reporting requirement could be viewed as motivating publicly traded corporations to either clean up their sites or release them into the market place in order to improve their balance sheets.

These factors translate to an increase in the supply of brownfields with profitable reuse potential - which is good for the environment, the economy, surrounding communities, and for investors.

II. An Increasingly Sophisticated and Hospitable EPA

With large debt and equity investments on the line, it is reasonable for the investment community to ask questions and have concerns about the posture of the US EPA and environmental regulators in general. Will EPA and state regulators be a help or a hindrance? What certainty can EPA bring to a transaction and the market in general?

Our fundamental goal at EPA—protection of human health and the environment—will always remain. But the way the Agency views and approaches contaminated land has changed. Let me give you a couple of specifics:

- We've changed the way we do business by integrating the objectives of land redevelopment and community revitalization into our cleanup programs. Our 2003 Land Revitalization Initiative emphasizes that cleanup and revitalization are mutually supportive, and that consideration of a property's reuse should be an integral part of agency cleanup decisions.

- We're also changing how we measure our own performance, to ensure that we are revitalizing property and not just cleaning it up.
- We're training our staff in the process of real estate development and introducing them to real life developers and lenders. We have trained more than 2,000 staff across all ten of our regions, with the specific goal of bridging the cultural gap between real estate and environmental professionals. We want our staff to understand the concerns and techniques of developers, so that we are better prepared to offer assistance when needed.
- We're working to provide and promote incentives to spur new investment in blighted land.
- And we're making it easier for states to work with developers to reuse property.

While there are many success stories out there, I'd like to highlight a few and tie in the EPA role in supporting these projects.

- Up the coast, in Emeryville, we provided a Revolving Loan Fund Grant that helped to clean up a former paint factory. A developer then transformed the factory into loft apartments—a multi-million dollar project that produced 62 residential units.
- In Silicon Valley, a 56-acre, former manufacturing site was added to the federal Superfund list in 1991. The site had been used to produce computer chips, semiconductors, and silicon wafers. The industrial cleaning solutions used in these processes had leaked from underground storage tanks. EPA worked with an interested purchaser to clean up the site and executed what we call a "Prospective Purchaser Agreement", which gave the developer protection from federal liability. The site is now an office complex that supports 1,800 jobs.

Earlier I mentioned former military sites. EPA's Federal Facilities program has been working actively with communities and developers at base closure sites to streamline the development and reuse process.

- Nearby in Orange County, the former El Toro Marine Corps Air Station was sold to a private development firm, the Lennar Corporation, for just over $600 million.

As some of you probably know, Lennar has been involved with developing several other former military sites in California, with planned reuses including a college campus, residential and commercial space, industrial parks, and even golf courses.

- To help continue successful transitions such as El Toro, EPA recently conducted a joint training session with the Department of Defense, Office of Economic Adjustment, which works with BRAC and FUDS communities. As a result of this effort, the surrounding communities will be better informed about the environmental conditions at the site and how they will be handled.

While EPA's programs only address a small percentage of the total universe of contaminated properties with potential for reuse, we have accomplished a great deal by working with the private sector and state and local governments.

- Already, more than 1.1 million acres of land have been made ready for reuse under the Superfund Program, covering more than 870 sites.
- With the Brownfields Program, where we're talking about far less significant contamination issues, EPA grants have assessed more than 8,300 properties, leveraging more than $8.2 billion in cleanup and redevelopment funding and 37,000 jobs.

That's a nice return on investment, and it validates EPA's effort to shift from a culture of enforcement and oversight to one of facilitation and assistance.

All of these steps, when taken together, will lead to market conditions ripe for urban rejuvenation and brownfields redevelopment, which in turn helps to secure environmental cleanups. For those with the vision to see how blighted properties can be reused in productive ways, the path has been cleared:

- Where there were once obstacles, there is now assistance.
- Where there were once uncertainties, there is reassurance.
- Where there was resistance, there is now cooperation.

III. Project Feasibility: Risk Management Mechanisms and Liability Clarification

In addition to the increasingly hospitable environment for brownfields at EPA, I am particularly happy to report progress in the areas of risk management and liability clarification.

Many of you are likely familiar with the 2002 Small Business Liability Relief and Brownfields Revitalization Act - known as the "Brownfields Law". For land purchasers, the law provides comprehensive, yet clearly articulated liability protections. In sum, a purchaser of contaminated property will be eligible for federal liability protection if the purchaser performs appropriate due diligence as to the environmental condition of the property. This protection is self-implementing; that is, you do not need to come to EPA to avail yourself of it. However, in certain circumstances, it may be worth the effort to seek a Prospective Purchaser Agreement – and agreement with the United States that describes the environmental status of a site, anticipated cleanup actions that will be taken, the scope of liability protection, and the site-specific steps a purchaser must take. The Brownfields Law and EPA's Prospective Purchaser Agreements thus alleviates project risk by allowing prospective purchasers to acquire property, while having the assurance that they will remain free from federal liability. We further encourage revitalization through agreements with states – MOAs - that allow sites to be addressed under their voluntary cleanup programs, simplifying the process and minimizing federal oversight.

The Ready for Reuse determination is another tool that helps stakeholders evaluate project conditions and risk. Ready for Reuse is an EPA certification that a particular property can support specified types of reuses, while remaining protective of human health and the environment. Before EPA created the Ready for Reuse determination, real estate investors and the public often had to seek out information about a site's environmental condition from many different sources, and that information was often written in terms difficult for the marketplace to interpret. We have found this

determination to be a valuable tool to helping facilitate reuse. To date, we have issued 26 RfR determinations at 45 sites covering over 22,000 acres.

On the financial side, there are additional tools for enhancing the feasibility of site reuse.

- The Federal Brownfields Tax Incentive (Section 198 of the Internal Revenue Code) allows environmental cleanup costs to be fully deductible in the year incurred, rather than capitalized. A demolition and environmental service company in West Chester, Pennsylvania, used federal and local tax incentives to save more than $800,000 on the cleanup of a former pharmaceutical manufacturing facility. The site produced penicillin, which contaminated area groundwater. The site is now a business park, which includes over 100,000 square feet of retail space.
- Many of you may be familiar with the Treasury Department's New Markets Tax Credits program, which makes available up to $15 billion in tax credits for making investments in distressed communities. We've worked alongside our partners at the Treasury to ensure that developers, investors, and communities understand how these tax credits can be applied to brownfield revitalization. For an urban redevelopment opportunity where the project will not meet the desired hurdle rate, consider the IRR when nearly 40 percent of your investment is returned in the form of tax credit payments.

Additional tools from EPA include Targeted Brownfields Assessments, which allow us to deploy an environmental assessment team to a property where a developer is ready to invest but needs a clearer picture of the property's environmental status. And our revolving loan funds provide quick injections of capital to offset cleanup costs through low interest loans.

There is no shortage of examples of projects that have taken advantage of the incentives, tools, grants, and other resources available to restore contaminated land.

- Just last year, in Houston, Texas, EPA announced its first-ever agreement with a developer to clean up a Superfund site—a 36-acre former metal casting foundry.

Under the agreement, the buyer guaranteed sufficient funds to cover cleanup, and agreed to pay for EPA's oversight costs to make sure cleanup was sufficient. In return, EPA provided protections – in a Prospective Purchaser Agreement - for both the buyer performing the cleanup and any future buyers of the property.

- In Los Angeles County, the City of Gardena has been literally transformed by brownfields redevelopment. EPA-funded assessments of the city's idle land, including a dormant airstrip and former auto service stations, attracted millions of dollars in private investment—the city now expects that a contaminated site that had been vacant for 15 years is going to become one of its busiest retail areas.

A final note on the redevelopment framework. Working through state cleanup programs is critical to successful site cleanup and redevelopment. States typically are more familiar with issues at the site, the state's own cleanup standards, the local real estate market, and the communities in which sites are located. The 2002 Brownfields Law provides $50 million annually for states to administer their cleanup programs and provided federal CERCLA liability protection for cleanups conducted under a state cleanup program. Before this, states could only provide state liability protection at brownfields sites, but not federal liability relief. It's another substantial, and relatively new, resource for the private sector to take advantage of.

IV. Top Tips for Successful Redevelopment Projects

Since we are in Los Angeles, home of so many "top" lists, I thought I would give you my list of the "top tips" for successful redevelopment projects. In no particular order –

One

Establish early on a good relationship with environmental regulators. Tell them what you are going to do. Show them – on paper, plans, site visits. And then live up to it. Give them whatever they ask – they're not trying to make things difficult for you, but rather they need to get comfortable with the conditions at the site and what you are going to do

about it. If there is a problem, such as newly discovered areas of contamination, bring it to their attention as soon as possible.

How best to do this?
Hire lawyers and consultants who know the people and the process. They'll bring credibility to your project and can speak the regulators' language.

Two
Get buy-in from local government officials on your cleanup plan. In any development project, you will be spending a large amount of time working with them on the entitlement process. Keep in mind the role local officials can play in showing support for your project on the environmental side as well. Neighbors and local community groups may want a new park in their area. New townhouses might not be the same, but local officials can help articulate the benefits brought by the developer when those townhouses will be built on the location of former Superfund site.

Three
Incorporate a public benefit component in your project.

Let's face it - environmental agencies have more work than they can handle. Program managers have to prioritize their work load and make decisions about which sites to focus on, including whether to negotiate a Prospective Purchaser Agreement (PPA). By agreeing to set aside some of your site to create new wetlands, a wildlife habitat, or a community recreation facility, you can bring positive attention to your site. Similarly, by agreeing to complete the cleanup of a high profile site that might otherwise linger, you can demonstrate a solid "public benefit" and forge relationships that may lead to a PPA. Want to build a new ski resort in Park City, Utah? Finish the cleanup of a former mining operation and incorporate green building and other sustainable development practices in your plan. You might just get not only an agreement with the United States limiting your liability, but the EPA Administrator may come to your site for a visit on Earth Day.

Four

Create an anchor at your site. Anchors not only draw customers and tenants to your project, but can be instrumental in getting them comfortable with living, working, or recreating at a brownfield or overlooked urban site. Consider the impact of siting a highly visible and publicly recognizable facility at your project, sending a strong message to the public that the site is safe for reuse and overcoming the stigma of an idled site. Hillwood Development built the American Airlines Arena in Dallas – home of NBA Dallas Mavericks, NHL Dallas Stars, and countless concerts –on the site of a former Union Pacific Railyard and TXU generating facility. In Baltimore, Honeywell and Struever Brothers, while final remedy and development plans were worked out, brought in creative temporary uses for a former chromium facility on the Inner Harbor: an ice skating rink during the Winter and Cirque du Soleil in the Spring. Hemisphere Development is collaborating with the world-renowned IMG Sports Academy to create a sports-oriented resort community at an 1100-acre former Diamond Shamrock site just east of Cleveland, and they are looking to repeat this approach at other sites around the country. If it's good enough for IMG affiliates Nomar and Jeter, Agassi and Sampras, it certainly is good enough for soccer moms, weekend warriors and second home buyers.

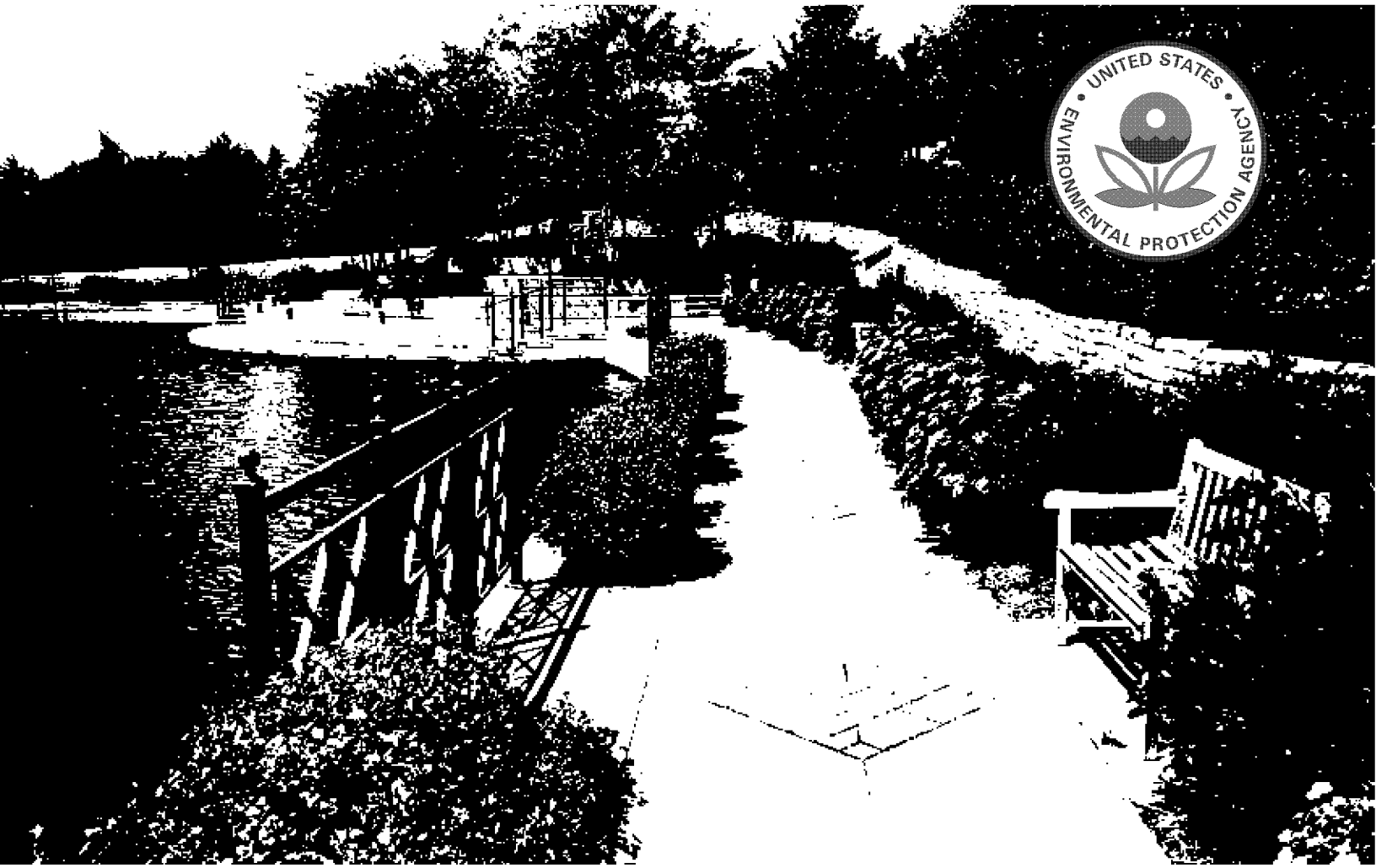
V. Final Thoughts

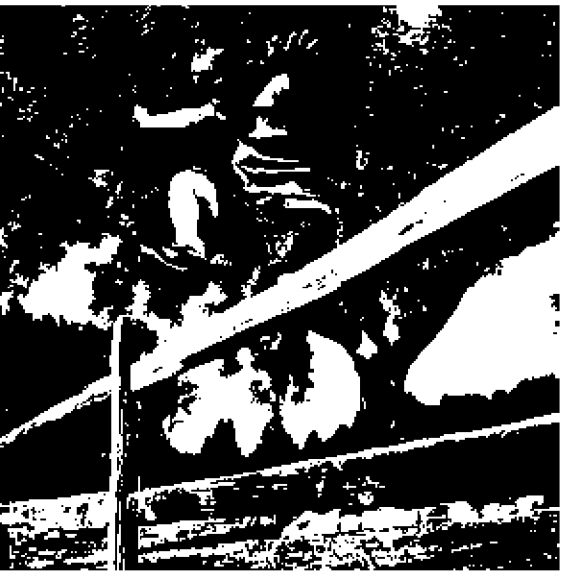
Today, you have resources and reassurances available to you that never existed before. Now is the time to work with communities, states, and EPA to reuse properties in ways that meet both private- and public-sector goals. We at EPA want to continue to work with you to transform blighted properties into assets that will provide great benefits to investors, the environment, and to the communities that had shouldered the burden of these blighted properties for so long. Now is the time, and I am grateful for your current and future contributions to the goals of land revitalization. Thank you.

U.S. ENVIRONMENTAL PROTECTION AGENCY

LAND REVITALIZATION

restoring land for America's communities





"EPA's cleanup programs have set a national goal for returning formerly contaminated sites to long-term, sustainable, and productive uses."

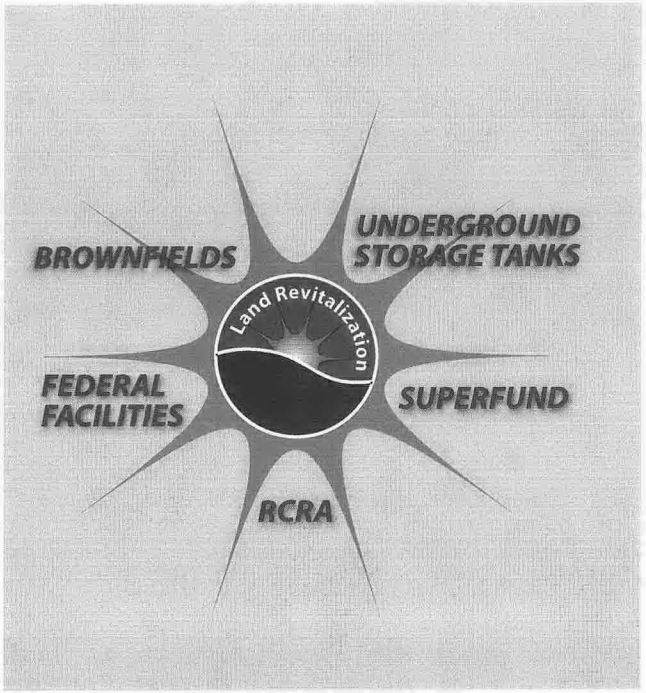
2003–2008 EPA Strategic Plan — Direction for the Future

"By encouraging cleanup and redevelopment of America's abandoned and contaminated waste sites. . .we are taking problem properties and transforming them back into community assets. We are empowering people to work together to revitalize and rehabilitate their communities."

Steve Johnson, EPA Administrator
August 14, 2006

Why Land Revitalization?

As a nation, we value land as a natural, cultural, and economic resource. Over time, hundreds of thousands of properties and millions of acres across the country have been damaged by minor to moderate to extreme pollution and distressed, dilapidated conditions. For more than a decade, a movement has grown across the country to restore and reclaim these properties for community, economic, and ecologic uses. In many places, government, private, and non-profit organizations are working with each other to assess, restore and return these unproductive properties to sustainable and beneficial uses that are protective of health and the environment. Neighborhood parks, residential and commercial developments, manufacturing facilities, and restored natural environments exist around the country because of revitalization partnerships. Cleaning up and reinvesting in these properties also takes development pressures off of undeveloped, open land. The days of erecting chain link fences around a property and posting "Keep Out" signs around valuable land resources wane, and we believe the momentum around cleanup and sustainable land reuse will continue to grow.



Land Revitalization Initiative

As part of its mission to protect human health and the environment, EPA is undertaking an Agency-wide initiative to revitalize land. To restore contaminated properties to economic and environmental vitality, EPA's land cleanup programs have set a national goal for returning formerly contaminated sites to long-term, sustainable, and productive uses. Working closely with States, Tribes, and local governments, we are building partnerships with communities, private, and non-government stakeholders to promote voluntary cleanups and revitalization, including urban river restoration that revitalizes land and water resources and "Good Samaritan" voluntary cleanups of abandoned mines and other sites. At cleanup sites that require the involvement of multiple government programs, we apply One Cleanup Program approaches to improve consistency, management, and cost-effectiveness. Working with others, our goal is to restore our nation's contaminated land resources and enable communities to safely return these properties to beneficial and sustainable economic, ecological, and societal uses.



Brownfields Cleanup and Redevelopment

EPA's Brownfields Program empowers states, communities, and other stakeholders in economic redevelopment to work together to prevent, assess, safely clean up, and sustainably reuse brownfields. The Brownfields Program provides technical and financial assistance, including grants for environmental assessment, cleanup, and job training.

www.epa.gov/brownfields/



Federal Facilities

The Federal Facilities Restoration and Reuse Program works with other Federal and state agencies to facilitate the cleanup and reuse of the nation's Superfund Federal facilities, including Base Realignment and Closure (BRAC) sites.

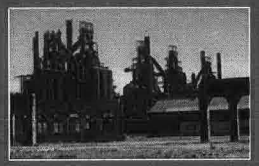
www.epa.gov/fedfac/



Underground Storage Tanks

The Underground Storage Tanks Program supports States, territories, and other partners in the cleanup and reuse of properties contaminated by petroleum releases from underground storage tanks and works to better integrate eligible petroleum brownfields into ongoing restoration/revitalization activities.

www.epa.gov/swerust1/



RCRA Corrective Action

The Resource Conservation and Recovery Act (RCRA) Corrective Action Program requires the investigation and cleanup of hazardous releases at operating facilities. RCRA Corrective Action differs from Superfund in that Corrective Action facilities generally have viable operators and on-going operations.

www.epa.gov/swerosps/rcrabt/



Superfund

The Superfund Program manages cleanups of the nation's uncontrolled hazardous waste sites that pose a current or future threat to human health or the environment. EPA's Superfund Redevelopment Program encourages communities at every cleanup site to consider anticipated future reuses early so that cleanups can accommodate those uses, while maintaining standards that protect human health and the environment.

www.epa.gov/superfund/programs/recycle/

EPA's Land Revitalization Staff

The Land Revitalization Staff works with EPA programs, other government agencies, and non-government partners to promote and develop land revitalization measures, tools, and information. The land revitalization vision is to restore the nation's contaminated land resources and enable communities to safely return these properties to beneficial economic, ecological, and societal uses.

One Cleanup Program Approaches

The One Cleanup Program is EPA's vision for how different cleanup programs at all levels of government can work together to ensure that resources, activities, and results are effectively coordinated, implemented, and communicated to the public. EPA cleanup programs coordinate with one another to remove unintended barriers, develop common measures, and improve the quality and availability of information so that contaminated land can be revitalized and returned to protective and beneficial uses.

Measures and Benefits

The Land Revitalization Outcomes and Benefits Workgroup is developing measures to enable EPA to better understand and communicate land revitalization accomplishments and inform future decision-making, priorities, and roles.

Training and Information

The Land Revitalization Staff offers training to EPA, State, Tribal and local governments on reuse of contaminated properties in private real estate markets and in natural ecological systems.

Coordination

Facilitating the exchange of information and coordination of action across cleanup programs can lead to faster, more efficient cleanups that are protective of future uses of previously contaminated sites. The Land Revitalization Staff, Coordinators, and partners are working together to better integrate program implementation.

Unintended Barriers

EPA is addressing unintended barriers to the appropriate reuse of land. The Long Term Stewardship Task Force has developed recommendations to ensure that site cleanups remain protective over time and the Agency is working to improve program activities related to groundwater protection and site assessment.

Sustainable Reuse

Sustainable land reuse and prevention of future recontamination is central to the land revitalization vision. EPA land revitalization staff are advancing best practices to manage stormwater on sites, protect watersheds, restore native ecological systems, erect greener buildings, and support healthy, vibrant communities.

Partnerships

To be effective, land revitalization requires collaboration among many stakeholders. The Land Revitalization Staff is working with all levels of government, community and watershed groups, and the private sector to clean up and appropriately reuse land.

HQ — www.epa.gov/landrevitalization/
Region 1 (CT, ME, MA, NH, RI, VT) — www.epa.gov/region1/
Region 2 (NJ, NY, PR, VI) — www.epa.gov/region2/
Region 3 (DE, DC, MD, PA, VA, WV) — www.epa.gov/region03/revitalization/
Region 4 (AL, FL, GA, KY, MS, NC, SC, TN) — www.epa.gov/region04/waste/
Region 5 (IL, IN, MI, MN, OH, WI) — www.epa.gov/region5/
Region 6 (AR, LA, NM, OK, TX) — www.epa.gov/region6/
Region 7 (IA, KS, MO, NE) — www.epa.gov/region7/
Region 8 (CO, MT, ND, SD, UT, WY) — www.epa.gov/Region8/land_waste/revitalization/
Region 9 (AZ, CA, HI, NV) — www.epa.gov/region9/
Region 10 (AK, ID, OR, WA) — www.epa.gov/region10/

Land Revitalization Staff

Office of Solid Waste and Emergency Response

Mail Code 5101T

EPA-500-F-06-003

October 2006



Scott A. Sherman
Associate Assistant Administrator
U.S. Environmental Protection Agency

Scott Sherman is the EPA Associate Assistant Administrator for the Office of Solid Waste and Emergency Response. As the Agency's deputy program official for OSWER, he focuses on policy development and implementation of the nation's hazardous and solid waste programs and cleanup initiatives, including Brownfields, Land Revitalization, Superfund, RCRA, Emergency Management, Federal Facilities, and USTs.

Before his appointment as Associate Assistant Administrator, Scott was the Agency's Associate General Counsel for Solid Waste and Emergency Response, where he managed the Solid Waste and Emergency Response division of the EPA Office of General Counsel.

Scott previously served as a Special Assistant Attorney General for the State of Texas and as a senior legal and policy advisor to Texas state energy and environmental commissioners. He is a member of the adjunct faculty of Johns Hopkins University, where he teaches environmental issues in real estate at the Carey Business School.

Scott received his B.A. with Highest Honors from the University of Texas and his J.D. *cum laude* from Harvard Law School. He also holds an M.S. in Real Estate from Johns Hopkins University, where his research focused on the cleanup and redevelopment of brownfield properties.

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(202) 566-0200 • sherman.scott@epa.gov

VICTORY PARK

Dallas, Texas

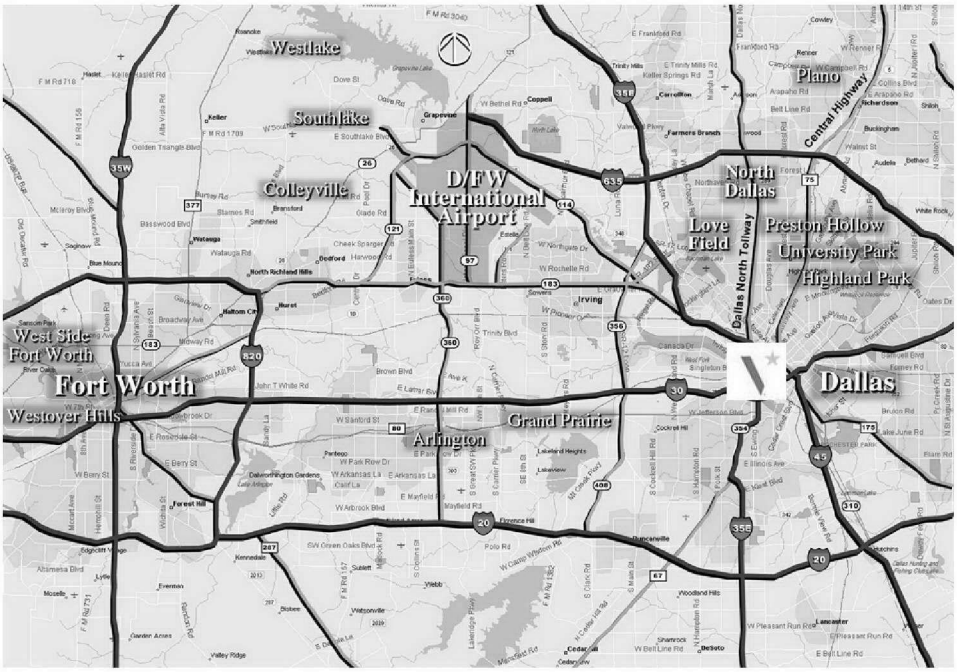
A Brownfield Redevelopment

UNIQUE OPPORTUNITY

- Goal was to create a master-planned mixed-use district surrounding an economic engine – sports arena
- Key factors:

1. Controlled the Dallas Mavericks and had a seat at the table for site selection of the new arena
2. Found available land with a unique location and ability to support mixed-use district
3. Held sufficient equity to support the development
4. Formed a public-private partnership to clean up land and build the arena and surrounding roads – bond election ($125MM for arena and ancillary improvements) and TIF ($25MM for roadway improvements)

LOCATION



LOCATION



LOCATION

The Victory Park site is the connector of Dallas' key urban districts.



ACCESS

Victory Park is surrounded by Dallas' major freeways and had the potential for multiple dedicated access points.



AN URBAN BROWNFIELD

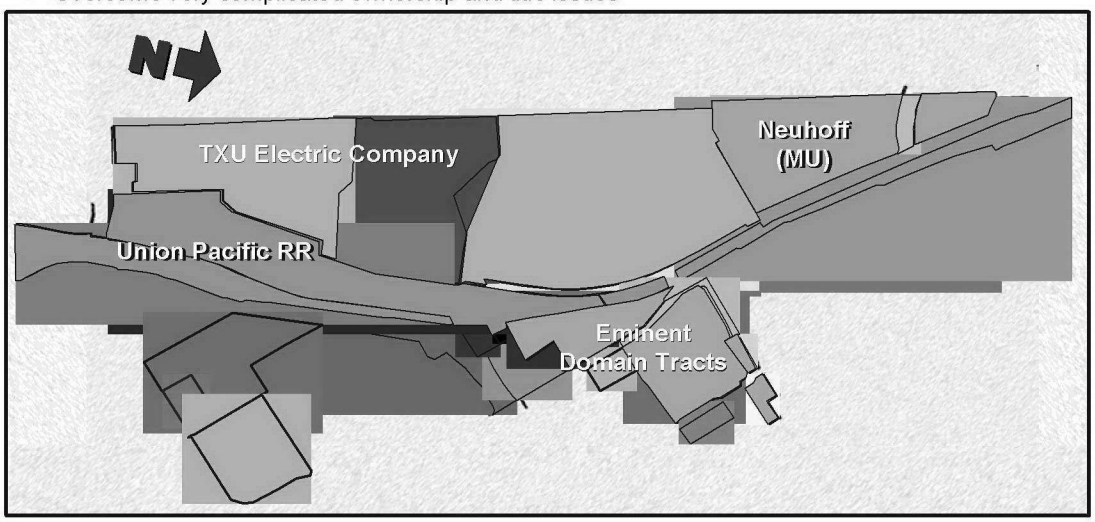
An opportunity to turn one of the city's worst eye-sores into a catalyst for urban development.



LAND ASSEMBLAGE

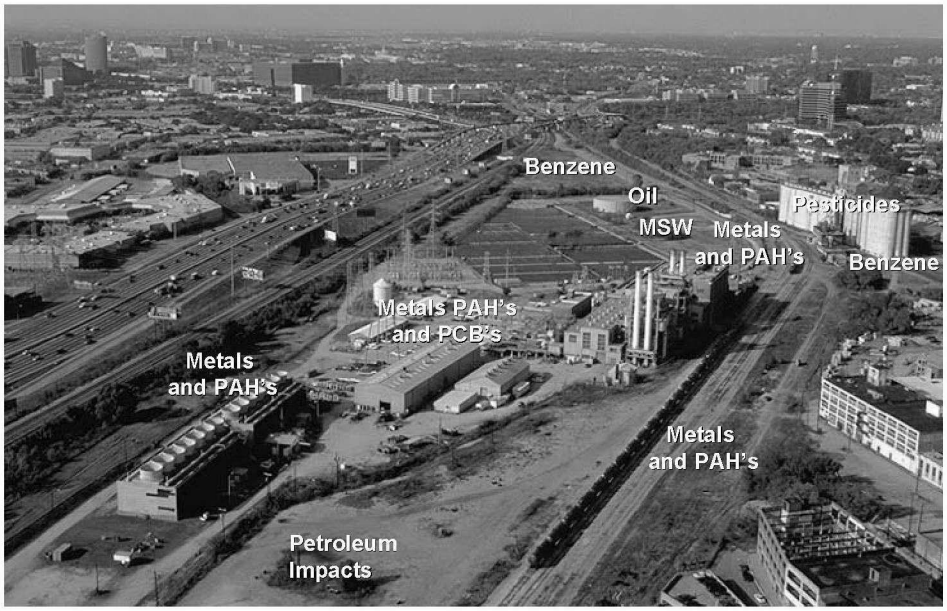
The land acquisition had to be a carefully executed strategy to ensure that our land basis was protected.

- Ensure ability to purchase with minimal investment until after successful arena vote
- Over 100 transactions to assemble 75 acres
- Overcome very complicated ownership and title issues



ENVIRONMENTAL CLEANUP

The cleanup involved more than 25 individual parcels of land with little or no available record of contaminants.



ENVIRONMENTAL CLEANUP

Referred to as "one of the greatest examples of urban remediation" by the EPA – received the Phoenix Award as one of the country's top remediation projects in 2001.

- 760,000 cubic yards of total earthmoving
- 310,000 cubic yards of contaminated soil removed in over 15,000 truckloads
- 250,000 cubic yards re-used on site
- 200,000 cubic yards of imported clean fill
- 15 million gallons of groundwater treated
- 45 structures demolished
- $12.0 million spent on brownfield clean-up





VICTORY PARK- OVERVIEW



MASTERPLAN

Phase I:

•Completed 2001

•Master infrastructure

•Remediation

•American Airlines Center

Phase II:

•7 buildings

- •W Hotel, The Terrace, the Vista, Victory Plaza Buildings, Cirque, House of Blues

•600+ residential units

•190,000 S.F. Retail Space

•155,000 S.F. Class A Office Space

Phase III:

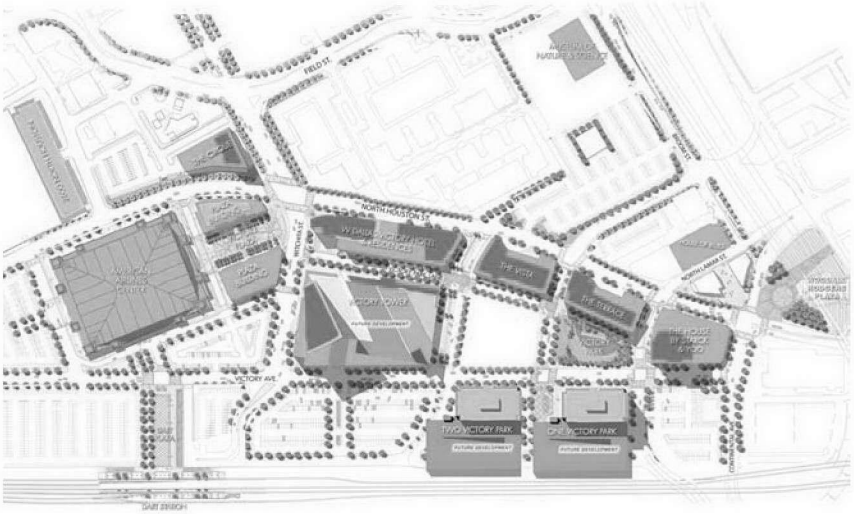
•3 buildings

- •The House, One Victory Park, Victory Tower-Mandarin Oriental, Dallas

•250 residential units

•150,000 S.F. Retail Space

•700,000 S.F. Office Space



AUTHENTIC

Truly mixed-use with:

- Hotels
- Residential
- Office
- Retail
- Restaurants
- Entertainment
- Culture and Education

- Public Spaces
  - Pedestrian-friendly, urban character
  - Victory Plaza
  - Katy Trail & Victory Overlook
  - One acre Victory Park
- State of the art technology infrastructure
  - Wireless
  - Fiber
  - Security
  - Unpredictable design by world renowned architects





AMERICAN AIRLINES CENTER

A state-of-the-art $400+ million sporting event, entertainment and performance venue. Designed by David Schwarz to respond to the surrounding architecture and be the centerpiece of a mixed-use, pedestrian friendly district.



W DALLAS VICTORY HOTEL & RESIDENCES



- 252 guest rooms
- Phase I North Tower- 60+ residences
- Phase II South Tower - 80+ residences
- Craft Restaurant
- Bliss Spa, Pool and Fitness Center on 16th and 17th floors
- Ghostbar on 33rd floor
- 43,700 SF retail and restaurants
- Henry Beguelin, Bella Flora, G-Star, Kenichi, Noka Chocolate

VICTORY PLAZA BUILDINGS

•5 stories

•155,000 square feet of office space

•65,000 square feet of retail space

•Architecture and Design by: HKS and Orne &Associates

•WFAA Studios, Victory Park Discovery Center, N9NE Steakhouse, NOVE, Victory Tavern, Paciugo Gran Caffe, Stuff and Quiksilver

•Victory Media Network



VICTORY MEDIA NETWORK

- Dallas' Times Square
- Digital art museum, sponsorship content, special events and concerts
- 11 total screens
- 4,000 SF of high definition LED boards
- Major sponsors:
  - Target
  - Bank of America



THE TERRACE

- 7-story mid-rise building
- 95 residential units
- Over 24,000 S.F. specialty retail and patio space
- Opened January 2007
- Luna de Noche, Klad, Jolie Boutique, Medina Oven & Bar, Gachet Coffee Lounge and Books



THE VISTA

- 7-story mid-rise building
- 129 rental units
- Over 25,000 S.F. retail space
- Lifestyle Fashion Terminal – Collection of shops:
  - •James Perse
  - •J.Lindeberg
  - •John Varvatos
  - •Diane Von Furstenberg
  - •Dune Furniture
  - •Avalon Salon
  - •Malin & Goetz
- Opened January 2007



HOUSE OF BLUES

- 60,000 S.F. mixed-use entertainment, retail, restaurant and special event space
- 1,500 person live music venue
- Re-development of a historic warehouse building
- Opened Spring 2007



THE CIRQUE

VICTORY PARK

- 28 Stories
- 252 apartments
- 10,000 square feet of retail space
- Architect and Design By: Gromatzky Dupree & Associates
- Developed by Hanover Company
- Scheduled completion late 2007



ONE VICTORY PARK

VICTORY PARK

- 455,000 SF Office
- 20 stories
- 15,000 SF Retail
- Architect and Design By: BOKA Powell
- Developed by Hines and Hillwood
- Scheduled completion 2008
  - Haynes & Boone
  - Plains Capital Bank
  - Ernst & Young



THE HOUSE

- Designed by Philippe Stark and Yoo
- 28 Story building
- 150 condominium units
- 30,000 S.F. retail space
  - Oakville Grocery
  - 'Wichcraft
- Scheduled completion 2008



VICTORY TOWER

- Mandarin Oriental Hotel
- 150 hotel rooms
- 90 residential units
- 300,000 S.F. Office
- 85,000 S.F. Retail
- Architect and Design By: Kohn Pedersen Fox, BOKA Powell, Peter Remedios and MorrisonSeifertMurphy
- Developed by Hillwood
- Scheduled completion 2010



LESSONS LEARNED

- Control the remediation process as a buyer and seek contributions from the seller
- Use qualified environmental team (lawyers, engineers and designers) with national reputations
- Clean up the property upon acquisition
- Summarize the remediation efforts to convey the process efficiently to lenders, partners and buyers
- As seller, push the buyer to conduct their own studies and accept the property as-is. Avoid any representations and ask the buyers to rely on the previous environmental reports.

MICHAEL D. CRAVER
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Dallas, Texas 75219
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mike.craver@hillwood.com

BIOGRAPHICAL INFORMATION

EDUCATION

B.B.A., Southern Methodist University, 1993
J.D., Southern Methodist University, 1996

PROFESSIONAL ACTIVITIES

2000-2007 Associate General Counsel and Vice President, Hillwood Development - responsible for all legal matters for the Victory Park development in Dallas, Texas
Member; State Bar of Texas, Dallas Bar Association and Dallas Association of Young Lawyers

LAW RELATED HONORS

Texas Lawyer – Named as One of Top 50 In-House Counsel in 2005
Speaker for 2007 State Bar of Texas Advanced Real Estate Seminar

Partnering for Sustainability and Success: Land Revitalization Efforts at The Dow Chemical Company

Tim King
Remediation Leader
The Dow Chemical Company

August 2, 2007

Texas Environmental Superconference

®™ Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

While the call for land for animal, agricultural, industrial and residential use is rising, the U.S. Environmental Protection Agency (EPA) estimates that between 500,000 and one million brownfields[1],—conservatively estimated by the U.S. Government Accounting Office to comprise hundreds of thousands of acres[2]-- exist in communities across America, many of these in otherwise desirable locations within their communities. While *manufacturing* land is an impossibility -- *revitalizing* land previously deemed undesirable is an exciting and achievable possibility through partnership between governments, industry and the public.

Why is Dow Interested in Land Revitalization?

Our interest in the land revitalization arena is a function both of who we are, and who we want to be as a company. As one of the founding companies of Responsible Care®, Dow is committed to the safe and responsible management of our facilities and products throughout their entire lifecycle. It's part of who we are. Equally important, though, is our commitment to becoming who we want to be.

Dow has a company vision to be the largest, most profitable, *most respected* chemical company in the world; our mission is to "constantly improve what is essential to human progress by mastering science and technology." This vision and mission come together in the concept of sustainability. At Dow, sustainability is about our relationship with the world and our contribution to solving its many challenges. Land revitalization is one way the company can contribute to solving one of the world's problems.

How Does a Company Like Dow Bring Sustainability to Life?

First, by adhering to the following set of Guiding Principles for Sustainability:

Measurement and Transparency
We will report our progress and challenges in an open and transparent manner.

Eco-Efficiency
We will create shareholder value by designing our products and operating our facilities to reduce natural resource and energy requirements, reduce waste and emissions, and maximize overall functionality.

Local versus Dow Standards
Our products, operations and practices will meet applicable government, or Dow standards, whichever are more stringent.

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[1] U.S. EPA. http://www.epa.gov/compliance/resources/faqs/cleanup/brownfields/index.html
[2] U.S. General Accounting Office. "Barriers to Brownfield Redevelopment", June 1996, p. 6
®Responsible Care is a registered servicemark of the American Chemistry Council

Raise the Industry Standard
We will work to improve the standards in the chemical industry through the development, application and promotion of Responsible Care, the global chemical industry's performance initiative.

Stakeholder Partnerships and Dialogue
We will seek inputs and promote partnerships between industry, government, non-governmental organizations, communities and other key stakeholders to focus on responsible solutions to common problems and concerns.

Eco-System and Cultural Integrity
We will understand and respect the limits of eco-systems and protect areas of recognized ecological and cultural significance.

Employee and Public Outreach
We will enhance the human potential of our employees through education and training and contribute to the development of public policies, which lead to progress in sustainable development.

Quality of Life
We will create shareholder value and improve the quality of life within our communities through environmentally sustainable economic development.

And *second*, by putting our guiding principles into action by establishing a clear set of ten-year goals for ourselves that challenge us to think more broadly about how we can use our leadership in science and technology to improve the human condition.

Dow's 2015 Sustainability Goals

Collaborate, Innovate, Elevate

The 2015 Sustainability Goals reflect Dow's commitment to the principles of Responsible Care® and have a broad external focus: strengthening our relationships with the communities where we operate, continuing to improve our product stewardship and innovation, and reducing our global footprint. The goals align to three areas of focus: Collaborate, Innovate and Elevate.

We will *collaborate* with people in our communities and others to help create stronger, safer communities. Our goals:

- Local Protection of Human Health and the Environment
- Contributing to Community Success

We will *innovate* to improve confidence that our products are managed safely throughout their lifecycle and develop products that will make a lasting, positive improvement on the world. Our goals:

- Product Safety Commitment
- Sustainable Chemistry
- Products Designed to Solve World Challenges

We will *elevate* our understanding of our impact on global ecosystems and work towards the efficient and effective use of our precious resources. Our goals:

- Energy Efficiency and Conservation
- Addressing Climate Change

How Does Land Revitalization Fit In This Sustainability Framework?

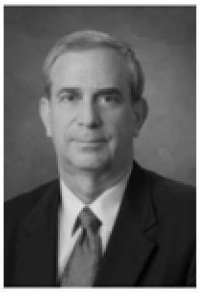
Land revitalization is the nexus where company, community and government goals converge. For Dow, our goal to collaborate with key stakeholders to contribute to community success, coupled with our focus on EH&S operational excellence, is directly aligned with EPA's mission to protect human health and the environment. Community goals of increased tax revenue, locally-based jobs, and new opportunities for the community can also be met with land revitalization efforts, possibly reversing the decay of already developed areas and slowing unsustainable urban growth trends as well. Finally, for a company that wants to have a positive impact on the human condition, it is simply the right thing to do.

###

Timothy A. King, P.E., P.G.

Tim King is a Remediation Leader for The Dow Chemical Company with responsibility for managing legacy sites in the U.S. and leads Dow's Land Revitalization effort. Mr. King has more than 20 years experience environmental affairs and remediation in both consulting and industry.

Mr. King holds a B.S. degree in Engineering from the West Virginia University Institute of Technology and a M.S. degree in Engineering Geology and Hydrogeology from Kent State University. He is a registered professional engineer as well as a registered professional geologist.



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Areas of Experience:
Environmental Law
- Transactions
- Counseling
- Litigation

Administrative Law

Jeff Civins

jeff.civins@haynesboone.com

Mr. Civins has practiced all aspects of environmental law since 1975. He advises clients on regulatory requirements, he assists them in the evaluation and negotiation of corporate transactions, and he represents them in environmental and toxic tort litigation.

As an adjunct professor at the University of Texas School of Law, Mr. Civins taught a seminar on Environmental Law Concerns to Business in 1987, and has taught a seminar on Environmental Litigation each Spring since 1992. He is co-editor of the Thomson West Texas Practice 2-volume treatise on Texas Environmental Law (1997 and 2005 editions).

Mr. Civins recently has represented:

- An airline in settling litigation with another airline regarding contamination at JFK Airport.
- A major energy company in private party Superfund litigation and in negotiating a settlement in a RCRA enforcement action brought by EPA Region 6 involving contaminated ground water.
- A major energy company in resolving regulatory issues relating to offshore operations.
- A national real estate company in its sale of office buildings in downtown Dallas and Houston and of a major development near Houston, and its acquisition of an apartment complex in Massachusetts and office building in Las Vegas.

Honors

- Top environmental lawyer in Texas (tied) -- Chambers USA America's Leading Lawyers (2003-present) ("Star" Classification -- 2006-present)
- Best Lawyers in America (1989-present)
- Texas Super Lawyer -- Texas Monthly (2003-present)
- Top 50 Lawyers in Central and West Texas -- Texas Monthly (2003-present)
- Austin Business Journal Best of Business Attorneys -- Environmental (2005)
- Who's Who Legal: USA – Environment (2006-present)

Education

J.D., University of Texas, 1975, with honors; Order of the Coif
M.S., in Chemistry, Pennsylvania State University, 1970
A.B., in Chemistry, Brandeis University, 1967

Memberships

Environmental and Natural Resources Law Section, State Bar of Texas, Past Chair, and Chair, Annual Texas Environmental Superconference; Administrative Law and Litigation Sections, State Bar of Texas; American Bar Association, Sections of Environment, Energy, and Resources, and of Litigation and Administrative Law; Air and Waste Management Association, Central Texas Chapter, Past Chair; American Chemical Society -- Environment Division; Environmental Law Institute; Texas Law Foundation; University of Texas Law School Alumni Association Executive Board, Keeton Fellow, and Dean's Roundtable; Past President, Communities-In-Schools, Central Texas Chapter

Selected Publications and Presentations

"Reconciling Shareholder Value Creation with Stakeholder Interests -- Corporate Sustainability," Panel Chair, Institute for Excellence in Corporate Governance -- 4th Annual National Conference, UT Dallas (October 26, 2006)

Conference Chair and Speaker on "All Appropriate Inquiry," The Eighteenth Annual Texas Environmental Superconference, the Environmental and Natural Resources Law Section of the State Bar of Texas, the Water Environment Association of Texas, the Texas Association of Environmental Professionals, the Air and Waste Management Association-Southwest Section, the Auditing Roundtable, and the American Bar Association Section of Environment, Energy and Resources (ABA-SEER) (August 3-4, 2006)

"All Appropriate Inquiry -- Limitations and Concerns Related to EPA's New Rules," Presentation, Air and Waste Management Association's Annual Conference & Exhibition, New Orleans, Louisiana (June 21, 2006)

"Doing Environmental Due Diligence," American College of Real Estate Lawyers Quarterly, (May 2006) and ABA-SEER Environmental Transactions and Brownfields Committee Newsletter (Nov. 2006)

"All Appropriate Inquiries -- Are They Appropriate?" with M. Mendoza, BNA Environmental Due Diligence Guide (Jan. 19, 2006, No. 167) and BNA EHS Strategies (Jan. 2006, No. 1)

"New Rule Affects Landscape For Real Estate Purchasers," Austin Business Journal (Jan. 6, 2006); Baltimore Business Journal (Mar. 17, 2006); Sacramento Business Journal (June 23, 2006)

"New AAI Rule: All A Matter of Perspective, Attorney Says," On The Cutting Edge: An Insider's Perspective, Interview, BNA Environmental Due Diligence Guide (Feb. 16, 2006)

"EPA's All Appropriate Inquiries Rule: How appropriate is it?" Participant, BNA national audio conference (February 21, 2006)

"Transactional Environmental Due Diligence -- What diligence is due?" with M. Mendoza, Natural Resources & Environment, ABA-SEER (Winter 2006)

"Public Participation in Environmental Permitting and Enforcement Proceedings," with Iris Gibson, University of Texas Administrative Law Conference (June 28-29, 2005)

"The Third Party and Transaction-Related Defenses," with M. Mendoza and C. Fernandez, ABA-SEER Environmental Litigation & Toxic Torts Committee Newsletter (July 2005)

"Environmental Management Systems," with A. Strong and C. Fernandez, Chapter 31, Volumes 45-46, Thomson West Texas Practice (2005)

"Environmental Aspects of Business Transactions," with B. Phillippi, Chapter 32, Volumes 45-46, Thomson West Texas Practice (2005-2007)

"Fundamentals of Environmental Law," State Bar of Texas Ten Minute Mentor

"Cleanup Help Not Aviall-able," with J. Eldridge, Texas Lawyer (Jan. 10, 2005)

"Proper environmental due diligence should be part of a stock acquisition," Austin Business Journal (Dec. 3-9, 2004), Dallas Business Journal; Birmingham Business Journal

"Who's Liable Now? New Federal Brownfields Legislation," with B. Phillippi, Texas Bar Journal (Dec. 2002), reprinted in Real Estate Issues (Winter 2003-2004)

"Practical Advice for Defense Counsel in Mass Toxic Tort Cases," with M. Mazzone and E. Kohn, Texas Lawyer (Nov. 2001)

"Water Issues for Oil & Gas Producers," Southwest Legal Foundation (2001)

In Honor and Memory of our friend

Gregg Cooke

"Dedicated and truly passionate about the environment"



Gregg Cooke
June 14, 1955 – September 17, 2006

In a column appearing following his death, *The Dallas Morning News* commended Gregg Cooke "for his tireless and innovative efforts to give Texans a healthier place to live, first as the Regional Administrator for the U.S. Environmental Protection Agency, Region 6, and most recently, as an attorney and consultant." Gregg not only was highly regarded on the national and state environmental stage, he was especially well-known for his performances on stage at this conference. It is only fitting that Gregg's memory, which has been honored by the U.S. Environmental Protection Agency (EPA), with the Clean Air Excellence Award and the EPA Strategic Alliance Award, and by the Texas Environmental Excellence Award, as well as by resolutions from the State of Texas Senate and House, be honored here as well—at the Nineteenth Annual Texas Environmental Superconference.

Throughout the years of the conference, Gregg was an active participant, especially in his years as EPA Regional Administrator. None of us who saw his performances, especially paired with former TCEQ Chairman Bob Huston, can forget Gregg's willingness to take on hilarious personas consistent with the theme of that year's program, from John Wayne, to Felix of the Odd Couple, to the Beatles, and to Luke Skywalker, paired with Bob's Yoda. These performances were consistently rated the tops of each year's program, for providing substance as well as entertainment.

Gregg Cooke built a national reputation as EPA Regional Administrator for EPA Region 6 for leadership, vision, and passion, including an ability to broker sometimes controversial compromises to improve air and water quality in Texas. Gregg loved the environment; he enjoyed showing everyone the Louisiana wetlands and having them experience its ecological significance, coastal restoration, and off-shore oil and gas development. He also was a national leader in the Brownfields program and led the way for revitalization of our communities. Gregg also was a great friend and supporter of our state agencies as well as the Native American communities.

Like Will Rogers, Gregg never met a stranger he didn't like -- on Southwest Airlines, the street, or the halls of the State Capitol or Congress. Through these "new friends," he constantly saw new opportunities and eagerly brought these ideas back to pursue to improve the environment. Gregg's people skills included a unique ability to bring disparate parties together to solve environmental problems, through his willingness to listen and to think outside the box.

At the time of his death, Gregg was a consultant to Collin, Dallas, Tarrant and Denton counties on regional smog planning. He was also counsel for the environmental law firm of Guida, Slavich & Flores in Dallas. He was seen as continuing to play an absolutely pivotal role in North Texas air quality.

Gregg was born and raised in Abilene, where his passion for the environment began as a child. He was an Eagle Scout, an honored high school band member and yearbook photographer. Gregg earned a bachelor's degree in history from Baylor University, where he graduated cum laude in 1977. He earned a master of foreign affairs degree from the University of Virginia in 1979 and a law degree from Baylor in 1982.

Gregg served on the executive staff for Texas Governor, Mark White before beginning his law practice in Dallas with Geary, Stahl and Spencer, where he became a partner. He then joined Texas Attorney General Dan Morales's office, where he served as Chief of the Natural Resources Protection and Energy Division and was the state's North American Free Trade Agreement environmental liaison. He also served as the Texas General Counsel for the Border Environmental Corporation Commission in Juárez, before becoming a partner with the firm of Haynes and Boone in Austin.

In 1998, President Bill Clinton appointed Gregg to head the EPA in Dallas and continued serving after President Bush took office until the end of 2002. It was a testament to his excellence as a leader and his integrity and his ability to work with divergent interests for the public good that he was the last Clinton EPA appointee at the agency when he left office.

Both elected officials and environmental watchdogs admired Gregg, and we know that he left an enormous void in the fight for the public health and the environment.

In his personal life, Gregg enjoyed travel with his wife, Melanie, and his daughter, Clara, with whom he also enjoyed Indian Princess activities. Gregg was a member of First United Methodist Church in Dallas, where he was in the choir. He also served on the board of directors for the Texas Lyceum and the Shakespeare Festival of Dallas.

In addition to his wife, Melanie, and his daughter, Clara, Gregg is survived by his parents June and Horace Cooke of Abilene, and two brothers, David Cooke of Boston and Raymond "Rusty" Cooke of El Paso.

Gregg's unexpected death last September leaves us all with a sense of loss with which we are still trying to come to grips. Gregg will be long remembered by all for his love for his family, his dear Texas, and the environment.

Friends of the Cooke family have established a college savings fund for Clara Cooke, Gregg's 13-year-old daughter. If you would like to contribute to the fund, please make your check payable to the "American Funds," noting that it is for Clara Cooke and mail it to Nancy K. Phillips, CPA, 5910 N. Central Expressway, Suite 1710, Dallas, Texas 75206. If you have any questions, please call 214-361-2444.

Lawrence E. Starfield
Deputy Regional Administrator

Larry Starfield is the Deputy Regional Administrator for the U.S. Environmental Protection Agency, Region 6, in Dallas, Texas. In this position, he is responsible for the efficient management of the 900-person regional office, and for the effective implementation of EPA programs in the South-Central United States (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas). He has served in that position since August 2001.

From 1997-2001, he served as the Regional Counsel for Region 6. As Regional Counsel, he managed an office of 60 lawyers that provided legal advice to the Regional Administrator and Region 6 program offices regarding the interpretation and implementation of federal environmental laws.

Before joining Region 6 in 1997, Mr. Starfield spent ten years with EPA's Office of
General Counsel in Washington, D.C., where he served as an attorney-advisor, Assistant General Counsel for RCRA, and Acting Associate General Counsel for Solid Waste and Emergency Response.

Before coming to EPA, he worked in Paris, France, from 1985 to 1987 as the correspondent for the "Bureau of National Affairs" on French environmental issues. From 1981 through 1985, he worked as an attorney with the law firm of Skadden Arps Slate Meagher & Flom, in Washington, D.C. He is a graduate of Wesleyan University and Yale Law School.

[Current as of June 2007]

Robert J. Huston

Consultant (2004 - present)

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Austin, TX 78746
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Previous Experience:

Chairman - Texas Commission on Environmental Quality (1999-2003)
One of three full time commissioners who serve as the governing board for Texas' primary environmental regulatory agency. The Texas Commission on Environmental Quality (TCEQ), formerly known as the Texas Natural Resource Conservation Commission (TNRCC), is responsible for air, water, and waste permitting and compliance, and administers all major federal environmental programs delegated from the U. S. Environmental Protection Agency. The agency employs a staff of approximately 3,000 and operates from a headquarters office in Austin, Texas and sixteen (16) regional offices across the state. Total budget for the current fiscal year is approximately $450 million. Highlights during tenure as TCEQ Chairman:

Successfully guided the agency through the legislative sunset review process, resulting in agency reauthorization for 12 years.

Transformed the working relationship between the agency and EPA Region 6 to one of cooperative joint environmental protection.

Largely completed the planning and initiated implementation of statewide plans for achieving the national Ozone standards.

Worked with State leadership to create and fund the Texas Emission Reduction Program, a $750 million incentive grant program to advance technology development and its application to clean up heavy duty diesel engines.

Private Enterprise and Consulting (1994-1998)
Entered into a partnership and provided the investment capital for a high end designer furniture and antique store - Durham Trading & Design Company. Grew the business to in excess of $2.0 million in annual sales. Sold interest to business partner in 2001.

Held the position of Chief Financial Officer for Bonner Carrington Corporation - European Market which held the master licensing rights for Schlotzsky's Deli in eight European countries. Helped develop the franchise system in Germany and participated in the opening of the first two stores.

Completed an operations review for the management of Bluebonnet Electric Cooperative. Assessed the current operational status and made recommendations for improved organization and future opportunities.

Developed business plan and arranged financing for Cornerstone Home and Hardware Store. Led the development of all business systems and remained as a consultant through the first three years focusing on operations, budgeting and finance.

Prepared several strategy documents for the owners of substantial real estate in the warehouse district of downtown Austin, which has experienced significant growth and development.

Vice President of Operations - Planet Pacific, Inc. - Mission Viejo, California (1991-1993)
Two years after acquisition of Espey, Huston & Associates, Inc. by Planet Pacific, Inc (PPI), was asked to relocate to the headquarters of PPI as Vice President of Operations. PPI owned three engineering firms, and owned and operated approximately 250,000 square feet of commercial real estate in Southern California. Primary role was monitoring and coordination of engineering operations, acquisition evaluation, and regular reporting to the investors of PPI.

Executive Vice President - Espey, Huston & Associates, Inc. - Austin, Texas (1972-1991)
In 1972, founded Espey, Huston & Associates, Inc., an engineering and environmental consulting firm, with Dr. William H. Espey, Jr. Firm grew from its original four employees to a peak of nearly 1,000, with annual revenue approaching $50 million, providing a broad range of design and consulting services to private and public sector clients throughout the United States and beyond. At peak, operated nine offices throughout Texas, and 13 offices in eight other states and two foreign countries. Sold to Planet Pacific, Inc. In 1989, remaining as Chief Operating Officer.

Engineering Scientist and Section Manager - Tracor, Inc. - Austin, Texas (1965-1972)

Education:

B.A. with Honors in Mathematics, University of Texas at Austin - 1965
Graduate Studies, U.T. Austin - 1965-1967
H. Y. Benedict Memorial Scholarship in Mathematics - 1963

Professional Activities:

Environmental Council of the States (ECOS)
- Executive Board - 2001-2003
- Secretary-Treasurer - April, 2003 - August, 2003
- Vice President - August, 2003 - October, 2003

Member, Government Advisory Committee to EPA Administrator, NAFTA Commission for Environmental Cooperation - May, 2003 - August, 2005

Texas Water Conservation Association, Austin, Texas
- Board of Directors - 1978-present
- Vice President and Executive Board Member - 1981-1990
- President and Board Chairman - 1991-1992
- Recipient - 56th Annual Convention Dedication - March, 2000

Fellow and Advisory Council Member, Univ. of Texas Center for Public Policy Dispute Resolution - 2003 - present

CYNTHIA C. SMILEY

BIOGRAPHY



Cindy Smiley is a partner in Kelly Hart & Hallman's Environmental and Administrative Law practice group. With more than 25 years of experience, Ms. Smiley focuses her current practice on counseling clients on federal, state, and local laws relating to water and waste issues. She represents individuals, corporations, and other business entities before the Texas Commission on Environmental Quality and other agencies in matters involving water rights, water quality, underground storage tanks, waste characterization and management, municipal setting designations, and other environmental and administrative law matters. Ms. Smiley also assists clients in matters before the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service. In addition, Ms. Smiley works with environmental consultants and clients who are evaluating potential environmental liabilities associated with property ownership, acquisition, and disposition.

EDUCATION & HONORS

- University of Texas, B.A., Plan II, *summa cum laude*, 1978
  - Phi Beta Kappa
  - Phi Kappa Phi
- University of Texas School of Law, J.D., 1981
- Outstanding Service Award presented by Environmental and Natural Resources Law Section, State Bar of Texas (August 2004)

ADMISSION & AFFILIATIONS

- State Bar of Texas, 1981
- U.S. District Court, Western District of Texas, 1988
- Austin Bar Association, Member of Administrative Law Section; Oil, Gas & Mineral Section; and Environmental, Natural Resources & Water Law Section
- Member of Executive Committee, Environmental and Natural Resources Law Section, State Bar of Texas, 2005-2008
- Board Member and Vice Chair, Industry Council on the Environment, 2007
- Chair, Southwest Section of Air & Waste Management Association, 2001-2002

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TETRA TECH

Nanotechnology: Potential Health Risks and Uncertainties

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ABSTRACT

Nanotechnology, a rapidly emerging field, encompasses an extensively broad range of technologies that take advantage of the unique properties of nanoscale materials to develop novel applications and devices. This technology is already being used in many wide-ranging fields, and the wave of applications is expected to continue at a rapid pace. Despite its perceived benefits, many questions and concerns have arisen regarding the potential implications of the development and use of nanoscale materials on human health and the environment. It is acknowledged that nanomaterials may pose new and unique health risks to humans and that it is possible that nanoscale materials may have undesirable impacts on the environment. However, very limited data currently exist to assess the potential for human health risks and impacts to the environment. Proponents of nanotechnology fear that the uncertainty of potential risks of nanoscale materials may hinder the development and commercialization of nanotechnology, while opponents fear that lack of the understanding of potential risks may manifest in unsafe production and use, and may fuel future litigation. To facilitate the continued growth of the nanotechnology field and to address occupational worker and consumer health concerns, several entities including government, industry, and academicians have already begun to research and develop frameworks for identifying, assessing, and managing nanotechnology risks. The objective of this paper is to provide a general overview of the unique chemistry of engineered nanoscale materials, the state of the science on potential risks associated with these materials, and some of the limitations and uncertainties associated with characterizing their risk.

1.0 INTRODUCTION

Nanotechnology is hailed by many as the next "big thing" – a revolutionary technology. It is poised to become possibly the most significant technology to impact social and economic development. Among academicians, government entities, legal groups, and industry, nanotechnology has evolved to mean many different things. Recently, in order to facilitate effective and accurate communication in the nanotechnology community, the American Society for Testing and Materials (ASTM) published standard terminologies defining nanotechnology and related terms (ASTM 2006). Per the ASTM standard, nanotechnology is a "wide range of technologies that measure, manipulate, or incorporate materials and/or features with at least one dimension between 1 and 100 nanometers (nm)." A nanometer is equal to one billionth of a meter (10^{-9} m). To put the dimensions of nanoscale materials (i.e., 1-100 nm) in perspective, human hair is approximately 80,000 nm wide and a red blood cell is about 7,000 nm wide.

Nanotechnology is already being applied to a broad range of industries including, but not limited to, electronics, automotive, cosmetics, medical, clothing, and energy. The most comprehensive source on nanotechnology activities indicates that about $9.6 billion was spent on research and development in 2005, and about $32 billion in products incorporating emerging nanotechnology were sold (http://www.luxresearchinc.com/press/RELEASE_TNR4.pdf). A May 2007 survey conducted by the Project on Emerging Nanotechnologies at the Woodrow Wilson International Center for Scholars indicates that there are currently about 475 consumer nano-based products in use (www.nanotechproject.org/122/nanotechnology-now-used-in-nearly-500-everyday-products; www.nanotechproject.org/consumerproducts). The National Institute for Occupational Safety and Health (NIOSH) indicates that by 2015, the global market for nanotechnology products is predicted to escalate to $1 trillion and approximately one million workers are expected to be employed by this technology in the United States alone (NIOSH 2007).

The accelerated growth of this emerging technology has drawn many concerns and skepticism from societal watch groups such as Environmental Defense and Green Peace. Proponents of nanotechnology fear that the uncertainty of potential risks of nanoscale materials may hinder the development and commercialization of nanotechnology, while opponents fear that the lack of understanding of potential safety and risks may manifest in unsafe production and consumer use, and may fuel future litigation. Some opponents point to hard lessons learned from technology such as asbestos and polychlorinated biphenyls (PCBs), which were once hailed for their excellent benefits and promise, but which later resulted in some unforeseen hazards. To address these concerns, there has been an integrated effort by government, industry, and academicians to conduct and support research on the toxicity of nanoparticles and to develop frameworks for assessing and managing nanotechnology risks. However, the critical question remains as to whether the benefits of nanotechnology can be maximized in tandem with effectively minimizing potential health and environmental hazards.

This paper provides a general overview of the unique chemistry of engineered nanoscale materials, the state of the science on potential risks associated with these materials, and some potential limitations and uncertainties associated with characterizing risks.

2.0 PHYSICAL AND CHEMICAL PROPERTIES

Nanoscale materials have been categorized into three types: natural, incidental or unintentional, and engineered or intentional. Natural nanoscale materials are tiny particles that are produced as a result of natural processes or that exist in nature, such as those emitted due to volcanic eruptions. Incidental nanoscale materials are those that are unintentionally produced due to human activity, such as diesel exhaust emissions or emissions from various industrial operations. Engineered nanomaterials are those that are intentionally created to take advantage of specific unique properties at the nanoscale. The nanoscale materials that are intentionally created (i.e., engineered) for various applications are the focus of this paper.

Engineered nanoscale materials can be created from the "bottom up" or "top-down" (EPA 2007). Bottom-up processes create materials from atoms and molecules and top-down processes create materials from their macroscale counterparts (EPA 2007). They are also derived from a wide range of materials, which affords a wide range of properties that can be manipulated or enhanced. Per EPA (2007), engineered nanoscale materials can be grouped into four categories: carbon-based materials, metal-based materials, dendrimers, and composites. Carbon-based materials are primarily comprised of carbon, and typically are hollow spheres, ellipsoids, or tubes (EPA 2007). The carbon-based nanomaterials that are spheres and ellipsoids are referred to as fullerenes, and cylindrical forms are referred to as nanotubes (EPA 2007). The metal-based materials include quantum dots, nanogold, nanosilver and metal oxides such as titanium oxides (EPA 2007). Dendrimers are nanoscaled polymers that are built from branched units, and composites are those materials that combine nanoscale materials with other bulk-type materials (EPA 2007).

Physical and chemical properties include a wide range of particle characteristics, such as elemental composition, density, crystal structure, chemical reactivity, solubility, and physical constants such as conductivity, melting point, hardness, and optical properties. For many nanoparticles, these properties are the same or similar to the properties of the material in conventional scale (Powers et al. 2006). However, one of the principal reasons that nanoparticles are of interest is the propensity for some of these properties to change as particle size decreases, generally to below 100 nm, and particularly below about 10 nm.

One of the primary characteristics that differ significantly between nanoscale and macroscale materials is the ratio of surface area to volume. As particles decrease in size, the proportion of atoms found at the particle's surface increases dramatically. In some nanomaterials, such as single-wall carbon nanotubes and fullerenes, virtually every atom in the particle is exposed on the surface. Changes in the surface-area-to-volume ratio caused by engineering to the nanoscale can change the reactivity, strength, and electrical characteristics of the material. For example, quantum dots exhibit quantum confinement which imparts unusual optical properties (a quantum dot is a closely-packed semiconductor crystal comprised of hundreds or thousands of atoms and whose size is on the order of a few nanometers to a few hundred nanometers; EPA 2007), carbon nanotubes exhibit novel mechanical and electrical properties, and nanoaluminum

particles exhibit increased reactivity over larger-scale materials of the same elemental makeup (Powers et al. 2006).

As a result of unique and diverse physical and chemical properties of nanomaterials, characterization of nanomaterials is challenging and understanding which nanoscale materials as well as which properties can or will cause human health concerns is difficult.

3.0 POTENTIAL HEALTH RISKS

The unique characteristics of engineered nanoscale materials (e.g., particle size and distribution, large surface-area-to-volume ratio, particle shape, surface chemistry, conductivity, etc.) are the key reasons they are of such great interest for development. It is believed that the same unique characteristics that make engineered nanoscale materials amenable to creating novel and broad ranging applications may potentially result in a broad range of toxic health effects and new environmental concerns.

To date, there are no known or reported cases of humans being harmed due to the manufacture of engineered nanoscale materials or the use of a nanotechnology product. Despite this finding, there is still reason for concern for potential occupational health and safety and consumer use associated with the development of nanotechnology products. The limited laboratory research studies available on the toxicity of nanoscale materials suggest that potential human health effects are possible. A number of "red flags" already indicate that some engineered nanomaterials will likely present unique health problems. In addition, studies of other similar scale nanomaterial (such as ultrafine particulate air pollution) provide preliminary estimates of possible adverse health effects that occur due to exposure to engineered nanoscale materials.

As the pace of nanotechnology continues to accelerate, the potential for human exposure will increase. The potential for nanoscale materials to enter the body is reported to be the greatest when they are in the form of nanoparticles, agglomerates of nanoparticles, and particles from nanostructured materials that become airborne or come in contact with the skin (NIOSH 2007). Humans have the potential to be exposed to nanoparticles via multiple routes, i.e., ingestion, dermal contact, and inhalation. The highest potential for human exposure to nanomaterials is projected to occur in occupational settings. However, other direct and/or indirect human exposures will likely occur due to consumer use and release of nanotechnology byproducts to the environment due to production and use.

The potential environmental fate and transport of nanomaterials in environmental media (i.e., air, water, soil, and sediment) is not well understood. There are only a few studies available on the environmental fate of nanoscale materials. Available information suggests that the properties of nanoparticles can change as they are transported in the environment, which can influence their potential toxicity (EPA 2007). They have the potential to interact with other nanomaterials and other environmental contaminants and could be transformed into lesser or more toxic materials. Bacteria and living cells can also take up nanoscale particles, which could influence the potential for these particles to bioaccumulate in the food chain (Biswas and Wu 2005).

To date, very limited data exist on the potential health effects of engineered nanomaterials. However, an extensive amount of toxicological studies are available on unintentional nanoscale particles (such as ultrafine particles), which have some similar characteristics of engineered nanoparticles with respect to size and dimensions. Several studies on the health effects of ambient air particulate matter including ultrafine particles, silica, carbon, and titanium dioxide particles are available in the scientific literature.

The findings of available studies suggest that, in general, nanoscale particles are more toxic on a mass-based exposure metric when compared to larger particles of the identical chemical composition (EPA 2007). Studies also demonstrated that particle surface area dose is a better dose metric than mass dose in predicting toxicity to inhaled particles. Available studies suggest that the toxicity of engineered nanomaterials will be directly dependent on the characteristics of the nanomaterial. Maynard (2006) report that toxicity studies on engineered nanoparticles in cell cultures and animals have shown that size, surface area, surface chemistry, solubility, and possibly shape may play a critical role in determining the potential harm that they may cause. Changing the composition or morphology of nanoparticles can significantly modify their characteristics and toxicity. Two nanoparticles with the same composition can behave toxicologically different due to very subtle but significant physical-chemical differences. Also, toxicity properties can be decreased or increased as they are being engineered or as they are transported through biological or environmental systems. Due to the diversity and complexity of engineered nanoparticles, it is therefore not possible to generalize about their potential toxicities.

The inhalation route of exposure is anticipated to be the most likely route in an occupational setting, so research efforts have focused on inhalation studies of nanomaterials. Several studies have reported potential effects to various nanoscale materials via the inhalation route. Studies in laboratory animals indicate respiratory toxicity following high exposures to nanotubes (Warheit et al. 2004; Lam et al. 2004). Warheit et al. (2004) reported that pulmonary toxicity studies in rates demonstrate that lung exposure to nanoparticles cause greater adverse inflammatory responses relative to larger particles with identical composition and equivalent mass concentration. Warheit et al. (2004) suggest that surface properties (particularly surface area) and free radical generation by the interaction of particles with cells appear to play critical roles in nanoparticle toxicity. Additional factors that could potentially influence nanoparticle toxicity include species differences, particle aggregation, and surface coatings. It has been demonstrated that inhaled nonparticles can enter the blood stream and may also circumvent the blood brain barrier, which has significant implications for potential harm on the central nervous system, specifically toxicity to the brain.

Less is know about the toxicological effects of nanomaterials via ingestion and dermal (skin) contact. Mice exposed via ingestion to nanoscale copper particles showed toxic effects on the kidney, liver and spleen (Chen et al. 2006). Even though the skin is traditionally considered to be an effective barrier to the penetration of large particles (> 1 um), studies show that penetration of nanoscale materials is possible but there is debate in scientific circles as to whether or not these materials can penetrate healthy intact skin. There is some evidence that dermal exposure to nanomaterials may also cause may cause inflammation in the lymph system.

Very limited studies have evaluated environmental impacts due to release of engineered nanoparticles. Toxicity studies and structure-activity relationship predictions suggest that some suspended natural nanosized particles in the aquatic environment will have low toxicity to aquatic organisms, with effects thresholds ranging from tens to thousands of parts per million (EPA 2007). Studies also indicate, however, that nanomaterials such as nanosilver particles are effective bactericidal agents.

To date, very few studies have successfully been conducted to assess potential toxicity of nanomaterials to ecological terrestrial test species such as plants, wildlife, soil invertebrates, or soil microorganisms (EPA 2007).

A challenge in evaluating risks associated with the production and use of engineered nanomaterials is the diversity and complexity of the potential types of nanomaterials that can be developed. Assessing the risk of these unique materials will require specific protocols and regulatory guidance to facilitate consistency in evaluations. EPA expects that the National Academy of Sciences risk assessment paradigm (consisting of hazard identification, exposure assessment, toxicity assessment, and risk characterization steps) will be appropriate for the risk assessment of nanomaterials (EPA 2007) but will require the inclusion of a life-cycle ("cradle-to-grave") approach. There is currently pressure on the federal government to increase its spending on nanorisk research and to develop the specific regulations to address nanotechnology products. To date, several frameworks have been proposed, but the most comprehensive framework that has been published is the collaborative effort of the Environmental Defense and DuPont (Environmental Defense-DuPont Nano Partnership 2007). This framework presents a 6-step process that seeks to provide guidance on evaluating and managing risk using an approach that is practical, comprehensive, transparent, and flexible. This process is designed for use by small and large companies, regulatory agencies, universities, and other groups interested in commercializing nanomaterials. This framework should not be viewed as regulation; however, it represents a significant step in the direction of trying to systematically establish guidance for evaluating nanotechnology risks.

4.0 UNCERTAINTIES

Given that nanotechnology has yet to achieve "mainstream" status, it is not surprising that there is a lack of information concerning health, safety, and environmental impacts. Knowledge gaps exist in a number of fundamental areas (The Royal Society and Royal Academy of Engineering 2004):

- detection and monitoring tools to evaluate exposure – many types of nanoparticles are too small to be measured by most instruments, and measurement standards do not exist
- characterization of various nanomaterials – it is not know which physical properties correlate most closely with toxicity, and industry proprietary nanotechnology data are not readily available to the general scientific community
- environmental fate and transport – no protocols exist for investigating the long-term environmental fate of nanomaterials, including their behavior in air, water, and soil, as well as their interactions with other chemicals
- epidemiology – little is known about the relationship between exposure to nanomaterials and health outcomes
- toxicology – there are few *in vivo* (whole animal) or *in vitro* ("test tube") protocols and models for investigating the toxicology of nanomaterials in humans and other species, nor is much known about the interaction of nanoparticles with living cells and subcellular structures

These knowledge gaps have a profound impact on the assessment of nanotechnology health risks. A number of additional questions remain with respect to nanotechnology risk assessment (EPA 2007):

- Is the current EPA risk assessment paradigm (hazard identification, exposure assessment, toxicity assessment, and risk characterization) applicable to quantifying nanotech risks? Are conventional metrics (i.e., mass) sufficient for estimating dose? Can conventional risk theories and equations used for chemicals be applied to nanomaterials?
- Will current particle and fiber toxicological data bases have the ability to predict the toxicity of intentionally produced nanomaterials?
- Are there specific toxicological endpoints that are of higher concern for nanomaterials such as neurological, cardiovascular, respiratory, or immunological effects? Are there subpopulations that may be at increased risk of adverse health effects associated with exposure to intentionally produced nanomaterials?
- Are current testing methods (organisms, exposure regimes, media, analytical methods, and testing schemes) applicable to testing nanomaterials in standardized agency toxicity tests? Will *in vitro* studies adequately characterize potential toxicity *in vivo*?

Clearly, the promise of "better living through nanotechnology" (to borrow from a Dow Chemical catch phrase) must be viewed in light of these uncertainties and gaps in knowledge. Research is needed to inform all actions related to the benefits and impacts of nanomaterials

(EPA 2007). However, there are significant challenges to addressing research needs for nanotechnology and the environment. The sheer variety of nanomaterials and nanoproducts adds to the difficulty of developing research needs. Each stage in their lifecycle, from extraction to manufacturing to use and then to ultimate disposal, will present separate research challenges. Nanomaterials also present a particular research challenge over their macro forms in that there exists a limited understanding of nanoparticles' physicochemical properties. Research will likely come from many sources, including academia, industry, EPA, and other agencies and organizations.

5.0 SUMMARY

Nanotechnology may represent the most significant technology to impact social and economic development. Nanotechnology is already being applied to a broad range of industries including, electronics, automotive, cosmetics, medical, clothing, and energy. About $9.6 billion was spent on research and development in 2005, and close to $32 billion in products incorporating emerging nanotechnology were sold. The accelerated growth of this emerging technology has drawn many concerns and skepticism from societal watch groups, and opponents fear that the lack of understanding of potential safety and risks may manifest in unsafe production and consumer use, and may fuel future litigation. Proponents of nanotechnology fear that the uncertainty of potential risks of nanoscale materials may hinder the development and commercialization of nanotechnology.

Nanoscale materials have been categorized into three types: natural, incidental or unintentional, and engineered or intentional. Engineered nanoscale materials can be created from the "bottom up" or "top-down". Bottom-up processes create materials from atoms and molecules and top-down processes create materials from their macroscale counterparts. One of the primary characteristics that differ significantly between nanoscale and macroscale materials is the ratio of surface area to volume. As particles decrease in size, the proportion of atoms found at the particle's surface increases dramatically. Changes in the surface-area-to-volume ratio caused by engineering to the nanoscale can change the reactivity, strength, and electrical characteristics of the material. As a result of unique and diverse physical and chemical properties of nanomaterials, characterization of nanomaterials is challenging and understanding which nanoscale materials as well as which properties can or will cause human health concerns is difficult.

To date, there are no known or reported cases of humans being harmed due to the manufacture of engineered nanoscale materials or the use of a nanotechnology product, but very limited data exist on the potential health effects of engineered nanomaterials. However, an extensive amount of toxicological studies are available on unintentional nanoscale particles (such as ultrafine particles), which have some similar characteristics of engineered nanoparticles with respect to size and dimensions. The findings of available studies suggest that, in general, nanoscale particles are more toxic on a mass-based exposure metric when compared to larger particles of the identical chemical composition. The inhalation route of exposure is anticipated to be the most likely route in an occupational setting, so research efforts have focused on inhalation studies of nanomaterials. Less is know about the toxicological effects of nanomaterials via ingestion and dermal (skin) contact. Very few studies have successfully been conducted to assess potential toxicity of nanomaterials to ecological terrestrial test species such as plants, wildlife, soil invertebrates, or soil microorganisms.

Research is needed to inform all actions related to the benefits and impacts of nanomaterials. The sheer variety of nanomaterials and nanoproducts adds to the difficulty of developing research needs. Research will likely come from many sources, including academia, industry, EPA, and other agencies and organizations.

6.0 REFERENCES

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ABA SEER CAA Nanotechnology Briefing Paper

American Bar Association
Section of Environment, Energy, and Resources

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ABA SEER CAA Nanotechnology Briefing Paper[1]

EXECUTIVE SUMMARY

In reviewing the statute, regulations, guidance, science, engineering, and technology utilized in implementing the Clean Air Act (CAA), the American Bar Association (ABA) Section of Environment, Energy, and Resources (SEER) CAA Nanotechnology Subcommittee developed this paper outlining possible application of the CAA to engineered nanoparticles (specifically excluding non-engineered nanoparticles, such as naturally occurring nanoparticles or nanoparticles from combustion sources). Several critical issues arise in this application. The most important issues are summarized in the following paragraphs.

First, the U.S. Environmental Protection Agency (EPA) must distinguish between types of nanoparticles, identifying nanoparticles posing actionable risk, and determining appropriate regulatory approaches for each type of nanoparticle requiring regulatory control. Nanoparticles exist in many forms in our environment today from natural and manmade sources, such as smoke, pollen, and viruses. For the first time, however, technology has developed sufficiently to allow the intentional engineering of structures with dimensions in the range of one to 100 nanometers, however. The almost infinite variety of nanostructures renders generalizations difficult and problematic, while the process of developing regulation addressing nanoparticle emissions requires caution to ensure proper priority is utilized in determining which types of nanoparticles require more conservative regulatory approaches.

Second, EPA must develop appropriate methods of sampling, analysis, and control sufficiently effective for nanoparticles. In reviewing existing tools used by current regulatory approaches, it is clear that current sampling, analytical, and control methods are ineffective when applied to nanoparticles. These methods were developed by exploiting the chemical and physical characteristics of larger particles and chemical vapors, chemical and chemical characteristics that are not shared by nanoparticles. Yet recently developed technology can fill that void utilizing EPA's existing programs.

Third, EPA must recognize and adapt to a new form of "quantification" as number, rather than mass. Currently, all CAA standards are based upon mass limitations whether mass concentrations, such as micrograms per cubic meter, or mass limitations, such as tons per year. It does not appear as though nanoparticulate can be effectively regulated in terms of mass because each particle potentially subject to regulation has an insubstantial weight not practicably quantifiable using ordinary methods. Moreover, collecting nanoparticulate and then weighing once the mass is sufficiently substantial would render the measurement meaningless because the size distribution, and thus number of nanoparticles, would be lost due to agglomeration. Thus, it appears that nanoparticles must be measured in terms of number, rather than mass.

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[1] Mary Ellen Ternes, McAfee & Taft, authored this paper with the kind assistance of Kenneth Meade, Wilmerhale.

Fourth and finally, to avoid creating unnecessary delay in developing strategies to address nanoparticle emissions, which could result in overregulation stifling this new industry, EPA must recognize that the current CAA program already contains sufficient authority to adequately address each of the issues discussed above, as more thoroughly explored below. But most importantly, EPA needs to determine the most efficient method to assess the risk from engineered nanoparticles and establish an appropriate mechanism to prioritize which types of engineered nanoparticles require attention first.

I. BASE ASSUMPTIONS

A. Behavior of Nanoparticulate

When matter gets really small, it behaves differently, and it is this different behavior that those in the fields of nanoscale science and engineering now recognize as an incredible tool in achieving valuable benefits to our society.

The difference in behavior occurs because atomic properties become more significant as the atom or atoms are freed from the affects of surrounding material. An easy example is gravity -- gravity does not matter, almost.[2] Also, the surface area of an atomic-sized bit of particulate matter is much greater in proportion to the contents of that atomic-sized bit of matter than larger sized particulate matter, allowing the atomic-sized bit of matter to become more chemically reactive -- important for catalysts in, for example, fuel cells and batteries.[3] The behavior of the matter is also more influenced by "quantum effects," which, simply put, is behavior of matter at the atomic level that is different than the behavior of that very same type of matter on a larger scale. For example, heat is absorbed continuously by normal scale matter, but only in discrete amounts for atomic sized matter,[4] while conductivity has been shown to occur in two dimensional nanoapplications, such as one layer of graphite (*i.e.*, pencil "lead").[5] The difference in chemical and physical properties and behaviors of this material is one of the biggest challenges facing environmental regulation of this industry.

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2 Physics Web, News for January 2002, Neutrons reveal quantum effects of gravity (Jan. 17, 2002) ("Physicists have observed quantized states of matter under the influence of gravity for the first time; … cold neutrons moving in a gravitational field do not move smoothly [as predicted for gravitational fields by the equivalence theory] but jump from one height to another, as predicted by quantum theory; … the effect of gravity is negligible at the atomic scale"), *see* http://physicsweb.org/articles/news/6/1/9.

3 The Royal Society & The Royal Academy of Engineering (July 2004) at 5.

4 Max Planck (1900) (energy can be released (or absorbed) by atoms only in "packets" of some minimum size; this minimum energy packet is called a quantum).

5 Scientific American, "Graphite Found to Exhibit Surprising Quantum Effects" (Nov. 10, 2005) ("Albert Einstein, Paul Dirac and other founding physicists may have used pencils to work out the details of relativity and quantum mechanics. Now their modern successors are employing pencil lead in a new way to prove those theories -- and potentially point the way toward a whole new form of electronics.").

Environmental policy and regulation developed to date relies on familiar chemical and physical properties:

- Solubility, the degree to which a substance can dissolve in another before reach saturation (*e.g.*, the difference between a positive analysis for BTEX versus free product in an UST cleanup);

- Reactivity, the degree to which a substance reacts with another (*e.g.*, the amount of a material necessary to neutralize an acid or base);

- Toxicity, calculated based upon assumed exposure routes and amounts for carcinogens and noncarcinogens; and

- Mass, a measure of the Earth's gravitational pull on a material (almost all environmental release restrictions are based on mass).

Environmental policy and regulation of nanoparticles, however, may introduce an entirely new set of critical parameters, including aerodynamic size, surface area, shape, composition (organic, metallic, or both), conductivity, and reactivity.

Moreover, in attempting to evaluate the risk posed by these nanostructures, if we look merely at the base element, such as carbon in a carbon sheet, nanotube, or buckyball, these forms seem relatively benign. When the properties of carbon in such forms reveal increased conductivity depending on the "chirality" or relative twisting of the structure as in DNA's double helix, however, we are reminded that engineered nanostructures are engineered precisely for these unique properties that arise from the structure itself, rather than the mere element or molecule alone, causing the properties of the structure to be the characteristic properly subject to regulation, rather than the properties of the element or molecule, as is currently regulated.

Evaluating the risk posed by different types of engineered nanoparticles becomes even more challenging when the structures utilize elements or chemicals currently regulated due to their systemic toxicity or carcinogenicity, and even more so due to the potential synergistic effects of structures combining these high risk elements or chemicals.

1. Targeted Nanoparticle As Engineered Product

Nanoparticles have always existed in the natural world and are a commonly recognized product of naturally occurring combustion (*i.e.*, forest fires and volcanic eruptions). It is not a stretch to understand that internal combustion engines, power plants, fire places, charcoal grills and scented candles all generate nanoparticles as well. These particles are merely byproducts of combustion and, though man-made, are not "engineered," however.

"Engineered" nanoparticles are those products manufactured through construction at the molecular level. Recent developments in methods and equipment can now be used to

manipulate single atoms. Single atoms have been manipulated into sheets, tubes, and spheres called "buckyballs,"[6] all made of simple carbon. Other types of nanoengineering include:

- Attaching benzene molecules to carbon sheets to conduct electricity;
- Using the M13 virus to attract and bind cobalt oxide ions on its outside layer to create positive electrodes;[7] and
- Killing cancer cells with a nanoparticle of polymer loaded with toxic docetaxel, studded with aptamers (tiny proteins) and polyethylene glycol molecules.[8]

The types of equipment used to manipulate atoms include the "scanning tunneling microscope" in 1982, and the atomic force microscope in 1986.[9] This equipment actually allows us to pick up an atom, slide or drag an atom, and build nanostructures.

Generally, nanoscale manufacturing occurs in either a "top-down" or "bottom-up" method, and in either a wet or dry environment. Top-down manufacturing involves breaking down a surface through cutting, edging, or grinding or imposing a pattern through lithography to create computer chips, or optical mirrors. Bottom-up manufacturing involves building materials through chemical synthesis, including both self-assembly (*i.e.*, growing crystals) and positional assembly, to create a variety of products, including cosmetics, fuel additives, displays, or experimental atomic or molecular devices.[10]

These manufacturing methods generally begin by subjecting a medium of solid, liquid, or gas to a reaction, which results in a transformation with a particular efficiency, creating a product of a particular purity which must be separated from unreacted byproducts.[11] Essentially, these production stages are very similar to those currently used in manufacturing, in either continuous or batch processes. Thus, points of potential waste generation and possible routes of exposure to waste byproducts would likely be similar and thus somewhat predictable.

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6 *See* http://www.nanotech-now.com/nanotube-buckyball-sites.htm.

7 Researchers trying to make tiny machines have turned to the power of nature, engineering a virus to attract metals and then using it to build minute wires for microscopic batteries. Reuters (Apr. 6, 2006).

8 Nanoparticles Annihilate Prostate Cancer, Scientific American (Apr. 11, 2006).

9 The Royal Society & The Royal Academy of Engineering (July 2004) at 6.

10 *Id.* at 25 (Table 4.1).

11 *See generally id.* at 26 (Table 4.2).

Examples of manufacturing sectors currently utilizing nanotechnology include:[12]

- Structural applications -- ceramics, catalysts, composites, coatings, thin films, powders, metals;
- Skincare products -- metal oxides (titanium dioxide, zinc oxide, iron oxide);
- ICT -- single wall nanotubes, nano elecronics, optic-electro materials (titanium dioxide, zinc oxide, iron oxide), organic light-emitting diodes;
- Biotechnology -- nanoencapsulates, targeted drug delivery, bio-compatible quantum dots, composites, biosensors;
- Instruments, sensors, characterization -- MEMs, NEMs, SPM, dip-pen lithography; and
- Environmental -- nanofiltration, membranes.

A manufacturing process that utilizes nanotechnology, in one form or another, may produce manufactured nanoparticulates that escape the manufacturing process, as well as byproducts that do not conform to the desired product specifications (and may be discarded as waste or allowed to escape as air pollutant emissions). Current air pollution monitoring methods, ambient air modeling methods, sampling and analytical methods, and control methods, do not perform adequately when applied to nanoparticles because they were created to identify, measure by mass, capture, and control elements or molecules of no particular physical shape or structure (other than size greater than 1000 to 1500 nanometers that behave in predictable ways both chemically and physically)

II. STATUTORY MODEL: THE CLEAN AIR ACT

The CAA established a process by which EPA can attempt to regulate releases of pollutants into the ambient air. This process includes identifying the types of pollutants, characterizing the risk of exposure to these pollutants once released to the atmosphere, controlling the release of these pollutants to the degree necessary to protect human health and the environment (based upon the potential risk once released), and monitoring the ability of regulated entities to capture these pollutants to prevent or mitigate their release.

The risk posed by exposure to nanoparticles in general is currently not well defined. Much work has been done to characterize the risk posed by certain types of

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[12] *Id.* at 27; *see also* EPA, External Review Draft: Nanotechnology White Paper (Dec. 2, 2005), available at http://www.epa.gov/osa/pdfs/EPA_nanotechnology_white_paper_external_review_draft_12-02-2005.pdf; Nanomaterials a risk to health at Work? First International Symposium on Occupational Health Implications of Nanomaterials; Nanoparticles and the Environment, Pratim Biswas, Chang-Yu Wu.

nanoparticles, particularly nanoparticles produced by conventional combustion technologies used, for example, in mobile sources and power plants. While nanoparticles may consist of constituents that are currently regulated pursuant to the CAA, they behave very differently from those currently regulated due to their small size, negligible mass, and higher reactivity resulting from larger surface areas. As a result, application of conventional methods to identify, monitor and measure, and control nanoparticles is, for the most part, inappropriate.

The CAA does provide the statutory framework and authority to both regulate these emissions of engineered nanoparticles, as well as to support the development of the appropriate tools to identify, monitor, and measure emissions of engineered nanoparticles and establish proper emission limitations and compliance tools, however. The following discussion addresses the provisions of the CAA relevant to EPA's regulation of engineered nanoparticle emissions.

A. Subchapter I, Part A -- Air Quality and Emission Limitations, §§ 101, 103, 108, 109, 110, 111, 112, 123

1. Sec. 101. Findings and Purpose

In enacting the CAA, Congress found, in relevant part, that the growth in the amount and complexity of air pollution brought about by industrial development had resulted in mounting dangers to the public health and welfare, including hazards to air. Congress additionally found that federal leadership would be essential for the development of cooperative federal, state, regional, and local programs to prevent and control air pollution.

Congress thus declared the purpose of the CAA was to protect and enhance the quality of the Nation's air resources so as to promote the public heath and welfare and the productive capacity of its population, as well as to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution.

This statutory authority applies with equal force to regulation of nanoparticle emissions where such emissions present a threat to the public health and welfare.

2. Sec. 103. Research, Investigation, Training, and Other Activities

With Section 103, Congress provided the Administrator with authority to establish a national research and development program for the prevention and control of air pollution, giving the Administrator broad authority to coordinate with other federal departments and agencies, and to develop a program of research, testing, and development of methods for sampling, measurement, monitoring, analysis, and modeling of air pollutants, including consideration of individual as well as complex mixtures of air pollutants and their chemical transformations in the atmosphere.

Nanoparticulate emissions would certainly seem to fall well within "complex mixtures" and "their chemical transformations in the atmosphere." Certainly, EPA's current

regulatory and policy development structure created in reliance on Section 103 is well-suited to address air emissions resulting from the emerging nanotech industry.

a. Air Pollutant Emissions Measurement

The Emission Measurement Center (EMC) of the EPA Office of Air Quality Planning and Standards (OAQPS) develops procedural methods used to characterize and measure air pollutant emissions. The EMC is divided into two groups -- Source Measurement Analysis Group and Source Measurement Technology Group. The EMC is part of the Emissions Monitoring and Analysis Division in OAQPS. Bringing together research scientists in EPA's Office for Research and Development (ORD) and those in OAQPS that are responsible for developing national performance and emissions standards, the EMC has developed methods for measuring air pollutants generated by the entire spectrum of industrial stationary sources. The EMC also serves as a conduit between regulators and the regulated community in providing technical expertise and guidance necessary to implement the rules, especially in specifying emission testing methods for pollution control evaluations, compliance determinations, and performance testing. The EMC is the EPA's focal point for planning and conducting field test programs to provide quality data in support of regulatory development, producing validated emission test methods, and providing expert technical assistance for EPA, state, and local enforcement officials and industrial representatives involved in emission testing.

The EMC publishes methods for emissions testing and monitoring in five categories differentiated by (1) the legal status of the methods with regard to their application under federally enforceable regulations and (2) the validation information available on the method and EPA's corresponding confidence in application of the method for its intended use. The EMC has published methods in the *Federal Register* that have been codified in 40 C.F.R. Parts 51 (SIP), 60 (NSPS), 61 (NESHAP) and 63 (MACT). In addition, the EMC also develops source category approved alternative methods (EPA approved alternatives to promulgated methods), conditional methods (methods reviewed and potentially applicable to specific source categories), preliminary methods (not well-defined but potentially useful in specific scenarios as gap-filling methods), and "idea box" methods (intended to promote information exchange only).[13] Methods developed by the EMC to date cover a wide variety of industry sectors and air pollutants.

It is clear from the breadth of the methods that EMC has developed to date that the EMC has statutory authority and the technical expertise to investigate and develop methods, using and building upon current state-of-the-art laboratory procedures, that would be adequate for at least quantifying nanoparticulate emissions.

Any effort to do so faces significant challenges. For example, there are detailed discussions in the docket materials supporting EPA's $PM_{2.5}$ rule regarding the struggles that are faced in attempting to capture and quantify nanoparticulate emissions. Though EPA recognizes many categories of ultra-fine particles less than 1 micron in diameter ("ultrafine particles" less than 0.1 micron in diameter that grow by coagulation or condensation and accumulate; "Aitkin-

13 *See* http://www.epa.gov/ttn/emc/tmethods.html.

Mode Particles between 0.01 and 0.1 micron, and Nucleation-Mode Particles less than 0.01 microns), EPA's own draft Staff Paper addressing $PM_{2.5}$ monitoring[14] provides that the $PM_{2.5}$ rule requires ambient monitoring using technology that is capable of capturing merely 50% of particles with aerodynamic diameter of 2.5 microns, 50% collection efficiency being deemed the effective cut off point.[15] However, the Staff Paper goes on to recognize various types of non-mass reliant ultra fine monitoring devices that count number, rather than capture and weigh mass,[16] including the nano-scanning mobility particle sizer (NSMPS), which counts particles between 0.003 to 0.15 μm range (as opposed to a standard scanning mobility particle sizer (SMPS), which counts particles in the 0.01 to 1 μm range). All of these techniques are discussed as "widely used in aerosol research."[17]

EPA's Staff Paper also recognizes, however, that while it may be possible to count ultrafine particulates, they change so quickly that the time distribution over the counting process may render the final count meaningless.[18] These changes affect the distribution of size, volume, and surface area of the nanoparticles. For example, while the Staff Paper discussed "typical distribution" of ambient particles,[19] all of these distributions may vary across locations, conditions, and time due to differences in sources, atmospheric conditions, topography, and the age of the particulate.

b. Air Pollutant Emissions Modeling

EPA also has a wide variety of resources that are used to model air pollution. EPA currently operates the Support Center For Regulatory Air Models (SCRAM) site, which provides information about mathematical models used to predict the dispersion of air pollution, such as computer codes, meteorological input data, documentation and guidance on usage. EPA's Regional Modeling Center provides information and data associated with regional applications, including a description of modeling projects, tabular and graphical summaries of the emissions scenarios, simulated model results, and access to emissions and meteorological inputs and predictions. EPA's The Modeling Clearinghouse is used for review of modeling techniques in specific applications. In its modeling, EPA utilizes Models-3, a flexible software

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14 Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, Table 2-1, OAQPS Staff Paper -- First Draft (EPA-452/D-03-00) (Aug. 2003).

15 *See also* 40 C.F.R. Part 50, Appendix L; 40 C.F.R. Part 53, Subpart F, Table F-3 (showing "fine" particulate as 0.85 microns).

16 *See* Staff Paper at Section 2.4.2.

17 *See* Continuous and Semi-Continuous Methods for PM Mass and Composition, Paul Solomon and Constantinos Sioutas, EM (Apr. 2006) at 17.

18 Staff Paper at 2-4 and 2-5.

19 The largest number of ambient particles in a typical distribution are very small, below 0.1 μm in diameter; however, most of the particle volume, and therefore most of the mass, is found in particles with diameters larger than 0.1 μm. Most of the surface area is between 0.1 and 1.0 μm, the distribution of which peaks around 0.2 μm. *Id.*

design system to simplify the development and use of environmental assessment and decision support tools for a wide range of applications from regulatory and policy analysis to understanding the interactions of atmospheric chemistry and physics. The initial version of Models-3 contains a Community Multiscale Air Quality (CMAQ) system with capabilities for urban to regional scale air quality simulation of tropospheric ozone, acid deposition, visibility, and fine particulate. EPA's Air Quality Modeling Group provides support in atmospheric and mathematical technique.

EPA also has models specifically designed for air toxics, including the Industrial Source Complex (ISC3) model, or, for more simple screening, the TSCREEN model. Stationary sources can also utilize EPA's "Guidance on the Application of Refined Dispersion Models for Hazardous/Toxic Air Releases," which provides guidance on the use of dense gas models.

The major barrier preventing use of EPA's current modeling resources to characterize the fate and transport of nanoparticle pollutant emissions in the atmosphere is that the current set of models utilize parameters (*i.e.*, follow rules) that describe the behavior of the target pollutants that are either measurable particulate in steady state or are chemicals, in each case regulated by mass. Because nanoparticles are neither steady state, nor properly regulated as mass, these models simply cannot be used for purposes of modeling nanoparticles. Thus, until measurement and modeling methods are developed for nanoparticles that take into account the unique nature of these pollutants, nanoparticulate emissions cannot be reliably measured, and their fate and transport in the atmosphere cannot be predicted. Because there are so many different types of nanoparticles that can vary so widely, work to develop proper measurement and modeling parameters must be carefully managed to ensure efficient use of resources and development of appropriate priorities.

3. Sec. 108. Air Quality Criteria and Control Techniques

Section 108(a) requires EPA to publish a list including each criteria air pollutant for the purpose of establishing national primary and secondary ambient air quality standards within 30 days after December 31, 1970, to be revised "from time to time, thereafter." Thus, theoretically, EPA could revise the NAAQS to include nanoparticles. A simpler path forward may be to simply revise the tools used to monitor the current $PM_{2.5}$ NAAQS so that nanoparticles are included in the $PM_{2.5}$ compliance requirements.

Section 108(b) requires EPA to publish air pollution control techniques simultaneously with the publication of the criteria pollutants list or a revision to that list. If EPA decided to designate nanoparticles as a criteria pollutant (which seems unworkable given the time consuming process of criteria pollutant process), then EPA would be required to also publish air pollution control techniques. EPA enforces air pollution control efficiencies and even specific technologies in implementing many sections of the CAA as discussed below, however.

a. Conventional Air Pollution Control Technology

The CAA requires the use of specific pollution control technologies and work practices at stationary sources through several different sections of the CAA: Standards of Performance for New Stationary Sources (NSPS pursuant to Section 111), Prevention of Significant Deterioriation/New Source Review (PSD/NSR pursuant to Sections 108 and109, and 160 through 193), and National Emission Standards for Hazardous Air Pollutants (NESHAPs pursuant to Section 112). Each of these statutory programs requires certain control technologies and work practices, and/or equivalent control efficiencies.

Processes that combust hazardous and solid waste, and the pollutants that are emitted by these processes, are regulated by a wide variety of conventional air pollution control methods proscribed by these programs. These industries combust extremely varied waste streams, creating nanoparticles of every type. Air pollution control methods currently used by waste combustion sources are designed to control a wide variety of pollutants, including acid gases such as chlorides or other halogen acid gases, criteria pollutants such as nitrogen oxides and sulfur dioxides, volatile organic compounds which are photoreactive and can form ozone, and particulate emissions. Any attempt to control nanoparticulate emissions, however, must be focused on ultrafine particulates that are much less than 2.5 microns (2500 nanometers) in diameter (also commonly referred to as aerosols, fumes, or very fine dust). A wide variety of air pollution control equipment is currently utilized to control types of emissions from stationary sources that may contain nanoparticulates such as fumes, mists, dusts, sprays, smokes, fly ash, coal dust, metal fumes and dust, carbon black, pulverized coal, and alkali fumes. Those methods include cyclones, scrubbers, filters, and electrostatic precipitators. Higher efficiency scrubbers and filters include ultrasonic venturi scrubbers, liquid scrubbers and packed beds, and high efficiency particulate air filters.[20]

All of these gas scrubbing techniques utilize one of four types of mechanisms for collecting particulate matter: interception, gravitational force, impingement, or contraction and expansion. Interception causes an effective increase in size of the fine particle, allowing it to be affected by gravity and thus easier to remove through settling, or slowing of the gas stream sufficiently to allow particles to fall out. Impingement occurs when an obstacle is placed in the gas stream itself such that particles that are too heavy to flow around the obstacle strike the obstacle itself. Contraction involves condensation of the moisture in the stream in an area of

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[20] In ultrasonic venture scrubbers, the stack gas is accelerated through an impact zone, causing the particulate to stick together or "agglomerate," after which the gas is circulated through a settling chamber to allow gravity to pull down the larger sized particulates. Scrubbers and packed beds remove particulate by causing the gas stream to percolate through, and contact, absorbing liquid, frequently utilizing packing to increase surface area for maximum contact between gas and liquid; HEPA filters remove particulate by filtering small particles from the gas stream while electrical precipitators collect oppositely charged particles. Handbook of Incineration Systems, Calvin Brunner, P.E., D.E.E., Chapter 22, Figure 22.1.

high turbulence, resulting in improved contact between solid and liquid particles which, through agglomeration, become heavy enough to separate from the gas stream.[21]

The removal efficiency achieved by each of these methods is dictated in large part by particle size (without considering operational parameters that are unrealistic in application, such as attempting extraordinarily high pressure drops to achieve greater impacts), either initial particle size or the size of the agglomerated particle created by the control device. Beginning with particles less than 100 nanometers, however, the chemical and physical characteristics of these particles do not behave as larger particles do, rendering these conventional control device techniques ineffective.

As an example, solid waste incinerator emissions treated with multistage controls, including a venturi and spray scrubber, achieved particulate removal efficiencies approaching 100% for all particulate matter over 5 microns in diameter, with 54.6% of the particulate emissions less than 760 nanometers in size. Thus, after applying all the stages of current air pollution control technology, approximately one half of the remaining particulates that will be emitted by this combustion source will be less than 760 nanometers.

Recent literature describing a study of venturi scrubbers utilizing a fine-water mist spray to achieve nucleation and agglomeration did achieve reportable removal efficiencies of particles between one and 100 nanometers.[22] With the aid of the fine-water mist spray to first cause the ultra-fine particulate to stick together into larger particles, the scrubber achieved 40% removal efficiency for 50 nm particulate, and 80% removal for 100 nm particulate.[23]

b. Enhancements Benefitting Nanoparticulate Removal

Currently, devices relying primarily on impact and agglomeration have not yet been developed for nanoparticulate removal in industry, though devices such as cyclones enhanced through operation at low pressures or addition of electrical fields may show some promise.[24]

Filtration systems, such as conventional HEPA filters and ultra-low particulate air-rated filters, have reportedly achieved relatively high removal efficiencies of fine particulate, such as 99.97% removal at 7300 nm and 99.9999% removal at 100 nm, but only if using very high-pressure drops. Use of a filtration system with very high pressure drops is not a widespread

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21 *Id.* at 22.14.

22 *An Efficient Venturi Scrubber System to Remove Submicron Particles in Exhaust Gas*, Cheun-Jinn Tsai, Chia-Hung Lin, Yu-Min Wang et. al, Journal of the Air & Waste Management Association, Vol. 55, p. 319 (Mar. 2005).

23 *Id.* at 323.

24 *Nanoparticles and the Environment*, Pratim Biswas and Chang-Yu Wu, Journal of Air & Waste Management Association, Volume 55, p. 708, 720 (June 2005).

practice, as it requires maximum performance, very high power usage and may damage the filtration equipment. The performance of these filters may be enhanced without using such great pressure drops by using electrostatically augmented air filters and dielectric screens.[25] These applications, however, are expensive and typically used only where absolutely necessary, such as ultra-clean rooms for micro-electronics component assembly or hospital surgeries. It is not yet clear whether this type of filtration will be feasible, adequate, or practical for industrial applications.

Another potential method of nanoparticulate control may involve utilizing a temperature gradient to direct nanoparticulate direction. In areas with higher temperatures, the nitrogen and oxygen molecules in the air are more excited and, thus, move around more. This movement effectively pushes the nanoparticle to an area of less molecular excitation (*i.e.*, a cooler area). This type of collection is called "thermophoretic collection" or "thermogenic separation." The potential benefit of this type of particulate collection for nanoparticles is that the effect is independent of size, as long as the size is nanoscale. Another benefit of thermophoretic collection is that many nanoscale synthesis systems utilize high temperatures to enhance chemical reactions necessary to achieve the molecular state from which the desired nanoparticle can be assembled through nucleation (preferred joining together, as in agglomeration or crystallization). The nucleation process occurs in a quench zone with high temperature gradients from hot to cool. Thus, thermophoretic collection systems may be a natural method for nanoparticulate collection, although the issue of removal remains.[26]

Another promising method for nanoparticulate removal, especially for systems with low-pressure drops (relatively constant pressure systems with low gas stream velocity), is the use of electrical fields. Particles that are electrically charged and subjected to an electric field become attracted to collector walls. Studies have indicated, however, that some particles fail to achieve a charge using standard electrical methods, resulting in less efficient capture (*i.e.*, from 90% for 60 nm particulate to less than 10% for 10 nm particulate). Enhancement of the process with additional directed ionization sources ("soft X-ray irradiation and unipolar coronas"), however, greatly enhances the capture efficiencies, raising them to greater than 99.99% for 5 to 100 nm particles.[27]

Thus, it is clear that air pollution control technologies exist upon which EPA can rely in implementing specific air emission standards pursuant to the various sections of the CAA.

4. Sec. 109. National Ambient Air Quality Standards

If EPA determined to regulate emissions of engineered nanoparticles as a new criteria pollutant pursuant to CAA Section 109, a fundamentally different approach would be in order. The criteria pollutants adopted to date by EPA pursuant to Section 109 (and their precursors) are regulated in terms of mass per volume of air. Nanoparticles may very well be

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25 *Id.*

26 *Id.* at 721.

27 *Id.*

$PM_{2.5}$, behave like VOC ozone precursors, or they may contain lead. It is unlikely that regulation of engineered nanoparticles based on mass limitations would be sufficient or adequate in terms of eliminating or minimizing the health impacts of ambient concentrations of these nanoparticles, however. Section 109 does not require that the regulation of identified criteria pollutants be based upon mass limitations or concentrations determined by mass. Therefore, Section 109 does not prevent EPA from adopting criteria pollutant primary or secondary standards based upon "number" of particles, rather than mass. The question may be, given the relatively smaller number of nanotechnology-based manufacturers that may release engineered nanoparticulates over the next few decades, compared to existing manufacturing sectors, could engineered nanoparticle emissions cause engineered nanoparticle concentrations (numerically based) in the ambient air sufficient to justify regulation as a criteria pollutant. As discussed above, EPA is not even regulating non-engineered nanoparticle emissions from mobile sources or power plants (carbonaceous particulate and consensable vapors) because they are not captured by the $PM_{2.5}$ monitor. Would EPA single out engineered nanoparticles as a $PM_{2.5}$ or VOC precursor? Or would EPA simply create a general nanoparticle $PM_{2.5\ [1\text{-}100\ nm]}$ category and regulate all nanoparticulate ambient concentrations?

EPA could choose to regulate engineered nanoparticles as precursors to $PM_{2.5}$ or VOC (and thus ozone), as a form of an existing criteria pollutant, or EPA could choose to regulate engineered nanoparticles as Hazardous Air Pollutants (HAP) and develop new Maximum Achievable Control Technology (MACT) Standards for these new industries. The latter seems more workable, but either appears possible.

5. Sec. 111. Standards of Performance for New Stationary Sources

Section 111 provides the Administrator with authority to specifically limit criteria pollutant emissions from new stationary sources and to require specific types of pollution control technologies and/or work practices. If EPA decided to regulate nanoparticles as criteria pollutants, presumably as something akin to $PM_{.001\text{-}0.10}$ (to capture nanoparticulate much smaller than $PM_{2.5}$), EPA could exercise its discretion to adopt new standards regulating nanopaticulate emissions pursuant to Section 111. This would be a burdensome task, as New Source Performance Standards and Emissions Guidelines (NSPS/EG) promulgated pursuant to Section 111 are developed on a source-category specific basis. As a result, in order to meet statutory requirements, EPA would be required to amend current NSPS/EG, or adopt new NSPS/EG, for each source category emitting the covered criteria pollutant -- in this case $PM_{.001\text{-}0.10.}$

6. Sec. 112. National Emission Standards for Hazardous Air Pollutants

Section 112 provides the Administrator with authority to regulate a pollutant as a HAP if it is on the list established by Congress at Section 112(b)(1). Nanoparticles are not specifically listed in Section 112(b)(1). Constituents contained in nanoparticles may be listed; however, the statutory list does not generically identify nanoparticles, based on physical form or size, on the list.

Paragraph (b)(2) does provide the Administrator with the authority to revise the list:

> (b)(2) Revision of the list.- The Administrator shall periodically review the list established by this subsection and publish the results thereof and, where appropriate, revise such list by rule, **adding pollutants which present, or may present, through inhalation or other routes of exposure, a threat of adverse human health effects** (including, but not limited to, substances which are known to be, or may reasonably be anticipated to be, carcinogenic, mutagenic, teratogenic, neurotoxic, which cause reproductive dysfunction, or which are acutely or chronically toxic) or adverse environmental effects whether through ambient concentrations, bioaccumulation, deposition, or otherwise, but not including releases subject to regulation under subsection (r) as a result of emissions to the air. **No air pollutant which is listed under section 108(a) may be added to the list under this section, except that the prohibition of this sentence shall not apply to any pollutant which independently meets the listing criteria of this paragraph and is a precursor to a pollutant which is listed under section 108(a) or to any pollutant which is in a class of pollutants listed under such section.** No substance, practice, process or activity regulated under title VI of this Act shall be subject to regulation under this section solely due to its adverse effects on the environment.

EPA, therefore, has the statutory authority to add nanoparticles to the list of HAPs, assuming that it has a scientific basis to do so, pursuant to the criteria set forth in Section 112(b)(2). If EPA were to do so, it could adopt MACT Standards, on a source category basis, for source categories emitting nanoparticles above threshold levels. As is the case with criteria pollutants, the statutory scheme contemplates regulating sources based on mass -- in this case, sources that have the potential to emit greater than ten (10) tons per year (tpy) of individual HAPs, or 25 tpy HAPs in the aggregate. EPA does have the authority, however, to also regulate HAP sources with potential emissions below those thresholds (so-called area sources).

Subsection (b)(4) further provides EPA with the authority to establish, by rule, test measures and other analytic procedures for monitoring and measuring emissions, ambient concentrations, deposition, and bioaccumulation of manufactured pollutants, including nanoparticles, should EPA determine that nanoparticles should be a listed HAP in Section 112.

Section 112(r) provides a mechanism for further regulation, in the context of preventing and mitigating accidental releases, for pollutants designated by EPA as "extremely hazardous substances." Nanoparticles are not currently so designated, but could be.

7. Sec. 123. Stack Heights

Section 123 prohibits the use of stack height as a means of circumventing emission limitations, thereby ensuring that sources cannot engineer a stack to exceed stack height "good engineering practices" in order to rely on dispersion rather than emissions limitations to reduce the impact of emitted pollutants on human health and the environment. This is not to say that some dispersion is not included when assessing emission impacts and potential control strategies; rather, the prohibition is to ensure that artificially high stacks are not used as a control strategy. For some transient forms of nanoparticulate emissions, dispersion may be an appropriate method of control strategy, particularly for those forms that quickly change or degrade when exposed to sunlight and other atmospheric conditions.

B. Subchapter I, Part C -- Prevention of Significant Deterioration of Air Quality, §§ 160 through 193

The CAA's Prevention of Significant Deterioration provisions provide EPA with authority to limit emissions of criteria pollutants into the ambient air to maintain compliance with the NAAQS. Given that nanoparticles could theoretically be regulated under one or more different categories (*i.e.*, under NAAQS, either as in VOCs (ozone precursors) or ultrafine particles not counted as $PM_{2.5,}$ and/or HAPs), addressing Part C (which applies to areas that currently meet established NAAQS for criteria pollutants) is premature at this point. It is clear, however, that how EPA decides to classify nanoparticles (*i.e.*, as an ozone precursor, as $PM_{2.5}$, or as a HAP) will determine whether, and how, nanoparticles will be treated for purposes of Part C.

Currently, $PM_{2.5}$ monitors demonstrate low capture efficiency below 1 micron, and none below 0.5 micron, and even then there is no particle size distribution. Further, the smaller nanoparticles and precursors of larger particulate are not captured by the current monitoring method for $PM_{2.5}$, which has a 50% cut point at 2.5 microns (see footnote 14) and falls outside the scope of the current $PM_{2.5}$ standard.

If future developments in monitoring technology allow, EPA could propose revisions to the current $PM_{2.5}$ standard, and specifically the monitoring provisions of that standard, to include monitors that capture submicron particulate. However, inclusion of submicron particulate in the $PM_{2.5}$ standard, which is simply a mass limitation per volume of air, alone will not adequately protect public health if, for example, it is demonstrated that forms of the submicron particulate are extremely harmful at exposures more properly characterized as numbers of particles, rather than mass of particles.

C. Subchapter II, Part A -- Motor Vehicle Emission and Fuel Standards, §§ 202 and 211

A significant percentage of nanoparticles in the ambient air in developed countries today is generated by mobile sources. The types of nanoparticles normally emitted from mobile sources, without considering nanoparticle fuel additives, are generally carbonaceous combustion byproduct and nitrogen oxides. These nanoparticles are not regulated by the current

$PM_{2.5}$ NAAQS, as indicated above. As is the case with these types of nanoparticles that are emitted from stationary sources, they could be regulated through an additional PM standard, should EPA choose to do so. Additionally, if developments in technology allow, EPA could incorporate nanoparticle emission standards into existing auto emission standards pursuant to Section 202.

Additional issues arise as a result of the development and widespread use of fuel additives to enhance motor vehicle performance. There are many different types of fuel additives developed through "nanotechnology" on the market today. Some of these may be harmless, such as the H2OIL Corporation's "F2-21" fuel additive, which appears to be merely water with a small amount of surfactant creating an emulsion, resulting in water droplets with diameters less than 100 nanometers.[28] Other types of "nano-fuel additives" may pose more risk, such as cerium oxide, however. According to Azonano.com, Oxonica's nano fuel additive "Envirox" is essentially cerium oxide in particles of ten nanometer in diameter, which creates a larger surface area for catalysis.[29] Cerium oxide is a lung irritant, however, and at nanometer particle size it may be even a greater irritant, as greater surface area may cause greater reactivity.[30] Thus, EPA should ensure that it exercises its authority under the CAA to carefully evaluate the health impacts of existing and new nanoparticulate fuel additives, similar to the manner in which EPA used the CAA to ultimately phase out the use of tetraethyllead as an additive.

Section 211 provides EPA with authority to require manufacturers to provide information regarding all fuels and fuel additives and to regulate such fuels or fuel additives based on concerns arising from such information.[31] Sections 211(a), (b), and (c) allow EPA to require fuel additive manufacturers to provide information regarding health effects of both fuels and fuel additives, while (c) also allows EPA to regulate fuels and fuel additives generally if EPA believes any emission product of the fuel or fuel additives will cause or contribute to air pollution, or if the fuel or fuel additive will damage the vehicle's emissions control equipment or impair its performance.

Section 211(f) prohibits regulated fuel and fuel additive manufacturers from distributing new fuels or fuel additives unless the fuel or fuel additive is "substantially similar" to any fuel or fuel additive used in vehicle certification. EPA may waive the prohibition if the manufacturer can prove that the new fuel or fuel additive and its emission products will not cause a violation of the vehicle's emission standards.

Thus, with Sections 202 and 211, EPA currently has sufficient authority to regulate emissions of engineered nanoparticles from motor vehicles, particularly resulting from the introduction of fuel additives.

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28 *See, e.g.*, http://www.foresight.org/nanodot/?p=1930.

29 *See, e.g.*, http://www.azonano.com/details.asp?ArticleID=31.

30 *See, e.g.*, http://physchem.ox.ac.uk/MSDS/CE/cerium_IV_oxide.html.

31 The Clean Air Act Handbook, Martineau and Novello, "Regulation of Fuel and Fuel Additives," at 300.

A word regarding *Massachusetts, et al., v. Environmental Protection Agency*[32] may be appropriate here. EPA's denial of the rulemaking petition seeking regulation of greenhouse gas emissions from motor vehicles pursuant to Section 202 does not prevent EPA from regulating emissions from facilities manufacturing engineered nanoparticles. First, Section 202(a)(1) gives EPA "considerable discretion" in deciding whether to make a threshold judgment to regulate.[33] Second, the situations are wholly different. With greenhouse gas emissions, EPA would have strained under the CAA to address the tenuous and uncertain global effects of solely anthropogenic greenhouse gas emissions into the stratosphere. With emissions of engineered nanoparticles, EPA would address emissions of substances that are more clearly "pollutants" released into the ambient air, resulting in direct and largely local impact. Moreover, there is no argument that engineered nanoparticles are solely anthropogenic. Thus, EPA can utilize its broad discretion to address emissions of engineered nanoparticles from motor vehicles, should it choose to do so.

D. Subchapter III – General Provisions, §§ 302, 303, 304

The general provisions of the CAA provide EPA with broad authority to protect public health and welfare from air pollutant emissions. The definitions provided by Section 302 provide the Administrator with broad authority to regulate any "air pollution agent or combination of such agents," including their precursors. The definition of welfare is also very broad and expands coverage to include impacts arising from the transformation, conversion, or combination with other air pollutants, which is characteristic of how nanoparticles behave in the atmosphere.

Section 303 provides EPA with authority to take emergency regulatory action when presented with evidence that a pollution source or combination of sources (including mobile sources) is presenting an imminent and substantial endangerment to the public health or welfare, or to the environment. EPA has broad authority to initiate a civil action, or issue orders for the protection of the public health or welfare, or the environment. Should EPA receive any evidence that nanoparticulate emissions from a particular source or sources pose such an endangerment, EPA has emergency powers sufficient to cause such a source or sources to cease and desist.

Section 304 allows citizens to file suit against EPA where EPA fails to perform any nondiscretionary duty or act under the CAA. At some point, should EPA fail to properly regulate nanoparticulate emissions, a good attorney will undoubtedly seek to find a nondiscretionary duty that EPA failed to perform with respect to regulating nanoparticulate emissions, and force EPA to act appropriately.

Section 320 provides EPA with authority to reconvene every three years to review its air quality modeling practices. If EPA finds itself needing additional statutory authority to

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32 415 F.3d 50 (D.C. Cir. 2005).

33 *Id.* at 58.

support developing parameters to describe behavior of nanoparticulate in standard air models, EPA could look to this provision.

E. Subchapter IV -- Acid Deposition Control

Nanoparticles often contain sulfur and nitrogen; however, the small overall mass contribution to the acid deposition issue that would seem to result from emission of nanoparticles may render Title IV less of a priority in this briefing paper. Additionally, the literature provides that some sulfur is actually helpful in serving as a nucleation base for agglomerating nanoparticles. At this point, Title IV seems less applicable than the CAA provisions discussed above.

F. Subchapter V -- Permits

Should nanoparticles become regulated pursuant to other sections of the CAA, then the provisions of Title V would apply accordingly. Implementation of Title V will be particularly affected by the timeline necessary to develop and adopt appropriate technology for the identification, capture, and monitoring of nanoparticles.

G. Subchapter VI -- Stratospheric Ozone Protection, §§ 601, 602

The science of nanoparticles is not yet sufficiently developed to know whether ambient levels of certain manufactured nanoparticles could cause a detrimental effect on stratospheric ozone.

Section 601 lists Class I and Class II substances in a chemical-specific manner similar to the listings of HAPs in Section 112. Thus, the discussion above regarding Section 112 applies here as well.

Pursuant to Section 602(c), EPA may add any substance to the list of Class I or Class II substances that the Administrator finds is known or may reasonably be anticipated to cause or contribute to harmful effects on the stratospheric ozone layer. If nanoparticle substances were to be added to the lists of Class I or Class II substances, then the remaining provisions of Section 602 would apply.

CONCLUSION

Based on the foregoing, the ABA SEER CAA Nanotechnology Subcommittee believes that EPA must: (1) distinguish between types of nanoparticles, identifying nanoparticles posing actionable risk, and determining appropriate regulatory approaches for each type of nanoparticle requiring regulatory control; (2) develop appropriate methods of sampling, analysis, and control sufficiently effective for nanoparticles; (3) recognize and adapt to a new form of "quantification" as number, rather than mass; and (4) to avoid creating unnecessary delay in developing strategies to address nanoparticle emissions, which could result in overregulation stifling this new industry, recognize that the current CAA program already contains sufficient authority to adequately address each of the issues discussed in this paper.

Document Title:

TSCA Inventory Status of Nanoscale Substances - General Approach

TSCA Inventory Status of Nanoscale Substances – General Approach

Purpose

The approach outlined in this document describes how EPA currently determines whether a nanoscale substance is a "new" chemical only for the purposes of the Toxic Substances Control Act (TSCA) Inventory. The Agency may use different approaches under its other authorities (e.g., the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)) in making regulatory status determinations. In adopting this approach under TSCA, EPA is not establishing a precedent on how nanotechnology issues arising under other EPA programs, other Federal Government agencies, or other federal statutes will be addressed.

Background

With the rapid advancement of nanotechnology and the introduction of nanoscale substances into U.S. commerce, it has become important for the U.S. Environmental Protection Agency (EPA) to consider the extent to which these substances may be "new chemical substances" under the Toxic Substances Control Act (TSCA), and thus subject to new chemical reporting under section 5(a) of TSCA. All substances, including nanoscale substances, that meet the TSCA definition of chemical substance are subject to TSCA.[1]

The TSCA Chemical Substance Inventory, established under section 8(b) of the Act, is comprised of substances that are considered to be "existing" in U. S. commerce. A substance not already included on the Inventory is considered to be a "new" chemical substance pursuant to TSCA section 3(9). Under section 5(a) of TSCA, a person must submit a Premanufacture Notice (PMN) to EPA at least 90 days before commencing manufacture or import, for a commercial purpose, of a chemical substance not on the Inventory, unless the substance is exempt from reporting under section 5(h) of the Act. The notification must include the information described in subparagraphs (A), (B), (C), (D), (F), and (G) of section 8(a)(2). After PMN review and upon receipt of a Notice of Commencement of Manufacture or Import (NOC), a chemical substance is added to the

[1] Certain categories of chemical substances are not subject to TSCA. Examples include foods and food additives, pesticides, drugs, cosmetics, tobacco, nuclear material, or munitions.

Inventory and becomes an "existing" chemical substance. Certain nanoscale substances that will be manufactured or imported for commercial purposes are expected to be new chemical substances and therefore subject to TSCA new chemical reporting requirements, as are any other new chemical substances.

EPA does not expect, however, that all nanoscale substances will qualify as new chemicals under TSCA. EPA thus intends to determine whether nanoscale substances are new or existing chemical substances based on the case-by-case approach that the Agency has historically applied in determining the Inventory status of chemical substances.

Note that the principles in this paper are not rules or regulations, nor do they otherwise impose legally-binding requirements on EPA or the regulated community. Rather, this paper informs the public of the approach EPA has historically taken under TSCA in evaluating whether chemical substances are new, and further informs the public of EPA's intention to follow this approach for nanomaterials that are chemical substances. Interested parties will be free to raise questions about the validity or applicability of these principles and EPA will consider whether the principles and their application are appropriate in that context at that time. Any decision regarding whether a chemical substance is a new chemical substance will be made based on the applicable statutory and regulatory requirements.

Determination of Whether A Chemical Substance is New or Existing

Section 3(2)(A) of TSCA defines the term "chemical substance" to mean "any organic or inorganic substance of a particular molecular identity...."[2] Thus, in determining whether a chemical substance is a new chemical for purposes of TSCA Section 5, or instead is an existing chemical, EPA determines whether the chemical substance has the same molecular identity as a substance already on the Inventory. A chemical substance with a molecular identity that is not identical to any chemical substance on the TSCA Inventory is considered to be a new chemical substance (i.e. not on the Inventory); a chemical substance that has the same molecular identity as a

[2] The text of section 3(2)(A) states that "the term 'chemical substance' means any organic or inorganic substance of a particular molecular identity, including – (i) any combination of such substances occurring in whole or in part as a result of a chemical reaction or occurring in nature, and (ii) any element or uncombined radical."

substance listed on the Inventory is considered to be an existing chemical substance.

Molecular Identity of a Chemical Substance

In general, a molecule is the smallest unit of matter that retains all of its chemical properties. Molecules that are made up of two or more atoms of like or different elements are held together by chemical bonds, with the principal types of chemical bonds being the ionic, covalent, and metallic bonds.

EPA views molecular identity as being based on such structural and compositional features as the types and number of atoms in the molecule, the types and number of chemical bonds, the connectivity of the atoms in the molecule, and the spatial arrangement of the atoms within the molecule. EPA considers chemical substances that differ in any of these structural and compositional features to have different molecular identities. For example, EPA considers chemical substances to have different molecular identities for the purposes of TSCA when they:

- have different molecular formulas, i.e., they have the same types of atoms but a different number of atoms, e.g., ethane (C_2H_6) and propane (C_3H_8), or they have the same number of atoms but different types of atoms, e.g., bromomethane (CH_3Br) and chloromethane (CH_3Cl), or they differ in both the types and numbers of atoms.
- have the same molecular formulas but have different atom connectivities, i.e., they have the same types and number of atoms but are structural isomers (e.g., n-butane and isobutane) or positional isomers (e.g., 1-butanol and 2-butanol).
- have the same molecular formulas and atom connectivities but have different spatial arrangements of atoms, e.g., they have the same types, number, and connectivity of atoms but are isomeric (e.g., (*Z*)-2-butene and (*E*)-2-butene).
- have the same types of atoms but have different crystal lattices, i.e., they have different spatial arrangements of the atoms comprising the crystals, e.g., anatase (atoms arrayed tetragonally) and brookite (atoms arrayed orthorhombically) forms of titanium dioxide.
- are different allotropes of the same element, e.g., graphite (carbon atoms arranged in hexagonal sheets with each atom bonded to three other atoms in the plane of a given sheet) and diamond (carbon atoms arranged in a tetrahedral lattice with each atom bonded to four other atoms).

- have different isotopes of the same elements.

Molecules can themselves be arranged or aggregated into particles or other physical forms of various types, shapes, and sizes with concomitant physical properties. EPA does not consider these particles or physical forms themselves to be different molecules with different molecular identities, but rather to be aggregates of molecules that have the same molecular identity, with no chemical bonding between the molecules. Consequently, EPA has not treated the mere aggregation of molecules into particles or varying physical forms to result in different chemical substances with different molecular identities for the purposes of TSCA.

Fundamental to TSCA is the identification of chemical substances as precisely as practicable for listing on the TSCA Inventory. Class 1 substances can be represented by a distinct chemical structure and specific molecular formula. Class 2 substances, including UVCB substances (substances of Unknown or Variable composition, Complex reaction products, and Biological materials), are an extremely broad category of chemical substances that cannot be represented by unique chemical structures or, in most cases, by unique molecular formulas. They can, however, be described using either partly indefinite names indicating variable structures (e.g., heptene), or names that are descriptive of complex or poorly defined compositions (e.g., tall-oil fatty acids), or that include sets of compositional characteristics (e.g., C15-18 .alpha.-alkenes). UVCB substance names may also include a supplemental definition (e.g., pentene, hydroformylation products, with the supplemental definition "A complex combination of products produced by the hydroformylation of pentene. It consists predominantly of C5 olefins and paraffins, C6 alcohols and aldehydes, and C18 acetals and boils in the range of approximately 45 degrees C to 290 degrees C..."). Class 2 substances that differ in such indefinite, variable, or complex structures, descriptive compositions, or sets of compositional characteristics, are considered different chemical substances with different molecular identities for the purposes of TSCA.

Since EPA generally has not considered units of matter beyond molecules, such as physical aggregates, to be reportable to the TSCA Inventory, EPA has not used particle size to distinguish for Inventory purposes two substances that are known to have the same molecular identity. Under principles of traditional chemistry these different forms of such substances would not be considered different chemicals. However, the form in which a chemical is manufactured, processed, used, or disposed of may play a role in

evaluating the risk of a substance and considering whether to address it in some fashion under TSCA.

TSCA Inventory Determination of Nanoscale Substances

As stated above, historically, EPA has not used particle size to distinguish substances that are known to have the same molecular identity for the purposes of the TSCA Inventory. In determining whether a nanoscale substance is a new or existing chemical, the Agency intends to continue to apply its current Inventory approaches based on molecular identity, rather than focus on physical attributes such as particle size.

New Chemicals

A chemical substance with a molecular identity that is not identical to any substance on the TSCA Inventory is considered to be a new chemical (i.e., not on the Inventory). A nanoscale substance might not have a non-nanoscale counterpart with the same molecular identity (e.g., nanotubes and carbon fullerenes), or a substance might be found in both nanoscale and non-nanoscale forms, but if the substance has not been reported previously to EPA and placed on the Inventory in either form, it is considered a new chemical.

A substance of this type would be subject to PMN reporting requirements regardless of whether it is manufactured or imported in the nanoscale form or the non-nanoscale form. When manufacture or importation commences and the substance is added to the Inventory, the listing is considered to encompass both nanoscale and non-nanoscale forms of the substance. Consequently, subsequent forms of the substance manufactured or imported, whether nanoscale or macroscale, which have the same molecular identity, would be considered existing chemical substances.

Systematic chemical nomenclature conventions may not exist for all nanoscale substances identified as new chemicals. In these cases, EPA will likely need to apply new nomenclature conventions to fully, uniquely, unambiguously, and consistently identify and name these new chemical substances for the purposes of the TSCA Inventory. As with existing nomenclature conventions, EPA expects that new nomenclature conventions developed for Inventory listing of these novel substances will include data elements necessary to describe and distinguish their unique molecular

identities but will not describe different physical forms (e.g., particle sizes) of these new substances. In the interim, EPA intends to describe new chemical substances (including new substances that exist in nanoscale forms) to the best of its ability for listing these substances on the Inventory, recognizing that names assigned to these substances and even their Inventory status may change once nomenclature conventions are developed. As necessary, EPA will provide interim guidance on molecular identity data elements that could be used by the notifier and the Agency to identify and name these new chemical substances for listing on the Inventory.

Existing Chemicals

Under the approach outlined in this paper, a nanoscale substance that has the same molecular identity as a substance listed on the Inventory (whether or not reported to the Agency as being manufactured or processed in nanoscale form) is considered an existing chemical, i.e., the nanoscale and non-nanoscale forms are considered the same chemical substance because they have the same molecular identity.

EPA's rationale for considering this group of nanoscale substances to be existing chemicals is based on the TSCA definition of "chemical substance." Although a nanoscale substance that has the same molecular identity as a non-nanoscale substance listed on the Inventory differs in particle size and may differ in certain physical and/or chemical properties resulting from the difference in particle size, EPA considers the two forms to be the same chemical substance because they have the same molecular identity. The Inventory listing in this case is considered to represent both the nanoscale and non-nanoscale forms of the substance and, as such, does not distinguish between two forms having the same molecular identity that differ only in particle size and/or physical/chemical properties resulting from the difference in particle size.

Assistance to Manufacturers and Importers

In order for manufacturers or importers of nanoscale substances to determine whether their substances are new or existing chemicals, and thus whether they are subject to PMN reporting requirements, EPA encourages companies to contact the New Chemicals Program to arrange a pre-notice consultation or to submit a request for an Inventory search under the *bona fide* intent to manufacture provision in 40 CFR §720.25. As EPA cannot always judge *a priori* if a nanoscale substance has a molecular identity

that is identical to a substance listed on the Inventory, EPA may require certain data on the nanoscale substance in order to determine whether it is an existing chemical covered by an existing Inventory listing, or whether it is a new chemical subject to PMN reporting requirements.

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Regulation of Nanoscale Materials under the Toxic Substances Control Act

American Bar Association
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Regulation of Nanoscale Materials under the Toxic Substances Control Act[1]

EXECUTIVE SUMMARY

Nanotechnology, loosely described as creating or using materials or processes at a scale of approximately one to one hundred nanometers (a nanometer is one billionth of a meter, or 10^{-9} m) in at least one dimension, is a rapidly-growing technology being used in virtually all major industrial sectors, including electronics, medicine, coatings, consumer products, aerospace, and specialty materials. Nanotechnology holds promise for environmental protection as well, offering the possibility of increased energy efficiency, improved pollution controls, and more effective cleanup technologies. With these promises come concerns: the possibility that applications of nanotechnology may pose new or unusual risks to human health or the environment.[2]

This paper addresses how the risks that may be associated with nanotechnology can be addressed by the Toxic Substances Control Act (TSCA). Unlike most other environmental statutes that focus on controlling the end products of economic activity (*e.g.*, emissions, discharges, and wastes), TSCA is largely a "front-loaded" statute that provides EPA with the authority and obligation to regulate chemicals before and during their use. In that sense, TSCA is essential to the concept of "cradle-to-grave" regulation of commercial activity. TSCA complements several other statutes available to EPA to regulate the nanotechnology (*e.g.*, Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)). Other U.S. agencies also have the authority to regulate nanotechnology (*e.g.*, Food and Drug Administration (FDA), Consumer Product Safety Commission, and Occupational Safety and Health Administration (OSHA)).

This paper comes to the following conclusions regarding the ability of TSCA to regulate nanoscale materials:

- Nanomaterials include chemical substances and mixtures that EPA can regulate pursuant to TSCA.

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[1] This report was prepared by Christopher L. Bell, Sidley Austin, TSCA Team Leader; Mark N. Duvall, The Dow Chemical Company; James C. Chen, Crowell & Moring; James Votaw, WilmerHale; and with contributions from the TSCA Nano Team of the Section of Environment, Energy, and Resources, which the authors gratefully acknowledge.

[2] An overview of the nature, promises, and possible risks associated with nanotechnology can be found in U.S. Environmental Protection Agency (EPA), External Review Draft: Nanotechnology White Paper (Dec. 2, 2005), available at http://www.epa.gov/osa/pdfs/EPA_nanotechnology_white_paper_external_review_draft_12-02-2005.pdf.

- TSCA, and the risk evaluation provisions of Section 5 in particular, was intended to address new health or environmental risks and the chemical products of new technologies. If a "new" chemical substance is manufactured at the nanoscale, it is subject to the same premanufacture notification (PMN) review requirements under TSCA Section 5(a)(1) that are applicable to any new chemical. Reasonable minds may differ as to whether EPA may properly consider nanoscale versions of existing chemical substances to be "new" and therefore subject to TSCA's PMN review requirements, however. This paper reviews the major arguments for and against EPA's legal authority to conclude that chemicals of identical or indistinguishable chemical structure, but differing in particle size or morphology (*i.e.*, form and structure), are "new" for purposes of TSCA regulation.

- As an alternative to its Section 5(a)(1) PMN authority over "new" chemical substances, EPA may regulate nanomaterials as existing chemical substances under its Section 5(a)(2) authority to promulgate significant new use rules (SNURs). Promulgation of SNURs for individual nanomaterials or categories of nanomaterials would be feasible for EPA, as shown by its promulgation of more than 700 SNURs. Once such a SNUR is issued, EPA can then regulate individual nanomaterials in a manner identical to how it would regulate them under the Section 5(a)(1) PMN process as "new" chemical substances.

- In addition, EPA has other authorities under TSCA to regulate nanomaterials, including the authority to require health and environmental testing; collect production, health, and environmental information about nanomaterials; and promulgate rules regulating, and even prohibiting, the manufacture, processing, distribution, and use of nanomaterials.

I. EPA HAS THE AUTHORITY TO REGULATE NANOMATERIALS UNDER TSCA

A threshold question is whether EPA has the authority under TSCA to regulate nanomaterials. TSCA provides EPA the authority to establish a regulatory framework governing "chemical substances." A "chemical substance" is "any organic or inorganic substance of a particular molecular identity, including – (i) any combination of such substances occurring in whole or in part as a result of a chemical reaction or occurring in nature and (ii) any element or

uncombined radical." [3] Nanomaterials that fall within the broad sweep of "organic or inorganic" substances are "chemical substances" that EPA has the authority to regulate under TSCA.[4]

Having established that nanomaterials can be "chemical substances" that can be regulated under TSCA, the next issue is determining the nature of EPA's TSCA authority. The most flexible authority provided under TSCA is that of Section 5. In considering action under Section 5, the first step is determining whether EPA can use its authority to regulate nanomaterials as "new" chemicals. To the extent that EPA's "new" chemical TSCA authority does not *per se* apply to nanoscale versions of existing chemicals, this does not preclude EPA's authority to regulate nanomaterials as "existing" chemicals under Section 5(a)(2) or other provisions of TSCA.

II. REGULATING NANOMATERIALS UNDER TSCA SECTION 5

TSCA Section 5 gives EPA authority to assess the risks of individual chemical substances and to impose limitations on their manufacture, processing, distribution, and use in appropriate cases, including prohibiting their manufacture altogether. This TSCA section has twin provisions: Section 5(a)(1) for "new" chemical substances, and Section 5(a)(2) for significant new uses of existing chemical substances. While the two provisions have different triggers, once triggered they operate almost identically. Much discussion and papers from various stakeholders has focused on EPA's ability to use Section 5(a)(1) to regulate as "new" chemical substances nanomaterials for which conventional-sized versions are already on the TSCA Chemical Substances Inventory (Inventory). Assuming that such distinctions reasonably can be drawn in individual cases, the arguments for this use of Section 5(a)(1) face obstacles. In contrast, the Section 5(a)(2) SNUR process appears to offer EPA adequate authority to effectively regulate nanoscale versions of materials that are already on the TSCA Inventory.

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[3] TSCA § 3(2)(A), 15 U.S.C. § 2602(2)(A). There are a number of statutory exclusions from the definition of "chemical substance" that are regulated under TSCA, including pesticides that are regulated by EPA under FIFRA, foods and drugs regulated by the FDA, and tobacco.

[4] The fact that nanomaterials may present novel or unusual challenges does not vitiate EPA's TSCA jurisdiction. For example, EPA has under TSCA successfully regulated biotechnology, including microorganisms, which EPA has recognized are not traditional chemical substances. *See* 59 Fed. Reg. 45526, 45527 (Sept. 1, 1994) ("While the term 'chemical substance' has been interpreted to include microorganisms, EPA acknowledges that microorganisms are not generally referred to as chemicals."). EPA reasoned that a microorganism is "[a] living organism [which] is [a] 'combination of such substances occurring in whole or in part as a result of a chemical reaction or occurring in nature . . . .'" 49 Fed. Reg. 50880, 50886 (Dec. 31, 1984). With regard to DNA, EPA concluded that DNA "however created, is 'an organic substance of a particular molecular identity.'" *Id.*

A. Technical Challenges in Distinguishing Between "Nanoscale" and Conventionally-Sized Chemical Substances

As a preliminary matter, EPA must address the difficult task of defining key terms such as "nanotechnology," "nanomaterials," and "nanoparticles." As noted above, nano-size particles have generally been understood to involve those particles that are one billionth of a meter in size or smaller. Size has not been the sole factor in defining "nanomaterials," however. For example, the U.S. National Nanotechnology Initiative (NNI) takes into account the properties of nanoscale particles in its definition of nanotechnology, while other definitions include the methods by which nanoscale materials are made. The International Organization for Standardization (ISO) has launched an initiative to develop, among other things, international consensus standards on terms, definitions, and nomenclature related to nanotechnology. (ASTM International has already developed a draft set of such definitions.) The U.S. is participating in the ISO effort (several U.S. government entities, including NNI, EPA, OSHA, the National Institute of Standards and Technology, and the Department of Defense are on the U.S. ISO delegation).[5]

The public discussion of EPA's authority to regulate nanomaterials typically presumes that "nanoscale" materials are clearly distinguishable from conventional-sized forms of materials with the same chemical structure. Neither particle size nor the form and structure of a chemical substance necessarily allows for easy distinctions between nanomaterials and conventional-sized materials, however.

Most chemical substances are comprised of or formed from nanoscale primary particles. These particles naturally aggregate and agglomerate to varying degrees (depending on the material and the process) into larger-scale particles. These aggregated or agglomerated nanoscale particles for the most part exist as micronscale or larger particles as commercially produced (so-called "conventional" or "bulk" materials). This is also true of so-called "engineered" (*i.e.*, intentionally manufactured) nanoscale materials. Carbon nanotubes, for example, may be synthesized as nanoscale primary particles, but, in the real world, natural physical forces that operate on any particle of that scale cause them to form aggregates and agglomerates in size ranges overlapping conventional particle sizes. As with conventional materials, the extent of aggregation and particle size are driven by process parameters, not molecular qualities. It is uncertain how one can articulate a non-arbitrary rationale distinguishing between "nanoscale" and "macroscale" substances based on either initial or final particle size.

Distinguishing between chemically similar materials on the basis of morphology (*i.e.*, form or structure) presents similar challenges. EPA would have to define the morphology intended to be represented by the "existing" Inventory entry, determine which variations in form or structure should be deemed "new," and articulate a rationale for the criteria selected. It is

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[5] The National Technology Transfer Act of 1994 obligates U.S. government agencies to participate in relevant consensus standards writing activities, and to use such standards in rulemakings where applicable (unless an agency explains why potentially applicable standards should not be used).

difficult to see how this can be accomplished other than on a case-by-case basis. It may also be difficult to apply such principles consistently without casting doubt on the Inventory status of a great many existing chemical substances (*e.g.*, carbon blacks) that reflect a multitude of engineered particle morphology variations designed to achieve particular particle properties (*e.g.*, smaller aggregate size or greater conductivity).

This very brief summary suggests that the discussion of EPA's legal authority under TSCA to regulate nanomaterials, whether as "new" or "existing" chemical substances, should be conducted with an understanding of the technical difficulties in distinguishing between nanoscale and conventional-sized materials of the same molecular identity. In addition, while this paper uses terms such as "nanomaterials" or "nanotechnology," it must be understood that these terms encompass a very diverse range of materials, uses, and risk profiles that may be very difficult to regulate as a single class of chemical substances.

B. Whether Nanomaterials Qualify As "New" Chemical Substances Subject to Regulation under Section 5(a)(1)

TSCA Section 8(b)(1) requires EPA to "compile, keep current, and publish a list of each chemical substance which is manufactured or processed in the United States," a list known as the TSCA Inventory.[6] A "new chemical substance" is any chemical substance that is not on the Inventory.[7]

With limited exceptions, "new" chemical substances cannot be manufactured unless the manufacturer first complies with the PMN provisions of TSCA Section 5(a)(1).[8] A person who intends to manufacture a "new" chemical substance must submit to EPA certain information for EPA's review at least 90 days before manufacturing the chemical. The outcomes of the PMN process can include placing the chemical substance on the Inventory and allowing it to be manufactured, processed, and used without limitation; subjecting the chemical substance to certain use restrictions; seeking more data about the substance before a decision is made; or a complete prohibition on manufacture (*e.g.*, through a TSCA Section 5(e) order).

Nanomaterials that are also "new" chemical substances are subject to the PMN requirements of TSCA Section 5(a)(1) like any other new chemical. For combinations of materials not presently reflected on the Inventory (EPA has given the example of a carbon-gold compound), the chemical substance is "new" and the requirement to submit a PMN clearly applies. The challenge in this context is determining when nanomaterials are "new." Many

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6 TSCA § 8(b)(1), 15 U.S.C. § 2607(b)(1).

7 TSCA § 3(9), 15 U.S.C. § 2602(9). EPA's regulatory definition of a "new chemical substance" tracks the statutory definition. *See* 40 C.F.R. §§ 710.3, 720.3(v), 720.25(a).

8 There are a variety of limitations on or exceptions to the PMN requirements, including chemicals used for research and development and chemicals manufactured in low volumes or for purposes of test marketing.

engineered nanomaterials share an identical or indistinguishable chemical structure with materials on the Inventory, such as silver or titanium, but may differ in primary particle morphology and typical particle size, depending on the material and when measured. These differences may result in very different physical characteristics and properties than those generally associated with the conventional form of the chemical, and that may cause the nanomaterials also to have different risk profiles than their chemically identical brethren. The question then arises whether EPA has the authority to require PMN review of such nanomaterials as "new" chemical substances, or whether such materials are subject only to EPA's other TSCA authorities applicable to "existing" chemical substances.

TSCA defines a "chemical substance" in terms of its "particular molecular identity."[9] A "new" chemical is considered a chemical that does not have the same particular molecular identity as any chemical on the Inventory. Applying contemporary TSCA nomenclature practices and conventions, the nanoscale versions of "existing" chemical substances are described identically, and their molecule identities are depicted identically to the conventional-sized version of the same chemical such that they can be said to have the same "particular molecular identity" as the existing chemical. Therefore, one would initially come to the conclusion that a nanoscale "existing" chemical is not a "new" chemical and therefore is not subject to the TSCA Section 5(a)(1) process.

EPA's historical practice generally has been to look to a chemical substance's molecular identity and not at other factors, such as physical or chemical properties, to determine whether a chemical substance is "new." EPA's emphasis on molecular structure is reflected in the PMN review process. The initial steps of the PMN review process involve EPA establishing a complete and accurate chemical name for the substance and determining whether the chemical is already on the Inventory.[10] If EPA determines, based on the chemical identity of the substance, that it is already on the Inventory, the PMN review ceases and the submitter is notified that the chemical can be manufactured in the U.S. This determination is made without any reference to the physical or chemical properties of the chemical.[11] EPA will consider the reactants and chemical reactions involved in manufacturing the chemical, but those are generally reviewed to verify the composition of the chemical substance under review, not to establish the physical or chemical properties of the chemical. To provide another example, a potential manufacturer making a *bona fide* intent request to EPA under 40 C.F.R. Section 720.25(b) to determine whether a chemical is on the Confidential Inventory does not have to provide EPA

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9 TSCA § 3(2)(A), 15 U.S.C. § 2602(2)(A).

10 *Chemistry Assistance Manual for PMN Submitters* (EPA 744-R-97-003) (Mar. 1997) at 15-16.

11 While data about the chemical's physical and chemical properties must be submitted with the PMN, EPA uses that information to assess the health and environmental risks posed by the chemical, and not for purposes of determining whether the chemical is on the Inventory. The risk assessment component of the PMN review is triggered only after EPA determines that the chemical is, in fact, not on the Inventory.

with information on the size or any other physical and chemical properties of the chemical; EPA makes the determination of whether a chemical is on the Confidential Inventory based solely on the chemical identity of the substance.[12]

Nevertheless, arguments can be made that the statutory term "particular molecular identity" is sufficiently flexible as to take into account physical properties or other defining characteristics in addition to molecular structure, at least to a limited degree, while recognizing that molecular structure is the definitive characteristic in most instances.

For one thing, the definition of "chemical substance" explicitly includes "any combination of such substances occurring in whole or in part as a result of a chemical reaction or occurring in nature."[13] Relying on that definition, EPA has included as individual entries on the Inventory many substances of unknown or variable composition, complex reaction products, and biological materials (UVCB substances). Some of these UVCB Inventory entries explicitly consider factors such as the manufacturing process and physical properties, factors that might be relevant to distinguishing nanoscale versions of macroscale existing chemical substances. For example, the following TSCA Inventory entries for UVCB materials include factors other than molecular structure:

> Naphtha (petroleum), light catalytic reformed, CAS No. 64741-63-5: A complex combination of hydrocarbons produced from the distillation of a catalytic reforming process. It consists primarily of hydrocarbons having carbon numbers predominantly in the range of C_5 through C_{11} and boiling in the range of approximately 35°C to 190°C (194°F to 446°F). It contains a relatively large proportion of aromatic and branched chain hydrocarbons. This stream may contain 10 vol. % or more benzene.
>
> Caramel (color), CAS No. 8028-89-5: The substance obtained by controlled heat treatment of food-grade carbohydrates . . . . Consists essentially of colloidal aggregates that are dispersible in water but only partly dispersible in alcohol-water solutions. Depending upon the particular caramelizing agent used, may have a positive or negative colloidal charge in solution.

It is important to recognize, however, that UVCB substances are "combinations" rather than discrete molecular entities. EPA developed the UVCB approach for complex reaction products for which there is no definite or known molecular formula or chemical structure information, and considered a range of other information in the absence of a precise chemical description. EPA added them to the Inventory under the "combination" aspect of the

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12 A portion of the TSCA Inventory where the chemical identity of the substances is maintained as confidential business information is maintained as confidential by EPA and can only be accessed through so-called *bona fide* requests to EPA.

13 TSCA § 3(2)(A)(i), 15 U.S.C. § 2602(2)(A)(i).

definition of "chemical substance." That "combination" authority may not be applicable to most nanomaterials, however, since they are typically not combinations and usually have defined particular molecular identities. Thus, the UVCB precedent does not appear to support using physical properties to distinguish, for purposes of listing on the TSCA Inventory, between chemical substances with known, definite, and common molecular identities.

There are also scattered instances of multiple entries on the Inventory for different physical forms of the same molecular identity. For example:

- Carbon (CAS No. 7440-44-0), diamond (CAS No. 7782-40-3), and graphite (CAS No. 7782-42-5) all consist of elemental carbon, but have separate entries on the Inventory.

- Silica (CAS No. 7631-86-9), quartz (CAS No. 14808-60-7), and cristobalite (CAS No. 14464-46-1) all consist of silicon dioxide, but have separate entries on the Inventory.

The silicon dioxide example, however, is instructive because EPA has declined to add different physical forms of silicon dioxide to the Inventory as separate entries. Unlike some other national chemical substance inventories, the TSCA Inventory does not include two other forms of silicon dioxide: silica amorphous, fumed, crystalline-free (CAS No. 112945-52-5), and silica gel, precipitated, crystalline-free (CAS No. 112926-00-8). In explaining why it declined to add those entries to the Inventory, EPA said:

> The Agency is aware that silicon dioxide, commonly referred to as silica, occurs and is distributed for commercial purposes in several different physical forms. Inasmuch as the chemical compositions of the various physical forms are the same, EPA does not consider the different physical forms of silica to be separately reportable under TSCA. For the purposes of TSCA, the various physical forms of silica (SiO_2) are all considered to be included under CASRN 7631-86-9, which is on the TSCA Inventory.[14]

Thus, EPA has occasionally been inconsistent in including different physical forms of the same particular molecular identity on the Inventory.[15] Despite these examples, EPA's publicly articulated rule of decision is to have a single Inventory entry covering a particular molecular

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[14] Letter from Henry P. Lau, Chief, Chemical Inventory Section, EPA, to Daniel C. Hakes, 3M (Nov. 19, 1993) (IC-4482).

[15] These Inventory entries were accepted mainly or exclusively during the original development of the Inventory, when EPA added tens of thousands of substances at once and circumstances precluded as thorough a consideration of particular entries as the PMN review process does today.

identity extend to all physical forms of that same molecular identity, even those with their own CAS numbers.[16]

While that has been EPA's articulated principle, the question for EPA today is whether it is statutorily limited to that principle. In this regard, it should be noted that Congress did intend to define "chemical substance" somewhat broadly:

> The Committee recognizes that basically everything in our environment is composed of chemical substances and therefore the definition of "chemical substances" is necessarily somewhat broad. However, because of the breadth of the definition, the Committee has carefully defined the authorities of the Administrator respecting such substances.[17]

That broad statement might suggest that EPA has the statutory authority to interpret the definition of "chemical substance" sufficiently flexibly as to regulate a new chemical substance nanomaterial with the same molecular identity as macro-sized materials already on the Inventory. Alternatively, it might also be read to support the general conclusion that, although nanoscale materials were not specifically contemplated by Congress in 1976, they are nevertheless chemical substances subject to TSCA, and to support a view of that EPA's discretion to implement its various TSCA authorities was "carefully defined" by Congress. Congressional statements about the applicability of TSCA to "chemical substances" broadly defined do not automatically lead to conclusions about Congressional intent with respect to the distinction between "new" and "existing" chemical substances.

TSCA Section 5(e) does give EPA broad risk management authority, *i.e.*, authority to restrict or prohibit the manufacture of a new chemical substance if there is inadequate data to permit a reasoned evaluation of the health or environmental effects of the new chemical substance and, in the absence of such information, activities involving the new chemical substance may present an unreasonable risk or there may be significant or substantial human exposure to the new chemical substance. In this situation, the general lack of data on the health or environmental effects of individual nanomaterials gives rise to the question of whether these risks can or should be addressed through EPA's new chemical PMN authority.[18] EPA's

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16 An administrative law judge rejected EPA's motion for summary judgment in a TSCA enforcement matter where EPA asserted that sub-molecular differences between an existing chemical substance and the chemical subject to the enforcement action allowed EPA to treat the latter as "new." *In The Matter Of Concord Trading Corp.*, Docket No. TSCA-94-H-19 (July 24, 1997).

17 H.R. Rep. No. 1341, 94th Cong., 2nd Sess. 10 (1976), *reprinted in* H. Comm. On Interstate and Foreign Commerce, Legislative History of the Toxic Substances Control Act (1976) (Legislative History) at 418.

18 For the reasons discussed at the beginning of this paper, it may be difficult to assess the risks for nanomaterials as a class given the diversity of materials that arguably might fit

PMN authority over "new" chemical substances, however, is not its only source of legal authority to assess and manage such risks.

As discussed below, Congress gave EPA a companion authority to its PMN authority that allows EPA to perform the same risk assessments and take the same risk management actions for existing chemical substances used for a significant new use as it can perform or take for new chemical substances. In particular, the risk management provisions of Section 5(e) apply to chemical substances "with respect to which notice is required by subsection (a)"; that notice can be a PMN or a significant new use notice (SNUN). Significantly, EPA uses the same form for both PMNs and SNUNs. Thus, the public policy interest in having EPA conduct risk assessments of individual nanomaterials, and impose appropriate risk management requirements, does not necessarily lead to the conclusion that nanomaterials must necessarily be "new" rather than "existing," since those goals can be met through either the PMN or SNUR authorities.

If EPA should decide to interpret the term "chemical substance" to authorize it to require PMNs for nanoscale versions of conventionally-sized chemical substances already on the Inventory, it should carefully consider the following points:

- Based on the statute and prior EPA pronouncements (*e.g.*, EPA's statements regarding silicon dioxide) and actions, most nanomaterial manufacturers today reasonably do not consider their nanomaterials to be new chemical substances. Accordingly, EPA would need to announce a new interpretation or rule publicly.[19] This would place manufacturers on notice of their obligation to submit PMNs under Section 5(a)(1). To the extent EPA changes its legal position, manufacturers should be given a reasonable time to come into compliance.

- EPA would need to consider the status of currently manufactured nanomaterials for which PMNs have not been submitted. The resolution of this issue will depend, among other things, on how EPA implements a change in policy (*e.g.*, whether by interpretive rule or substantive rulemaking) and any prior action EPA might have taken with respect to a particular chemical substance (*e.g.*, a determination by EPA in response to a *bona fide* request that a specific nanomaterial was already on the Inventory and did not have to go through the PMN process). Attempting to reverse prior EPA determinations regarding individual nanomaterials

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in that category. The ISO initiative on nanotechnologies includes standards on the environmental, health, and safety issues associated with nanotechnologies. The U.S. is leading the ISO working group developing these EHS standards.

19 EPA is well aware that significant changes in existing policies (*e.g.*, through interpretative rulemakings) generally require that the public be provided with prior notice and an opportunity for comment, as do substantive rulemakings.

would pose particularly challenging procedural issues. Further, any decision to change the TSCA status of nanomaterials would have to take into account not only the legal obligations of manufacturers, but also the practical and legal impacts on the distributors, processors, and users of such materials.

- EPA would need to address the considerable technical challenges facing any effort aimed specifically at nanomaterials. As discussed above, defining nanomaterials in a manner so that they can be meaningfully and practically distinguished for regulatory purposes from conventionally-sized materials of the same molecular structure (whether by particle size or morphology) is not easily done.

- EPA would need to develop procedures and criteria for reviewing nanomaterial PMNs so that its review would not shut down this promising technology.

- EPA should consider how any change in policy with respect to nanomaterials may affect the regulation of conventional-sized materials. In particular, establishing the principle that materials of identical chemical structure are distinguishable for TSCA Inventory purposes based solely on differences in particle size or form and structure could result in significant changes to the implementation of TSCA for all chemical substances.

C. Whether Nanomaterials Qualify As "Significant New Uses" of Existing Chemical Substances Subject to Regulation under Section 5(a)(2)

In light of the uncertain legal authority to regulate nanomaterials under Section 5(a)(1) through the PMN process where conventional-sized versions appear on the Inventory, EPA should consider that it does have all the risk assessment authority of Section 5(a)(1) available to it under its significant new use authority of Section 5(a)(2) if nanomaterials are considered to be existing chemical substances. That authority requires EPA first to promulgate a SNUR through rulemaking, but otherwise all of its PMN authority remains available. This SNUR authority offers EPA considerable flexibility to regulate nanomaterials.

The TSCA legislative history emphasized that EPA's authority under Section 5(a)(2) is a counterpart to its authority under Section 5(a)(1):

> If a new use of an existing substance has been specified by the Administrator in accordance with this subsection [Section 5(a)(2)], all of the premarket notification procedures and authority during the premarket notification period apply to such new use of an existing substance.[20]

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20 S. Rep. No. 698, 94th Cong., 2nd Sess. 19 (1976), *reprinted in* Legislative History at 175.

For example, EPA may issue orders under Sections 5(e) and 5(f) with respect to chemicals notified under either Section 5(a)(1) or Section 5(a)(2), as both provisions refer to "a chemical substance with respect to which notice is required by subsection (a)."

Congress regarded both the PMN and the SNUR authority as suitable for addressing risks presented by new technology:

> The provisions of the section [Section 5, not simply Section 5(a)(1)] reflect the conferees['] recognition that the most desirable time to determine the health and environmental effects of a substance, and to take action to protect against any potential adverse effects, occurs before commercial production begins. Not only is human and environmental harm avoided or alleviated, but the cost of any regulatory action in terms of loss of jobs and capital investment is minimized. For these reasons the conferees have given the Administrator broad authority to act during the notification period.[21]

This determination of health and environmental effects must be made before a new chemical is manufactured, and can be made before a new use of an existing chemical is undertaken. A key distinction between Section 5(a)(1) PMNs and Section 5(a)(2) SNURs is that under Section 5(a)(2), EPA must promulgate a rule subject to public notice and comment, whereas under Section 5(a)(1), EPA already has in place a generic rule requiring submission of a notice.[22] Once EPA has issued a rule under Section 5(a)(2), however, the two provisions operate in a very similar manner.

SNUR rulemakings proceed under the provisions of the Administrative Procedure Act.[23] This involves publication of a proposed rule, opportunity for public comment, and publication of a final rule together with a "concise general statement" of the SNUR's basis and purpose. EPA has already promulgated more than 700 SNURs using this procedure. Thus, SNURs are by far the most common subject of rulemaking under TSCA. This history of successful SNUR promulgation is strong evidence that EPA can practicably exercise its SNUR authority over nanoscale versions of existing chemicals.

In promulgating a SNUR, EPA must explain how the SNUR reflects EPA's consideration of the following statutory factors:

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21 H.R. Conf. Rep. No 1679, 94th Cong., 2nd Sess. (1976) 65, 66, *reprinted in* Legislative History at 678, 679 (emphasis added).

22 *See* 40 C.F.R. § 720.22.

23 5 U.S.C. § 553.

(A) the projected volume of manufacturing and processing of a chemical substance,

(B) the extent to which a use changes the type or form of exposure to human beings or the environment to a chemical substance,

(C) the extent to which a use increases the magnitude and duration of exposure of human beings or the environment to a chemical substance, and

(D) the reasonably anticipated manner and methods of manufacturing, processing, distribution in commerce, and disposal of a chemical substance.

Nanomaterials may raise concerns under any of these factors, but (B), (C), and (D) seem particularly relevant to the unique characteristics of nanomaterials. Specifically, EPA's SNUR authority allows it to address new risks associated with manufacturing, processing, or using an existing chemical in a new way. Thus, the statutory factors that EPA must consider in issuing a SNUR are some of the very factors that would cause EPA to want to issue a SNUR for a nanomaterial or category of nanomaterials.

These statutory factors must simply be considered; specific findings are not required. These factors are considerably less burdensome for EPA in rulemaking than the requirements for issuing a rule under Section 6, which include both a finding that a chemical substance "presents, or will present an unreasonable risk of injury to health or the environment," and consideration of factors such as the chemical substance's effects, benefits, and substitutes, and the economic impact of the rule. Whereas Section 6 rules are judicially reviewable under the "substantial evidence" test, SNURs are reviewable under the more deferential "arbitrary and capricious" test.[24]

EPA is not limited to issuing SNURs on individual nanomaterials, but may instead issue SNURs for categories of nanomaterials. The language of Section 5(a)(2) is not expressly limited to substance-by-substance rulemaking. EPA has already used Section 5(a)(2) to address chemical categories.[25] While such rulemaking has ultimately listed individual chemical substances within the categories, the rulemaking has been based on category characteristics. EPA's 1989 new chemical follow-up SNUR amendments addressed the category of PMN chemicals for which it had previously issued an order under Section 5(e)[26] and the category of non-Section 5(e) PMN chemicals for which EPA had concerns about actions by other

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24 TSCA § 19(c)(1)(B), 15 U.S.C. § 2618(c)(1)(B).

25 *See, e.g.*, 40 C.F.R. § 721.9582, covering 88 perfluoroalkyl sulfonates; 71 Fed. Reg. 12311 (Mar. 10, 2006) (proposed addition of 183 perfluoroalkyl sulfonates).

26 40 C.F.R. § 721.160.

manufacturers.[27] EPA issued rules setting up an expedited process for promulgating SNURs covering members of these broad categories. EPA's experience with categorical SNURs to date suggests that EPA can successfully promulgate categorical SNURs for nanomaterials.

In issuing the new chemical follow-up amendments, EPA cited Section 26(c) of TSCA as supporting a categorical approach.[28] TSCA Section 26(c), "Action with respect to categories," provides in part:

> (1) Any action authorized or required to be taken by the Administrator under any provision of this [Act] with respect to a chemical substance or mixture may be taken by the Administrator in accordance with that provision with respect to a category of chemical substances . . . .
>
> (2) For purposes of paragraph (1):
>
> (A) The term "category of chemical substances" means a group of chemical substances the members of which are similar in molecular structure, in physical, chemical, or biological properties, in use, or in mode of entrance into the human body or into the environment, or the members of which are in some other way suitable for classification as such for purposes of this [Act], except that such term does not mean a group of chemical substances which are grouped together solely on the basis of their being new chemical substances.[29]

Thus, the bottom-line criterion for qualifying as a category is being "in some . . . way suitable for classification as such" for purposes of TSCA, an extremely flexible test. EPA may be able to establish through rulemaking that particular classes of nanomaterials meet the definition of a "category of chemical substances" on the basis of their common characteristics, unique to nanomaterials. EPA could then conduct its risk assessments, and impose risk management controls, on individual nanomaterials in the same manner as it does through the PMN process.

One aspect of Section 5(a)(2) that may present a challenge to EPA in promulgating SNURs for some nanomaterials is the required determination that the particular use of the chemical substance for which a SNUR is promulgated be, in fact, a "new" use. EPA has consistently taken the position that if a substance is being used in a particular manner at the time

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27 40 C.F.R. § 721.170.

28 52 Fed. Reg. 15594, 15597 (Apr. 29, 1987) (proposed rule); 54 Fed. Reg. 31298 (July 27, 1999) (final rule).

29 15 U.S.C. § 2625(c).

that a SNUR is proposed, that specific use is not "new" and cannot be the subject of a SNUR.[30] Thus, to the extent that nanoscale versions of some chemical substances are already being distributed in commerce for certain uses, it may be difficult for EPA to make the requisite determination that those uses are "new." Therefore, in order to preserve the effectiveness of the SNUR as a risk management tool, EPA must proceed apace in identifying projected new uses of nanomaterials that meet the statutory factors. If EPA delays unnecessarily, it may find that its ability to promulgate SNURs for certain nanomaterials is constrained -- as more and more uses of nanoscale materials become "existing" uses.

One additional difference between Section 5(a)(1) PMNs and Section 5(a)(2) SNURs is that SNUR rulemakings under Section 5(a)(2) trigger Section 12(b) export notification requirements.[31] EPA recently proposed to amend its Section 12(b) regulations to limit export notifications for exports of SNUR chemicals to a one-time occurrence (per chemical per country, not per calendar year), as has been the case for Section 4 chemicals for several years.[32] If adopted, this provision would minimize the impact of the export notification requirement for nanomaterials covered by SNURs.

III. REGULATING NANOMATERIALS UNDER OTHER PROVISIONS OF TSCA

A. TSCA Section 4 Test Rules

TSCA Section 4 authorizes EPA to require manufacturers and processors of existing chemicals to conduct tests "to develop data with respect to the health and environmental effects" of the chemical.[33] EPA may require such testing by rule if it determines that a chemical substance may present an unreasonable risk to human health or the environment. EPA also may promulgate a test rule without a risk-based finding if it determines that chemical is produced in substantial quantities and there may be substantial human or environmental exposure to the chemical, that there are insufficient data available to determine the environmental or health effects of the chemical, and that testing is necessary to provide such data. EPA also can obtain test data without going through the rulemaking process, issuing consent decrees requiring testing where a consensus exists among EPA and interested parties and the public about the adequacy of a proposed testing program. Further, the statute contemplates that EPA will use its TSCA

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30 *See, e.g.*, 68 Fed Reg. 35315 (June 13, 2003) (SNUR for *Burkholderia cepacia* complex), where EPA explains that existing uses of *Burkholderia* are not appropriate for inclusion in the SNUR for the microorganism. *See*, *more generally*, 55 Fed. Reg. 17376 (Apr. 24, 1990), where EPA explains that: "To establish a significant new use, EPA must determine that the use is not ongoing."

31 Export notification requirements would also be triggered for nanomaterials subject to rulemakings or proceedings under TSCA Section 4, 6, or 7.

32 Proposed 40 C.F.R. § 707.65(a)(2)(ii), 71 Fed. Reg. 6733, 6743 (Feb. 9, 2006).

33 TSCA § 4(a), 15 U.S.C. § 2603(a).

Section 4 authority in order to address not only EPA's own need for health and safety data, but also the health and safety data needs of sister agencies, such as the National Institute of Occupational Safety and Health, the Department of Labor, and the National Cancer Institute.[34]

EPA has also successfully used the threat of invoking its TSCA Section 4 authority to encourage manufacturers and processors to enter into voluntary agreements to test existing chemicals, most notably the "high production volume" testing program that includes over 2,200 chemicals (each with an annual production rate of over one million pounds).

Accordingly, neither the statute nor EPA's existing Section 4 rules prohibit EPA from exercising its authority under TSCA Section 4 to require manufacturers or processors of nanoscale versions of chemical substances to test those chemicals to better evaluate the potential environmental or health risks posed by those materials. Unless voluntary testing agreements are entered, however, EPA would need to demonstrate, through notice and comment rulemaking, that it can support either a risk- or exposure-based finding for a nanoscale substance that is subject to the test rule. EPA can base such a decision on risk, or on a determination that the nanomaterial is produced in substantial quantities and there may be substantial human or environmental exposure, and that testing is necessary to fill data gaps. Further, consistent with EPA's successful HPV testing initiative, EPA may consider whether a voluntary approach to testing might be appropriate for certain classes of nanomaterials.

Whether through voluntary efforts, negotiated testing agreements, or rulemaking, the authority to require the generation of health and safety data is an extremely valuable tool that is available to EPA under TSCA Section 4. The importance of this tool with respect to nanomaterials is underscored by EPA's *Nanotechnology White Paper*, which identifies a considerable body of data that EPA and its sister agencies believe are important to understanding the health and safety implications of nanomaterials.

B. TSCA Section 6 Rules

TSCA Section 6(a) authorizes EPA to regulate the manufacture, processing, commercial distribution, use, and/or disposal of an existing chemical when there is a reasonable basis to conclude that the substance "presents or will present an unreasonable risk of injury to health or the environment."[35] EPA has the authority under TSCA Section 6 to promulgate regulations:

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34 *See* TSCA § 4(e), 15 U.S.C. § 2603(e), establishing an Interagency Testing Committee to recommend substances for testing under Section 4. A recent example of a test rule that was promulgated to address another agency's data needs is the 2004 *In Vitro* Dermal Absorption Rate test rule, which was promulgated under Section 4 to generate data of interest to OSHA. *See* 69 Fed. Reg. 22402 (Apr. 26, 2004).

35 TSCA § 6(a), 15 U.S.C. § 2605(a).

- prohibiting or limiting the manufacture, processing, or distribution in commerce of the chemical generally or for a particular use, as well as prohibiting or regulating the commercial use of a chemical;

- requiring that the chemical, or any article containing the chemical, be labeled or accompanied by warnings and instructions for use, distribution, or disposal;

- requiring creation and maintenance of records of manufacturing/processing methods and reasonable monitoring or testing necessary to assure regulatory compliance;

- regulating disposal of the chemical, or any article containing the chemical; or

- requiring notification to distributors, other persons in possession of the chemical, and the general public of the unreasonable risk of injury.[36]

Unlike the Section 5 SNUR authority, Section 6 provides EPA with the capacity to prohibit or limit outright certain activities, but the exercise of that authority must be established through on the record rulemaking based upon a finding of unreasonable risk and a requirement that EPA impose the least economically burdensome controls to manage that risk.[37]

C. TSCA Section 7: EPA's Imminent Hazard Authority

TSCA Section 7 authorizes EPA to initiate a civil action to seize an imminently hazardous substance, mixture, or article containing them, and seek such other relief against any person who manufactures, processes, distributes, uses, or disposes of an imminently hazardous substance, mixture, or article containing them. EPA's authority under TSCA Section 7 is broad, and authorizes EPA to seek a court order requiring recalls, replacements/repurchases, public notices of risk, or a combination of any of these requirements.

D. EPA's Information-Gathering Authorities

EPA has broad information-gathering powers regarding existing chemicals (*i.e.*, in addition to the information it may gather through the review of "new" chemicals) under TSCA Sections 5, 6, and 8, some of which are self-implementing and do not require any new action by EPA to be applicable to nanomaterials. These include:

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36 TSCA § 6(a)(1)-(7), 15 U.S.C. § 2605(a)(1)-(7).

37 EPA may take immediate action under TSCA Section 5(f) if it determines that a chemical that is the subject of a PMN or SNUN presents or will present an unreasonable risk before it is able to issue a TSCA Section 6 rule.

- TSCA Section 5 -- As part of the PMN and SNUR processes, EPA can issue TSCA Section 5(e) orders seeking additional information about chemicals for which PMNs or SNUNs have been submitted, but where EPA determines that it does not have sufficient information to evaluate the PMN or SNUN.

- TSCA Section 6(b) -- Authorizes EPA to order a manufacturer or processor to provide certain information to EPA if EPA has a reasonable basis to conclude that the manufacture or processing of an existing chemical substance may present an unreasonable risk to human health or the environment. EPA may, for example, order the manufacturer or processor to submit a description of the chemical substance's quality control procedures. EPA can require the manufacturer or processor to modify those procedures to the extent EPA believes necessary to address any inadequacies. Further, if EPA determines that a chemical that has been distributed presents an unreasonable risk, EPA is authorized to order the manufacturer or processor to notify its customers and the public of the risk and to replace or repurchase the chemical, as appropriate, to abate the risk.

- TSCA Section 8(a) -- EPA has promulgated a number of information-gathering rules under this provision, including rules to gather detailed information on specific chemicals and more generic rules such as the Inventory Update Rule that collects basic production information on chemicals on the Inventory every four years.

- TSCA Section 8(c) -- Manufacturers and processors of chemicals must create and maintain records of "allegations" -- whether written or oral -- that the chemical "caused a significant adverse reaction to health or the environment."[38] These records must be made available to EPA upon request. This is a very broad information-gathering tool because it encompasses allegations that can come from any source and that can be made without formal proof or regard for evidence. Thus EPA could, for example, request TSCA Section 8(c) records from certain sectors where nanomaterials are prevalent to determine if there are significant numbers of allegations regarding adverse reactions associated with nanomaterials or products containing nanomaterials.

- TSCA Section 8(d) -- EPA can, by rule, designate chemicals for which manufacturers and processors must submit to EPA any health and safety studies conducted regarding the listed chemicals. Such rules are retrospective as well as prospective; qualifying studies must be submitted

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[38] 40 C.F.R. § 717.3(a).

that were conducted in the ten years prior to the listing and for the next ten years after the listing.

- TSCA Section 8(e) -- Manufacturers, processors, or distributors of chemicals must "immediately inform EPA if they obtain information that reasonably supports the conclusion that the chemical substance . . . presents a substantial risk of injury to health or the environment." This has been an important information-gathering tool for EPA, and has also been the subject of recent enforcement actions. As nanomaterials are more broadly introduced into the economy, Section 8(e) will be a key mechanism for EPA to track the occurrence of adverse effects on human health or the environment.

Nanoscale materials are not excluded from these various information-gathering authorities and may allow EPA to collect a broad range of production, health, and environmental risk information regarding nanomaterials. In particular, the "allegations of adverse effects" recordkeeping and the "substantial risk" reporting requirements together might form the basis of an "early warning" system for potential risks associated with the products of nanotechnology. EPA could then use this new information in assessing the risks and benefits of particular nanomaterials.

E. TSCA Section 21 Citizen Petitions

In addition to EPA's authorities, TSCA Section 21 allows citizens to petition EPA to initiate a proceeding for the issuance, amendment, or repeal of a rule under TSCA Section 4, 6, or 8 or an order under Section 5(e) or 6(b)(2) regarding chemical substances. A TSCA Section 21 petition must set forth facts that the petitioner believes establish the need for the action requested. Nanomaterials are not excluded from the scope of Section 21 petitions.

EPA is required to grant or deny the petition within 90 days of its filing. If EPA grants the petition, it must promptly commence an appropriate proceeding. If EPA denies the petition, it must publish its reasons for the denial in the *Federal Register*. Within 60 days of denial, or the expiration of the 90-day period, if no action is taken, the petitioner may commence a civil action in a U.S. district court to compel initiation of the requested rulemaking proceeding.

CONCLUSION

The following conclusions can be made regarding the ability of TSCA to regulate nanotechnology: (1) nanomaterials include chemical substances and mixtures that EPA can regulate pursuant to TSCA; (2) if a "new" chemical substance is manufactured at the nanoscale, it is subject to the same PMN review requirements under TSCA Section 5(a)(1) that are applicable to any new chemical; and (3) as an alternative to its Section 5(a)(1) PMN authority over "new" chemical substances, EPA may regulate nanomaterials as existing chemical substances under its Section 5(a)(2) authority to promulgate SNURs. In addition, EPA has other authorities under TSCA to regulate nanomaterials, including the authority to require health and environmental testing; collect production, health, and environmental information about

nanomaterials; and promulgate rules regulating, and even prohibiting, the manufacture, processing, distribution, and use of nanomaterials.

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RCRA Regulation of Wastes from the Production, Use, and Disposal of Nanomaterials

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RCRA Regulation of Wastes from the Production, Use, and Disposal of Nanomaterials[1]

EXECUTIVE SUMMARY

The booming growth of nanotechnology in the U.S. economy has already begun to create an expanding universe of wastes from the manufacture, use, and disposal of products containing nanomaterials.[2] Just as nanomaterial products offer useful novel properties, nanomaterial wastes may present regulators with unexpected and unique questions. Researchers are trying to assess how nanomaterials and nanoparticles released into the environment will migrate through groundwater, adhere to soil, move through air/water and water/sediment partitions, and become available for bio-uptake. For example, some scientists have raised concerns that the relatively large surface area presented by small amounts of nanoparticles may make such nanomaterials comparatively more toxic than similar amounts of larger-scaled versions of the same materials.[3]

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2 The Woodrow Wilson Institute's Project on Emerging Nanotechnology has assembled a database listing over 200 consumer products that claim to include nanomaterial components. This database can be accessed at http://www.nanotechproject.consumerproducts (June 2, 2006). The projected market for single-walled carbon nanotube products alone is projected to approach $5 billion within the next five years, and the National Science Foundation has predicted that nanotechnology will have a $1 trillion impact on the world's economy a decade from now. Nanomaterials will likely become ubiquitous parts of consumer products, chemical and metals manufacturing processes, biomedical services and devices, power sources, and military weaponry and systems.

3 *Getting Nanotechnology Right the First Time*, Statement to the National Research Council, Dr. Richard Denison, Environmental Defense (Mar. 25, 2005) at 2.

Nanomaterials will also offer new opportunities for cleaning up hazardous wastes and contamination. For example, nanoscale iron particles have proven effective at reducing concentrations of persistent chlorinated organic compounds in groundwater.[4] Nanomaterials may also play a vital role in creating environmental detectors and sensors that can quickly identify small concentrations of toxic compounds in the environment. Ironically, the use of these nanomaterials to solve environmental problems may collide with concerns that releasing these same nanomaterials into the environment raises unknown and unacceptable risks.[5]

EPA has the authority under the Resource Conservation and Recovery Act (RCRA) to regulate the generation, transportation, management, and disposal of secondary materials that become solid or hazardous wastes.[6] EPA now shares some of that authority through delegation to states with hazardous waste regulatory programs which meet -- or exceed -- EPA's standards. To date, neither federal nor state waste management programs have offered regulations or guidances that expressly address the management or disposal of nanoscale wastes. EPA has noted, however, that "[n]anomaterials that meet the definition of RCRA hazardous wastes would be subject to these regulations."[7]

This paper assesses the potential application of current RCRA statutory and regulatory requirements to the burgeoning field of nanoscale materials.[8] It discusses whether current federal requirements can adequately address potential environmental concerns posed by nanoscale materials.

We conclude that EPA already has expansive authority under RCRA to regulate discarded wastes that might include nanoscale materials. EPA's current regulations governing the management of hazardous wastes will also likely apply broadly to solid and hazardous wastes containing nanoscale constituents. Despite EPA's sweeping powers to regulate hazardous waste

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4 *See, e.g.*, Zhang. W. (2003). Nanoscale iron particles for environmental remediation: An overview. *J. Nanoparticle Res.* 5**:** 323–332.

5 *Nanoscience and Nanotechnologies: Opportunities and Uncertainties*, RS Policy document 20/4, RAEng Policy document R2.19 (July 2004) at 5 ("[s]pecifically, we recommend as a precautionary measure that . . . the use of free nanoparticles in environmental applications such as remediation of groundwater be prohibited").

6 Regulations implementing Subtitle C of RCRA for hazardous waste management appear in 40 C.F.R. Parts 260-279.

7 U.S. Environmental Protection Agency, NANOTECHNOLOGY WHITE PAPER (Initial Draft) (Nov. 2, 2005) at 25.

8 We use the terms "nanomaterials" and "nanoparticles" in a generic sense. The precise definitions of nanoscale materials, however, remains a topic of active open discussion, and several associations (including the International Standards Organization and the ASTM International) are attempting to set standards that will define these materials.

management and its comprehensive regulatory framework, we also identify below several areas of potential interest where EPA may wish to determine whether its current regulations will have unintended consequences when applied to nanoscale waste materials.

I. RCRA OFFERS BROAD STATUTORY AUTHORITY TO EPA TO REGULATE WASTES CONTAINING NANOPARTICLES

RCRA provides EPA with broad statutory and regulatory powers to control the management of hazardous wastes in the United States. For example, RCRA Section 3002 directs EPA to set out comprehensive regulatory standards for generators of hazardous wastes, and other provisions of RCRA empower EPA to set out detailed regulatory standards for all aspects of waste management and disposal.[9] Similar statutory provisions direct EPA to set out expansive regulatory standards for persons who generate or transport hazardous wastes.[10]

If nanomaterials are discarded or are included in other secondary materials managed as wastes, they will almost certainly fall under this sweeping statutory framework. To the extent that nanomaterials in wastes pose novel environmental risks, which EPA's current regulations fail to address, EPA likely has sufficient authority under RCRA to promulgate new regulations to address discarded secondary materials arising from the generation, use, treatment, or disposal of nanomaterials.

EPA's powers to promulgate new regulations to address environmental risks will allow it to respond to novel characteristics or hazards from discarded nanoscale materials. For example, if EPA's current regulatory definitions of hazardous characteristics (ignitability, corrosivity, reactivity, and toxicity) fail to encompass unexpected risks from nanoscale materials, EPA possesses ample statutory authority to promulgate regulations to define new characteristic or listing aimed at certain troubling nanomaterials.

As an intermediate step before promulgating new regulations, EPA can also draw on its emergency authorities to address particular hazards posed by discarded nanomaterials. For example, EPA (and, to a lesser extent, private parties) can seek injunctive relief to address imminent and substantial endangerments posed by the release of hazardous constituents from solid or hazardous wastes.[11] It is likely that the conventionally sized versions of many nanomaterials will fall within the broad array of chemicals that qualify as "hazardous constituents" under EPA guidance,[12] and therefore EPA can rely on its emergency authority to

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9 42 U.S.C. § 6921 *et seq.*

10 *Id.*

11 42 U.S.C. §§ 7002, 7003.

12 *See* 40 C.F.R. Part 261, App. VIII (listing of hazardous constituents); 40 C.F.R. Part 264, Appendix IX (ground water monitoring list of hazardous constituents); 55 Fed. Reg. 30798, 30874 (July 27, 1990) (proposal to define "hazardous waste" or "hazard

address dangerous releases of these nanomaterials. EPA can also rely on other authorities to address releases of nanomaterials that might otherwise fall outside its regulatory ambit, including its permit omnibus authority for facilities that have (or should have had) permits to treat, store, and dispose of hazardous wastes.[13]

II. EPA'S REGULATORY DEFINITIONS OF "SOLID WASTE" AND "HAZARDOUS WASTE" CAN ENCOMPASS MOST SECONDARY MATERIALS CONTAINING NANOMATERIALS

A. Nanomaterials and the Definition of "Solid Waste"

EPA has expansive authority to regulate secondary materials once they are discarded and become "solid waste" within the RCRA universe. EPA has promulgated regulations that broadly interpret the types of discarding activities that can bring secondary materials into the category of "solid waste." As a result, EPA's RCRA regulations should apply to wastes containing nanomaterials that are discarded onto land, burned, or recycled as a means of disposal.[14] These broad categories of "discard" should cover actions that would typically occur with wastes containing nanomaterials.

EPA's authority to regulate secondary materials containing nanomaterials is less clear, however, when manufacturers attempt to recycle or reuse those nanomaterials. Given the high value of specially manufactured nanomaterials (*e.g.*, nanoscale metals such as platinum used in catalysts or gold in biomedical devices, or highly valuable configurations of single-walled carbon nanotubes), manufacturers and users may have a strong interest in recovering certain nanomaterials for reuse or recharging. While EPA's regulatory authority only extends to discarded secondary materials, it has set out detailed regulations for the management and

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constituent" for corrective action purposes to include items listed in these two Appendices). To the extent that RCRA arguably only grants EPA corrective action authorities over "hazardous wastes" at interim status treatment, storage, and disposal facilities, EPA has interpreted "hazardous waste" under Section 3008(h) of RCRA to encompass any kind of waste within the broad statutory definition of the term. Under this interpretation, EPA can order corrective action for releases of nanomaterials that qualify as "hazardous wastes" under 42 U.S.C. Section 6903(5) even if they do not constitute "hazardous waste" under EPA's current regulatory definition. 55 Fed. Reg. at 30809.

13 42 U.S.C. § 3005(c)(3) (authorizing Administrator to include terms and conditions "necessary to protect human health and the environment" in permits for hazardous waste treatment, storage, and disposal facilities). As discussed below, EPA can also order permit holders to take similar actions to address releases of hazardous constituents from solid waste management units at facilities that manage hazardous wastes. 42 U.S.C. §§ 3004(u)-(v), 3008(h).

14 40 C.F.R. § 240 *et seq.*

handling of recycled materials that may become sufficiently waste-like to trigger RCRA requirements.

To our knowledge, the issues related to recycling of nanomaterials in manufacturing and consumer products have received comparably less attention.[15] It is possible, however, that in the near future EPA may need to investigate potential environmental concerns posed by the continued use of off-specification nanomaterials that fail to meet strict quality requirements but which retain valuable characteristics.[16] To the extent that such off-specification nanomaterials remain in commercial use, they may fall outside EPA's regulatory ambit under RCRA.[17] The long-term accumulation and storage of secondary nanomaterials destined for continuing commercial use also may potentially pose regulatory concerns.[18]

B. Nanomaterials and the Definition of "Hazardous Waste"

EPA regulations currently define solid wastes as "hazardous wastes" if they either display a hazardous characteristic or appear on a list of hazardous wastes from certain industrial activities or certain discarded commercial chemicals.

1. Characteristic Hazardous Wastes and Nanomaterials

If a solid waste containing a nanomaterial exhibits a hazardous characteristic, the nanoscale dimensions of its constituent should not be relevant to the waste's classification as hazardous. For example, a waste that displays the hazardous characteristic of ignitability because it contains powdered aluminum will remain characteristically hazardous regardless of

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15 *See, e.g.*, Letter from David Wagger, Institute of Scrap Recycling Industries, Inc., to William Farland, U.S. EPA (Jan. 24, 2006) (commenting that EPA's draft White Paper on Nanotechnology fails to adequately address issues posed by the prospective recycling of nanoscale materials and products). These comments are available at http://www.isri.org/AM/Template.cfm?Section=Home&CONTENTFILEID=2589&TEMPLATE=/CM/ContentDisplay.cfm.

16 For example, a batch of nanoscale silver may lack a sufficient concentration of a specific size of nanoparticles needed for use as a medical antibacterial salve, but it may nonetheless remain useful as a general antifungal surface coating.

17 Of course, some of these issues may be addressed by EPA's pending proposed revisions to its regulatory definition of solid waste. 71 Fed. Reg. 23361 (Apr. 24, 2006) (Unified Regulatory Agenda).

18 *See* 40 C.F.R. § 261.2(c)(4) (discarding secondary materials through recycling via speculative accumulation). This regulatory provision, however, does not categorize commercial chemicals listed in 40 C.F.R. Section 261.33 as solid wastes even if they are speculatively accumulated. *Id.*

whether the aluminum is nanoscale. While smaller quantities of the nanomaterials may be required to create the characteristic in the solid waste, the characteristic itself (and the regulatory authority over the solid waste) remains unaffected.

While EPA clearly can regulate nanoscale materials under its current regulations, it may nonetheless need to examine in the future whether to revise some of the management scenarios it uses for hazardous characteristic definitions to reflect special uses and characteristics of nanomaterials.[19] Given the lack of clear data at present, we do not know of any special concerns raised by EPA's management scenarios or computer modeling for its current hazardous characteristic definitions.

EPA may also need to address concerns about the standard of knowledge required to adequately characterize a waste containing nanoscale materials relying on the generator's process knowledge. EPA's current regulations allow a generator to classify a waste as hazardous by "[a]pplying knowledge of the hazard characteristic of the waste in light of the materials or the processes used."[20] To the extent that manufacturing processes using nanoscale materials pose novel issues with comparatively less process knowledge, EPA may need to offer guidance to generators on the extent to which they may have to sample or test their nanoscale wastes rather than rely solely on process knowledge.

If nanoscale materials ultimately pose new qualities or risks not adequately captured by current hazardous characteristics, EPA may also need to assess whether it should define new hazardous characteristics to reflect these new risks. We are not aware of any particular novel hazard posed by nanomaterials generally that might require the development of such a new characteristic. As discussed above, however, EPA has broad statutory authority to define new hazardous characteristics as needed through the regulatory process if it feels that

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19 For example, the current toxicity characteristic relies on the toxicity characteristic leaching procedures (TCLP) to determine whether a waste is characteristically toxic. EPA originally designed this test to yield extracts from waste samples that would reflect the releases expected to occur if the hazardous wastes were co-managed in an unlined municipal solid waste landfill. EPA then set levels of constituents allowed to leach from the waste so that such releases would not migrate through groundwater in sufficient concentrations to exceed maximum concentration limits for persons relying on the aquifer for drinking water. To the extent that nanoparticles adhere to soils, transport in groundwater, or infiltrate into drinking water in significantly different ways from larger-scale particles, EPA's current assumptions for the toxicity characteristic may not fully assess how characteristically toxic wastes with nanomaterials might affect groundwater. The presence of nanomaterials in a waste sample might arguably also affect the waste's behavior in a Pensky-Martens Closed Cup test for ignitability, the waste's classification as a "liquid" under the paint filter test for purposes of the ignitability characteristic, and the waste's status as "aqueous" for purposes of the corrosivity characteristic.

20 40 C.F.R. § 262.11(c)(2).

current hazardous characteristics fail to properly regulate risks posed by wastes containing nanoscale materials.

2. Listed Hazardous Wastes and Nanomaterials

EPA's listings for hazardous waste encompass wastes generated either by specific industrial activities and uses (F and K wastes) or by the discarding of commercial chemicals (U and P wastes). Neither category of listings expressly addresses wastes containing nanoscale materials or wastes from nanomaterials manufacturing.[21]

F and K listings include categories of industrial activities that will likely use or generate nanoscale materials. For example, K-listed wastes from the organic chemical, inorganic chemical, pesticides, explosives, and ink formulation industries may soon include nanoscale materials as these industries increasingly formulate new nanoscale products or adopt nanoscale materials to produce existing chemicals in more efficient ways.[22] F-listed wastes may also soon include nanomaterials. EPA's regulations will impose hazardous waste management standards on these listed wastes without regard to the use of nanomaterials as an ingredient or production process.

While EPA's ability to regulate listed hazardous wastes that might contain nanomaterials seems broad and sufficient to address potential environmental risks, EPA may wish to assess whether its current framework could yield unintended consequences. For example, a nanoscale formulation of a commercial chemical may lack the hazardous effects that led EPA to list it (despite the presence of the same hazardous constituents).[23] The derived-from rule and the mixture rule might also lead to the designation of a large quantity of mixed wastes as hazardous because it contains extraordinarily small amounts of a listed hazardous nanomaterial waste. Given special efforts to formulate nanoscale versions of commercial chemical products

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21 While these industries are still adapting to nanotechnologies, many potential examples could quickly arise. For example, the use of nanoscale aluminum in high-grade military explosives might yield wastewater treatment sludges that qualify as K044 listed wastes.

22 Given the likely ubiquitous use of nanomaterials and nanotechnology, other K-listed industrial sectors may generate wastes containing nanomaterials. For example, petroleum refineries may look to nanoscale catalysts to increase production efficiency, and many printing operations will likely adapt inking formulations that rely on precise application of inks in nanoscale amounts.

23 This situation may pose EPA with tricky questions of statutory interpretation. For example, petitioners may request that EPA classify nanoscale materials as fundamentally different and consequently a "new chemical" under the Toxic Substances Control Act. At the same time, however, those same petitioners may ask EPA to designate nanoscale versions of currently listed hazardous wastes as the same material within the hazardous waste listing description.

that would offer comparative environmental benefits, retaining nanoscale versions of listed wastes as hazardous without regard to their actual environmental risks may discourage efforts to harness nanotechnology for green chemistry or other environmentally beneficial uses.

Nanoscale materials may also affect the process that EPA uses to list or delist solid wastes as hazardous. EPA currently adds solid wastes to the hazardous waste listings based on whether they (1) exhibit a hazardous characteristic; (2) display acute toxic effects on humans or rats; or (3) pose a substantial present or potential hazard to human health or the environment when improperly managed.[24] EPA uses similar factors to weigh whether to delist a hazardous waste upon a showing the waste does not pose an environmental hazard based on its actual management and disposal. To the extent that wastes containing nanomaterials display unique characteristics that EPA's current regulatory factors or computer models would not accurately predict, the listing process and delisting procedures may inappropriately over- or under-predict environmental risks.

C. Nanomaterials and Exemptions from the Definitions of "Solid Waste" and "Hazardous Waste"

The regulatory definitions of "solid waste" and "hazardous waste" include numerous exemptions for several types of secondary wastes. EPA included these exemptions for a broad array of reasons, including (1) other regulatory programs already address risks posed by the materials (*e.g.*, exemptions for discharges pursuant to National Pollutant Discharge Elimination System permits); (2) the materials pose relatively little environmental risk (*e.g.*, *de minimis* releases to wastewater treatment systems); (3) RCRA includes statutory exemptions for certain activities (*e.g.*, Bevill amendment wastes or wastes resulting from oil and gas exploration and production activities); or (4) a need to provide flexibility for production activities that may include some wastes at an intermediate stage (*e.g.*, exemptions for in-process recycling or product storage tank bottoms prior to removal).

Notably, the exemption from the definition of "hazardous waste" given to household hazardous wastes may pose the most immediate forum for EPA to address these issues.[25] A large array of consumer items purporting to contain nanomaterials have already entered the marketplace.[26] One potential avenue for the uncontrolled release of nanomaterials

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24 40 C.F.R. § 261.11(a).

25 40 C.F.R. § 261.4(b)(1).

26 To complicate this issue further, some products marketed as "nanotechnology" may not actually contain nanomaterials. A. von Bubnoff, *Study Shows No Nano in Magic Nano, the German Product Recalled for Breathing Problems*, SMALL TIMES (May 26, 2006) (accessible at http://www.smalltimes.com/document_display.cfm?document_id=11586). EPA may need to wrestle with the accuracy of "nanomarketing" claims if they start to cloud the application of RCRA regulatory requirements.

into the environment will be the discarding of consumer goods that qualify as household hazardous wastes. While EPA can address some of these releases, if necessary, through its emergency authorities under RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act,[27] this approach would only allow mitigation of environmental damages after they occur rather than prevent the release in the first place.

Given the large array of exemptions and the separate policy rationales underlying each of them, EPA may need to revisit how these exemptions apply to specific uses of nanomaterials on a case-by-case basis. Unfortunately, the large variety of nanomaterials and the significant difference in their properties based on small incremental differences in particle size or structure will make it difficult for EPA to craft modifications to these exemptions on broad-based principles.

III. EPA'S CURRENT REGULATORY FRAMEWORK ALLOWS IT TO REGULATE GENERATORS OF SOLID AND HAZARDOUS WASTES CONTAINING NANOSCALE MATERIALS

RCRA regulations set out several requirements for generators of hazardous wastes. Depending on the quantity of hazardous waste produced at its facility, a generator may need to satisfy notification, recordkeeping, storage, and management requirements. Facilities that generate waste containing nanomaterials will face the same requirements regardless of the dimensions of the underlying constituents of their hazardous waste.

Wastes containing nanomaterials may nonetheless pose challenges to EPA's current framework to regulate generators. Most notably, RCRA requirements for generators vary based on the amount of hazardous waste that they generate in a calendar year. Large quantity generators of hazardous waste must notify EPA of their activities, establish contingency plans, and store their wastes in certain units generally for 90 days or less.[28] By contrast, small quantity generators (SQGs) and conditionally exempt small quantity generators (CESQGs) need to meet only a subset of these requirements and have more flexible time limits for storing waste on-site. Because nanoscale materials may present novel properties at comparatively small quantities, the current 100 kilogram annual threshold to qualify as a CESQG may allow the on-site storage and management of nanomaterials for extensive periods of time. EPA may review whether to vary

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[27] *See CERCLA Nanotechnology Issues*, American Bar Association, Section of Environment, Energy and Resources (June 2006) at 4-7. As discussed above, EPA can address releases of constituents of solid or hazardous wastes that pose an imminent risk to human health and the environment under RCRA Section 7003. While the household hazardous waste exemption removes such materials from the definition of hazardous wastes, they nonetheless remain solid wastes and therefore releases of hazardous constituents from them should be subject to EPA's emergency order authority.

[28] 40 C.F.R. Part 262 *et seq.*

storage and management quantity thresholds based on the actual hazard posed by the nanomaterials rather than their quantity.[29]

Numerous regulatory exemptions allow generators to stay outside the full panoply of hazardous waste regulatory management standards.[30] While these exemptions also serve numerous policy objectives, they generally assume that larger quantities of hazardous waste stored for a longer period at a generator's facility will pose a larger risk to human health and the environment. To the extent that nanomaterials may change the degree of risk posed by equivalent volumes of waste, or may have qualities that make standard tank and container storage inappropriate for them, EPA may need to confirm the suitability of standard regulatory standards applicable to generators managing hazardous nanomaterials under exemptions from RCRA permitting.

The exemption of on-site storage of nanoscale wastes in certain types of management units may pose one of the most immediate and significant areas for EPA inquiry. It is likely that many nanoscale materials or wastes may be handled under existing exemptions for 90-day storage in tanks and containers, treatment in elementary neutralization units and totally enclosed treatment facilities, in-loop recycling, and other exempt storage and treatment options. To the extent that nanoscale materials display unusual qualities or respond differently to standard treatment technologies, these exemptions may not adequately address those unique aspects. Alternatively, the special qualities of nanoscale materials may make it very difficult for generators to manage their wastes in certain types of units and create regulatory uncertainty and dislocation for existing operations.[31]

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29 EPA has already recognized that wastes which pose a greater toxic risk in relatively smaller doses may merit different classification and treatment. Acute hazardous waste, for example, remains subject to different thresholds for accumulation and temporary storage at generator facilities.

30 Perhaps the most notable exemptions allow generators to store and (in limited circumstances) treat hazardous waste in Subpart J tanks and Subpart I containers for less than 90 days without triggering full permitting requirements under 40 C.F.R. Parts 264 or 265. EPA also exempts satellite accumulation areas from permitting requirements, and as a result facility operators may store and manage nanoscale waste materials for an unlimited time as long as they satisfy labeling and minimal storage requirements and they do not exceed 55 gallons (or 1 quart for acute wastes). 40 C.F.R. § 262.34(c).

31 For example, it may prove problematic for a generator to demonstrate that a totally enclosed treatment facility (TETF) has prevented all possible releases of nanoscale materials treated in the TETF when current monitoring and detection technologies may not reliably detect low-level releases of nanoscale materials. Current regulatory standards require that a TETF be "constructed and operated in a manner which prevents the release of hazardous waste or any constituent thereof into the environment during treatment." 40 C.F.R. §§ 260.10 (definition of TETF), 264.1(g)(5) (exemption from permitting for treatment occurring in a TETF).

Last, EPA may face novel challenges arising from the application of universal waste management standards to wastes that may now begin to contain nanomaterials. For example, EPA has promulgated universal waste standards that provide reduced management burdens on certain types of large-volume, low-risk wastes such as discarded batteries and lamps. Some of the most promising applications for nanomaterials will likely arise in exactly these areas, and discarded universal wastes in these categories may begin to contain nanoscale components. If universal waste management standards for these items allow their co-disposal into municipal solid waste landfills, EPA may need to review in the near future its current regulatory framework appropriately addresses these wastes if they contain nanomaterials.[32]

IV. EPA'S CURRENT REGULATIONS ALLOW IT TO REGULATE TRANSPORTERS OF SOLID AND HAZARDOUS WASTES THAT CONTAIN NANOMATERIALS

EPA's current regulations provide a comprehensive framework for persons who transport hazardous wastes. These rules require generators to provide manifests to allow tracking of hazardous waste shipments, establish management standards for the transporters themselves, and impose obligations on the ultimate receivers of hazardous waste to report discrepancies between the shipped wastes and the manifest information. These rules do not address any specific risk or management practice that expressly affects nanoscale materials, but EPA's current regulatory scheme should allow it to address effectively environmental risks posed by the transport of solid and hazardous wastes containing nanomaterials.

As generators create increasingly large amounts of hazardous nanomaterial wastes that require shipping for off-site treatment or disposal, they may have to consider how certain EPA requirements for transporters might apply to their waste shipments. For example, the pending uniform hazardous waste manifest provides a block for special handling instructions and additional information. Given that many nanomaterials may not contain clear handling instructions or spill response information in the material safety data sheets that accompany them, generators and transporters may wish to assure that the nanowaste's manifest includes any special measures needed to respond to a release or spill. To the extent that transporters may also temporarily store hazardous wastes containing nanomaterials during transport for periods up to ten days, some of the same concerns outlined below for on-site accumulation by generators may also apply to transporters operating or using transfer facilities.

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32 We also note that generators must certify on the Uniform Hazardous Waste manifest that they have a waste minimization program in place, and (for large generators) that they selected the "practicable method of treatment, storage, or disposal currently available" that "minimizes the present and future threat to human health and the environment." 40 C.F.R. Part 262 Appendix (uniform hazardous waste manifest). All off-site shipments of hazardous waste after September 2006 will have to use the new uniform manifest.

V. EPA'S CURRENT RULES FOR TREATMENT, STORAGE AND DISPOSAL FACILITIES ALLOW IT TO REGULATE THESE FACILITY'S MANAGEMENT AND DISPOSAL OF NANOSCALE WASTES

RCRA bestows EPA with broad authority to regulate facilities that treat, store, and dispose of hazardous wastes (TSDFs), and the statute sets out numerous specific requirements that EPA must implement for certain types of waste disposal methods (*e.g.*, minimum technology standards for certain land-based units used to store or treat hazardous wastes).[33] This sweeping statutory grant of authority appears unaffected by the nanoscale dimensions of wastes that might be managed at the TSDF, and EPA should have the ability to promulgate regulations as needed to address novel environmental risks posed by the disposal of hazardous wastes containing nanoscale materials.

While EPA has extensive statutory authority to address hazardous wastes containing nanoscale materials, it may wish to re-examine some of its existing TSDF regulatory standards to assess their adequacy for nanomaterials. One notable area of potential review would be whether land disposal restriction (LDR) treatment standards for certain waste codes will -- when applied to wastes containing nanoscale materials -- meet the statutory standard of substantially reducing the underlying hazardous constituents in the waste so as to minimize any risk it poses to human health and the environment.[34]

EPA may also wish to assure that facilities that treat, store, or dispose of nanoscale waste materials have adequate plans in place for closure and post-closure activities. To the extent that nanoscale materials exhibit unexpected or qualitatively different properties in groundwater, soils, or waste waters, current standards for corrective action may also need to expressly account for these factors when selecting an appropriate response action. For example, to the extent that EPA or delegated states rely on conservative default values to select a response action threshold, those default values will almost certainly not include any adjustments for potentially different risks posed by nanomaterials.

Several aspects of nanomaterial management remain relatively unexplored. We are unaware, for example, of tests on the efficacy of incineration or combustion as a control strategy for nanoscale versions of either hazardous constituents or wastes typically handled in incinerators, boilers, or industrial furnaces. While we do not know of any anticipated chemical

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33 42 U.S.C. § 6924(o) (minimum technological requirements).

34 While some treatment methods will likely address any likely novel characteristics of nanoscale materials within their waste code (*e.g.*, thermal retorting for solid wastes containing nanoscale metals), other technologies that rely on fixation or chemical bonding may need review.

aspect of these nanomaterials that would affect the suitability of combustion or other control strategies, EPA may wish to monitor or sponsor research on these issues.[35]

VI. DELEGATED STATE WASTE PROGRAMS MAY ALSO SET OUT THEIR OWN MANAGEMENT REQUIREMENTS FOR NANOMATERIAL WASTES, BUT NONE HAVE YET DONE SO

Pursuant to RCRA's provisions that allow states to assume primary responsibility to administer their own hazardous waste programs that are at least as stringent as federal requirements, EPA has delegated authority to 45 states to implement their own hazardous waste programs. To our knowledge, none of these state programs have any regulations, guidances, or policies that expressly address any special risks posed by solid or hazardous wastes that contain nanomaterials. While several states are investigating nanomaterials, none of them have announced plans to proceed with any regulatory initiatives at this time.[36]

States, however, also have the ability to impose more stringent hazardous waste management requirements within their delegated programs under certain circumstances.[37] Some states may choose at a future date to regulate nanoscale waste materials expressly under standards that differ from EPA's regulatory framework. For example, some states may wish to designate certain nanoscale wastes as listed hazardous wastes even if EPA has chosen not to impose such a listing. Alternatively, other states may wish to allow the use of nanoscale materials in a dispersive fashion into the environment (for example, as an environmental remediation technology) even if EPA might consider the placement of larger-scale versions of the same material as disposal onto land. If EPA wishes to foster a uniform regulatory policy for the regulation of nanoscale waste materials, it may need to offer guidance or regulations to guide state regulations in a consistent manner.

VII. RCRA REQUIREMENTS SHOULD NOT DISCOURAGE THE ENVIRONMENTALLY BENEFICIAL USE OF NANOMATERIALS

This paper has focused on the ramifications of applying RCRA regulatory standards to the wastes that contain nanomaterials. EPA should note, however, that RCRA may also affect the use of nanotechnology in environmentally beneficial ways. For example, nanomaterials may offer innovative means to treat intractable soil and groundwater

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35 EPA, of course, has already actively and expansively supported research into the environmental uses and aspects of nanomaterials, and some of its research may already encompass these issues.

36 California, for example, might act to regulate nanostructures before EPA. L. Bergeson, *Nanotechnology: Opportunities and Challenges for EPA,* EPA Millennium Lecture Series, Frontiers in Nanotechnology (May 9, 2005).

37 40 C.F.R. § 270.1 *et seq.*

contamination.[38] It is unclear, however, how RCRA regulations will deal with the intentional placement of these nanoscale materials onto land in a manner that arguably constitutes disposal. EPA may need to clarify its policy in regard to these uses through guidance similar to its policies for the application to land of agricultural chemicals or military munitions in their intended use.[39]

At the least, current EPA regulations may need to provide a clear path for TSDFs that wish to use innovative nanotechnology in corrective actions to address groundwater or soil contamination. Other potential nanotechnologies that may apply to RCRA waste management options might include the use of nanoscale filters for groundwater remediation and environmental sensors that use nanomaterials for inexpensive and speedy sample analysis or release detection.

CONCLUSION

We conclude that EPA already has expansive authority under RCRA to regulate discarded wastes that might include nanoscale materials. EPA's current regulations governing the management of hazardous wastes will also likely apply broadly to solid and hazardous wastes containing nanoscale constituents. Despite EPA's sweeping powers to regulate hazardous waste management and its comprehensive regulatory framework, we also identify below several areas of potential interest where EPA may wish to determine whether its current regulations will have unintended consequences when applied to nanoscale waste materials.

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38 Zhang (2003), *supra* note 4; Gavaskar, A., Tatar, L. and Condit, W, *Cost and Performance Report – Nanoscale Zero-Valent Iron Technologies for Source Remediation*, Presentation to Naval Facilities Engineering Command (Sept. 2005); PARS Environmental, Inc., *In situ Groundwater Treatment Using Nanoiron: A Case Study* (2005).

39 40 C.F.R. § 261.2(c)(1)(ii).

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The Adequacy of FIFRA to Regulate Nanotechnology-Based Pesticides

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The Adequacy of FIFRA to Regulate Nanotechnology-Based Pesticides[1]

EXECUTIVE SUMMARY

As applied to pesticides, the new and developing area of nanotechnology has the potential to bring real benefits, but also regulatory challenges. Reportedly, it has already begun changing the nature of some pesticides. There are consumer products on the market today using engineered nanoparticles of active ingredients such as silver to achieve antimicrobial effects, and many more are likely.[2] Even as these consumer products are introduced, agricultural chemical producers are developing new pesticide products using nanotechnology to enhance the effectiveness or delivery of those pesticides. Among the uses of nanotechnology in agriculture currently being explored are agrochemical delivery (delivery of pesticides and other chemicals only when needed or for better absorption), nanosensors, and new or modified active pesticidal ingredients.[3]

Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the U.S. Environmental Protection Agency (EPA) has the authority and responsibility to determine whether the benefits of pesticidal products developed using nanotechnology (referred to herein as "nanopesticides") outweigh any risks, and to determine the conditions under which a nanopesticide may be registered so as to limit potential risks. EPA has stated that "[i]t is expected that pesticide products containing nanomaterials will come under FIFRA review and registration." Yet it has also acknowledged questions about how FIFRA can be applied to

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2 *See, e.g.*, Woodrow Wilson International Center for Scholars, Project on Emerging Technologies, A Nanotechnology Consumer Products Inventory, available at http://www.nanotechproject.org/index.php?id=44.

3 *See, e.g.*, Woodrow Wilson International Center for Scholars, Project on Emerging Technologies, Inventory of Agrifood Nanotechnology, available at http://www.nanotechproject.org/index.php?id=50; Center for Science, Technology, and Public Policy, University of Minnesota, "The Nanotechnology-Biology Interface: Exploring Models for Oversight, September 15, 2005, Workshop Report," available at http://www.hhh.umn.edu/img/assets/9685/nanotech_jan06.pdf.

nanopesticides, such as whether use of a nanoscale material results in a change to a pesticide product already registered under FIFRA.[4]

This paper addresses that and other challenging issues relating to the application of FIFRA to nanopesticides. It discusses the extent to which FIFRA and EPA's implementing regulations and programs are adequate to address the regulatory challenges of such products.

In summary, EPA has considerable authority under FIFRA to prohibit, condition, or allow the manufacture and use of nanopesticides. Its regulatory tools include regulation of pre-registration research and development (R&D) through experimental use permits (EUP); requirements for pre-registration testing; the registration requirement, which requires development of data and can impose limits on the use and handling of a nanopesticide; requirements for registrants to submit post-registration adverse effects information; possible requirements for post-registration testing; and reregistration requirements. Additionally, EPA has strong enforcement options under FIFRA to proceed against unregistered nanopesticides or those found to cause unreasonable adverse effects on human health or the environment. EPA may therefore prohibit the use of nanopesticides presenting unreasonable adverse effects, and may restrict other nanopesticides so as to ensure that risks do not become unreasonable.

I. GENERAL COMMENTS ON FIFRA REGULATION OF NANOPESTICIDES

A. FIFRA Provides Considerable Authority to Regulate Nanopesticides

FIFRA offers EPA ample statutory authority to regulate nanopesticides. This authority covers the entire scope of regulatory interest, from pre-registration research and development, to registration, through post-registration marketing and use.

As discussed in greater detail below, under FIFRA Section 5, EPA regulates pre-registration activities such as R&D. For example, EPA currently regulates R&D on conventional pesticides through EUPs. Pesticide developers must notify EPA and obtain a permit prior to conducting R&D on pesticides except where the Agency has expressly chosen to exempt certain classes of R&D. EUPs themselves can be tailored to address the particular circumstances of the R&D activities or the material involved. Thus, EPA can ensure that the risks of testing unregistered nanopesticides are managed appropriately.

The degree of control that EPA has under FIFRA is in marked contrast to the Agency's regulation of R&D under the Toxic Substances Control Act (TSCA). For example, under the premanufacture notice (PMN) R&D exemption, developers of new chemical substances have no obligation to notify EPA of any aspect of their R&D activities. EPA has limited means of controlling research risks beyond enforcing certain minimal requirements. Instead, the TSCA regulation simply requires that hazards are communicated; that the amount

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[4] EPA, Science Policy Council, "Nanotechnology White Paper" (external review draft) (Dec. 2, 2005) at 26, 27, available at http://www.epa.gov/osa/pdfs/EPA_nanotechnology white_paper_external_review_draft_12-02-2005.pdf.

produced for R&D not exceed that reasonably necessary for the research purpose; that a technically qualified individual supervise the research; and that records are maintained.[5]

As noted above, EPA has chosen to promulgate several limitations on the requirement to obtain an EUP prior to conducting R&D. Stringent controls have not been deemed necessary in the past for such research on conventional pesticides; however, they may or may not be necessary for R&D on nanopesticides. Theoretically, workers would be protected by applicable Occupational Safety and Health Administration (OSHA) requirements. Nevertheless, EPA could cut back on or eliminate its self-imposed restrictions on the scope of the EUP requirement with respect to nanopesticides if appropriate.

EPA's most powerful tool for controlling the potential risks posed by nanopesticides is the registration requirement. Registration review provides EPA with the opportunity to prohibit, condition, or allow the manufacture and use of nanopesticides and prescribe the conditions of that manufacture or use. The registration requirement in FIFRA Section 3 is backed up by strong enforcement powers that EPA can exercise over unregistered pesticides under FIFRA Sections 12, 13, 14, and 19.

The registration requirement expressly provides EPA authority to require the generation of data necessary for risk assessment on the candidate nanopesticide; to conduct a risk assessment balancing the risks and benefits of the nanopesticide; to prohibit the use of a nanopesticide that is determined to present unreasonable adverse effects to human health or the environment; and to condition the use of a nanopesticide to ensure that it does not present the threat of unreasonable adverse effects. The authority afforded under FIFRA is far more flexible than that provided for existing chemicals under TSCA Sections 4, 6, and 7. Instead, EPA's FIFRA authority is more akin to EPA's authority under TSCA Section 5(a)(1) regulating new chemicals, but is even more comprehensive than this PMN authority.

EPA's authority to regulate nanopesticides under FIFRA continues post-registration as well. After a period of years, reregistration is required under FIFRA Sections 3(g) and 4. EPA can require post-registration testing of nanopesticides under FIFRA Sections 3(c)(2)(B) and 4. Nanopesticide registrants remain under an obligation to notify the Agency of adverse effects discovered after registration under FIFRA Section 6(a)(2). If EPA should determine that the balance of risks and benefits of a nanopesticide has shifted since its original risk assessment, the Agency has a variety of tools to halt further use of the nanopesticide under FIFRA Sections 12, 13, 14, and 19.

B. Nanopesticides Provide EPA with Regulatory Challenges

Although the Agency has considerable authority to regulate nanopesticides under FIFRA, exercising that authority appropriately will require rethinking its decisions on issues that are settled with respect to conventional pesticides. Among the challenges are the following:

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[5] 40 C.F.R. §§ 720.3(cc) and (ee), 720.36.

- Nano versions of registered conventional pesticides raise questions as to whether new registrations are needed under current requirements, although this question is likely to be more easily resolved under TSCA.

- EPA may want to reconsider its exemptions from EUP requirements for nanopesticides.

- EPA may need to identify an appropriate data set for EPA's risk assessment of nanopesticides.

- EPA may want to develop registration requirements specifically for nanopesticides.

II. EPA AUTHORITY TO REGULATE NANOPESTICIDES PRIOR TO REGISTRATION

EPA has authority to regulate any substance or mixture of substances intended to be a pesticide prior to registration. Existing authorities under FIFRA in the pre-registration regulatory arena do not distinguish regulated products by size, but by intended function (*i.e.*, as a pesticide). Accordingly, the Agency is well poised to regulate nanopesticides prior to their registration either immediately or upon modification of existing regulations or policies.

A. EPA's EUP Authority

EPA's authority to regulate pre-registration activities for pesticides has generally focused on R&D activities, particularly with respect to those persons wishing to accumulate the necessary information in order to register a pesticide under FIFRA Section 3. Under FIFRA Section 5(a), EPA has established a number of requirements for the pre-registration activities under an EUP. These requirements are set forth generally in the regulations at 40 C.F.R. Part 172.

Many of the requirements of Part 172 may apply directly or with some minor modification to nanopesticides. For example, EPA has prescribed data submission requirements for EUPs at 40 C.F.R. Section 172.4(b). Since those requirements set forth the information needed by the Agency in general terms, EPA likely would not need to conduct additional rulemaking to address EUP data requirements for nanopesticides. Regardless, EPA may still wish to review those requirements in light of the unique properties of nanopesticides and make modifications as necessary. Specifically, as a matter of practical application, EPA may want to notify applicants of the specific nanopesticide information that the Agency believes is appropriate in order to meet the requirements of 40 C.F.R. Sections 172.4(b)(1)(iii), (vi), and (vii) regarding the details of the testing, scope of testing to be conducted, purpose of the testing, any prior testing or knowledge of existing properties or toxicity of the nanopesticides, and the planned storage and disposal plans for the nanopesticides. Section 172.4(b)(1)(viii) provides EPA with sufficient authority even beyond the scope of the information described, in that this provision allows EPA to seek any "other additional pertinent information as the Administrator may require." Accordingly, EPA has the authority in existing regulations to require additional

testing or information necessary to appropriately review any EUP application associated with nanopesticides.

In addition, EPA can solicit public comment and even hold a public hearing on any EUP permit applications that may be of regional or national significance.[6] On several occasions EPA has solicited public comment on EUP applications related to small-scale field testing of genetically engineered microbial pesticides,[7] and the Agency may wish to do so for nanopesticides as well.

Based on the information submitted under 40 C.F.R. Section 172.4(b) and the Agency's analysis of such information, EPA may impose appropriate limitations on a nanopesticide's EUP to address any potential risks.[8] As to whether an EUP would be needed for a nanopesticide for which a macro version has been registered, see the discussion of pesticide registration below.

As an alternative to direct application of existing provisions, should EPA determine that nanopesticides warrant specific regulatory provisions, the Agency may wish to consider a special nanopesticide provision on EUPs that addresses the unique characteristics of those substances. EPA has done this in the past with genetically modified microbial pesticides.[9] EPA would need to support the decision for special provisions with evidence demonstrating this need. Given the new and unique properties of nanopesticides, this would likely not be an issue.

B. Exemptions from EUP Requirements and Corresponding Controls

Currently, under 40 C.F.R. Section 172.3, certain types of R&D activities are exempt from the EUP requirements. Examples include tests conducted in laboratories or greenhouses and replicated field trials or other tests intended solely to assess a pesticide's potential efficacy, toxicity, or other properties.[10]

Given the unique properties of nanopesticides, EPA may wish to reconsider that general presumption as applied to these new types of pesticides, especially with respect to tests assessing toxicity. EPA has expressly reserved the right to revoke the general presumptions on a case-by-case basis. Specifically, pursuant to 40 C.F.R. Section 172.3(e), EPA may require that any type of testing for a particular pesticide or class of pesticides, including tests generally exempt from EUP requirements, be conducted under an EUP through notification to the pesticide developer. Given the unique characteristics of nanopesticides, EPA may wish to consider

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6 40 C.F.R. § 172.11.

7 *See, e.g.*, 69 Fed. Reg. 23193 (Apr. 28, 2004); 66 Fed. Reg. 30458 (June 6, 2001).

8 *See* 40 C.F.R. § 172.5(c).

9 *See, e.g.*, 40 C.F.R. Part 172, Subpart C.

10 *See, e.g.*, 40 C.F.R. § 172.3(b) and (c).

invoking the provisions of 40 C.F.R. Section 172.3(e), should Agency analyses justify such action. Depending on the Agency's evaluation of the risks, such action could be for particular nanopesticides, particular sub-classes of nanopesticides, or for the entire class of nanopesticides.

Other controls under FIFRA also exist for unregistered pesticides. For example, under FIFRA Section 3(a), EPA may through regulation limit the distribution, sale, and use of any unregistered pesticides undergoing R&D that are not the subject of an EUP or emergency exemption. In order to do so, however, EPA must demonstrate that such regulation is necessary to prevent unreasonable adverse effects on the environment.

C. Other Pre-Registration Exemptions Potentially Applicable to Nanopesticides

In addition to the general EUP exemptions, FIFRA Section 12(b)(5) also provides an exemption from civil penalties where an unregistered pesticide (such as an R&D nanopesticide) is being shipped for testing. Typically, the reasons involved with the testing include determining the potential value of the product as a pesticide or the product's toxicity or other properties. Although this exemption may be of concern to EPA for nanopesticides, this provision relates solely to shipment of R&D pesticides. Accordingly, any concerns that EPA may have with respect to appropriate labeling or use can be addressed through other FIFRA provisions as discussed in this paper.

D. Temporary Tolerance Level

Testing nanopesticides may result in nanopesticide residues on or in foods. In such situations, EPA may issue a temporary tolerance level for the expected nanopesticide residue prior to issuance of an EUP. The Agency would need to determine whether a temporary tolerance level would be required for nanopesticides under FIFRA Section 5(b), just as EPA would for any other R&D pesticide. With respect to application to nanopesticides, the terms of Section 5(b) do not appear otherwise to restrict EPA's regulatory authority in this regard simply because of the unique characteristics of nanopesticides. Accordingly, FIFRA appears to grant EPA wide latitude in this area.

In the case where a temporary tolerance already exists for the conventional version of a nanopesticide, EPA may wish to consider whether the Agency would need to revise the applicable tolerance, or issue a separate tolerance altogether, in order to address the nanopesticide version and the particular circumstances associated with that pesticide.

E. Studies

Under FIFRA Section 5(d), EPA may determine whether to require certain studies to be performed during the EUP period. Thus, EPA can sometimes require testing as a condition of granting an EUP. This provision, however, applies only to "a pesticide containing any chemical or combination of chemicals which has not been included in any previously registered pesticide." Where a conventional registered pesticide contains the same "chemical or combination of chemicals" used in a nanopesticide, this provision apparently would not apply.

F. State Issuance of EUPs

Under FIFRA Section 5(f) and 40 C.F.R. Part 172, Subpart B, EPA has authorized states to issue EUPs under state authority. A number of states have applied for and received EPA authorization. Given the unique properties of nanopesticides and the authorization given to states to issue EUPs, EPA may wish to consider whether it should amend that authorization and its regulations in light of the unique characteristics of nanopesticides.

Regardless of whether EPA chooses to amend those regulations, the Agency still retains broad authority over state-issued EUPs under 40 C.F.R. Section 172.26. Specifically, those provisions require states issuing, amending, or revoking state-level EUPs to provide EPA with notification of such actions. EPA retains the ability to amend or revoke such EUPs provided sufficient justification. Accordingly, while EPA may wish to revisit whether the provisions of 40 C.F.R. Section 172.26 require revision in light of the unique properties of nanopesticides, existing regulatory authority already provides a significant degree of post-issuance oversight. Any subsequent changes deemed appropriate or necessary would likely be more effective prior to issuance by the authorized state.

III. EPA AUTHORITY TO REQUIRE REGISTRATION OF NANOPESTICIDES

A. The Registration Requirement Gives EPA Substantial Control over Nanopesticides

The centerpiece of EPA's FIFRA authority to regulate nanopesticides is the registration requirement of FIFRA Section 3. Subject to limited exceptions, no one may distribute or sell any unregistered pesticide, a prohibition backed up by strong enforcement tools. As part of the registration process, EPA can require applicants to develop extensive information relevant to an assessment of the pesticide's risks and benefits. Registration itself is not a simple up-or-down decision, but rather is always a limited approval that conditions the use of a pesticide in a manner designed to prevent unreasonable adverse effects. Thus, through the registration requirement, EPA may prohibit the use of nanopesticides presenting unreasonable adverse effects on human health or the environment, and may restrict other nanopesticides in a tailored manner so as to ensure that the risks do not become unreasonable.

If a nanopesticide is unregistered, it may not be distributed or sold in the United States (except under exceptions such as that for R&D discussed above and certain export exemptions).[11] Moreover, distribution and sale of a registered nanopesticide is also prohibited if the pesticide is distributed, sold, or used in a manner that departs from the conditions of EPA's approval, such as claims substantially different than those approved in a registration,[12] a composition different from that reviewed in the registration[13] or that is adulterated,[14] or a use

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11 FIFRA §§ 12(a)(1)(A), 17(a), 7 U.S.C. §§ 136j(a)(1)(A), 136o(a).

12 FIFRA § 12(a)(1)(B), 7 U.S.C. § 136j(a)(1)(B).

13 FIFRA § 12(a)(1)(C), 7 U.S.C. § 136j(a)(1)(C).

inconsistent with the product's labeling.[15] Violation of these prohibitions can bring civil or criminal penalties under FIFRA Section 14, and orders for stop sale, removal, or seizure under FIFRA Section 13. EPA can suspend or cancel the registration or change its classification under FIFRA Section 6, and can order a recall under FIFRA Section 19(b). It can inspect for compliance under FIFRA Section 9. These enforcement tools give EPA authority to ensure that its ability to control nanopesticides through registration is effective.

Before exercising its enforcement authority against distributors and sellers of unregistered nanopesticides, EPA may want to educate them about the application of FIFRA to nanopesticides. As can be seen with some nanotechnology-based consumer products, non-traditional pesticide producers are entering the market. Due to the unique characteristics of nanopesticides, some producers and sellers may not recognize that FIFRA applies to their products and may be unaware of their obligations under FIFRA.

B. Whether Nanopesticides Are Covered by Existing Registrations of Conventional Pesticides

A threshold question is whether a nanopesticide is unregistered. This question arises where a conventional version of a nanopesticide is already registered. This question under FIFRA resembles that under TSCA as to whether a nanomaterial is an existing or new chemical substance, but the resolution under FIFRA is clearer than that under TSCA.

Under FIFRA Section 3(c)(5)(D), registration decisions depend in part upon an EPA determination that a pesticide "will not generally cause unreasonable adverse effects on the environment." Thus, EPA has both the authority and responsibility to determine whether the benefits of a nanopesticide outweigh its risks, and to determine the conditions under which a nanopesticide may be registered so as to limit those risks appropriately. Key factors in that determination are the claims and composition of the nanopesticide. Since the precise balancing of risks and benefits of a nanopesticide is likely to be different than that for a corresponding registered conventional pesticide, it is likely that EPA would take the position that use of nanoscale ingredients in place of conventional ingredients in a registered pesticide would necessitate the need for a new or amended registration.

In contrast, regulation under TSCA Section 5(a)(1) depends on whether a prospective PMN chemical has the same "particular molecular identity" as an existing chemical,[16] a determination that is independent of risk assessment considerations. Under TSCA the question turns on chemistry, which is not under EPA's control; but under FIFRA the question turns on risk assessment, which is under EPA's control.

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14 FIFRA § 12(a)(1)(E), 7 U.S.C. § 136j(a)(1)(E).

15 FIFRA § 12(a)(2)(G), 7 U.S.C. § 136j(a)(2)(G).

16 *See* TSCA § 3(2)(A)(i), 15 U.S.C. § 2602(2)(A)(i).

Under FIFRA, a pesticide is considered unregistered if its claims differ substantially from claims made for the registered pesticide, or if its composition differs from the composition of the registered pesticide.[17] On the other hand, a pesticide with the same formulation and claims as a registered pesticide may be added to the registration by supplemental statement (*i.e.*, without a separate risk assessment).[18]

The claims made for a nanopesticide may well differ from those made for a corresponding registered conventional pesticide, since nanotechnology allows for many new applications. Taking the antimicrobial active ingredient silver as an example, macro versions of silver-based pesticides are registered for use in swimming pools and other applications. Silver-based nanopesticides are being used as antimicrobials in fabrics, appliances, and other consumer applications.[19] Although both sets of uses involve antimicrobial activity, the details on the claims may well differ. Such differences may support an EPA determination that registrations for macro versions may not apply to nano versions.

Composition includes the identity of both active and inert ingredients and their ratios. Thus, the issue of whether or not a nanopesticide has the same composition as a corresponding registered conventional pesticide is not simply a function of whether the nano ingredient is an active or an inert. Given the unique characteristics of nanomaterials, it is unlikely that a nanopesticide will have the same composition as the corresponding registered macro version.

Even where the claims and composition of a nanopesticide are ostensibly identical to that of its macro version, EPA could take the position that the substitution of a nanoscale ingredient for its macro counterpart constitutes a change in composition *per se*. Moreover, the product chemistry, toxicology, and other information submitted for the macro version under 40 C.F.R. Part 158, Subparts C and D almost certainly would not apply to the nano version.

The unique characteristics of a nanopesticide will most likely result in different risks and benefits than its macro version. Thus, EPA's previous resolution of the balance of risks and benefits, and appropriate control measures, for the corresponding conventional pesticide is likely to differ from that for the nanopesticide, even where the composition and claims are ostensibly identical.

Thus, a new or amended registration application will be needed for a nanopesticide, at least in most cases. Where the registrant of a conventional pesticide applies for registration of a nano version of that pesticide, an application for an amended registration of the

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17 FIFRA § 12(a)(1)(B) and (C), 7 U.S.C. § 136j(a)(1)(B) and (C).

18 FIFRA § 3(e), 7 U.S.C. § 136a(e).

19 *See* Woodrow Wilson International Center for Scholars, Project on Emerging Technologies, Nanotechnology Consumer Products Inventory, available at http://www.nanotechproject.org/index.php?id=44.

corresponding macro pesticide under FIFRA Section 3(c)(7) and 40 C.F.R. Section 152.44 might be appropriate. An amended registration application could be required to provide additional information specific to the nanopesticide's risks and benefits.

C. Data Requirements for Registration of Nanopesticides

To perform the statutorily-mandated risk assessment for a nanopesticide, EPA needs information on the potential risks and benefits of the nanopesticide. Under FIFRA Section 3, EPA may obtain the necessary data from prospective registrants. This authority contrasts with EPA's inability to require testing of PMN chemicals except through a consent order under TSCA Section 5(e). Risk assessments under TSCA Section 5(a)(1) necessarily rely on structure-activity relationships and other assumptions in many instances, which may create difficulties for EPA where the unique characteristics of nanomaterials make analogies to conventional chemical substances unreliable. Under FIFRA, however, EPA can ensure that the Agency has all the data on the specific nanopesticide necessary to perform its risk assessment.

Under FIFRA Section 3(c)(2)(A), EPA may publish guidelines for the kinds of information that it needs to support registration, and it may revise those guidelines from time to time. EPA's current data requirements appear in 40 C.F.R. Part 158. EPA could develop data requirements specifically for nanopesticides. It has done so for genetically modified biochemical pesticides and microbial pesticides.[20] To date, EPA has not promulgated data requirements specifically for plant-incorporated protectants,[21] although it is considering doing so.[22] EPA may wish to consider whether adopting data requirements specifically for nanopesticides would be helpful for the Agency in conducting its risk assessments.[23]

For example, EPA's current data requirements for physical and chemical characteristics (color, melting point, vapor pressure, etc.) do not address the key characteristics that denote the unique character of nanomaterials.[24] Also, since nanomaterials may be used in

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20 40 C.F.R. §§ 158.690, 158.740.

21 *See* 40 C.F.R. Part 174, Subpart H (data requirements for plant-incorporated protectants -- reserved).

22 EPA has indicated that it intends to propose data requirements for the registration of plant-incorporated protectants in February 2007. 71 Fed. Reg. 23226, 23327 (Apr. 24, 2006) (semiannual regulatory agenda).

23 EPA has recently proposed updates to its data requirements for biochemical and microbial pesticides, 71 Fed. Reg. 12071 (Mar. 8, 2006), and for conventional pesticides, 70 Fed. Reg. 12276 (Mar. 11, 2005).

24 40 C.F.R. § 158.190.

nanopesticides at extremely low levels, current thresholds and exemptions may not be appropriate.[25] EPA may also want to revisit testing guidelines for application to nanopesticides.

D. Registration Decisions for Nanopesticides

Where a candidate nanopesticide presents some data gaps (which appears likely for most nanopesticides, at least for the near term), EPA has discretion to review the nanopesticide registration application under criteria which allow for the conditional registration of the pesticide, pending the development of additional required data, under FIFRA Section 3(c)(7).[26]

In addition, when making registration decisions, EPA may impose appropriate restrictions on the registration of a nanopesticide in order to prevent it from causing unreasonable adverse effects. Among the restrictions available to EPA for nanopesticide registrations in appropriate cases are the following:

- Registration for general use or restricted use under FIFRA Section 3(d) and 40 C.F.R. Part 152, Subpart I.
- Labeling restrictions under FIFRA Section 3(c)(5)(B) and 40 C.F.R. Part 156. These may include use of personal protective equipment, disposal restrictions, use restrictions, etc.
- Tolerances under the Federal Food, Drug, and Cosmetic Act (FFDCA) Section 408 and 40 C.F.R. Part 180.
- Worker protection standards under FIFRA Section 25(a) and 40 C.F.R. Part 170.
- Packaging standards under FIFRA Section 25(c)(3) and 40 C.F.R. Part 157.

As appropriate, EPA may want to revise its implementing regulations for these provisions to address the unique circumstances of nanopesticides.

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25 *See, e.g.*, 40 C.F.R. § 158.155(c) (0.1% threshold for impurities); 40 C.F.R. § 155(e) (no information required for impurities associated with inerts, even inerts which may be nanoparticles); 40 C.F.R. § 158.175(b)(2) (table of standard certified limits); Pesticide Registration (PR) Notice 96-8, "Toxicologically Significant Levels of Pesticide Active Ingredients" (Oct. 31, 1996), § IV (guidance on levels considered toxicologically significant), available at http://www.epa.gov/opppmsd1/PR_Notices/pr96-8.html.

26 *See* 40 C.F.R. § 152.111.

IV. EPA'S POST-REGISTRATION AUTHORITY TO REGULATE NANOPESTICIDES

Nanotechnology is both new and rapidly developing. EPA may anticipate that significant information relevant to nanopesticides will continue to become available for years. As EPA approves registrations for nanopesticides, it may do so with the assurance that it has substantial authority under FIFRA to amend its regulation of those nanopesticides even after granting registration.

EPA can expect to receive relevant information directly from nanopesticide registrants. FIFRA Section 6(a)(2) imposes on each registrant of a nanopesticide the obligation to notify EPA promptly of "additional factual information regarding unreasonable adverse effects on the environment of the pesticide." EPA regulations under 40 C.F.R. Part 159 specify particular kinds of information required to be submitted. The information may relate to a class of registered pesticides, rather than to a particular pesticide.[27] In addition, there is a catch-all provision for information that the registrant knows or should know that EPA might regard as raising concerns about the continued registration of the pesticide or about the terms and conditions of that registration.[28] This threshold for reporting is arguably lesser than, or at least comparable to, the "substantial risk" criterion for reporting of information under TSCA Section 8(e).

EPA may also exercise other post-registration authority. For example, EPA chose to develop a tailored requirement for reporting post-registration information for plant-incorporated protectants.[29] EPA also has issued a reminder to registrants of genetically engineered microbial pesticides of the need to report adverse effects information under FIFRA Section 6(a)(2).[30] EPA may wish to undertake similar action for nanopesticides as well.

EPA can also require nanopesticide registrants to develop new data post-registration. FIFRA Section 3(c)(2)(B) authorizes EPA to require registrants to conduct new studies, and FIFRA Section 4(d)(3) allows EPA to require submission of missing or inadequate data in connection with reregistration. Section 3(c)(2)(B) can be triggered whenever EPA determines that such new data are "required to maintain in effect an existing registration of a pesticide." This is a lesser threshold than the thresholds under TSCA Section 4(a) for EPA to issue a test rule.

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27 *See* PR Notice 98-3, "Guidance on Final FIFRA Section 6(A)(2) Regulations for Pesticide Product Registrants" (Apr. 3, 1998), § X, available at http://www.epa.gov/opppmsd1/PR_Notices/pr98-3.pdf.

28 *See* 40 C.F.R. § 159.195(a).

29 *See* 40 C.F.R. § 174.71.

30 51 Fed. Reg. 23313, 23320 (June 26, 1986).

EPA must eventually reconsider its registration decisions in light of post-registration developments. Under FIFRA Section 3(g)(1)(A), EPA is required to review a pesticide's registration every 15 years. The 15-year review interval does not preclude any earlier review of the registration.[31] Reregistration is required under FIFRA Section 4(a) for pesticides containing active ingredients also contained in any pesticide initially registered before November 1, 1984. As EPA conducts its reregistration reviews, the Agency can consider the particular hazards presented by nano versions of those active ingredients. While reconsideration of a new registration of a nanopesticide will not occur for many years, EPA may grant initial registrations for nanopesticides knowing that reregistration will eventually be required. Reregistration decisions have a lower threshold for EPA action than does TSCA Section 6(a), with its requirement that EPA determine that a chemical substance or mixture "presents or will present an unreasonable risk of injury to health or the environment."

In appropriate cases, EPA may also act to protect the public from nanopesticides without waiting for reregistration. Based on sufficient evidence, under FIFRA Section 6, EPA may by order cancel or suspend a registration, or change its classification. Under FIFRA Section 13, EPA may issue stop sale, use, or removal orders for pesticides whose registrations have been cancelled or suspended. EPA may also order a recall under FIFRA Section 19(b) for such pesticides. Past experience demonstrates that EPA's recall authority has proven easier to use than its "imminent hazard" authority under TSCA Section 7.

CONCLUSION

The preceding discussion indicates that EPA can regulate nanopesticides adequately through its existing statutory authority, although it may want to revisit its current regulations and guidance to address the unique characteristics of nanopesticides.

Congress did provide additional statutory authority to regulate antimicrobials under the Food Quality Protection Act (FQPA), but that authority mostly addressed procedure rather than substantive criteria for registration.[32] The FQPA does not establish a precedent for EPA needing legislative action to address particular classes of pesticides presenting different characteristics than the pesticides traditionally addressed by FIFRA.

The better precedent is genetically engineered microorganisms used as pesticides. In 1986, EPA determined that it could regulate the pesticidal products of biotechnology through FIFRA, despite the Agency's recognition that at least some of those products were likely to exhibit new traits. EPA addressed such factors as EUP exemptions, data requirements for registration, and post-registration reporting of adverse effects information for bioengineered

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31 *See* FIFRA § 3(g)(1)(B), 7 U.S.C. § 136a(g)(1)(B).

32 Food Quality Protection Act of 1996, Pub. L. No. 104-170, Title II, Subpart B, amended by the Antimicrobial Regulation Technical Corrections Act of 1998, Pub. L. No. 105-324. *See* 64 Fed. Reg. 50672 (Sept. 17, 1999) (proposed rule to implement this aspect of the FQPA).

microbial pesticides under FIFRA without the need for new legislative authority.[33] More recently, in 2001 EPA promulgated regulations to address a particular class of bioengineered pesticides, plant-incorporated protectants, again without additional legislative authority.[34] These examples suggest that EPA can regulate nanopesticides effectively under FIFRA.

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33 *See* 51 Fed. Reg. at 23313.

34 66 Fed. Reg. 37772 (July 19, 2001) (40 C.F.R. Part 174). The passage of the FQPA in 1996 had an incidental impact on this rulemaking.

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EMS/Innovative Regulatory Approaches

American Bar Association
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EMS/Innovative Regulatory Approaches[1]

EXECUTIVE SUMMARY

Rather than simply applying existing legal authority and regulatory approaches directly to nanotechnology in all respects, an innovative approach may be needed for several reasons. Potential accountability mechanisms include corporate stewardship, voluntary programs, flexible and performance-based standards, tailored monitoring and reporting, and proactive public education and dialogue. While the protection of human health and the environment is important, the evaluation of standards and approaches should be done within the appropriate context of the material in question, its setting, and the actual risks posed so as not to raise concerns where impacts are unlikely or to unduly restrict economic development. The unique nature of nanotechnology may also require an innovative approach to industry's concerns related to potential liability and confidentiality. Reference to foreign efforts may help guide the U.S. Environmental Protection Agency's (EPA) efforts toward consistency, efficiency, and effectiveness. Above all, the emergence of the nanotechnology industry requires EPA to think of environmental management as a systematic approach where regulation is only one of many possible tools to deal with potential environmental and public health issues.

I. INTRODUCTION

Because the environmental and exposure issues related to nanotechnology may be different in kind from technologies with which regulators are more familiar, an innovative approach to environmental management may be needed. Historically, the United States and many other countries have relied on a government-based regulatory system that has focused primarily on controlling workplace exposures, reducing end-of-the pipe and fence-line emissions from larger industrial facilities, management standards for hazardous wastes, and information disclosure and risk analysis for new chemicals and pesticides as the principal methods of holding industries accountable for the workplace, environmental, and public health consequences of their activities and products. As one commentator has noted, at least with respect to air, water, and waste standards, environmental regulators have applied 20th century approaches (primarily command and control regulations) to regulate 19th century technologies (such as industrial

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boilers, metal plating operations, and wastewater treatment plants). The historical approach has been successful in dealing with some of the most significant water, air, and soil pollution problems of the past. This may not be the most advantageous approach for nanotechnology for several reasons, however, including:

- the speed at which nanotechnologies are developing;
- the competitive pressures to move technology quickly into the marketplace;
- the limited resources available to government regulators;
- the difficulty in enacting new federal environmental legislation;
- the level of scientific uncertainty and the complex risks involved with nanotechnology;
- the difficulty in monitoring nanoscale releases; and
- the importance to the industry of maintaining public confidence.

Government agencies, the nanotechnology industry, advocacy organizations, individuals, and other relevant stakeholders may wish to consider employing an innovative range of management systems and accountability mechanisms to create a more sustainable and reliable system that assures public health and environmental protection while facilitating the growth of this fledgling, but potentially transformative, industry. The goal would be to avoid the rote application of existing regulatory approaches to these 21st century technologies if a better way exists.

The purpose of this paper is to provide some general thoughts and identify potential issues for consideration, but not to offer specific recommendations. Other briefing papers will focus on the issues related to nanotechnology in the context of specific environmental statutes and regulatory programs.

II. ENVIRONMENTAL ACCOUNTABILITY

"Environmental accountability" is a concept that incorporates a broad range of mechanisms designed to subject the environmental behavior of organizations to public scrutiny. The goal would be to encourage individual members of industry to engage in preferable environmental behavior by a systematic approach that uses a variety of mechanisms to foster a sense of responsibility, provide economic incentives, and establish certain legal obligations. Such mechanisms may include:

- the traditional regulatory and enforcement system;

- new approaches to regulation, including more flexible performance-based standards;
- economic instruments and product standards;
- enhanced monitoring and required public reporting;
- liability standards;
- voluntary industry leadership programs and public reporting protocols;
- improved public education;
- corporate social responsibility programs; and
- relevant stakeholder dialogues

Instead of relying solely or even primarily upon regulations, an environmental accountability regime would employ a variety of mechanisms. Some would be imposed by government, while others would be voluntarily adopted (or acquiesced to) by affected organizations based on self-interest or individual or organizational values. Still other mechanisms may result from economic pressure from customers, investors, and the public at large.

Implementation of environmental accountability regimes can vary greatly. Some examples may be useful. In 2005, Environmental Defense (ED) and DuPont entered into a partnership to develop a joint framework for the responsible development, production, use, and disposal of nanoscale materials. The ED-DuPont Responsible Nanotechnology Standards initiative will develop principles and processes for evaluating risks associated with nanoscale materials; developing risk management approaches for the manufacture, use, and disposal of nanoscale materials; and communicating risk identification and risk management decisions to stakeholders, such as consumers, regulators, and the public.

In addition to the ED-DuPont initiative, many other self-governance and best practices initiatives have been launched by various organizations. Some of these initiatives include the International Council on Nanotechnology, managed by Rice University's Center for Biological and Environmental Nanotechnology, the ASTM International's Committee E56 on Nanotechnology, and the International Organization for Standardization's Technical Committee on Nanotechnologies (TC 229).

The implementation of the self-governance initiatives will generate information on logistical and economic feasibility of these mechanisms, and can help develop critical information to understand whether and what type of dedicated regulatory program may be necessary. These initiatives could serve as the basis for the broad application of voluntary programs that will provide the emerging nanotechnology industry with the necessary flexibility to adjust to the market while providing sufficient safeguards to protect human health and the

environment. Moreover, as the EPA has successfully demonstrated under the National Environmental Performance Track Program, environmental management systems can be used as a voluntary regulatory tool, and the standardization of a nanotechnology management system could serve as the basis for providing accountability and transparency to a voluntary nanotechnology management program.

III. LEADERSHIP INCENTIVES

Another example of environmental accountability is leadership incentives. Recognizing that environmental behavior is driven by factors beyond command and control regulations, EPA and many states have developed voluntary environmental leadership programs. The incentives for participating in these programs may include public recognition, improved working relationships with government agencies, penalty avoidance through auditing and self-reporting, and regulatory flexibility. As an emerging industry, it may be useful for EPA, industry leaders, and non-governmental organizations (NGO) to consider the role that leadership programs could play in motivating desired environmental behavior.

Typical elements of environmental leadership programs include:

- a good compliance record;
- the existence of a company environmental management system that sets goals for environmental performance, maintains careful records, establishes employee training programs, requires periodic audits, provides for management review of the audits, and encourages continuous improvement in operations based on the management review; and
- reporting and prompt correction of violations that are identified through the environmental audits.

The goals established through leadership programs are often expected to go beyond mere compliance with the law, often addressing unregulated matters, committing to emission reductions that could not be required under existing regulations, or adopting preventive approaches that are not required by law.

Programs such as the Occupational Safety and Health Administration's (OSHA) Star Program, EPA's Performance Track, the Green Tier in Wisconsin, and the Clean Corporate Citizen Program in Michigan are examples of well-developed leadership programs. EPA's Energy Star program is another example of a leadership program, although one that exists in an area entirely unregulated by EPA. While these programs generally have broad support, some NGOs have historically expressed concerns that leadership programs can be resource intensive, diverting government resources away from other important efforts such as strengthening inspection and enforcement efforts. In addition, some NGOs believe that leadership programs do not focus on priority environmental problems. Another concern raised by some NGOs is that some companies have been allowed to remain in EPA's Performance Track program despite what may be seen as a poor compliance record.

EPA should consider working with members of the nanotechnology industry, NGOs, and other relevant stakeholders to determine whether a special leadership program for nanotechnology companies or companies that use nanotechnologies in their products could be added to the Performance Track or a separate nanotechnology leadership program created to take advantage of the incentives for better performance available through these programs. Participation by a broad range of stakeholders in the consideration and design of leadership programs may help to limit future problems and concerns.

IV. LIABILITY CONCERNS

Environmental accountability and voluntary management systems also relate to liability concerns. Common law and statutory liability for nanotechnology, as with any new technology or product entering the marketplace, will depend upon the factual context. In general, however, liability for very fine particulates and persistent pollutants has historically pushed the boundaries of the "failure to warn" doctrine, as the harm caused may take years to materialize as a measurable problem traceable to particular activities. Companies seeking a suitable liability prevention approach could use processes like environmental management systems and related product liability prevention oriented toward disposal risks, and control the long-term risks of nanoscale particulate matter.

Through environmental management systems, companies must identify activities that "touch" the environment. Where a regulatory framework is conditioned upon such releases through reporting requirements that have a threshold level which does not require reporting of de minimis quantities, there may be a need for environmental management that goes beyond (or operates in lieu of) regulatory requirements. Small quantities of persistent pollutants could accumulate in a manner that leads to long-term liability risks, but not where a sound environmental management system monitors this risk.

One approach may be for EPA to encourage the establishment of stewardship standards that attempt to foresee and avoid potential liabilities. In this manner, the environmental management system can operate as a liability prevention measure, and also create a feedback loop that aids the regulatory community in determining the proper threshold to use and test to require reporting or other waste management requirements. In other new technology settings (*e.g.*, pest-resistant biotech crops under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), EPA worked with industry to create voluntary environmental management system approaches that were incorporated into permits -- and imposed via contract on the chain of commerce. EPA took the data obtained in practice and tailored the program to optimize it. Similar approaches could be used in nanotechnology to attempt to reach an optimum balance between beneficial innovation and the regulatory oversight that controls environmental liability risks.

V. MONITORING, REPORTING, AND PERMITTING

Tensions may arise between (1) the desire of nanotechnology companies to bring their products to market quickly; (2) the limited data which currently exist on potential exposures and risk related to nanotechnology; (3) the goal of protecting the environment and public well-

being; and (4) the desire to reasonably accommodate relevant stakeholders while not unduly stifling economic potential. While regulations have played an important role in evaluating certain risks which are more readily assessable and less reliant on contextual (rather than more theoretical) exposures and risks, the existing framework may not be best suited to nanotechnology. That said, it is important to note that the last several years have seen an evolution in the driving forces for testing, monitoring, and reporting potential risks.

The roles of individuals, NGOs, and political leaders have increased significantly in securing the development and disclosure of additional data related to potential environmental and exposure risks in addition to (or in lieu of) more demanding regulation. Consumer acceptance or rejection of new products can clearly sway industry behavior. In addition, manufacturers and investors may be driven by self-interest to evaluate and limit workplace exposures, environmental risks, and product liability claims. When viewed in this light, the development of reporting monitoring and reporting requirements through a collaborative approach of qualified stakeholders may significantly reduce the tensions noted above.

The unique and varied nature of the nanotechnology industry may require an even stronger reliance on the involvement of relevant stakeholders in the development and evolution of formal or informal government or industry standards through the following efforts:

- Developing monitoring and reporting guidelines through a high level panel composed of scientists, regulators, environmental and safety NGOs, and nanotechnology industry representatives convened by the government, organizations such as ISO, or through a dialogue process such as those convened by organizations such as the Meridian Institute.

- Developing and funding a research regime aimed at rapid "ramp up" of the assessment and identification of nano-size industrial products, byproducts, and releases.

- Quickly developing monitoring technology needed to assess realistic releases, exposures, and risks involving nanomaterials.

- Recognizing that the potential exposures, pathways, and risks must be evaluated in the appropriate context and setting throughout the process.

Several examples from the permitting context are pertinent. One readily available model for flexibility is the "plant-wide applicable limits" approach developed under the Clean Air Act and used in EPA's Project XL program. Under this program, Intel, working with its local stakeholders and EPA, was able to design a new permit that allowed its microchip production facilities to change its product mix without new permits so long as umbrella emissions limits for entire facilities were met. With a product life cycle that can be as short as eight months, the ability to change product lines without having to modify a permit was essential for Intel to remain competitive.

A second model for flexibility is the cap and trade system used to regulate sulfur dioxide emissions from coal-fired power plants. Because the primary concern about sulfur dioxide emissions was that they generated acid rain over wide areas of the country, Congress established a ceiling (a cap) on sulfur dioxide emissions from coal-fired power plants at a level substantially lower than existing emissions. After allocating emissions allowances to all of the regulated facilities, Congress authorized the facilities to trade emissions allowances among each other so long as a plant held at the end of each year one allowance for each ton of sulfur it emitted. This system allowed the plants wide latitude in choosing how to control emissions, stimulated innovation, and substantially reduced the cost of compliance.

The point of these two examples is not that they necessarily have specific applicability to nanotechnology. Rather, the examples demonstrate that imaginative regulatory approaches can be devised in the context of open stakeholder negotiations.

Two elements were essential to the success of the more flexible approach used in the Intel situation: enhanced monitoring and public reporting, along with earlier and more substantial stakeholder involvement. Because flexible permits are designed to reduce delays arising from government reviews and approvals (particularly given increasingly limited government budgets), alternative accountability mechanisms would ideally be substituted to ensure that the public is adequately informed and protected. These mechanisms would include government and public access to additional information that could help track facility performance and identify problems, and more stakeholder influence at the front end of the approval process over the structure of the regulatory mechanisms. Just as it has worked for the microchip industry, a more flexible approach to permitting designed with broad stakeholder involvement and relying on enhanced monitoring and public reporting may allow the nanotechnology industry to continue its rapid growth while adequately protecting public health and the environment.

VI. ADAPTABLE RULES

A threshold issue is to distinguish between "pollutants" or "waste" on the one hand, and manufacturing "products" or "tools" on the other. It would seem that if the manufacture and use of nanomaterials are properly managed in a reasonably controlled environment, then it may be appropriate to limit or avoid the regulation of such materials and uses. For example, EPA policy or guidance could establish handling criteria that would exempt certain products or activities from the application of certain regulatory requirements (*e.g.*, the use of carbon nanotubes within an enclosed structure). Compliance with those criteria would allow a company to avoid regulation within that context. This approach is similar to the way infectious waste has been controlled. The primary problems with infectious waste are proper isolation, packaging, storage, and disposal to prevent exposure. Rather than adopt a full-scale, RCRA-like program to deal with what was primarily an occupational exposure issue, many states opted for narrower standards that focused on improved waste handling.

Applying this approach to the management of nanomaterials, more tailored command and control requirements would be triggered in the event of an exposure-relevant release or non-compliance with the established criteria. Such an approach may alleviate industry

concern about potential permitting requirements, citizen suits, etc., while providing a contextual framework for EPA and the public to appropriately assess and respond to actual risks.

EPA may also consider the implementation of pilot programs, temporary requirements or voluntary programs to evaluate the efficacy of certain approaches before promulgating mandatory and enforceable regulations. This approach may need to be revisited should a loss of public or regulatory confidence arise due to the perception of a serious threat, government inaction, or industry shortcomings. This may be viewed as a potential risk of the "wait and see" approach, however.

VII. CLEAR ENFORCEMENT PRIORITIES

The future development and commercialization of nanotechnology in the United States could significantly depend upon the effective formulation and implementation of clear federal and state environmental and worker safety enforcement priorities. Enforcement priorities should reflect the lessons learned from existing environmental and worker safety programs. More than 30 years of empirical evidence demonstrates that effective enforcement is a function of clarity, predictability, and rationality (CPR). First, enforcement agencies should set clear and generally applicable workplace and environmental performance standards. Legal uncertainty, whether due to the lack of clarity or inconsistent state and federal requirements, is the enemy of environmental and worker safety, economic development, and technological growth.

Second, enforcement should be predictable. Enforcement in some programs may appear to some to be dependent on the individual preferences and perceptions of field and program personnel. In some cases, a condition or practice that one inspector or agency views as a significant violation proves to be of little or no concern to another inspector or agency in a different jurisdiction. To the extent possible and at the outset of the development of management requirements, it may be advantageous to implement one consistent, performance-based compliance and enforcement standard, applicable to as many companies as possible.

Third, enforcement priorities would preferably be rationally based and rationally applied. It is not at all clear that existing enforcement priorities and paradigms, designed to address the environmental and workplace safety problems associated with older manufacturing processes and technology, will have salience with the newer manufacturing processes, technologies, and products that are on the horizon. Rote reliance on existing enforcement priorities and approaches could at once cripple progress and prevent useful products from reaching the market, while at the same time simply missing opportunities to address potentially new environmental and/or workplace risks. On the other hand, the hasty development of a nanotechnology-specific enforcement program -- even if legally supportable -- could prove counterproductive. This suggests that a more cautious approach would be appropriate.

Relying on the range of compliance tools available to EPA and the states may also be important. These include compliance training programs, technical assistance, environmental auditing, encouraging the use of environmental management systems and participation in environmental leadership programs. Compliance training may be somewhat difficult at the outset depending upon the nature of nanotechnology regulation and the expertise of state and

federal regulators and their contractors. Still, compliance assistance may be important for new, smaller entrants into the industry. Promoting the use of environmental auditing and environmental management systems may stimulate more careful self-regulation from the outset and limit the need for enforcement actions. Finally, finding a place for nanotechnology companies within corporate leadership programs could help establish a standard for excellence in environmental management among companies involved with nanotechnology.

VIII. BALANCE BETWEEN CONFIDENTIALITY AND PUBLIC DISCLOSURE

Regulated businesses typically provide both routine and episodic reports to state and federal agencies regarding environmental releases and chemical management. Consideration should be given by both government and the regulated community about what portions of these reports should be submitted and maintained subject to confidentiality claims based on public safety concerns rather than trade secret/confidential business information or national security grounds. Currently, most environmental reporting programs do not, or do not adequately, provide for confidentiality claims by regulated entities based on public safety concerns. The federal Freedom of Information Act does exempt documents in government files from mandatory public disclosure on public safety grounds, but only in connection with documents related to law enforcement. Further refinements to state and federal "freedom of information" laws may be deemed necessary to address the need to exempt certain information from pubic disclosure on public safety grounds.

Nanotechnology's risks may arise in the setting of confidential research relating to adverse effects. At one level, material information about environmental risks can trigger SEC reporting and tort law obligations, even where the material information was generated from unpublished research that reveals not only the risk, but confidential aspects of the technology. The decision to disclose such research may also present complex questions of law and scientific ethics where there is a question as to whether the research was performed in accordance with accepted scientific principles, whether the results are statistically significant, and whether the study adequately controlled for confounding factors. Moreover, under one statute applicable to some nanotech (FIFRA), there is a data compensation program that applies to confidential information from which EPA and other companies benefit. Original data submitters have 15 years in which other registrants must compensate them for use of their data.

Other concerns must be addressed in balancing the desire for public disclosure while maintaining confidentiality. Unlike potential risks to health and safety, which arise in the context of security/vulnerability assessment and workplace/end-user exposure, these other concerns are purely economic, but of significant importance in encouraging the development of nanotechnology products and applications.

Protection of intellectual property rights and proprietary business information is crucial to fostering an environment which encourages capital expenditure to develop nanotechnology products and markets. When dealing with disclosure of sensitive nanotechnology information, those who engage in nanotechnology businesses also have legitimate concerns for the protection of proprietary information so as not to enable reverse engineering or unfair competition in world markets, and to shield themselves from presently

unforeseen, unspecified, and unregulated liability. Although the Freedom of Information Act provides certain protection for proprietary information, additional innovative protections will need to be addressed and implemented such as the use of panel science-law judges, among others, to protect the propriety or intellectual property of the creators of innovative technology from unfair competition, and to limit the mechanism and availability of citizen suits which such otherwise unshielded mandatory disclosures would invite.

Finally, a mechanism for risk assessment must be crafted to permit the controlled but necessary sharing of confidential information with insurers and others who furnish acceptable risk shifting mechanisms, such as private or federally funded liability insurance, to be utilized for the benefit of all -- nanotechnology businesses as well as workplace and end-user exposures.

These confidentiality issues must be addressed in the context of the need for good information to allow government to design appropriate management approaches and the need for sufficient information about both the risks and benefits of nanotechnologies to build public confidence in the industry. A dialogue among relevant stakeholders on information confidentiality and disclosure that carefully parcels out what information must be maintained as confidential to protect legitimate trade secrets, security issues, and the need for transparency could be an important early step in making progress on this critical issue.

IX. PROMOTION OF NANOTECHNOLOGY FOR ENVIRONMENTALLY BENEFICIAL USES

Environmentally friendly nanotechnology (EFNT) has potential application in manufacturing through reducing waste, replacing toxic materials with less toxic alternatives, and requiring less resources and energy. EFNT also has applications in green energy, waste treatment and remediation, and environmental sensors. This section offers some thoughts on how EPA could further its underlying goal of protecting human health and the environment by encouraging the development and use of EFNT. These suggestions are generally aimed at furthering EPA's ongoing efforts; most would avoid substantial additional cost or rulemaking.

Elements of public education and dialogue efforts may include:

- Providing context under realistic scenarios for the use of and potential exposure to EFNT.
- Publicizing technical reviews, guidance, and success stories related to EFNT.
- Encouraging similar efforts by state environmental agencies.
- Informing governmental entities and industry about EFNT means for reducing waste, reducing resource use, and saving energy.

- Hosting forums and conferences on EFNT technologies for governmental entities and industry.

- Seeking input from industry on how its EFNT products could be utilized and promoted.

- Advising industry of less toxic EFNT alternatives to other materials.

With respect to remediation techniques utilizing EFNT, EPA may consider:

- Prioritizing more research and use toward a variety of regulated sites and conditions over more relevant time periods.

- Encouraging their use at sites where the known risks from existing conditions considerably outweigh the potential risks from EFNT.

- Encouraging the use of experimental EFNT at portions of sites as appropriate.

- Providing flexibility and other incentives for the use of experimental ENFT remediation techniques (*e.g.*, more flexible timelines and conditions).

- Using it at sites managed by EPA and other federal facilities.

- Creating a registry of sites where EFNT has been used successfully, and information about EFNT use at those sites.

- Establishing defined and feasible metrics for demonstrating acceptable fate and transport, toxicity, and exposure risks related to the introduction of nanomaterials into the environment.

EPA may also create incentives for using EFNT products and technology by:

- Encouraging the purchase and use of EFNT by public entities (federal, state, local).

- Discounting permit and application fees.

- Prioritizing permit and approval processing.

- Considering the beneficial use of EFNT in the context of enforcement actions (*e.g.*, supplemental environmental projects; offsets for penalties or consideration of the calculated economic benefit of noncompliance).

A promotional program for EFNT could be developed in the context of a wider analysis of the role that EPA should play in publicizing both the benefits and the risks of nanotechnologies. This approach could allow EPA to identify and promote the environmental benefits without running the risk of losing credibility by over-promotion without adequately taking into account certain risks involved.

X. CONSIDERATION OF INTERNATIONAL APPROACHES

A number of reasons may exist for international coordination or consideration of nanotechnology management:

- Virtually every industrialized nation is actively pursuing scientific research and economic development of nanotechnology.

- Rapid globalization of economy, industry, and innovation systems suggest much value in consistent regulatory frameworks.

- Seeking coordinated international approaches at the outset of regulatory consideration would avoid trade and other disputes between conflicting entrenched national programs (*e.g.*, U.S./exporter vs EU/importers dispute over biotech crop approvals).

Existing international regimes, such as the Basel Convention on Hazardous Waste or the United Nations Convention on Transport of Dangerous Goods, may cover applications of nanotechnology, but require interpretation or negotiations to determine what fits where. In some instances, these Conventions may drive the adoption of nanotechnology as substituting for more hazardous technologies in electronic waste.

Formal international regulations or treaties specific to nanotechnology would be premature at this time given nascent state of technology and uncertainties about potential risks, and the wide variety of industries and media (air, water, etc.) that can be implicated. Initial international coordination efforts should therefore focus on information sharing, confidence-building, and voluntary measures. The threat of liability exists independent of regulation, and it is already driving industry self-governance.

Rather than trying to reinvent the wheel for nanotechnology alone at the international level, emphasis should be on supporting and advancing existing international coordination initiatives, including:

- ***International Standards Organization:*** The ISO has established a Technical Committee (TC 229) to develop international standards for nanotechnology, including standards for: terminology and nomenclature; metrology and instrumentation; test methodologies; modeling and simulation; and *science-based health, safety, and environmental practices.*

- ***ASTM:*** The ASTM has established an International Committee E56 on Nanotechnology that is currently developing standards for nanotechnology, including one that addresses environmental safety issues.

- ***Meridian Institute:*** The Meridian Institute and the National Science Foundation (NSF) sponsored an international Dialogue on Responsible R&D in Nanotechnology in June 2004 attended by officials from 25 nations. The purpose of the meeting was "to bring together governmental representatives from countries with significant nanotechnology research and development (R&D) programs to enter into an informal dialogue about how best to ensure that such programs are carried out in a responsible manner." The meeting resulted in an agreement "to form a preparatory group to explore possible actions, mechanisms, timing, institutional frameworks, and principles for ongoing international dialogue, cooperation, and coordination in the area of responsible R&D of nanotechnology."

- ***International Risk Governance Council***: The IRGC has launched an initiative to develop a "conceptual risk governance framework" for nanotechnology that will be globally acceptable. It has published a comprehensive draft report entitled "Nanotechnology Risk Governance" and convened meetings in January 2006 and July 2006 to develop an international risk governance system for nanotechnology.

- ***Semiconductor Industry Trade Associations (U.S., Korea, EU, Japan, and Taiwan):*** Foresee a "post-silicon era'" in their "International Technology Roadmap for Semiconductors," which projects nanotechnology as replacing current chip-making processes in another decade or two. Molecular electronics will sustain the chip industry rule "Moore's Law," which projects a doubling of computing power in two-year timeframes. The Roadmap addresses Environmental Health & Safety as well.

- ***Institute of Electrical and Electronics Engineers***: The IEEE, which has a standard setting component, convened an international workshop to map standards for nanotechnology in 2003, attended by representatives of ten nations, and has since begun to develop standards for nanotechnology.

- ***International Association of Nanotechnology:*** IAnano is working on a roadmap and framework for nanotechnology, including developing guidelines for quality control, health and safety, and nomenclature of nanotechnology.

- ***International Council on Nanotechnology:*** One of the major activities of the ICON is "to provide a multi-stakeholder, international and neutral forum for exploring health and environmental issues."

International coordination and regulation of nanotechnology will face many challenges and obstacles, including the different political, economic, and technological perspectives and capabilities of different nations. Nevertheless, for the reasons stated above, international coordination may offer potential benefits. Given the numerous international initiatives listed above, it would be advisable for EPA, before considering unilateral U.S. regulations, to consider and participate in existing international initiatives to see if an international consensus emerges on a regulatory approach for nanotechnology. At a minimum, consideration of such approaches may provide insight and guidance on more favorable approaches.

XI. EXPANDED PUBLIC EDUCATION

A public education program should be evaluated to provide the public with accessible information on the status of nano-material development, potential benefits and risks of nanomaterials, what is being done to investigate and understand the risks, what is being done by EPA and others to protect against the risks, and what individuals can do to protect themselves against any risks. Such a program could include, among others, the following elements:

- Developing pages on EPA's website that provide a variety of information, FAQ sheets, guidance, references for further information (*e.g.*, a link to the National Institute of Occupational Safety and Health webpage), examples of use, etc.

- Establishing a web-based dialogue on the benefits and risks of nanotechnology that is open to industry and the general public.

- Disseminating information and availability of information through press releases and print and other media by providing information to, and encouraging dissemination by:

  - State and local officials, such as through the National League of Cities, National Association of Counties, U.S. Conference of Mayors, etc.

  - State and local regulatory bodies.

  - Potentially related trade groups, industry organizations, and legal associations (*e.g.*, state bars or the environmental and regulatory sections of state bars).

  - Various public interest groups.

- Considering the feasibility of involving qualified stakeholders (industry, scientists, public interest organizations) in the creation of the public education materials, and highlighting the varied involvement.

In addition to the above efforts, it would be helpful to hold multi-stakeholder forums involving industry, scientists, lawyers, academics, public interest representatives, and others for insight into perceived risks, tension points, perceptions of regulatory protection, and possible ways to resolve various issues. Such forums should consider involving members of the general public in stakeholder forums and separate discussion or breakout groups to achieve same objectives.

By creating opportunities for the public to have open access to as much information on the nature of nanotechnology and its potential benefits and risks, EPA would allow open-minded participants to provide input based more on knowledge than on fear.

XII. A SYSTEMS APPROACH

The nanotechnology industry is facing at least two critical issues related to environmental management. The first is the need for a flexible and adaptive approach to environmental oversight that takes into account both the regulatory system as well as other approaches of driving desirable environmental behavior. The second is building and maintaining public confidence. If the nanotechnology industry does not address issues of public confidence in the technology, it may suffer the same fate as that of genetically modified seed crops in the EU -- rejection of the crops as unsafe by the public and by public officials, even though the scientific consensus identified little if any risk from the use of GMO seeds. The specter of unfounded public rejection suggests that accountability tools must be identified that create public confidence in the industry. Both of these issues support the importance of a systems approach to environmental management.

The risk of public rejection is especially acute in situations where scientific uncertainty is significant and where interest groups are likely to stake out strongly held positions early in the development of the technology. As Professor Gregory Mandel noted in his study of responses to risks posed by biotechnology and by nuclear power production, "individuals and interest groups do not revise their technology preferences in response to scientific and empirical information in the manner that such information appears to indicate." Rather, a wide range of cultural factors tend to drive and reinforce polarization. These factors include biased assimilation of new data -- Mandel notes that "individual beliefs are remarkably resilient to the introduction of new data that challenges the beliefs"; the tendency of individuals to rapidly and automatically have a positive or negative feeling when confronted with certain ideas or concepts; cognitive dissonance avoidance which leads individuals to discount information that conflicts with their perception of risks; and group dynamics that tend to perpetuate and reinforce polarization among individuals who socialize with those holding similar views. The polarization phenomenon is aggravated by the fact that moderate voices tend to be underrepresented in debates involving technological risk because moderate voices typically do not inspire a "moderate movement."

The risk of public rejection of nanotechnology for non-scientific reasons may be reduced if companies and government use the tools of environmental accountability early in the commercialization process. Accountability could be enhanced by providing more open access to information about the public health and environmental issues, involving a wide range of

stakeholders in discussions about the appropriate approaches to regulating nanotechnology, enhancing monitoring, providing the public with credible information about both the risks and the societal benefits of the technology, and creating a process that allows regulations and industry practices to adapt to new scientific findings.

A productive systematic approach to environmental accountability requires constructive contact among the industry, government, advocacy organizations, and other public stakeholders. Mandel espouses a concept he calls "dialogue and deliberation" in which representatives of the relevant interest groups (including "moderates") engage in a "culture-conscious" dialogue that focuses on values, in addition to potentially competing claims about the scientific, economic, and social benefits and risks. "The goal of the dialogue would be to help different groups learn about each other and each other's views, with a goal of cultural accommodation and understanding. Once these objectives have been achieved, a substantive policy deliberation can begin, aimed at developing widely-acceptable policy solutions." Both the Meridian Institute and the Environmental Law Institute have convened policy dialogues related to nanotechnology to launch the deliberation process, but a much more robust dialogue involving many more stakeholders and more approaches to assure environmental accountability may be needed as the industry continues to evolve. The earlier that these dialogues are initiated and the more open they are, the more likely that the dialogues will avoid or overcome interest group polarization. The dialogues would be most productive and useful if they focus on the real risks associated with the industry based on the best available scientific evidence, and finding ways to address the risks while allowing the industry to continue to develop. The result should be increased public confidence and reduced risk of unfounded rejection of new technology.

CONCLUSION

We believe that the issues surrounding nanotechnology provide an interesting and unique opportunity for EPA to imagine and implement a 21st century approach to environmental management. Consideration of the issues and options presented here would allow the systematic development and use of a wide range of tools to encourage desirable environmental behavior that will protect human health and the environment while allowing the industry to grow and compete globally.

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Nanotechnology Briefing Paper
Clean Water Act

American Bar Association
Section of Environment, Energy, and Resources

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Nanotechnology Briefing Paper
Clean Water Act[1]

EXECUTIVE SUMMARY

The purpose of this briefing paper is to evaluate the existing statutory authority under the Clean Water Act (CWA or Act) to regulate nanotechnology and nanoparticles.[2] One of the stated national goals of the CWA is the elimination of the discharge of pollutants into the navigable waters. Accordingly, the CWA generally provides the U.S. Environmental Protection Agency (EPA) with authority to regulate the discharge of "pollutants" consistent with this national goal. The term "pollutant" is defined fairly broadly so that nanoparticles discharged into a navigable water would likely be subject to regulation under the Act as a discharge of a pollutant. Thus, there appears to be adequate existing authority under the CWA that would allow EPA to regulate nanoparticles.

Although EPA likely has the authority to regulate nanoparticles, however, it would also likely be necessary for EPA to demonstrate that certain nanoparticles (*e.g.*, specific compounds or a class or category of nanoparticles) have a potential adverse effect on human health or the environment, thus making regulation of the nanoparticle necessary and appropriate under the CWA. To this end, further research and study would likely be necessary. In addition, before any meaningful regulation could be implemented, the technology must be developed that would allow nanoparticles to be accurately monitored, measured, and controlled.

In light of the above, and by way of illustration, this paper evaluates specific sections of the CWA that have some readily apparent relevance to the regulation of nanoparticles and generally considers the following four questions:

1. Does the section have any applicability to the regulation of nanoparticles? In other words, is the section of any use to EPA if it were to find that regulation was necessary and appropriate?

2. If so, does the section provide EPA the authority to regulate nanoparticles?

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1 This report was prepared by Pamela E. Barker, Godfrey & Kahn, S.C.; Timothy Butler, H. Butler, P.S.; Joseph M. Dawley, Babst, Calland, Clements & Zomnir, P.C.; Paul Herran, Department of the Corporation Counsel; Brian King, Schwabe, Williamson & Wyatt; Kirsten L. Nathanson, Crowell & Moring LLP; Kavita Patel, Schiff Hardin LLP; Jim Wedeking, Sidley Austin LLP; Harry Weiss, Ballard, Spahr, Andrews & Ingersoll, LLP; Jack Wubinger, Jones Day; and Steven Ziesmann, Godfrey & Kahn S.C.

2 The American Bar Association's Section of Environment, Energy, and Resources is neither advocating for nor against the environmental regulation of nanoparticles. This analysis only serves to inform EPA on how it could use existing legal authority, or where additional legal authority is required, to regulate nanoparticles should it choose to do so.

3. What are the technical, legal, or other problems involved in the application of this section to nanotechnology due to the unique nature of nanoparticles?

4. What are the options for dealing with such problems?

I. EFFLUENT GUIDELINES (CWA § 301, 33 U.S.C. § 1311) AND TOXIC AND PRETREATMENT STANDARDS (CWA § 307, 33 U.S.C. § 1317)

EPA may include nanoparticles as a regulated pollutant pursuant to Sections 301(g)(4) and 307(a). In doing so, EPA will have to place nanoparticles in a particular class of pollutants -- conventional, toxic, or non-conventional. CWA Section 301 requires EPA to set technology-based effluent limitations for point source discharges; CWA Section 307 requires the establishment of toxic and pretreatment effluent standards. EPA, under these sections, has the authority to establish technology-based effluent limitation guidelines and standards for nanoparticles discharged from a point source. EPA also has the authority, pursuant to CWA Section 307(b), to establish pretreatment standards for those facilities that discharge to a publicly-owned treatment works.

The main problem for addressing nanoparticles will be determining the best available technology that is economically feasible for regulated entities. Nanotechnology is still being developed and very little is known about the availability of technology to control nanoparticles in wastewater streams. EPA should consider extensive research projects, including collaborative efforts with regulated entities, and the use of technology-forcing regulations to ensure the development of appropriate control technologies.

II. WATER QUALITY RELATED EFFLUENT LIMITATIONS (CWA § 302, 33 U.S.C. § 1312)

CWA Section 502(6) defines the term "pollutant" so broadly as to include virtually any material added to a watercourse. Accordingly, for purposes of analyzing the application of the water quality provisions of the CWA to nanoparticles, it can be assumed that all the provisions of the Act dealing with the creation of and implementation of water quality standards will apply to the discharge of any form of nanoparticles to any water of the United States covered by the Act.

Section 302 of the CWA allows the EPA to create and modify water quality-related effluent limitations whenever EPA determines that the technology-based effluent limits created under CWA Section 304 are not sufficient to protect the affected waters to the degree required under the Act. The section further allows EPA to modify such water quality-based effluent limitations on economic or technical grounds, with certain special considerations in the case of toxic pollutants.

In the case of nanoparticles, it will be a necessary prerequisite for application of this section that there be a reasonably accurate scientific basis on which to make a judgment that the quality of the affected water is adversely affected by the addition of nanoparticles to the water body. While any detailed description of the process is beyond the scope of this paper, the

general outlines of the analysis can be described. First, unless there is a determination that nanoparticles are *per se* harmful, the toxicity or degree of pollution will probably be extrapolated based on the known toxicity of the same materials in non-nano quantities. So, for example, since lead is harmful as a pollutant in some quantity, EPA may assume it is harmful in smaller quantities, and act accordingly by prescribing some form of pollution abatement based on best available technology. If, on the other hand, an assumption of harm is not allowed, EPA will be required to develop data to show that the nanoparticles do in fact cause harm to the water body before it can invoke the jurisdiction of CWA Section 302.

III. WATER QUALITY STANDARDS AND IMPLEMENTATION PLANS (CWA § 303, 33 U.S.C. § 1313) AND REVISED WATER QUALITY STANDARDS (33 U.S.C. § 1313a)

Section 303 of the CWA provides for the adoption of state water quality standards by EPA and for the periodic revision of such standards on a three-year cycle. The burden of the section is to ensure that the state standards as approved by EPA are consistent with federal guidelines established by EPA under those provisions dealing with technology-based water quality standards, toxic effluent limitations and water quality-based effluent limitations. The section also provides for the identification of water bodies not meeting federal/state criteria, and for such water bodies, the creation of Total Maximum Daily Load (TMDL) programs.

Since there are (in all likelihood) no existing state or federal criteria for nanoparticles as such, the application of Sections 1313 and 1313a to such materials will necessarily await the development of such criteria. It is possible, however, that there may be some materials already regulated by EPA for which the applicable criteria may apply to such materials in nano form. For example, if nanoparticle X is discharged to a water body in such amounts as to be measurable at levels in excess of some existing criterion value for material X, that discharge would be subject to the provisions of CWA Section 303.

IV. INFORMATION AND GUIDELINES (CWA § 304, 33 U.S.C. § 1314)

Section 304 of the CWA provides in pertinent part that EPA shall create water quality standards for all waters of the United States for any and all pollutants, to create technology-based effluent limitations to be imposed under the National Pollutant Discharge Elimination System (NPDES) program, and to create individual control strategies for toxic pollutants. The section also provides for evaluation of and control of nonpoint source pollutants.

With respect to nanoparticles, this element of the EPA authority will in all likelihood be the most challenging. In order to create applicable water quality standards, EPA will be required to assemble a reasonable database covering all known effects of specified nanoparticles in water bodies. Such information will necessarily include toxicity studies, biological and chemical effect studies, transport/deposition data, uptake and bioaccumulation information and a host of other data to evaluate the possible adverse effects of specific nanoparticles on biological organisms, including humans. As one example, there is a recent study of "buckyballs" (carbon nanoparticles) and their effect on two aquatic species, bass and water fleas. The data showed an adverse effect on brain tissue. Such studies must be collected

and peer-reviewed before they can be used to create water quality standards that can be used to create applicable discharge criteria. Likewise, EPA will have to evaluate appropriate discharge control mechanisms to determine if they are technologically viable and economically achievable. As suggested above, it is possible that EPA can use data previously gathered on known pollutants (*i.e.*, lead, cadmium) to extrapolate effects of such materials in nanoparticle form, although such extrapolation must be scientifically defensible in light of such principles as threshold effects.

V. STATE REPORTS ON WATER QUALITY (CWA § 305, 33 U.S.C. § 1315)

CWA Section 305 provides for the reporting of the states' progress in implementing the provisions of the CWA to Congress. Given the state of knowledge concerning nanoparticles, it is unlikely that the states will have much to report until the scientific database expands, and EPA has created applicable water quality standards and criteria, including effluent limitations. Once the requisite data are collected, and are implemented in the form of state/federal regulations, effluent limitations, and applicable permit conditions, states will be required to include data on nanoparticles as part of their biennial reports.

VI. NATIONAL STANDARDS OF PERFORMANCE (CWA § 306, 33 U.S.C. § 1316)

CWA Section 306 pertains to national standards of performance as a means to control the discharge of pollutants. National standards of performance are based on best available demonstrated control technology, processes, or operating methods for sources within a list of categories (*e.g.*, pulp and paper mills, organic chemicals manufacturing). The list of categories may be revised by EPA from time to time to incorporate the pertinent category of sources discharging nanoparticles, if not already within the listed categories. CWA Section 306 allows EPA to consider other factors such as the cost of achieving the reduction of nanoparticles in effluent, as well as any non-water quality, environmental impact, and energy requirements in establishing national standards. The existence of such technology or other demonstrated control alternatives for nanoparticles is a prerequisite to regulation under Section 306, and the standards are subject to change by EPA as technology and alternatives concerning nanoparticles change.

As with CWA Sections 301 and 307, advancement in science and technology are key to establishing the appropriate standards for regulating nanoparticles and achieving a reduction of nanoparticles in effluent. Additional research is required to determine whether nanoparticle performance standards should be added to existing point source categories or whether the nanotechnology industry itself will require the creation of its own category.

VII. RECORDS AND REPORTS; INSPECTIONS (CWA § 308, 33 U.S.C. § 1318)

CWA Section 308 may be EPA's best tool presently to gather data on nanoparticles that may be discharged to waters of the United States. Congress and other regulatory agencies are currently in an "information gathering" mode with respect to nanotechnology and its effects on the environment, and the most effective way EPA can participate in that effort is to invoke Section 308 to gather data and require monitoring from nanoparticle users and manufacturers. This section grants the Administrator broad authority to require the owner or operator of a point source to maintain records, make reports, perform

monitoring and sampling, and provide information to EPA as is "reasonably" required to carry out the purposes of the Act. Section 308 also gives EPA the ability to enter and inspect facilities of an "effluent source," along with its records.

The power to gather information does not need to be used in anticipation of an enforcement action as courts have interpreted Section 308 broadly. "The breadth of this statutory grant of authority is obvious. In our view, the statute's sweep is sufficient to justify broad information disclosure requirements relating to the Administrator's duties, as long as the disclosure demands which he imposes are 'reasonable.'"[3] In *NRDC*, the D.C. Circuit upheld EPA's ability under Section 308 to require NPDES permit applicants to list all toxic pollutants currently used or manufactured as an intermediate or final product or byproduct. Thus, EPA was not limited to information related to toxic pollutants in a facility's effluent discharge -- it could obtain information under Section 308 on *all* toxic pollutants at a facility, because they *could* be discharged from the facility. Therefore, if a facility that uses or manufactures nanoparticles is discharging to waters of the United States, EPA could utilize Section 308 to inspect the facility, obtain records, require discharge monitoring, and make reports to EPA to gain more information on the nature of nanoparticle discharges.

While EPA has abundant legal authority to collect data, technical challenges in monitoring and measuring nanoparticles in an effluent discharge may render Section 308 meaningless. EPA cannot impose unreasonable requirements under Section 308 (*i.e.*, a high-cost experimental monitoring system), so until reasonable and effective monitoring technology is developed for nanoparticles, EPA may be limited to obtaining operational data from a nanoparticle facility. Due to the current difficulty in measuring nanoparticles in water, EPA could take first steps under Section 308 to gather data from facilities on (1) the use and manufacture of nanoparticles and (2) the frequency and volume of any discharges to waters of the U.S. from nanoparticle production facilities. EPA should also work with the scientific community to develop feasible monitoring technologies for nanoparticles, which could then be used for requiring nanoparticle users and manufacturers to install and use Section 308 monitoring and reporting programs.

VIII. ENFORCEMENT (CWA § 309, 33 U.S.C. § 1319)

CWA Section 309 governs enforcement of the CWA's pollutant-regulation provisions. If added as a pollutant under Section 309(c)(7), EPA could use this section to enforce nanoparticle standards and limitations. Nanoparticle listings and the ability to enforce whatever standards EPA may set require an appropriate, measurable, and well-defined limit. Continued research into technologies that may effectively measure and capture nanoparticles from discharge effluent is required before EPA begins any enforcement activities.

IX. OIL AND HAZARDOUS SUBSTANCE LIABILITY (CWA § 311, 33 U.S.C. § 1321)

CWA Section 311 regulates discharges of oil and "hazardous substances," defined under Section 311(b)(2)(A), to the waters of the United States from vessels and onshore and

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[3] *NRDC v. EPA*, 822 F.2d 104, 119 (D.C. Cir. 1987).

offshore facilities. EPA could conceivably designate particular nanoparticles, or specific groups of nanoparticles, as "hazardous substances" under Section 311. These materials, however, currently defy description, classification, and characterization as to what impacts they might have on human health and the environment. If future scientific and political support exists to characterize such materials as hazardous, Section 311 may serve to require cleanup of nanoparticle discharges.

X. FEDERAL FACILITIES POLLUTION CONTROL (CWA § 313, 33 U.S.C. § 1323)

CWA Section 313 simply reaffirms that federal facilities are subject to and must comply with all federal, state, interstate, and local requirements relating to the control and abatement of water pollution. While this section may not serve to add any substantive limitations, federal research, military, and production facilities may be significant sources of potential nanoparticle emissions. Should EPA regulate these discharges, enforcement initiatives involving federal facilities could set significant precedents for nanotechnology management.

XI. NONPOINT SOURCE MANAGEMENT PROGRAMS (CWA § 319, 33 U.S.C. § 1329)

Unlike with point sources, nonpoint source pollution derives from varied and often unidentifiable sources. Rainwater transports a variety of potentially harmful substances, such as sediment, fertilizer, pesticides, agricultural nutrients, motor oil, or salts, into surface and groundwater. There is no formal definition of nonpoint source pollution. CWA Section 319 is structured to accommodate the watershed-to-watershed variability of nonpoint source pollution by vesting most of the responsibility for investigation and control with the states. Among these responsibilities is (1) a state assessment report identifying waters failing to attain water quality standards and significant nonpoint source contributors; and (2) a state management program utilizing best management practices or other methods to control nonpoint source pollution for each watershed. These reports and programs are subject to approval by the Administrator. The remainder of the statute discusses funding and federal cooperation to aid the states in carrying out the listed goals.

The effect of nanoparticles on aquatic life remains largely unknown. Should evidence showing an adverse impact on surface water ecosystems appear, however, states will be obligated to evaluate the extent of water quality impairment caused by nanoparticles added through nonpoint sources. Due to their size, nanoparticles originating from industrial processes, consumer products, or an unknown number of other sources could be easily transported by rain and runoff to water bodies. Deposition of suspended, airborne nanoparticles via raindrops is also a potential source adding to nonpoint source impairment. It is possible that surface waters could become laden with nanoparticles originating from somewhere other than a point source. Should this occur, the statutory structure already in place could adequately track and potentially reduce nonpoint nanoparticle pollution provided that certain prerequisites occur. First, common to all nanoparticle pollution issues, effective measurement technologies and methods must be developed. Secondly, potential sources of nanoparticle diffusion must be identified. This may include everything from residential property to smokestacks, automobile tailpipes, and agricultural operations. Lastly, state agencies must have enough of an understanding of nanoparticles to effectively create and enforce best management practices that prevent

nanoparticles from eventually draining into surface waters, be it through runoff or aerial deposition.

Should nanoparticle impairment become a serious concern, the scientific and technical issues unique to nanoparticles may require some centralization to manage nonpoint source pollution. Best management practices might be best developed at the federal level in the form of product assembly guidelines. Examples could be the requirement of certain types of bonding to prevent nanoparticle deterioration and dispersion over time. Other requirements under the Clean Air Act to limit nanoparticle emissions could prevent suspended nanoparticle deposition in surface waters, similar to the formation of acid rain. Best management practices, however, will most likely require a reactive approach as it is unlikely that they may be designed and implemented until after EPA better understands nanotechnology uses and the fate and transport of nanoparticles in water runoff.

XII. CERTIFICATION (CWA § 401, 33 U.S.C. § 1341)

Applicants for a federal license or permit to conduct any activity that may result in a discharge into navigable waters must obtain certification from the state or an interstate water pollution control agency that the proposed discharge will comply with applicable water quality standards. Under Section 401, this would include any future water quality standards for nanoparticles.

The Section 401 certification process depends greatly on the content of the state's water quality standards. Most state water quality rules contain provisions prohibiting the degradation of water quality and the impairment of beneficial uses. Given the uncertain state of scientific knowledge regarding the environmental and health effects of nanoparticle discharges, some states might assert that any level of nanoparticle discharge violates state water quality standards and should be prohibited or unduly restricted. EPA could begin developing guidance for states to use in establishing water quality standards for nanoparticles. This approach will be complicated by the fact that each state may decide to develop its own response to this issue pending completion of the EPA guidance.

XIII. NPDES (CWA § 402, 33 U.S.C. § 1342)

The basic features of the NPDES program are: (1) the issuance of point source discharge permits with pollutant-specific numeric effluent limitations based on either technology-forcing standards or water quality protection standards; (2) the measurement of compliance against those effluent limitations by routine and frequent monitoring of effluent quality using standardized sampling and analytical methods; and (3) the routine and frequent reporting of the effluent quality measurements through discharge monitoring reports which are readily available to and understandable by the public as well as regulators.

In the formative years of the NPDES permit program, the effluent limits tended to be technology-based rather than water quality-based. Prior to the development of industry-specific effluent limitation guidelines, NPDES permits tended to be based on the permit writer's "best professional judgment." As the program matured, it became more standardized. For

example, the NPDES program now includes prescribed analytical methods,[4] industry-specific effluent limitation guidelines,[5] specific toxic pollutant standards,[6] and national recommended water quality criteria for 128 pollutants issued pursuant to CWA Section 304. Following the 1987 amendments to the CWA, renewed emphasis was placed on water quality issues (including contributions from storm water-related sources and nonpoint sources) and water quality-based effluent limitations. Where water quality-based effluent limitations are unattainable through the application of treatment technology, source-specific "best management practices" are often prescribed in addition to or in lieu of numeric effluent limitations. Best management practices are included as "special conditions" in the NPDES permit form. Other special conditions that have been employed to address unusual situations include: the collection of additional source-specific data and information above and beyond routine effluent quality monitoring; and the performance of special studies, such as ambient stream studies, toxicity reduction evaluations, sediment studies, mixing zone studies, and bioaccumulation studies, all for the purpose of acquiring data and information for future NPDES permit modifications or renewals.

Generally speaking, the discharge of any pollutant from a point source is unlawful unless the discharge is authorized by a NPDES permit.[7] Presuming the nanoparticle in question is determined to be within the CWA's broad definition of "pollutant," the NPDES permit program is applicable to point source discharges of the nanoparticle. In order to fit neatly within the NPDES permit program, the nanoparticle in question must be detectable and measurable through reasonably reliable and feasible sampling and analytical methods. In addition, the nanoparticle must be amenable to available treatment technology.

To the extent that the nanoparticle in question is detectable and measurable, the NPDES permit application process should be able to determine anticipated concentration and mass loading values for the regulated discharge. Similarly the effluent quality of the permitted discharge will be amenable to measurement for discharge monitoring and compliance purposes. To the extent that the nanoparticle in question is treatable through available technology, there will be a basis for the establishment of technology-based effluent limitations. The establishment of water quality-based effluent limitations may lag in time pending the performance of research on effects of the nanoparticle on various surface water receptors and designated uses.

It is conceivable, perhaps likely, that the regulation of nanoparticles covered by the NPDES program will follow the same evolutionary curve described at the outset of this section. In the early years, NPDES permits will be based upon the "best professional judgment" of the permit writer. As nanotechnology sectors emerge and develop, sector-specific effluent limitation guidelines can be promulgated to standardize the regulatory outcomes of the NPDES permit application and renewal processes. In addition, water quality criteria can be derived as the field research database develops.

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4 40 C.F.R. Part 136.

5 40 C.F.R. Parts 400-471.

6 40 C.F.R. Part 129.

7 CWA §§ 301(a) and 402(a), 33 U.S.C. §§ 1311(a) and 1342(a).

To the extent the nanoparticle in question is not detectable and/or reliably measurable and/or treatable, the NPDES permit program may still be able to provide some degree of regulation through the development of source-specific special conditions. The NPDES permit program enables the permit writer to employ "special conditions" to deal with atypical situations such as the emerging scientific and regulatory issues presented by nanoparticles. For example, a NPDES permit covering the discharge of nanoparticles could require the collection of "effects" data relating to ambient stream parameters, sediment, bioaccumulation in receptors, etc. It could also require the performance of toxic reduction evaluation studies or treatability studies. If the establishment of numeric effluent limitations is not technically feasible, the permit writer is authorized to specify best management practices as a means of regulating discharges through source control pending the development of a basis for specifying numeric effluent limitations.

XIV. ADMINISTRATION (CWA § 501, 33 U.S.C. § 1361)

CWA Section 501 allows the Administrator to recognize achievements in innovation related to waste treatment and pollution abatement programs. The Administrator may award a certificate or plaque to a regulated entity to recognize an outstanding "technological achievement or innovative process, method, or device in their waste treatment and pollution abatement programs."[8] Regional Administrators may also provide awards to eligible nominees.[9] This recognition includes an announcement in the *Federal Register* and notification to the Governor of the State or Tribal leader of the jurisdiction where the recipient is located, as well as the Speaker of the House and President pro tempore of the Senate.[10] The award does not allow for monetary awards or grants.[11] The Administrator may use these powers to promote or recognize any regulated entity that takes substantial steps towards solving many of the problems related to nanotechnology in wastewater, including the detection and filtration of nanoparticles or, conversely, the use of nanotechnology as an innovative solution to current problems involving wastewater treatment. Few, if any, government-owned wastewater treatment plants could afford the research and development required to produce this type of novel technology. The powers of this statute and their attendant regulations could best be used to promote and recognize research and development by other entities eligible for the award, such as privately-owned corporations and universities.[12]

XV. DEFINITIONS (CWA § 502 33 U.S.C. § 1362)

CWA Section 502 provides the definition of terms used in subchapter II of the Clean Water Act. As terms are currently defined, nanoparticles could already be considered a "pollutant," "toxic pollutant," or "medical waste" under the Act.

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8 CWA § 501(e)(1), 33 U.S.C. § 1361(e)(1).

9 40 C.F.R. § 105.1.

10 CWA § 501(e)(3), 33 U.S.C. § 1361(e)(3); 40 C.F.R. § 105.15.

11 CWA § 501(e)(2), 33 U.S.C. § 1361(e)(2).

12 *See* 40 C.F.R. § 105.5.

The term "pollutant" is defined to include, *inter alia*, chemical wastes and "industrial, municipal, and agricultural waste discharged into water."[13] The term "toxic pollutant" is defined to include "those pollutants, or combination of pollutants . . . which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the Administrator, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring."[14] The definition is notably broad enough to include materials known to harm aquatic life, but not human beings. Provided that the Administrator is satisfied with information showing harm to human or aquatic life, EPA may issue regulations for nanoparticles under 40 C.F.R. Part 129. The term "medical waste" includes, *inter alia*, "such additional medical items as the Administrator shall prescribe by regulation."[15] Considering the planned use of nanotechnology in drug delivery, if adequate information exists to warrant regulation, nanoparticles could be regulated under this narrower definition.

Considering that nanoparticles conceivably fit under three separate definitions of pollutants, the Administrator may wish to consider an exclusion of nanoparticles from these sections (either through a requested congressional amendment or amendment to the Code of Federal Regulations), if they are to either be regulated in some other manner or left unregulated.

XVI. WATER POLLUTION CONTROL ADVISORY BOARD (CWA § 503, 33 U.S.C. § 13630

CWA Section 503 creates an advisory board whose members are appointed by the President. Unlike the Effluent Standards and Water Quality Information Advisory Committee, established at CWA Section 515, the scope of its advisory role is not specifically defined. Since the Board exists to "advise, consult with, and make recommendations to the Administrator on matters of policy,"[16] it is authorized to study and make recommendations on the issue of nanoparticle regulation.

CONCLUSION

Although EPA likely has the authority to regulate nanoparticles, however, it would also likely be necessary for EPA to demonstrate that certain nanoparticles (*e.g.*, specific compounds or a class or category of nanoparticles) have a potential adverse effect on human health or the environment, thus making regulation of the nanoparticle necessary and appropriate under the CWA. To this end, further research and study would likely be necessary. In addition,

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13 CWA § 502(6), 33 U.S.C. § 1362(6).

14 CWA § 502(13), 33 U.S.C. § 1362(13).

15 CWA § 502(20), 33 U.S.C. § 1362(20).

16 CWA § 503(b), 33 U.S.C. § 1363(b).

before any meaningful regulation could be implemented, the technology must be developed that would allow nanoparticles to be accurately monitored, measured, and controlled.

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CERCLA Nanotechnology Issues

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CERCLA Nanotechnology Issues[1]

EXECUTIVE SUMMARY

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 *et seq.*, deals with risks to human health and the environment posed by uncontrolled releases of hazardous materials.

In the context of a rapidly emerging nanotechnology and nanomaterials sector, existing CERCLA mechanisms would be useful primarily to provide response and liability authority if releases of nanoscale materials prove hazardous to human health or the environment. The retrospective CERCLA liability framework is probably most valuable as a backup tool to deal with adverse consequences that are unanticipated or that otherwise elude environmental regulation. Certain provisions of the statute may also operate prospectively to regulate current use and disposal of nanomaterials classified as hazardous.

The functional core of the statute is the "hazardous substance" definition, which serves as the gateway to the substantive response, liability, funding, and reporting mechanisms. The single greatest challenge for applying CERCLA to nanomaterials is deciding whether they fall within this definition. This paper assumes that nanomaterials exist or can be created that will have adverse effects on human health or the environment and therefore can be classified as "hazardous." Because of the unique properties of nanomaterials, it is further assumed that such adverse effects may manifest themselves upon low-level exposure or release. The means of validating these assumptions and their applicability to different classes and uses of nanomaterials are beyond the scope of this paper.

Despite the practical challenges posed by this threshold definitional question, it is possible to conclude that the existing statutory framework is readily adaptable to nanomaterials that are identified, now or in the future, as "hazardous substances." The following discussion focuses on the major elements of the statute and the challenges posed by their application to nanomaterials. It also comments on elements of CERCLA for which nanomaterials present special considerations.

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I. TRIGGERING THE STATUTE: "HAZARDOUS SUBSTANCES" AND RELEASE REPORTING

A. Designation of Hazardous Substances (Section 102)

Virtually all of CERCLA's substantive liabilities and enforcement authorities turn on the statutory definition of "hazardous substances." Release, use, or detection of materials within this category serves to bring the statute to bear on facilities, their owners and operators, and a variety of activities and events.

CERCLA defines "hazardous substances" in the broadest possible terms. In addition to a CERCLA-specific list, the category includes listed or characteristic "hazardous waste" under the Resource Conservation and Recovery Act (RCRA), and materials designated as hazardous or toxic under numerous other statutes.[2] Under CERCLA Section 102(a), the U.S. Environmental Protection Agency (EPA) has omnibus authority to list substances "which, when released into the environment may present substantial danger to the public health or welfare or the environment."[3]

Before considering how these concepts may apply to nanotechnology, it is useful to recall their origin. CERCLA cast a wide net to assure that government would have the authority to react to events and conditions that endanger human health and the environment, and that responsible parties would shoulder a fair share of costs. The broad-spectrum approach to hazardous substances reflects legislative intent to leave no room for jurisdictional hairsplitting. This fundamental philosophy is a hallmark of the statute.

Upon enactment and in the decades since, CERCLA has built on a broad foundation of received knowledge to define what should qualify as a "hazardous substance." Chemicals of concern were and have been defined by reference to extant medical and epidemiological knowledge. Incorporation of regulatory decisions under media-specific programs such as RCRA, the Clean Water Act, the Clean Air Act, and the Occupational Safety and Health Act (OSH Act) brings into the net materials identified as appropriate for regulatory control because of their environmental and human health effects. Those programs also provide conceptual frameworks for risk assessment. CERCLA draws these diverse elements into a comprehensive, flexible mechanism for dealing with environmental harms not regulated under other programs.

When it comes to nanomaterials, no comparable base of knowledge exists today. Yet paradoxically, the CERCLA hazardous substance definition can readily accommodate the fluid and evolving nature of the nanotechnology sector.

The limited studies available today would probably not support the designation of any existing nanomaterial as a CERCLA hazardous substance. Considering the diversity of nanomaterials and the pace and breadth of nanotechnology innovation, the gap between the

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2 *See* CERCLA § 101(14), 42 U.S.C. § 9601(14).

3 42 U.S.C. § 9602(a).

sector and the environmental knowledge necessary to regulate it seems likely to persist and even expand. These problems are compounded by the fact that nanoscale forms of some elements or compounds may present concerns not normally associated with conventional forms of the same materials. Carbon 64 fullerenes and carbon nanotubes, for example, appear to behave differently than bulk elemental carbon; nanoscale aluminum particles may present an explosion hazard not normally associated with metallic aluminum. But nanomaterials may also behave differently in the sense that "hazardous" properties may not persist in the natural environment. Small particles that present exposure concerns in pure form may agglomerate, disperse, or react, for example, and thus may not pose the kind of "substantial danger" that the hazardous substance definition requires "when released into the environment." Issues like these seem likely to pose ongoing challenges for classification of nanoscale materials.

The power under CERCLA Section 102 to list new "hazardous substances" provides EPA ample authority to meet such challenges: EPA can classify nanomaterials as hazardous if it concludes that they present "substantial danger to the public health or welfare or the environment." This definition is flexible enough to permit EPA to define "danger" as appropriate for a given material. The built-in cross-references to other statutes moreover operate to extend CERCLA's reach in parallel with other regulatory decisions about specific nanomaterials.

Once a material is designated a "hazardous substance," it and actors associated with it are subject to the statute regardless of regulatory status at the time of production, use, or disposal. In other words, should adverse effects of a nanomaterial become apparent after release and exposure, the decision to classify it as a "hazardous substance" would operate, as it did upon enactment in 1980, to trigger the portions of the statute oriented toward remedying past mistakes.

B. Release Reporting and "Reportable Quantities" (Sections 102, 103)

The reporting requirement of CERCLA Section 103 operates in conjunction with the "hazardous substance" definition to bring the statute into play when a release to the environment occurs. Section 103 requires reporting of hazardous substance releases that exceed "reportable quantity" thresholds defined pursuant to Section 102. EPA's authority to promulgate regulations defining reportable quantities[4] goes with the hazardous substance listing authority and provides ample power to set reportable quantities for nanomaterials deemed hazardous.

For nanomaterials, the concept of a "reportable quantity" runs up against much the same knowledge gap as does the "hazardous substance" definition. Since CERCLA was enacted, it has typically been possible not only to identify materials that should be deemed hazardous, but also to define a threshold level of regulatory concern that could be translated into a CERCLA "reportable quantity." For nanomaterials, both questions turn on information yet to be developed.

The concept of a "reportable quantity" also highlights a conceptual problem distinct from the state of current knowledge. It has long been a fundamental assumption of

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4 CERCLA § 102(a), 42 U.S.C. § 9602(a).

environmental regulation that larger quantities of regulated material pose greater risk.[5] This relation may not hold for a nanomaterial that causes toxic or hazardous effects at low volumes or weights. For this reason, it is not clear that the seemingly conservative default quantity threshold of one pound[6] would be adequate for all nanoscale materials.

II. RESPONSE/REMEDIATION

A. Federal Authority to Respond

1. Removal/Remedial Authority; Funding (Section 104(a)-(d))
2. Information Gathering (Section 104(e))
3. Property Acquisition (Section 104(j))
4. Brownfields Revitalization (Section 104(k))
5. Superfund (Sections 111, 112)

CERCLA authorizes direct governmental action to address environmental contamination upon discovery, regardless of the passage of time since the act or omission giving rise to it, and regardless of whether such acts or omissions were lawful at the time. These powers include authority to conduct and fund removal and remedial action and to coordinate action by state and tribal authorities,[7] to compel disclosure of information from private parties,[8] and to acquire property needed to conduct remedial action.[9] Complementary authorities include funding for response actions and "peripheral matters,"[10] and for brownfields evaluation.[11]

For nanomaterials, these powers are important for two reasons. The first harks back to the statute's origins -- EPA could respond to a hazardous nanomaterial release or condition under the statute just as it has for hundreds of sites over the last quarter-century. There is nothing unique about nanoscale "hazardous substances" that would constrain this authority or impair the statute's operation.

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5 *See* Hester, "Small Stuff, Big Challenges: RCRA and CERCLA in the New World of Nanoscale Materials" (ELI/Woodrow Wilson Institute presentation, May 25, 2005).

6 *See* CERCLA § 102(b), 42 U.S.C. § 9602(b).

7 CERCLA § 104(a)-(d), 42 U.S.C. § 9604(a)-(d).

8 CERCLA § 104(e), 42 U.S.C. § 9604(e).

9 CERCLA § 104(j), 42 U.S.C. § 9604(j).

10 CERCLA §§ 111, 112, 42 U.S.C. §§ 9611, 9612.

11 CERCLA § 104(k), 42 U.S.C. § 9604(k).

The second is crucial in light of the limited knowledge currently available about the environmental fate and transport of nanoscale materials. Nothing in the statute would prevent EPA from deciding *in the future* to classify a nanomaterial as hazardous and then invoking its response authority to address conditions arising from preceding releases or actions. In such a scenario, CERCLA would operate precisely as it did upon enactment to impose "retroactive" liability for historic practices.

After-the-fact responses would be no more desirable for future problems associated with nanoscale materials than they were for the drum dumps uncovered in the 1980s. The immediate question, however, is whether the statutory authorities under CERCLA would be available in that eventuality. The answer is that they would be. The sole qualification is again technical rather than legal -- as discussed above, the threshold question is whether a given nanomaterial should be treated as a "hazardous substance." For nanomaterials deemed to fall within that category, the statutory response authorities could operate without modification.

B. Risk Assessment

1. Materials

a. ATSDR; coordination with TSCA and FIFRA (Section 104(i))

b. ATSDR funding (Section 111(m))

2. Releases/Sites

Within the CERCLA framework, risk assessment operates at two levels. One is the threshold determination of whether a substance warrants regulatory concern. The other is whether a given site warrants response or remediation.

As to the first of these, CERCLA expressly provides for coordination between EPA and the Agency for Toxic Substances and Disease Registry (ATSDR).[12] It also contemplates that research on materials or substances should be coordinated with similar programs of toxicological testing under the Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).[13] There is nothing unique to nanomaterials that would require modification of this basic structure. Considering the scope of research already in progress and the existing level of interagency coordination, there is no evident reason to think that the framework defined by the statute cannot be effective in developing information necessary to make regulatory decisions about nanomaterials.

As to the second, evaluation of releases and sites proceeds under the authority of CERCLA Section 105, which authorizes the National Contingency Plan (NCP) and the National Priorities List (NPL),[14] the Hazard Ranking System,[15] and coordination with state-led response

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12 CERCLA § 104(i), 42 U.S.C. § 9604(i).

13 CERCLA § 104(i)(5)(C), 42 U.S.C. § 9604(i)(5)(C).

14 CERCLA § 105(a), 42 U.S.C. § 9605(a).

actions.[16] Conditions associated with nanomaterials can be addressed within these authorities. Their application is again constrained only by the current state of knowledge, in this context the lack of information about the environmental fate and effects of nanomaterials.

C. Mechanics/Standards of Response and Remediation

1. NCP (Section 105, 40 C.F.R. Part 300)

2. Cleanup Standards (Section 121)

a. Standards and Practices Development -- OSWER, etc.

3. Nanomaterials as Remediation Technology

4. Public Participation in Remedial Action Plan Development (Section 117)

CERCLA response actions proceed under criteria stated in the NCP, with remedial actions selected in accordance with Section 121. The general rules applicable to remedial actions include the preference for permanent remedies that reduce the volume, toxicity, or mobility of hazardous substances.[17] The degree of cleanup is defined by reference to the general concept of assuring protection of human health and the environment.[18] Implementation includes state and public involvement under CERCLA Sections 121(f) and 117, respectively.[19]

EPA has authority under these provisions to define remediation objectives and select remedies for releases of hazardous nanoscale materials. No general or site-specific standards, criteria, or best practices yet exist for such releases. But their development falls within the existing mandates of EPA's Office of Solid Waste and Emergency Response and Office of Site Remediation and Enforcement; complementary research may be conducted under the aegis of the Office of Research and Development. These authorities and structures seem capable of serving without modification as vehicles for developing information necessary to define response and remediation objectives for hazardous nanomaterial releases.

In this context, nanomaterials present an interesting dichotomy -- their potential adverse effects must be balanced against their potential utility as remediation tools. EPA's National Center for Environmental Research lists remediation among possible "applications,"[20]

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15 CERCLA § 105(c), 42 U.S.C. § 9605(c).

16 CERCLA § 105(h), 42 U.S.C. § 9605(h).

17 CERCLA § 121(b)(1), 42 U.S.C. § 9621(b)(1).

18 CERCLA § 121(d), 42 U.S.C. § 9621(d).

19 42 U.S.C. §§ 9621(f), 9617.

20 *See* "Nanotechnology: Research Projects," available at http://es.epa.gov/ncer/nano/research/index.html (visited May 1, 2006).

-- for example, nanomaterials may promote degradation of chlorinated hydrocarbons. The idea of using nanomaterials to mitigate known risks of "conventional" hazardous substances is in tension with concerns about the environmental and health effects of the nanomaterials themselves. This tension has prompted the UK's Royal Society and Royal Academy of Engineering to argue that the use of free nanoparticles in environmental applications such as remediation should be prohibited until appropriate research has demonstrated that benefits outweigh risks.[21] Presumably risks posed by nanoscale materials in a remediation context will be evaluated not only in light of the risks they pose given the usual considerations of environmental setting, fate and transport, and potential receptors, but also in light of their benefits in reducing the hazards posed by other pollutants.

For present purposes, it is sufficient to note that the existing statutory authorities provide ample latitude to explore the positives of nanomaterials as well as the negatives.

III. COMPENSATION/LIABILITY/ENFORCEMENT MECHANISMS

A. Core Section 107 "Polluter Pays" Concept

1. "Response Costs"

2. Natural Resource Damages

3. Federal Lien

4. Settlement Authority and Procedures (Section 122)

CERCLA's liability provisions provide means to impose and allocate responsibility for releases of hazardous nanomaterials. CERCLA Section 107 expresses the central liability concept -- persons standing in certain well-defined relationships to "hazardous substances" are jointly and severally responsible for response costs. These potentially responsible parties (PRPs) may be the owners of facilities where hazardous substances are now located, the owners or operators at the time of disposal, or generators, transporters, or disposers of hazardous substances. These familiar PRP categories can apply to facilities and operations involving nanomaterials that fall within the hazardous substance definition.

It would of course be preferable to anticipate and avoid adverse effects of nanomaterials through regulation under other programs. Given the rapid pace of nanotechnology and nanomaterial development and marketing, however, regulatory decision-making may have difficulty keeping up. If we assume that nanomaterials may warrant classification as "hazardous substances," it seems prudent to assume as well that unanticipated problems will arise after releases have occurred.

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21 *See* The Royal Society and Royal Academy of Engineering, "Nanoscience and nanotechnologies: opportunities and uncertainties" (2004) at 46-47, Section 5.4, Paragraph 44, available at http://www.nanotec.org.uk/finalReport.htm (visited May 14, 2006).

The CERCLA liability framework can be expected to function perfectly well in the latter scenario, serving as a backstop for consequences that other programs fail to anticipate or avoid. Its ability to do so reflects its historic origin as a reaction to discovery of hazardous materials at uncontrolled disposal sites -- sites created, in many instances, in violation of no contemporaneous legal requirements. CERCLA embodies a legislative policy judgment that the need to protect human health and the environment warrants the imposition of strict joint and several liability, even if the conduct in question was lawful at the time and the liability is in effect retroactive. The statute is intrinsically backward-looking. It provides a means of second-guessing risk assessment judgments and of assuring that persons within the statutory categories of PRPs, bear the costs of late-emerging external costs.

These concepts can readily be adapted to evolving knowledge about the fate and environmental effects of nanomaterials. Perhaps more importantly, the statute's notorious burdensomeness can be a significant deterrent in a sector where rapid change taxes the capacities of prospective regulatory tools. The specter of retroactive CERCLA liability, with all it implies, provides a powerful incentive for developers and manufacturers to assure that their nanomaterials are produced, used, and disposed of safely.

In the context of nanomaterials, it is particularly appropriate that CERCLA Section 107 imposes no minimum or quantity threshold. It is axiomatic that liability attaches upon the release of any amount of hazardous substance.[22] Thus, although certain other portions of the statute tie affirmative reporting and disclosure obligations to mass triggers, for example the release reporting, reportable quantity, emergency planning, and toxic release disclosure authorities discussed in Part IV below, release of any amount of a hazardous substance can give rise to Section 107 liability. The de micromis exemption of Section 107(o) does not materially alter this conclusion. Although it defines presumptive thresholds below which persons in the "arranger" or "transporter" categories[23] are not liable, it is subject to an exception for situations in which materials disposed of contribute significantly to costs of response or natural resource restoration.[24] The de micromis exemption does not apply at all to current owners of CERCLA "facilities," or to persons who owned such facilities when hazardous substances were released. In those important categories, the rule remains unqualifiedly that any release triggers liability.

Complementary liability provisions address natural resource damages,[25] the federal superlien for response costs,[26] and authority to settle claims and grant covenants not to

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22 *See, e.g.*, *Goodrich Corp. v. Town of Middlebury*, 311 F.3d 154, 161 (2d Cir. 2002), *cert. denied*, 537 U.S. 937 (2003); *A&W Smelter and Refiners, Inc. v. Clinton*, 146 F.3d 1107, 1110-11 (9th Cir. 1998).

23 CERCLA § 107(a)(3) and (4), 42 U.S.C. § 9607(a)(3) and (4).

24 CERCLA § 107(o)(2), 42 U.S.C. § 9607(o)(2).

25 CERCLA § 107(f), 42 U.S.C. § 9607(f).

26 CERCLA § 107(l), 42 U.S.C. § 9607(l).

sue and contribution protection.[27] Like the core liability principles, all could function without modification in the context of hazardous nanomaterial releases.

B. Collateral Enforcement Tools

1. Information Requests (Section 104)

2. Unilateral Orders (Section 106)

3. Financial Responsibility and Guarantor Cost Recovery (Section 108)

a. "Classes of Facilities" (Section 108(b))

4. Civil Penalties (Section 109)

5. Whistleblower Protection (Section 110)

6. Special Notice Procedures (Section 122(e))

There is nothing unique to nanomaterials that would affect the operation of the collateral CERCLA enforcement mechanisms listed above. For nanomaterials denominated "hazardous substances," for sites warranting attention consistent with the NCP, and with respect to persons within the categories of "responsible parties" under Section 107, these CERCLA liability provisions can be expected to operate with respect to nanoscale materials as they have with respect to conventional "hazardous substances."

C. Contribution and Related Issues (Section 113(f))

1. Contribution (Section 113(f)(1))

2. Contribution Protection (Section 113(f)(2))

CERCLA's contribution and contribution protection mechanisms complement the basic liability framework and similarly can be expected to operate as they stand with respect to liability for nanomaterial releases.

D. Incidental Liability Provisions: Exemptions, Safe Harbors, Defenses

1. Fiduciaries (Section 107(n))

2. De Micromis PRPs (Section 107(o))

3. MSW (Section 107(p))

4. Contiguous Properties (Section 107(q))

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[27] CERCLA § 122, 42 U.S.C. § 9622.

5. Prospective Purchaser (Section 107(r))

6. De Minimis Settlements (Section 122(g))

7. Recyclers (Section 127)

Since 1980, several categories of liability exemptions and qualifications have been engrafted onto the basic CERCLA liability framework. These provisions do not pose any unique problems as applied to nanomaterials.

The technical question of quantity thresholds arises in several of these categories. The "de minimis" category is expressed in relative terms, as a comparison with the danger posed by other hazardous substances at a facility, so there is no problem with a numerical threshold. The "de micromis" category is defined by a quantity threshold (110 gallons of liquid, 200 pounds of solid) that might be problematic for nanomaterials, but at least part of the disposal must have occurred before April 1, 2001, so it is unlikely disposal of nanomaterials will fit within the definition in any event.

A similar question may arise as to the municipal solid waste (MSW) exemption of Section 107(p), which applies to "waste generated by a household" or waste generated by certain other entities that is "essentially the same as" household waste and that contains hazardous substances in relatively the same proportion. As nanomaterials come into more widespread use, residual quantities may be expected to show up in MSW. It is unclear whether these materials would appear in forms, amounts, or concentrations that would call into question the continued appropriateness for the MSW exemption. This possibility should be noted, however, as another manifestation of the larger question about whether existing quantity thresholds are adequate to deal with nanomaterials. If so, however, Section 107(p)(2) already provides that the exemption shall not apply if EPA determines that the MSW "has contributed significantly or could contribute significantly, either individually or in the aggregate, to the cost of the response action or natural resource restoration."[28] That determination is not judicially reviewable.[29] The statute is thus again flexible enough to cope with any special concerns that might arise in connection with nanomaterials in the municipal solid waste stream.

IV. COLLATERAL AND INCIDENTAL ELEMENTS/SUBPROGRAMS

A. SARA Title III

1. Emergency Planning Notification (SARA Title III Section 302, 42 U.S.C. § 11002)

2. Emergency Release Notification (SARA Title III Section 304, 42 U.S.C. § 11004)

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28 42 U.S.C. § 9607(p)(2).

29 CERCLA § 107(p)(3), 42 U.S.C. § 9607(p)(3).

3. Hazardous Chemical Inventory Reporting (SARA Title III Sections 311 and 312, 42 U.S.C. §§ 11021, 11022)

4. Toxic Release Reporting (SARA Title III Section 313, 42 U.S.C. § 11023)

These SARA Title III programs share the fundamental premise that emergency planners and members of the public need information about the presence and release of materials that are hazardous, extremely hazardous, or toxic. For nanomaterials falling within these categories, the same premise applies.

Aside from the subcategory of "extremely hazardous substances," these programs rely on well-settled CERCLA definitions. Unsurprisingly, the major question would appear again to be whether the default mass-based thresholds for these programs are valid for nanoscale materials that are classified as "hazardous substances." For extremely hazardous substances in general, for example, the default EPCRA Threshold Planning Quantity (TPQ) is 10,000 pounds, but 500 pounds "if the solid exists in a powdered form and has a particle size less than 100 microns."[30] The minimum threshold level for inventory reporting is 500 pounds for the TPQ for extremely hazardous substances, and 10,000 pounds for all other hazardous chemicals. There is no statutory restriction, however, on EPA's authority to set these values lower if warranted; the Extremely Hazardous Substance lists appended to 40 C.F.R. Part 355 identify numerous materials with TPQs of one pound. This conclusion would have to be reconsidered, however, if continuing research and development revealed that the weight and risk of nanomaterials or classes of nanomaterials are wholly independent. As the nanotechnology sector continues its rapid change and growth, the adequacy of these threshold levels will require continuing attention.

If a Material Safety Data Sheet must be maintained on premises pursuant to the OSH Act, then Tier 1 and Tier 2 inventory requirements of Sections 311 and 312 automatically apply. As a practical matter, the SARA Title III obligations follow automatically from the OSH Act determination -- subject again to the distinct question of whether the default weight thresholds are adequate in light of the type and degree of risk posed by a given nanoscale material.

CONCLUSION

The current state of knowledge concerning the environmental and health effects of nanomaterials poses practical difficulties in applying CERCLA. It is probably correct to say that most of the scientific and technical predicates for applying the statute to nanomaterials do not yet exist.

This knowledge gap is not as problematic under CERCLA as it is for environmental statutes that focus on current activities. Indeed, CERCLA was purpose-built to cope with the unanticipated adverse consequences of previously accepted practices. It expanded existing law by creating a totally new concept -- liability for conditions that exist today, no

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30 40 C.F.R. § 355.30(e)(2)(i).

matter when the conduct giving rise to them occurred. This concept fits the paradigm of adverse consequences that may arise in the future from as-yet unknown properties of nanomaterials.

Only technical input is needed to apply the statutory authorities to nanomaterials. When we can answer the questions of whether nanomaterials are hazardous, and if so, in what ways and in what amounts, the CERCLA machinery will be available to address adverse consequences.

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PROFILE



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Practices

- Energy
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- New York
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Education

- J.D., Stone Scholar, Columbia University, 1986
- B.A., high honors, Phi Beta Kappa, The University of Texas at Austin, 1983

Court Admissions

- U.S. District Court for the Southern District of Texas
- U.S. Court of Appeals for the 5th and District of Columbia Circuits
- U.S. District Court for the Southern District of New York

Experience

Tracy D. Hester heads the environmental law section in the Houston office. He counsels clients in regulatory matters, emphasizing enforcement defense, permitting, environmental diligence in acquisitions and transactions, and cost recovery litigation. Mr. Hester's practice also focuses on the innovative application of environmental laws to emerging technologies, such as wind and other renewable power projects, and on novel compliance strategies. He is one of the few lawyers in America qualified to speak on applying environmental laws to new nanoscale materials.

Mr. Hester represents clients from several energy industry sectors, including petrochemical manufacturers, petroleum and natural gas pipelines, petroleum refineries, as well as utilities, nanoscale materials manufacturers, cement kilns, newspaper printers and hazardous waste disposal operations. He also advises and represents financial institutions, companies and local governments in litigation and compliance negotiations in ozone regulatory policy, endangered species controversies, wetland assessment and mitigation, and water quality projects. Long one of Texas' environmental "go-to" lawyers, he routinely assists companies with emergency response planning and security assurance legal requirements.

Noteworthy

- Chambers USA: Guide to America's Leading Business Lawyers, Environmental Law, 2003-2006
- Highly Recommended Individual Attorney, Practical Law Company, Environmental Law
- American Law Institute, 2004
- Best Lawyers in America, Environmental Law, 2006-2007
- Texas Super Lawyer, Environmental/Land Use, 2003-2006

Chemical Security

Nineteenth Annual Texas Environmental Superconference
"An Oscar Winning Performance" - "All Quiet on the Western Front"
August 2-3, 2007

Introduction

"All Quiet on the Western Front" was released on April 21, 1930, a story depicting both the horror and monotony of "The Great War" along with the societal schism it created back at the home-front. One of the advertising posters for the film depicted a woman holding a sign that read: "Lest We Forget! This picture is brought back to you at a time when the whole world is again fearful of war. The story was written by one who hated war because he knew from experience that it is hell, not glory. .... It is greater than mere entertainment, because it is a war against war itself...." A generation later, society again finds itself in a position where the whole world is fearful of war and torn apart on the issue of how best to wage war against terrorism; war itself. This makes All Quiet on the Western Front an apt framework for a discussion on protecting against increasing terrorists threats on the chemical industry.[1]

Imminent and On-Going Risk

A Congressional Research Service report on Chemical Facility Security updated August 2, 2006 notes that "[f]acilities handling large amounts of potentially hazardous chemicals (i.e., chemical facilities) might be of interest to terrorists, either as targets for direct attacks meant to release chemicals into the community or as a source of chemicals for use elsewhere." In July 2004, the Homeland Security Council issued national planning scenarios to federal, state, and local homeland security preparedness committees, two of which included industrial chemical releases.[2] In the first scenario, terrorists successfully attacked a petroleum refinery and caused 350 hypothetical fatalities and an additional 1,000 hypothetical casualties. In the second scenario, a large volume of chlorine was released and resulted in 17,500 hypothetical fatalities, 10,000 hypothetical severe injuries, and 100,000 additional hypothetical casualties. On March 12, 2002, the *Washington Post* reported that a classified study conducted by the U.S. Army Surgeon General dated October 29, 2001, found that a terrorist attack resulting in a chemical release in a densely populated area could injure or kill as many as 2.4 million people.[3] According to the news article, the study found "even middle-range casualty estimates

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[1] In this paper and for purposes of discussion of this topic, the term chemical is intended to include oil and natural gas as well as other types of chemicals typically considered when discussing chemical plants.

[2] Homeland Security Council, The White House, National Planning Scenarios — Executive Summaries, July 2004. [http://www.globalsecurity.org/security/library/report/2004/hsc-planning-scenarios-jul04.htm], visited July 29, 2005.

[3] Pianin, Eric. "Study Assesses Risk of Attack on Chemical Plant." *Washington Post*, Mar. 12, 2002. p. A8.

from a chemical weapons attack or explosion of a toxic chemical manufacturing plant are as high as 903,400 people."[4]

Moving away from the theoretical to actual examples of terrorism aimed at the chemical industry, as recently as June 2, 2007, news sources across the world were focused on reports that four individuals had conspired to commit a terrorist act against the United States by planting explosives at the site of the John F. Kennedy airport jet-fuel supply tanks. The would-be terrorists aimed not only to explode those tanks but also to cause fire and explosions in the pipes running from those tanks and underneath passenger terminals and neighborhoods surrounding the terminal. The would-be terrorists anticipated "greater destruction than in the Sept. 11 attacks" and bragged that "[e]ven the Twin Towers can't touch it…this can destroy the economy of America for some time." It was not just the economy they were seeking to injure, but also the spirit of the United States. The would-be terrorists were quoted as saying, "Anytime you hit Kennedy, it is the most hurtful thing to the United States. They love John F. Kennedy…If you hit that, this whole country will be in mourning. It's like you can kill the man twice."

A spokesman for the company whose pipeline was the subject of the foiled attack declined to discuss what he knew about the plot, adding that "[t]here was a time when we would brag about our safety and security features, but we would not do that now, for fear we would be undermining them". That pipeline company and others have and will continue in the future to factor in the risk of terrorism in addressing the security of their pipeline system and in protecting information related to those pipeline systems. Pipelines have already been the target of terrorism in Great Britain, Colombia, and Turkey. A report prepared for Congress last year noted Al Qaida's interest in pipelines as targets, especially the Alaska pipeline that handles 17 percent of domestic crude oil production.

Another recent threat against the chemical industry was found on a February 8, 2007 posting of the electronic magazine Sawt al-Jihad (Voice of Jihad). The website included an article by Adib al-Bassam entitled "Bin Laden and the Oil Weapon" that discussed attacking oil infrastructure as a means to damage the U.S. economy and reduce the United States' ability to maintain operations in Afghanistan and Iraq. A recent jihadist website posting similarly called for attacks on oil infrastructure. This is not a major shift in strategy, though it may be a renewed call to arms. Al-Qa'ida and other jihadist elements repeatedly have called for attacks on oil and natural gas infrastructure throughout the world, but have succeeded only in attacking targets in the Middle East.

Those attacks were carried out very systematically, through a process of careful target selection, information gathering (detailed and accurate facility and security information was collected prior to the attack), planning, and preparation. According to one post-attack reporting, the information gathered to plan and prepare the attack included the use of insiders and bogus facility vehicles. Controlling who has access to the chemical industry and oil and natural gas infrastructure and information related thereto is, therefore, very important in the effort to wage war on war itself. According to a news articles written by Kevin Mooney and posted on July 5, 2007 at CNSNews.com, "Illegal

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[4] Id.

aliens have been found working at military bases, refineries, airports and even a nuclear power station in the past few years, and their use of fictitious identification papers continues to bedevil even employers who try to operate legally, federal agents say."

In addition to information, terrorists that work from within United States chemical facilities may gain access to materials to be used in subsequent attacks. For example, one of the 1993 World Trade Center bombers, Nidal Ayyad, worked as a chemical engineer at a United States company and used company stationery to order chemical ingredients to make the bomb. According to a U.S. Prosecutor in the case against the bombers, though "some suppliers balked when the order came from outside official channels, when the delivery address was a storage park, or when [a co-conspirator] tried to pay for the chemicals in cash," others did not.[5] Moreover, testimony at the trial of the bombers indicated that they had successfully stolen cyanide from a chemical facility and were training to introduce it into the ventilation systems of office buildings.[6] More recently, chemical trade publications reportedly were found in al Qaeda hideaways.[7]

Maritime Transportation Security Act

One of the first comprehensive means by which Congress responded to the perceived recent increased threat of terrorism against chemical facilities was to adopt the Maritime Transportation Security Act (MTSA, P.L. 107-295) of 2002 (MTSA). The MTSA was signed on November 25, 2002 and fully implemented on July 1, 2004. It was designed specifically to protect the nation's ports and waterways from a terrorist attack. The MTSA was developed using a risk-based methodology, focusing attention and increased security on those sectors of the industry perceived as having a higher likelihood of being involved in a terrorist incident. The first step undertaken by the MTSA was to require the Coast Guard to conduct a vulnerability assessment which identified vessels and facilities that pose a high risk of being involved in a transportation security incident. The term 'transportation security incident' is defined in the Act as a security incident resulting in a significant loss of life, environmental damage, transportation system disruption, or economic disruption in a particular area.

The next step in the MTSA scheme was to require security plans that addressed the vulnerabilities identified. The Coast Guard was tasked with preparing a National Maritime Transportation Security Plan and Area plans for each Captain of the Port (COTP) Zone. Commercial vessels and facilities that the Coast Guard assessed as higher risk were then required to prepare and submit to the Coast Guard security plans for deterring a transportation security incident to the maximum extent feasible. Security

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[5] Parachini, John V. "The World Trade Center Bombers (1993)." In: Jonathan B. Tucker (ed.) 2000. *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, Cambridge, MA: MIT Press. p. 190. Citing the summation statement of Henry J. DePippo, Prosecutor, *United States of America v. Mohammad A. Salameh et al.*, S593CR.180 (KTD), Feb. 16, 1994, pp. 8435-8439.

[6] *Id.*

[7] Bond, Christopher. Statement on S. 2579. *Congressional Record*, Daily Edition, June 5, 2002, p. S5043.

plans could include such features as passenger, vehicle and baggage screening procedures; security patrols; establishing restricted areas; personnel identification procedures; access control measures; and/or installation of surveillance equipment. The vessel and facility plans had to be consistent with the National and Area plans. The vessel and facility plans also had to identify the qualified individual having full authority to implement security actions; identify and ensure the availability of security measures necessary to deter to the maximum extent practicable a transportation security incident; and describe the training, drills, and security actions of persons on the vessel or facility to be carried out under the plan.

Transportation Worker Identification Card Program

The next major step in security for MTSA-regulated facilities involves the Transportation Workers Identification Card (TWIC) program. The TWIC program will initially require all personnel requiring unescorted access to secure areas of MTSA-regulated facilities and vessels and all mariners holding Coast Guard-issued credentials to enroll in the TWIC program and obtain a TWIC. A TWIC will be a tamper-resistant "Smart Card" containing the worker's biometric (fingerprint template) to allow for a positive link between the card itself and the individual. "Secure area" means that area on board a vessel or at a facility over which the owner/operator has implemented security measures for access control in accordance with a Coast Guard approved security plan. Facility and vessel owners/operators are required to inform employees of their responsibility to possess a TWIC and what parts of the facility and vessel will require a TWIC for unescorted access. Owners/operators are also encouraged, but not required, to provide this same information to personnel that are not employees, but are likely to access the facility (e.g. contractors, vendors).

Applicants can "pre-enroll" on-line and therein provide their basic biographical information in order to expedite the in-person enrollment process. However, as part of the required enrollment process to obtain a TWIC, all applicants will be required to visit an enrollment center to provide biographical information, fingerprints, and have a photo taken. The TWIC applicant will be notified by email or phone if they have met the qualifications to receive a TWIC card. If so, each employee must return to their respective enrollment center to pick up the TWIC card. A biometric verification will be made at that time and the applicant will select a PIN. Once that occurs, the credential will be activated and be valid for 5 years.

The cost of a TWIC will be $137.25. Workers with current, comparable background checks (hazardous materials endorsement, merchant mariner document, certificate of registry, merchant mariner license, or Free and Secure Trade (FAST)) will pay a lower price of $105.25. Payment must be made with credit card (Visa or MasterCard only), money order, or cashier's check. TSA/Lockheed Martin has also announced that it will make available pre-paid company debit Visa cards for purchase via *prepaidsolutions.com*. The intent is to allow companies to bear the cost of their employees' TWICs while avoiding the cost of processing numerous duplicative employee-reimbursement requests. An employer can have cards sent in batches to itself

or directly to employees. Note that a service charge of $5.50 per card will apply and the cards may be issued with or without an individual's name.

The background check will review immigration status, criminal history, mental competency, and terrorist watch lists. If no adverse information is disclosed, TSA estimates that it will be able to complete a background check in less than 10 days. If TSA determines that an applicant poses an imminent threat to transportation or national security, TSA may notify the applicant's employer. The applicant will be required to sign an authorization allowing TSA to do so during the enrollment process. Generally, TSA will not provide the reasons for a disqualification to an employer. However, if TSA has reliable information concerning an imminent threat posed by an applicant and providing limited threat information would minimize the risk, then TSA would provide such information.

The background check will initially verify the person's immigration status to determine that the person apply is eligible for a TWIC. Individuals under the following immigration statuses are eligible to apply for a TWIC per 49 CFR 1572.105:

- A national (includes citizen) of the United States.
- A lawful permanent resident of the United States.
- A refugee admitted under 8 U.S.C. 1157.
- An alien granted asylum under 8 U.S.C. 1158.
- An alien in valid M-1 nonimmigrant status who is enrolled in the United States Merchant Marine Academy or a comparable State maritime academy. Such individuals may serve as unlicensed mariners on a documented vessel, regardless of their nationality, under 46 U.S.C. 8103.
- A nonimmigrant alien admitted under the Compact of Free Association between the United States and the Federated States of Micronesia, the United States and the Republic of the Marshall Islands, or the United States and Palau.
- A commercial driver licensed in Canada or Mexico who is admitted to the United States under 8 CFR 214.2(b)(4)(i)(E) to conduct business in the United States.
- An alien in lawful nonimmigrant status who has unrestricted authorization to work in the United States, except—
    1. An alien in valid S-5 (informant of criminal organization information) lawful nonimmigrant status;
    2. An alien in valid S-6 (informant of terrorism information) lawful nonimmigrant status;
    3. An alien in valid K-1 (Fiancé(e)) lawful nonimmigrant status; or
    4. An alien in valid K-2 (Minor child of Fiancé(e)) lawful nonimmigrant status.
- An alien in the following lawful nonimmigrant status who has restricted authorization to work in the United States—
    1. H-1B Special Occupations;
    2. H-1B1 Free Trade Agreement;
    3. E-1 Treaty Trader;
    4. E-3 Australian in Specialty Occupation;

5. L-1 Intracompany Executive Transfer;
6. O-1 Extraordinary Ability;
7. TN North American Free Trade Agreement; or
8. C-1/D, Crew Visas

The background check will also review the applicant's criminal history. With regard to criminal history, there are some crimes which are considered "permanent disqualifying criminal offenses", meaning that if the person was ever convicted of that crime, the person is ineligible for a TWIC. The Permanent Disqualifying Criminal Offenses, as identified in section 1572.103 of the final rule, are:

- Permanent disqualifying criminal offenses ("Unlimited look back")
    1. Espionage or conspiracy to commit espionage
    2. Sedition or conspiracy to commit sedition
    3. Treason or conspiracy to commit treason
    4. A federal crime of terrorism (18 U.S.C. 2332(g)) or comparable State law
    5. A crime involving a TSI (transportation security incident). Note: A transportation security incident is a security incident resulting in a significant loss of life, environmental damage, transportation system disruption, or economic disruption in a particular area. The term "economic disruption" does not include a work stoppage or other employee-related action not related to terrorism and resulting from an employer-employee dispute.
    6. Improper transportation of a hazardous material under 49 U.S.C. 5124 or a comparable state law
    7. Unlawful possession, use, sale, distribution, manufacture, purchase...or dealing in an explosive or explosive device
    8. Murder
    9. Threat or maliciously conveying false information knowing the same to be false, concerning the deliverance, placement, or detonation of an explosive or other lethal device in or against a place of public use, a state or government facility, a public transportations system, or an infrastructure facility
    10. Certain RICO (Racketeer influenced and Corrupt Organizations) Act violations where one of the predicate acts consists of one of the permanently disqualifying crimes
    11. Attempt to commit the crimes in items (a)(1)-(a)(4)
    12. Conspiracy or attempt to commit the crimes in items (a)(5)-(a)(10)
    13. Convictions for (a)(1)-(4) are not eligible for a waiver.

A second category of criminal offenses are considered "interim disqualifying criminal offenses", meaning that if the person was convicted of that crime within the past seven years or released from incarceration for a conviction of that crime within the last five years, the person is ineligible for a TWIC. The Interim Disqualifying Criminal Offenses, as identified in section 1572.103 of the final rule, are:

14. Unlawful possession, use, sale, manufacture, purchase, distribution...or dealing in a firearm or other weapon
15. Extortion
16. Dishonesty, fraud, or misrepresentation, including identity fraud and money laundering (except welfare fraud and passing bad checks)
17. Bribery
18. Smuggling
19. Immigration violations
20. Distribution, possession w/ intent to distribute, or importation of a controlled substance
21. Arson
22. Kidnapping or hostage taking
23. Rape or aggravated sexual abuse
24. Assault with intent to kill
25. Robbery
26. Fraudulent entry into a seaport
27. Lesser violations of the RICO (Racketeer Influenced and Corrupt Organizations) Act
28. Conspiracy or attempt to commit crimes in this paragraph (b)

Applicants that believe the TSA has not applied standards properly or based on incorrect court records or mistaken identity can appeal a denial. Applicants that are denied a TWIC due to a legitimate disqualification have the opportunity to seek a waiver of the disqualification by applying to TSA for a waiver within 60 days if the determination is made that a security threat exists. The applicant will describe why they no longer pose a security threat, the TSA will review the (1) circumstances, (2) applicant's work and personal history since conviction, (3) the length of time out of prison, and (4) references of persons who know the applicant and can attest to his/her responsibility and good character. If an applicant knows that he or she does not meet the standards concerning criminal activity or mental capacity, or is in Temporary Protected Status at the time of enrollment, the applicant may apply for a waiver an advance. Note that waivers are not available for applicants that have been convicted of espionage or conspiracy to commit espionage, sedition or conspiracy to commit sedition, treason or conspiracy to commit treason, or a federal crime of terrorism (18 U.S.C. 2332(g)) or comparable State law.

During this initial phase, an estimated 750,000 individuals will be required to obtain a TWIC card. Future phases may require all worked in the transportation industry or those that come into contact with the transportation industry to obtain a TWIC card. During the initial rollout of TWIC, workers will present their cards to authorized personnel, who will compare the holder to his or her photo, inspect security features on the TWIC and evaluate the card for signs of tampering. The Coast Guard will verify TWICs when conducting vessel and facility inspections and during spot checks using hand-held scanners, ensuring credentials are valid. A second rulemaking, anticipated in calendar year 2007, will propose enhanced access control requirements, including the use of electronic readers by certain vessel and facility owners and operators.

The TWIC program rules are complicated and the roll-out of the program is going to be long and involved. Not only companies that operate oil and natural gas MTSA-regulated facilities and vessels need to be aware of the requirements and potentially obtain TWIC cards for their employees, but also any consultant (e.g. lawyers, geologists, engineers) that spends time at such facilities or on such vessels needs to be aware of the program and evaluate whether it is in their best interest to procure TWIC cards for their employees. Someone not possessing a TWIC card will require side-by-side escort at all times in restricted areas. This would require the facility-manager (client) to assign a full-time TWIC-card-carrying person to accompany the consultant at all times. Said facility-manager may prefer to hire someone with a TWIC card to enable his own workers to return to their job while the consultant is on site.

Chemical Facility Anti-Terrorism Standards

The next major step in securing chemical facilities against terrorism will address those facilities not regulated by MTSA. It will be overseen by the Department of Homeland Security (the "Department"). On October 4, 2006, President Bush signed the Department of Homeland Security Appropriations Act of 2007, which provides the Department with the legal authority to regulate the security of chemical facilities that are at high-risk of being terrorist targets. The Department thereafter entered into a rulemaking to adopt the Chemical Facility Anti-Terrorism Standards (CFATS). The interim final rule was published in the Federal Register on April 9, 2007 and made effective June 8, 2007.

Although CFATS is applicable only to those facilities that are not regulated by MTSA, it largely follows the MTSA format inasmuch as it establishes risk-based performance standards for identifying those chemical facilities that are at risk and then requires those facilities to prepare vulnerability assessments and to develop and implement site-specific security plans based on their vulnerability assessments. The vulnerability assessments and site-specific security plans and documents related to the review and approval of same and to any inspections or audits will be designated as chemical-terrorism vulnerability information to be treated as classified and safeguarded from being public distribution.

The Department plans to implement CFATS in phases, with those chemical facilities identified as the highest security risk being addressed first. The first step, therefore, is to determine which chemical facilities present the highest risk. To determine that, all chemical facilities that possess (to include manufacture, use, store, or distribute) any of the chemicals listed in the final Appendix A to the CFATS rule, a draft of which is attached hereto, will be required to submit information to the Department through a screening process referred to as the Top Screen Questionnaire available online at www.DHS.gov/chemicalsecurity. Facilities that are required to submit Top Screen data must due so within sixty days after the program is initiated or within sixty days of the effective date of a Final Appendix A or within 60-days of coming into possession of any such chemical at the corresponding quantity. Chemical facilities must designate an officer of the corporation or someone designated by an officer of the corporation that resides in the United States as the person responsible for the Top Screen information.

Once the Top Screen Questionnaire is completed, facilities will be placed within a risk-based tier structure by Department officials. Facilities will be classified into four tiers, with Tier 1 being those facilities that present the highest risk. It is assumed that a majority of facilities that complete the Top Screen Questionnaire will not be considered "high risk". The presence of a chemical is merely a baseline threshold requiring a facility to complete Top Screen; the Department will consider the information submitted through Top Screen to determine which facilities fall into the "high risk" category. The Department will review the Top Screen information and respond with a letter to each facility identifying the site's preliminary risk category and the need for a vulnerability assessment and site-specific security plan.

Continuing with its risk-based approach, the Department identified nineteen Risk-Based Performance Standards (RBPSs) that chemical facilities must address in their vulnerability assessments and subsequent site-specific plans: restricted area perimeter; securing site assets; screening and access controls; deter, detect and delay; shipping, receipt and storage; theft and diversion; sabotage; cyber; response; monitoring; training; personnel surety; elevated threats; specific threats, vulnerabilities or risks; reporting of significant security incidents; significant security incidents and suspicious activities; officials and organizations; records; and others yet to be determined by the Department. The Security Vulnerability Assessment required by CFATS must be submitted within ninety days after receipt of the letter and Site Security Plan must be submitted within 120 days after the Security Vulnerability Assessment is due.

The Site Security Plan must describe the appropriate levels of security measures that the facility must implement to address the vulnerabilities identified in their Security Vulnerability Assessment. The Site Security Plan must also meet risk-based performance standards for their designated Tier level. Tier 1 and 2 facilities will be required to update their Security Vulnerability Assessment and Site Security Plan every 2 years, while Tier 3 and 4 will be required to update their Security Vulnerability Assessment and Site Security Plan every 4 years. The Department will inspect chemical facilities designated as "high risk" at regular intervals with higher risk facilities being inspected first and more often. The Department may, however, inspect a facility at any time based on new information or security concerns. The Department must provide the facility with a minimum of 24 hours advance notice unless specific security concerns demand immediate attention.

Chemical Facility Anti-Terrorism Standards Proposed Appendix A: DHS Chemicals of Interest

Chemical of Interest	Chemical Abstract Service (CAS) Number	Screening Threshold Quantity (STQ) (lbs)
1,1,3,3,3-pentafluoro-2-(trifluoromethyl)-1-propene	382-21-8	Any Amount
1,1-Dimethylhydrazine	57-14-7	11,250
1,2-bis(2-chloroethylthio)ethane	3563-36-8	Any Amount
1,3-bis(2-chloroethylthio)-n-propane	63905-10-2	Any Amount
1,3-Butadiene	106-99-0	7,500
1,3-Pentadiene	504-60-9	7,500
1,4-bis(2-chloroethylthio)-n-butane	142868-93-7	Any Amount
1,5-bis(2-chloroethylthio)-n-pentane	142868-94-8	Any Amount
1-Butene	106-98-9	7,500
1-Chloropropylene	590-21-6	7,500
1H-Tetrazole	16681-77-9	2,000
1-Pentane	109-67-1	7,500
2,2-Dimethylpropane	463-82-1	7,500
2-Butene	107-01-7	7,500
2-Butene-cis	590-18-1	7,500
2-Butene-trans	624-64-6	7,500
2-chloroethylchloromethylsulfide	2625-76-5	Any Amount
2-Chloropropylene	557-98-2	7,500
2-Chlorovinyldichloroarsine	541-25-3	Any Amount
2-Methyl-1-butene	563-46-2	7,500
2-Methylpropene	115-11-7	7,500
2-Pentene, (Z)-	627-20-3	7,500
2-Pentene,(E)-	646-04-8	7,500
3,3-dimethyl-2-butanol	464-07-3	Any Amount
3-Methyl-1-butene	563-45-1	7,500
3-Quinuclidinyl benzilate (BZ)	62869-69-6	Any Amount
5-Nitrobenzotriazol	2338-12-7	2,000
Acetaldehyde	75-07-0	7,500
Acetone	67-64-1	2,000
Acetone cyanohydrin, stabilized	75-86-5	2,000

Acetyl bromide	506-96-7	2,000
Acetyl chloride	75-36-5	2,000
Acetyl iodide	507-02-8	2,000
Acetylene	74-86-2	7,500
Acrolein	107-02-8	3,750
Acrylonitrile	107-13-1	15,000
Acrylyl chloride	814-68-6	3,750
Allyl alcohol	107-18-6	11,250
Allylamine	107-11-9	7,500
Allyltrichlorosilane, stabilized	107-37-9	2,000
Aluminum bromide, anhydrous	7727-15-3	2,000
Aluminum chloride, anhydrous	7446-70-0	2,000
Aluminum phosphide	20859-73-8	2,000
Ammonia (anhydrous)	7664-41-7	7,500
Ammonia (conc. 20% or greater)	7664-41-7	15,000
Ammonium nitrate (nitrogen concentration of 28%34%)	6484-52-2	2,000
Ammonium perchlorate	7790-98-9	2,000
Ammonium picrate	131-74-8	2,000
Amyltrichlorosilane	107-72-2	2,000
Antimony pentafluoride	7783-70-2	2,000
Arsenous trichloride	7784-34-1	Any Amount
Arsine	7784-42-1	Any Amount
Barium azide	18810-58-7	2,000
bis(2-chloroethyl)ethylamine	538-07-8	Any Amount
bis(2-chloroethyl)methylamine	51-75-2	Any Amount
bis(2-chloroethyl)sulfide	505-60-2	Any Amount
bis(2-chloroethylthio)methane	63869-13-6	Any Amount
bis(2-chloroethylthioethyl)ether	63918-89-8	Any Amount
bis(2-chloroethylthiomethyl)ether	63918-90-1	Any Amount
bis(2-chlorovinyl)chloroarsine	40334-69-8	Any Amount
Boron tribromide	10294-33-4	2,000
Boron trichloride	10294-34-5	Any Amount
Boron triflouride	7637-07-2	Any Amount
Boron triflouride compound with methyl ether (1:1)	353-42-4	11,250
Bromine	7726-95-6	7,500
Bromine chloride	13863-41-7	Any Amount
Bromine pentafluoride	7789-30-2	2,000

Bromine trifluoride	7787-71-5	2,000
Bromotrifluorethylene	598-73-2	7,500
Butane	106-97-8	7,500
Butene	25167-67-3	7,500
Butyltrichlorosilane	7521-80-4	2,000
Calcium dithionite	15512-36-4	2,000
Calcium hydrosulfite	15512-36-4	2,000
Calcium phosphide	1305-99-3	2,000
Carbon disulfide	75-15-0	15,000
Carbon monoxide	630-08-0	Any Amount
Carbon oxysulfide	463-58-1	7,500
Carbonyl fluoride	353-50-4	Any Amount
Carbonyl sulfide	463-58-1	Any Amount
Chlorine	7782-50-5	1,875
Chlorine dioxide	10049-04-4	2,000
Chlorine monoxide	7791-21-1	7,500
Chlorine pentafluoride	13637-63-3	Any Amount
Chlorine trifluoride	7790-91-2	Any Amount
Chloroacetyl chloride	79-04-9	2,000
Chloroform	67-66-3	15,000
Chloromethyl ether	542-88-1	750
Chloromethyl methyl ether	107-30-2	3,750
Chloropicrin	76-06-2	Any Amount
Chlorosulfonic acid	7790-94-5	2,000
Chromium oxychloride	7803-51-2	2,000
Crotonaldehyde	4170-30-3	15,000
Crotonaldehyde, (E)-	123-73-9	15,000
Cyanogen	460-19-5	Any Amount
Cyanogen chloride	506-77-4	Any Amount
Cyclohexylamine	108-91-8	11,250
Cyclohexyltrichlorosilane	98-12-4	2,000
Cyclopropane	75-19-4	7,500
Cyclotetramethylenetetranitramine	2691-41-0	2,000
Diazodinitrophenol	87-31-0	2,000
Diborane	19287-45-7	Any Amount
Dichlorosilane	4109-96-0	Any Amount
Diethyl ethylphosphonate	78-38-6	Any Amount
Diethyl N,N-dimethylphosphoramidate	2404-03-7	Any Amount

Diethyl phosphate	762-04-9	Any Amount
Diethyldichlorosilane	1719-53-5	2,000
Diethyleneglycol dinitrate,	693-21-0	2,000
Difluoroethane	75-37-6	7,500
Dimethyl ethylphosphonate	6163-75-3	Any Amount
Dimethyl methylphosphonate	756-79-6	Any Amount
Dimethyl phosphate	868-85-9	Any Amount
Dimethylamine	124-40-3	7,500
Dimethyldichlorosilane	75-78-5	2,000
Dimethylphosphoramidodichloridate	677-43-0	Any Amount
Dinitrogen tetroxide	10544-72-6	Any Amount
Dinitroglycoluril	55510-04-8	2,000
Dinitrophenol	25550-58-7	2,000
Dinitroresorcinol	35860-51-6	2,000
Dinitrosobenzene	25550-55-4	2,000
Diphenyl-2-hydroxyacetic acid (aka benzilic acid)	76-93-7	Any Amount
Diphenyldichlorosilane	80-10-4	2,000
Dipicryl sulfide	2217-06-3	2,000
Dodecyltrichlorosilane	4484-72-4	2,000
Epichlorohydrin	106-89-8	15,000
Ethane	74-84-0	7,500
Ethyl acetylene	107-00-6	7,500
Ethyl chloride	75-00-3	7,500
Ethyl ether	60-29-7	7,500
Ethyl mercaptan	75-08-1	7,500
Ethyl nitrite	109-95-5	7,500
Ethyl phosphonyl dichloride	1066-50-8	Any Amount
Ethyl phosphonyl difluoride	753-98-0	Any Amount
Ethylamine	75-04-7	7,500
Ethyldiethanolamine	139-87-7	Any Amount
Ethylene	74-85-1	7,500
Ethylene oxide	75-21-8	Any Amount
Ethylenediamine	107-15-3	15,000
Ethyleneimine	151-56-4	7,500
Ethyltrichlorosilane	115-21-9	2,000
Fluorine	7782-41-4	Any Amount
Fluorosulfonic acid	7789-21-1	2,000
Formaldehyde (solution)	50-00-0	11,250

Furan	110-00-9	3,750
Germane	7782-65-2	Any Amount
Germanium tetrafluoride	7783-58-6	Any Amount
Guanyl nitrosaminoguanylidene hydrazine		2,000
Guanyl nitrosaminoguanyltetrazene	109-27-3	2,000
Hexaethyl tetraphosphate and compressed gas mixtures	757-58-4	Any Amount
Hexafluoroacetone	684-16-2	Any Amount
Hexanitrodiphenylamine	35860-31-2	2,000
Hexanitrostilbene	20062-22-0	2,000
Hexolite	121-82-4	2,000
Hexotonal	107-15-3	2,000
Hexyltrichlorosilane	928-89-2 6	2,000
Hydrazine	302-01-2	11,250
Hydrochloric acid (conc. 37% or greater)	7647-01-0	11,250
Hydrocyanic acid	74-90-8	1,875
Hydrogen	1333-74-0	7,500
Hydrogen bromide, anhydrous	10035-10-6	Any Amount
Hydrogen chloride (anhydrous)	7647-01-0	Any Amount
Hydrogen cyanide	74-90-8	Any Amount
Hydrogen fluoride/Hydrofluoric acid (conc. 50% or greater)	7664-39-3	750
Hydrogen iodide, anhydrous	10034-85-2	Any Amount
Hydrogen peroxide (concentration of at least 30%)	7722-84-1	2,000
Hydrogen selenide	7783-07-5	Any Amount
Hydrogen sulfide	7783-06-4	Any Amount
Iodine pentafluoride	7783-66-6	2,000
Iron, pentacarbonyl-	13463-40-6	1,875
Isobutane	75-28-5	7,500
Isobutyronitrile	78-82-0	15,000
Isopentane	78-78-4	7,500
Isoprene	78-79-5	7,500
Isopropyl chloride	75-29-6	7,500
Isopropyl chloroformate	108-23-6	11,250
Isopropylamine	75-31-0	7,500
Lead azide	13424-46-9	2,000
Lead styphnate	15245-44-0	2,000
Lithium amide	7782-89-0	2,000
Lithium nitride	26134-62-3	2,000

Magnesium aluminum phosphide		2,000
Magnesium diamide	7803-54-5	2,000
Magnesium phosphide	12057-74-8	2,000
Mannitol hexanitrate, wetted	15825-70-4	2,000
Mercury fulminate	628-86-4	2,000
Methacrylonitrile	126-98-7	7,500
Methane	74-82-8	7,500
Methyl bromide	74-83-9	Any Amount
Methyl chloride	74-87-3	7,500
Methyl chloroformate	79-22-1	3,750
Methyl ether	115-10-6	7,500
Methyl formate	107-31-3	7,500
Methyl hydrazine	60-34-4	11,250
Methyl isocyanate	624-83-9	11,250
Methyl mercaptan	74-93-1	Any Amount
Methyl phosphonyl dichloride	676-97-1	Any Amount
Methyl phosphonyl difluoride	676-99-3	Any Amount
Methyl thiocyanate	556-64-9	15,000
Methylamine	74-89-5	7,500
Methylchlorosilane	993-00-0	Any Amount
Methyldichlorosilane	75-54-7	2,000
Methyldiethanolamine	105-59-9	Any Amount
Methylphenyldichlorosilane	149-74-6	2,000
Methyltrichlorosilane	75-79-6	2,000
N,N-diisopropyl-2-aminoethyl chloride hydrochloride	4261-68-1	Any Amount
N,N-diisopropyl-β-aminoethanol	96-80-0	Any Amount
N,N-diisopropyl-β-aminoethyl chloride	96-79-7	Any Amount
Nickel Carbonyl	13463-39-3	750
Nitric acid	7697-37-2	2,000
Nitric oxide	10102-43-9	Any Amount
Nitro urea	556-89-8	2,000
Nitrocellulose	9004-70-0	2,000
Nitrogen trioxide	10544-73-7	Any Amount
Nitroglycerine	55-63-0	2,000
Nitroguanidine	556-88-7	2,000
Nitromethane	75-52-5	2,000
Nitrostarch	9056-38-6	2,000
Nitrosyl chloride	2696-92-6	Any Amount

Nitrotriazolone	932-64-9	2,000
Nonyltrichlorosilane	5283-67-0	2,000
o,o-diethyl S-[2-(diethylamino)ethyl] phosphorothiolate	78-53-5	Any Amount
Octadecyltrichlorosilane	112-04-9	2,000
Octolite	68610-51-5	2,000
Octonal	124-13-0	2,000
Octyltrichlorosilane	5283-66-9	2,000
o-ethyl-N,N-dimethylphosphoramido-cyanidate	77-81-6	Any Amount
o-ethyl-o-2-diisopropylaminoethyl methylphosphonite	57856-11-8	Any Amount
o-ethyl-S-2-diisopropylaminoethyl methyl phosphonothiolate	50782-69-9	Any Amount
o-isopropyl methylphosphonochloridate	1445-76-7	Any Amount
o-isopropyl methylphosphonofluoridate	107-44-8	Any Amount
Oleum (Fuming Sulfuric acid)	8014-95-7	7,500
o-pinacolyl methylphosphonochloridate	7040-57-5	Any Amount
o-pinacolyl methylphosphonofluoridate	96-64-0	Any Amount
Oxygen difluoride	7783-41-7	Any Amount
Pentaerythrite tetranitrate or PETN	78-11-5	2,000
Pentane	109-66-0	7,500
Pentolite	8066-33-9	2,000
Peracetic acid	79-21-0	7,500
Perchloromethylmercaptan	594-42-3	7,500
Perchloryl fluoride	7616-94-6	Any Amount
Phenyltrichlorosilane	98-13-5	2,000
Phosgene	75-44-5	Any Amount
Phosphine	7803-51-2	Any Amount
Phosphorus	7723-14-0	Any Amount
Phosphorus oxychloride	10025-87-3	Any Amount
Phosphorus oxychloride	10025-87-3	2,000
Phosphorus pentachloride	10026-13-8	Any Amount
Phosphorus pentachloride	10026-13-8	2,000
Phosphorus pentasulfide	1314-80-3	2,000
Phosphorus trichloride	7719-12-2	Any Amount
Phosphorus trichloride	7719-12-2	2,000
Piperidine	110-89-4	11,250
Potassium chlorate	3811-04-9	2,000
Potassium cyanide	151-50-8	2,000

Potassium nitrate	7757-79-1	2,000
Potassium perchlorate	7778-74-7	2,000
Potassium phosphide	20770-41-6	2,000
Propadiene	463-49-0	7,500
Propane	74-98-6	7,500
Propionitrile	107-12-0	7,500
Propyl chlorofromate	109-61-5	11,250
Propylene	115-07-1	7,500
Propylene oxide	75-56-9	7,500
Propyleneimine	75-55-8	7,500
Propyltrichlorosilane	141-57-1	2,000
Propyne	74-99-7	7,500
Quinuclidine-3-ol	1619-34-7	Any Amount
RDX and HMX mixtures	121-82-4	2,000
Selenium hexafluoride	7783-79-1	Any Amount
Silane	7803-62-5	7,500
Silicon tetrachloride	10026-04-7	2,000
Silicon tetrafluoride	7783-61-1	Any Amount
Sodium chlorate	7775-09-9	2,000
Sodium cyanide	143-33-9	2,000
Sodium dinitro-o-cresolate	25641-53-6	2,000
Sodium dithionite	7775-14-6	2,000
Sodium hydrosulfite	7775-14-6	2,000
Sodium nitrate	7631-99-4	2,000
Sodium phosphide	7558-80-7	2,000
Sodium picramate	831-52-7	2,000
Stibine	7803-52-3	Any Amount
Strontium phosphide	13450-99-2	2,000
Sulfur dichloride	10545-99-0	Any Amount
Sulfur dioxide (anhydrous)	7446-09-5	Any Amount
Sulfur monochloride	10025-67-9	Any Amount
Sulfur tetraflouride	7783-60-0	Any Amount
Sulfur trioxide	7446-11-9	7,500
Sulfuryl chloride	7791-25-5	2,000
Sulfuryl fluoride	2699-79-8	Any Amount
Tellurium hexafluoride	7783-80-4	Any Amount
Tetrafluoroethylene	116-14-3	7,500
Tetramethyllead	75-74-1	7,500

Tetramethylsilane	75-76-3	7,500
Tetranitroaniline	53014-37-2	2,000
Tetranitromethane	509-14-8	7,500
Tetrazol-1-acetic acid	21732-17-2	2,000
Thiodiglycol	111-48-8	Any Amount
Thionyl chloride	7719-09-7	Any Amount
Thionyl chloride	7719-09-7	2,000
Titanium tetrachloride	7550-45-0	2,000
Toluene 2,4-diisocyanate	584-84-9	7,500
Toluene 2,6-diisocyanate	91-08-7	7,500
Toluene diisocyanate (unspecified isomer)	26471-62-5	7,500
Trichlorosilane	10025-78-2	2,000
Triethanolamine	102-71-6	Any Amount
Triethanolamine hydrochloride	637-39-8	Any Amount
Triethyl phosphite	122-52-1	Any Amount
Trifluoroacetyl chloride	354-32-5	Any Amount
Trifluorochloroethylene	79-38-9	Any Amount
Trimethyl phosphite	121-45-9	Any Amount
Trimethylamine	75-50-3	Any Amount
Trimethylchlorosilane	75-77-4	2,000
Trinitroaniline	26952-42-1	2,000
Trinitroanisole	606-35-9	2,000
Trinitrobenzene	99-35-4	2,000
Trinitrobenzenesulfonic acid	2508-19-2	2,000
Trinitrobenzoic acid	129-66-8	2,000
Trinitrochlorobenzene	88-88-0	2,000
Trinitrofluorenone	129-79-3	2,000
Trinitro-meta-cresol	602-99-3	2,000
Trinitronaphthalene	558101-17-8	2,000
Trinitrophenetole	4732-14-3	2,000
Trinitrophenol	88-89-1	2,000
Trinitroresorcinol	82-71-3	2,000
Trinitrotoluene	118-96-7	2,000
Tris(2-chloroethyl)amine	555-77-1	Any Amount
Tris(2-chlorovinyl)arsine	40334-70-1	Any Amount
Tritonal	54413-15-9	2,000
Tungsten hexafluoride	7783-82-6	Any Amount
Uranium hexafluoride	7783-81-5	2,000

Urea	57-13-6	2,000
Urea nitrate	124-47-0	2,000
Vinyl acetate monomer	108-05-4	11,250
Vinyl actylene	689-97-4	7,500
Vinyl chloride	75-01-4	7,500
Vinyl ethyl ether	109-92-2	7,500
Vinyl fluoride	75-02-5	7,500
Vinyl methyl ether	107-25-5	7,500
Vinylidene chloride	75-35-4	7,500
Vinylidene fluoride	75-38-7	7,500
Vinyltrichlorosilane	75-94-5	2,000
Zinc dithionite	7779-86-4	2,000
Zinc hydrosulfite	7779-86-4	2,000
Zirconium picramate	63868-82-6	2,000

This list was last modified on June 8, 2007.

Chemical Security

"All Quiet on the Western Front"



Presented to the
Nineteenth Annual Texas
Environmental Superconference

They left as boys never to return . . .
without proper identification,
a vulnerability assessment,
and a site-specific security plan.

Rebecca L. Fink, Counsel
NuStar Energy, L.P.

NuStar Energy L.P.



Then…



...and Now.

UNCLASSIFIED//FOR OFFICIAL USE ONLY

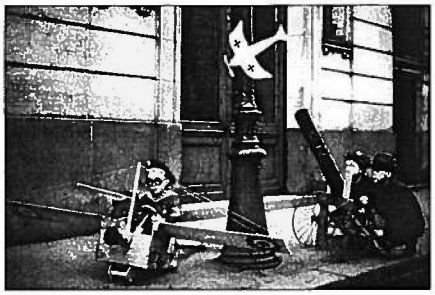
Office of Intelligence and Analysis
Homeland Security
Federal Bureau of Investigation

Joint Homeland Security Assessment

(U//FOUO) Jihadist Website Posting Renews Call to Attack Oil and Natural Gas Infrastructure

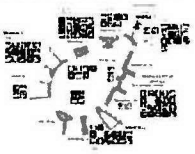
23 February 2007

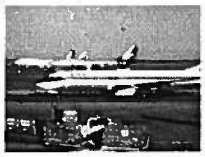
Then...



...and Now.

June 2007 – JFK Airport/Pipeline Plot



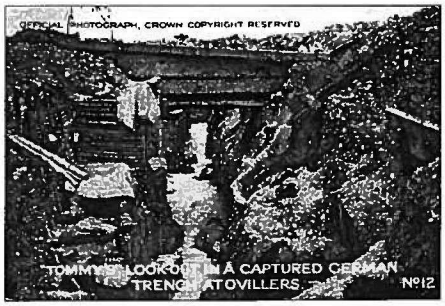


In a recorded conversation, the would-be terrorists stated:

"Anytime you hit Kennedy, it is the most hurtful thing to the United States. They love John F. Kennedy...if you hit that, this whole country will be in mourning. It's like you can kill the man twice."

"Even the Twin Towers can't touch it...this can destroy the economy of America for some time."

Then…



…and Now.

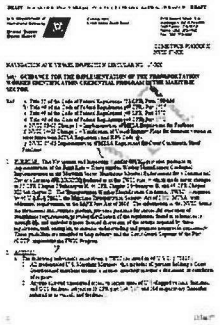




Then…



…and Now.



Then…



Mata Hari (meaning Eye of the Dawn) – known as one of the most beautiful spies in history – her real name was Greta Zelle - she was convicted as a spy and executed on October 15th, 1917.

…and Now.

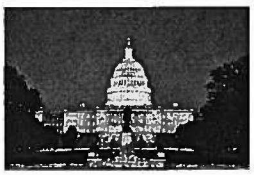


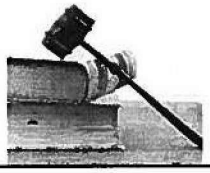
Nidal Ayyad
Worked as a chemical engineer at a United States company; one of the 1993 World Trade Center bombers.

Then…



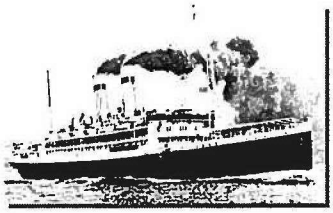
…and Now.





Maritime Transportation Security Act of 2002 (MTSA)

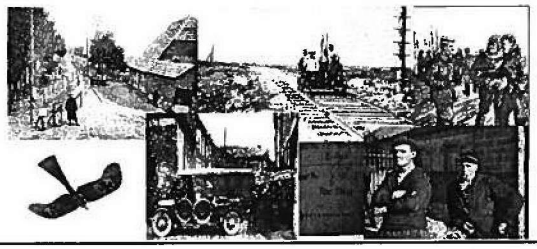
- Signed on November 25, 2002 and fully implemented on July 1, 2004.
- Vulnerability Assessment - Coast Guard required to conduct a vulnerability assessment to identify vessels and facilities that pose a high risk of being involved in a transportation security incident.



- The term 'transportation security incident' is defined in the Act as a security incident resulting in a significant loss of life, environmental damage, transportation system disruption, or economic disruption in a particular area.

MTSA – Part 2

- Coast Guard tasked with preparing a National Maritime Transportation Security Plan and Area plans for each Captain of the Port (COTP) Zone.
- Commercial vessels and facilities that the Coast Guard assessed as higher risk were then required to prepare and submit to the Coast Guard security plans for deterring a transportation security incident to the maximum extent feasible.



Transportation Worker Identification Credential (TWIC)



A TWIC will serve as an identification card for all personnel requiring unescorted access to secure areas of MTSA-regulated facilities and vessels and all mariners holding Coast Guard issued credentials or qualification documents.



Who needs a TWIC?

Anyone that needs unescorted access at a facility and/or on board vessels that are required to have a security plan (33, CFR, Parts 104, 105 and 106).

All credentialed Merchant Mariners.

Who does not need a TWIC?

Passengers on board MTSA regulated passenger vessels, federal law enforcement officials, public safety officials, USCG personnel, federal officials and foreign vessels carrying valid ISPS Certificates.



Secure Area: 33 CFR 101.105

"Secure Area means the area on board a vessel or at a facility or outer continental shelf facility over which the owner/operator has implemented security measures for access control in accordance with a Coast Guard approved security plan."

Restricted Areas: 33 CFR 105.260

The infrastructures or location identified in an area, vessel or facility security assessment or by the operator that require limited access and a higher degree of security protection.

"Escort"

- In an area defined as a restricted area in a vessel or facility security plan, escorting is defined as a live, physical side-by-side escort. One-to-one or one escort for multiple persons, depending....
- Outside of restricted areas, side-by-side escorting is not required as long as the method of surveillance or monitoring is sufficient to allow for a quick response if an individual "under escort" is found in an area where he/she is unauthorized or is engaging in activities other than those for which escorted access was granted.

How does one get a TWIC?



•Pre-Enroll – Provide information on-line or via telephone.



•Enroll - Provide biometric information, have a photo taken, and submit documentation.



•Pick Up TWIC - Return to the enrollment center, undergo biometric verification, select a pin, and pay $137.25.

Web Site
www.tsa.gov/twic
Call Center
1-866-DHS-TWIC

Texas Enrollment Centers:
Beaumont - Brownsville
Corpus Christi - Houston
Port Arthur - Texas City
Victoria - Freeport
Galveston - Matagorda

Who cannot get a TWIC?

TSA will conduct a background check that will review:

Immigration Status



Criminal History

Mental Competency

Terrorist Watch Lists



What criminal violations prevent obtaining a TWIC?

The Permanent Disqualifying Criminal Offenses, are identified in section 1572.103 of the final rule, and include:

***Espionage or conspiracy to commit espionage**
***Sedition or conspiracy to commit sedition**
***Treason or conspiracy to commit treason**
***Terrorism**
Improper transportation of a hazardous material
Unlawful possession, use, sale, distribution, manufacture, purchase...or dealing in an explosive or explosive device
Murder
Attempt to commit the above crimes



What criminal violations prevent obtaining a TWIC?

"Interim disqualifying criminal offenses" disqualify an applicant if convicted within the past seven years or released from incarceration for a conviction of that crime within the last five years. The Interim Disqualifying Criminal Offenses, as identified in section 1572.103 of the final rule, include:



Unlawful possession, use . . . or dealing in a firearm or other weapon
Extortion
Dishonesty, fraud, or misrepresentation.
Bribery
Smuggling
Immigration violations
Certain controlled substance crimes
Arson
Kidnapping or hostage taking
Rape or aggravated sexual abuse
Assault with intent to kill
Robbery
Fraudulent entry into a seaport
Conspiracy or attempt to commit the above crimes.



What if a person is denied a TWIC?

- The applicant will be notified.
- The employer may be notified - If TSA determines that an applicant poses an imminent threat to transportation or national security, TSA may notify the applicant's employer. The applicant certifies the following statement in writing: *"I acknowledge that if the Transportation Security Administration determines that I pose a security threat, my employer, as listed on this application, may be notified...."*

Denied! Security Threat!



Is there an opportunity to appeal a denial?

- Applicants that are denied a TWIC due to a disqualification have the opportunity to seek a waiver of the disqualification by applying to TSA for a waiver within 60 days if the determination is made that a security threat exists.
- The applicant will describe why they no longer pose a security threat, the TSA will review the (1) circumstances, (2) applicant's work and personal history since conviction, (3) the length of time out of prison, and (4) references of persons who know the applicant and can attest to his/her responsibility and good character.
- Appeals are also available if the applicant believes the TSA has not applied standards properly or based on incorrect court records or mistaken identity.





Then what do we do with the TWIC...?

- During the initial rollout of TWIC, workers will present their cards to authorized personnel, who will compare the holder to his or her photo, inspect security features on the TWIC and evaluate the card for signs of tampering.
- The Coast Guard will verify TWICs when conducting vessel and facility inspections and during spot checks using hand-held scanners, ensuring credentials are valid.









Key Dates:



Final Rule Published - January 2007

Final Rule Effective - March 26, 2007.

U.S. Merchant Mariners must obtain a TWIC by Sept 25, 2008.



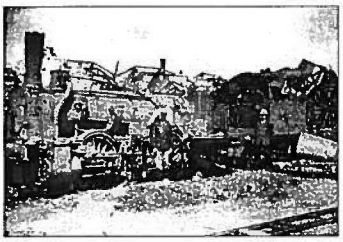
Others must obtain a TWIC by deadline established by individual COTP.



What is next...?

A second rulemaking, anticipated in calendar year 2007, will require the use of electronic readers by certain vessel and facility owners and operators.

Future phases may require all workers in the transportation industry or those that come into contact with the transportation industry to obtain a TWIC card.



Chemical Facility Anti-Terrorism Standards (CFATS)



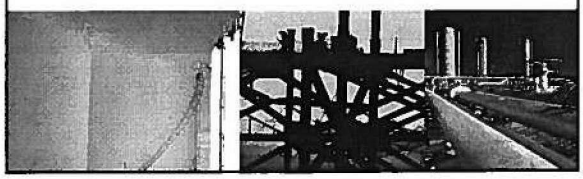
Oct. 4, 2006 – President Bush signed the Dept. of Homeland Security (DHS) Appropriations Act of 2007 which provides the DHS with the legal authority to regulate the security of high-risk chemical facilities – section 550 of the Act states that the regulations will apply to chemical facilities that present high levels of security risk.

April 9, 2007 - Implementing rule published in the Federal Register.

Applicability

Covered facilities will largely fall into three categories:

- chemical manufacturing, storage and distribution facilities;
- petroleum refineries, and
- liquefied natural gas storage (peak shaving) facilities.



Exemptions

- Facilities regulated pursuant to the Maritime Transportation Safety Act (MTSA)
- Public Water Systems, as defined in the Safe Drinking Water Act
- Treatment Works, as defined in the Federal Water Pollution Control Act
- Facilities owned or operated by the Department of Defense or the Department of Energy
- Facilities subject to regulation by the Nuclear Regulatory Commission (NRC)



Top Screen

- Any facility that manufactured, used, stored or distributed certain chemicals above a specified quantity must complete and submit a CSAT Top-Screen.
- Due within sixty days after the program is initiated or within sixty days of the effective date of a Final Appendix A or within 60-days of coming into possession of any such chemical at the corresponding quantity.



http://www.dhs.gov/xlibrary/assets/chemsec_csattopscreenquestions.pdf

Sample from Proposed Appendix A: DHS Chemicals of Interest

Chemical of Interest	Chemical Abstract Service (CAS) Number	Screening Threshold Quantity (STQ) (lbs)
• 1,1,3,3,3-pentafluoro-2-(trifluoromethyl)-1-propene	382-21-8	Any Amount
• 1,1-Dimethylhydrazine	57-14-7	11,250 lbs
• 1,2-bis(2-chloroethylthio)ethane	3563-36-8	Any Amount
• 1,3-bis(2-chloroethylthio)-n-propane6	3905-10-2	Any Amount
• 1,3-Butadiene	106-99-0	7,500 lbs
• 1,3-Pentadiene	504-60-9	7,500 lbs
• 1,4-bis(2-chloroethylthio)-n-butane	142868-93-7	Any Amount

Questionnaire

- Facility Information (e.g. Name, Owner or Operator, EPA Facility Identifier)
- Co-Located Facilities
- Capacity and Market Share Information
- Supplier Information (e.g. Airport Fuels & Military Installation Supplier)
- Chemicals of Concern Present On Site (Toxic, Flammable, Explosive, etc.)
- Storage of Chemicals of Concern (Theft, Sabotage, Contamination, etc.)
- Weapons-of-Mass-Effect (WME) Chemicals
- Chemical Weapons/Chemical Weapon Precursors (CW/CWP) Chemicals
- Mission Critical Chemicals & Mission Critical Production
- Economically Critical Chemicals & Economically Critical Production



Security Risk Assessment

- Based on Top Screen - Risk Assessment (Tiers 1 to 4)
- Requirement to Conduct a Security Vulnerability Assessment and Site Security Plan.
- Security Vulnerability Assessment due within 90 days after response from Department.
- Site Security Plan due within 120 days after the Security Vulnerability Assessment is due.



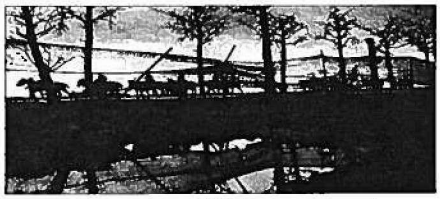
"We are within measurable, or imaginable, distance of a real Armageddon. Happily there seems to be no reason why we should be anything more than spectators."

Stated in a letter by Prime Minister Henry Asquith, July 24, 1914 - one week before the war started.

Security Vulnerability Assessment

The Department identified nineteen Risk-Based Performance Standards that chemical facilities must address in their vulnerability assessments:

restricted area perimeter; securing site assets; screening and access controls; deter, detect and delay; shipping, receipt and storage; theft and diversion; sabotage; cyber; response; monitoring; training; personnel surety; elevated threats; specific threats, vulnerabilities or risks; reporting of significant security incidents; significant security incidents and suspicious activities; officials and organizations; and records.



Site Security Plan

- **The Site Security Plan must describe the appropriate levels of security measures that the facility must implement to address the vulnerabilities identified in their Security Vulnerability Assessment.**
- **The Site Security Plan must also meet risk-based performance standards for their designated Tier level.**



Updates & Inspections

- **Tier 1 and 2 facilities must update their Assessment and Plan every 2 years - Tier 3 and 4 must update their Assessment and Plan every 4 years.**
- **The Department will inspect chemical facilities - higher risk facilities will be inspected first and more often.**
- **The Department must provide the facility with a minimum of 24 hours advance notice unless specific security concerns demand immediate attention.**



Biography

Rebecca Fink currently works as an environmental and regulatory attorney for NuStar Energy L.P. (formerly known as Valero L.P.). NuStar Energy L.P. is a publicly traded, limited partnership based in San Antonio with operations in the United States, the Netherlands Antilles, Canada, Mexico, the Netherlands, and the United Kingdom. NuStar Energy L.P. has 9,113 miles of pipeline and is one of the largest independent terminal and petroleum liquids pipeline operators in the nation. Prior to working at NuStar Energy L.P., Rebecca worked at the law firm of Lloyd Gosselink Blevins Rochelle & Townsend P.C. and practiced in the areas of environmental permitting, remediation, and compliance counseling. Rebecca was admitted to the bar in Texas in 2000, having received a J.D. cum laude in 2000 from Texas Tech University. While in law school, she was an assistant editor of the Texas Tech Law Review and the managing editor of the Texas Administrative Law Journal.

Laurencia Fasoyiro is a Staff Litigation Attorney for the Texas Commission on Environmental Quality ("TCEQ") where she provides legal representation and support to the Office of Compliance and Enforcement, the Financial Administrative Division, and the Remediation Division. She received her Bachelor of Art degree from the University of Houston; her law degree from Thurgood Marshall School of Law; and her Masters of Law ("LL.M") in Energy, Environmental and Natural Resource Law from the University of Houston Law Center. She was an adjunct professor at Thurgood Marshall School of Law and a former council member of the Houston Bar Association's Environmental Law Section. In addition to her legal training, she has Basic Mediation training from University of Houston Law Center's A.A. White Dispute Resolution Center and Binding Arbitration training from Worklife Institute Center for Mediation and Conflict Resolution. In her spare time, she volunteers for the Harris County Dispute Resolution Center. She is a member of the Environmental and Natural Resources Law Section of the State Bar of Texas; and Air and Waste Management Association.

"Lost in Translation"

Open Meetings

19th Annual Texas Environmental Superconference

August 2-3, 2007

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Purpose

The rhetoric about open meetings abounds with inflammatory language about "smoke-filled rooms," "secret meetings," and decisions made by elected officials "behind closed doors." The purpose of the Texas Open Meetings Act is to bring the decisions and operations of governing bodies into the "sunshine" or the "light of day" so that citizens can see and hear their governors govern. *See Cox Enterprises, Inc. v. Board of Trustees of Austin Independent School Dist.*, 706 S.W.2d 956 (Tex. 1986); *Save Our Springs Alliance, Inc. v. Lowry*, 934 S.W.2d 161 (Tex. App. - Austin 1996, writ dism'd); *Willmann v. City of San Antonio*, 123 S.W.3d 469 (Tex. App. – San Antonio . 2003, no pet.). As the Texas Supreme Court has explained, the Open Meetings Act "recognized the wisdom contained in the words of Justice Brandeis that: 'Sunlight is said to be the best of disinfectants; electric light the most efficient policeman.'" *Acker v. Texas Water Com'n*, 790 S.W.2d 299, 300 (Tex. 1990) (citing Louis Brandeis, OTHER PEOPLE'S MONEY 92 (1914 ed.)).

Given the choice of getting public business done efficiently or strictly complying with the Act, the courts will renounce efficiency. Said one court, "The goal of efficient government should not be used as an excuse to pull down the shade the Act has raised. To lower that shade and blot out the sunlight in the name of efficiency would promote only more 'efficiency.'" *Esperanza Peace and Justice Center v. City of San Antonio*, 316 F.Supp.2d 433, 478 (W.D. Tex. 2001). Therefore, the Texas Supreme Court demands "exact and literal compliance" with the terms of the Texas Open Meetings Act, and actions taken by a governmental body in violation of the Act are subject to judicial invalidation in a suit brought by persons adversely affected by such actions. *See Acker v. Texas Water Com'n*, 790 S.W.2d 299, 300 (Tex. 1990); *City of Bells v. Greater Texoma Utility Authority*, 744 S.W.2d 636 (Tex. App. - Dallas 1987, no writ); *Cameron County Good Government League v. Ramon*, 619 S.W.2d 224 (Tex.App. - Beaumont 1981, writ ref. n.r.e.); *Garcia v. City of Kingsville*, 641 S.W.2d 339 (Tex. App. - Corpus Christi 1982, no writ).

So what is it? The Texas Open Meetings Act (the "Act"), Tex. Gov. Code Ch. 551 (Vernon's 2004),[1] has three central features: (1) the requirement that meetings be open to the public; (2) the requirement that the subject matter of meetings be posted prior to the meetings to give the public notice of the meeting; and (3) the requirement that minutes or tape recordings of meetings be kept. Everything is built around those three main ideas. Like all rules there are exceptions, but the exceptions are specific and narrowly drawn. The Act does not establish all of the rules for conducting a meeting. Its requirements in addition to those basic tenets of parliamentary procedure generally followed by all organized associations.

It seems fairly straightforward, but the application of the Act has tripped up many a governmental body. Sometimes there are bad actors who want to cut secret deals, but there are many more well intentioned public servants who inadvertently run afoul of the Act. Consider this context: a person decides to "give back" to his or her community by running for elective office for a position on the board of a governmental body. The person gets elected and their

[1] Unless otherwise stated, all statutory references are to the Texas Government Code Chapter 551.

new board duties range from learning about public finance to water law to employment law. They have a demanding full-time job where they are accustomed to using all manner of modern communication methods and devices, including the telephone, electronic mail, video conferencing, instant messaging, etc. In their business world, they can meet with colleagues on short notice or no notice; they can discuss anything they want to; invite or exclude anyone they please; even veer off topic, meet over barbeque, or reschedule for another date or time. If they do not have time to get everyone together at one time and place, they can just send out e-mails to colleagues or have an on-line meeting. **Then they get elected, and all that changes**. They are going to need help in understanding why and learning how to get business done and comply with the three main tenets of the Act.[2]

The Devil is in the Definitions

Analyzing the application and meaning of the Act is akin to diagramming a really poorly written sentence. There are lots of defined terms, which would lead a novice to the conclusion that the definitions are clear. Not so. Much of the litigation about the Act revolves around several key definitions.

"*Governmental Body*"

Section 551.002 of the Act provides that, "Every regular, special, or called meeting of a governmental body shall be open to the public, except as provided by this chapter." Section 551.001(3) of the Act defines the term "Governmental body" as follows:

> "Governmental body" means:
>
> (A) a board, commission, department, committee, or agency within the executive or legislative branch of state government that is directed by one or more elected or appointed members;
>
> (B) a county commissioners court in the state;
>
> (C) a municipal governing body in the state;

[2] This reality also explains why the legislature has mandated training on the Act. Section 551.005 of the Act requires each elected or appointed public official who is a member of a governmental body subject to the Act to complete a course of training of not less than one and not more than two hours regarding the responsibilities of the governmental body and its members under the Act. The training must be completed not later than the 90th day after the date the member takes office. The office of the attorney general may provide the training and may also approve any acceptable course of training offered by a governmental body or other entity. The attorney general has a training DVD available at no cost. Sadly, reading this paper does not qualify as completing the required training.

(D) a deliberative body that has rulemaking or quasi-judicial power and that is classified as a department, agency, or political subdivision of a county or municipality;

(E) a school district board of trustees;

(F) a county board of school trustees;

(G) a county board of education;

(H) the governing board of a special district created by law;

(I) a local workforce development board created under Section 2308.253;

(J) a nonprofit corporation that is eligible to receive funds under the federal community services block grant program and that is authorized by this state to serve a geographic area of the state; and

(K) a nonprofit corporation organized under Chapter 67, Water Code, that provides a water supply or wastewater service, or both, and is exempt from ad valorem taxation under Section 11.30, Tax Code.

§ 551.001(3).

This definition seems straightforward, but the definition of "Governmental body" in the Act is a starting place for determining whether the entity is subject to the Act, not an ending place. Two of the more commonly litigated elements of the definition involve its application to state level entities and to special districts.

State Level Governmental Bodies (§ 551.001(3)(A))

Section 551.001(3)(A) provides that, "a board, commission, department, committee, or agency within the executive or legislative branch of state government that is directed by one or more elected or appointed members" is a "governmental body." TEX. ATT'Y GEN. OP. No H-772 (1976) sets forth the following test that has been used to determine whether a state level governmental body is subject to the Act.

> . . . before the Act is applicable to a meeting of a statewide public body, five prerequisites must be met. These are:
>
> (1) The body must be an entity within the executive or legislative department of the state:
>
> (2) The entity must be under the control of one or more elected or appointed members;

(3) The meeting must involve formal action or deliberation between a quorum of members (*but see* definition of "Meeting" in the Act);

(4) The discussion or action must involve public business or public policy; and

(5) The entity must have supervision or control over that public business or policy.

TEX. ATT'Y GEN. OP. No H-772 (1976), at 2

In addition to the factors outlined by the Attorney General, when an entity is created by legislation, it is also necessary to look at its statutory authority to determine whether the Act applies. *See, e.g.*, Texas Water Code § 9.006 (Texas Water Advisory Council); Tex. Rev. Civ. Stat. Ann. Art. 5190.6 (economic development corporations), Tex. Local Gov. Code § 211.0075 (zoning commissions), Texas Water Code § 15.006 (Nonprofit Water Supply Corporations that receive assistance from the Texas Water Assistance Program); Texas Water Code § 16.002 (Nonprofit Water Supply Corporations that receive assistance from the Texas Water Development Board); Texas Water Code § 17.002 (Nonprofit Water Supply Corporations that certain bonds from the TWDB).

Special Districts (§ 551.001(3)(H))

The term "special district" clearly includes legislatively created or authorized districts such as municipal utility districts, water control and improvement districts, and other districts created under Texas Constitution Article III, § 52, or Art. 16, § 59. It also includes hospital districts, water districts and road districts.

However, the term "special district" has also been construed to include other entities. For example, although not legislatively created, in *Sierra Club v. Austin Transp. Study Policy Advisory Committee* 746 S.W.2d 298 (Tex. App. – Austin, 1988, writ denied), the court found that the Austin Transportation Study Policy Advisory Committee (ATSPAC), was a special district and subject to the Act. ATSPAC had been designated a "Metropolitan Planning Organization" under federal law, and was an "official body designated by the governor." *Id.* at 300-01. The ATSPAC played "a vital role in deciding which highway projects are planned, built and funded in the Austin urban area." *Id.* The court concluded that although the ATSPAC was not a "special district" in the usual sense, it functioned as such for purposes of the Act . *Id.* at 301.

The Attorney General's office has relied on *Sierra Club* to find other committees to be "special districts." For example, in GA-0280, the Attorney General opined that the Border Health Institute (BHI) was a "special district" and subject to the Act. The Attorney General stated,

> Like the ATSPAC, the BHI is primarily composed of representatives of public entities. In addition, its enabling statute indicates that it performs governmental

> functions, particularly those of providing health care and health education to persons living in the border region. The BHI, unlike ATSPAC, was created by statute. Both receive appropriated and federal funds, even if indirectly. As the court noted in *Sierra Club*, the language of the OMA "clearly reveals the Legislature's intention to give it broad coverage." *[citations omitted]* It "broadly applies to any meeting by a quorum of the members of a governmental body which meets to discuss any public business or policy, with certain exceptions." *[citations omitted]* As a result, we believe that the BHI exhibits the kind of qualities sufficient to bring it within the category of a "special district" for purposes of the [Act]. *[citations omitted]* We conclude that chapter 551 of the Government Code, the Open Meetings Act, is applicable to meetings of the governing board of the BHI, a planning committee established under federal law."

TEX. ATT'Y GEN. OP. No. GA-0280 (2004).

Therefore, the need to look beyond the definition of "Governmental Body" in Section 551.001 is necessary in order to determine whether the board, commission, committee or entity is subject to the Act.

"***Meeting***"

Section 551.002 of the Act provides that, "Every regular, special, or called meeting of a governmental body shall be open to the public, except as provided by this chapter." Section 551.001(4) of the Act defines the term "Meeting" as follows:

> "Meeting" means:
>
> (A) a deliberation between a quorum of a governmental body, or between a quorum of a governmental body and another person, during which public business or public policy over which the governmental body has supervision or control is discussed or considered or during which the governmental body takes formal action; or
>
> (B) except as otherwise provided by this subdivision, a gathering:
>
> (i) that is conducted by the governmental body or for which the governmental body is responsible;
>
> (ii) at which a quorum of members of the governmental body is present;
>
> (iii) that has been called by the governmental body; and

(iv) at which the members receive information from, give information to, ask questions of, or receive questions from any third person, including an employee of the governmental body, about the public business or public policy over which the governmental body has supervision or control. The term *does not include* the gathering of a quorum of a governmental body at a social function unrelated to the public business that is conducted by the body, or the attendance by a quorum of a governmental body at a regional, state, or national convention or workshop, ceremonial event or press conference, if formal action is not taken and any discussion of public business is incidental to the social function, convention, workshop, ceremonial event, or press conference.[3] The term includes a session of a governmental body.

§ 552.001(4).

As can be seen, the definition of "Meeting" has several other key terms embedded in it – including "quorum" and "deliberation." Those definitions will be analyzed separately, but first with regard to "Meetings," it is clear that a "Meeting" includes every regular, special or called meeting of the board or commission members themselves about public business in its jurisdiction is discussed. The term "Meeting" also includes staff briefings of a quorum of the governmental body, and instances when a quorum of the governmental body listens to or receives information from their staff or the general public.

Some unexpected events can be "Meetings" within the meaning of the Act. For example, the Attorney General found that breakfast meetings of the commissioners' court must be open to the public and preceded by notice if public business or public policy over which the court has supervision or control is considered. TEX. ATT'Y GEN. OP. No. H-785 (1976). Similarly, if a quorum of a governmental body (like a City Council) attends the meeting of a committee created by that governmental body (like the Zoning Commission), then their attendance at the committee meeting is subject to the Act involving notice, minutes, etc. TEX. ATT'Y GEN. OP. No. JC-0313 (2000). Basically, for purposes of the Act, a "Meeting" occurs when there is a giving and receiving of words about a matter of public business or within the body's jurisdiction.

However, the legislature has clarified that a gathering of a quorum at a purely social function at which no public business is conducted is not a "Meeting," nor is attendance at a regional, state, or national convention or workshop, ceremonial event, or press conference -- if no formal action is taken and any public business discussed is only incidental to the function being attended. *See* § 551.002(B)(iv). There is a special exception that allows a quorum of a governmental body to attend and testify at a legislative committee of agency meeting. *See* § 551.0035.

[3] 2007 Tex. Sess. Law Serv. Ch. 165 (S.B. 1306) Vernon's 2007.

As a practical matter, however, the public's suspicion is often that whenever two or more members of a gonvernmental body are together, public business is being discussed. This turned out to be the case in *Gardner v. Herring*, 21 S.W.3d 767 (Tex.App.-Amarillo 2000, pet. denied). Gardner, a trustee on the Tulia Independent School District's Board of Trustees (the Board), sued Herring in both her personal capacity and her official capacity as the president of the Board. The lawsuit alleged violations of the Act by individual members of the Board. The evidence showed that a quorum of the Board congregated after a formal meeting to talk for about twenty minutes, and during this period, Herring revealed the existence of a lawsuit filed by Gardner against the district. One or more members of the Board responded to the disclosure and, in responding, uttered that the "circumstance was regrettable." The court took into consideration the length of the conversation, the subject of the disclosure, the potential affect of the suit upon the district's official acts, and the fact that some reply to the disclosure was made by a Board member. The court concluded that could reasonably, though not necessarily, infer that a "giving and receiving of spoken words" (or verbal exchange) about a matter of public business or within the district's jurisdiction had occurred. So, no utterance is casual.

"***Deliberation***"

Section 551.002 of the Act provides that, "Every regular, special, or called meeting of a governmental body shall be open to the public, except as provided by this chapter." Section 551.001(4) of the Act defines the term "Meeting" as a "deliberation between a quorum of a governmental body, or between a quorum of a governmental body and another person, during which public business or public policy over which the governmental body has supervision or control is discussed or considered or during which the governmental body takes formal action." The term "Deliberation" is defined in Section 551.001(2) of the Act, as "a verbal exchange during a meeting between a quorum of a governmental body, or between a quorum of a governmental body and another person, concerning an issue within the jurisdiction of the governmental body or any public business."

Under the Act, "deliberation" means "discussion." A verbal exchange includes oral, written, and probably electronic discussion. TEX. ATT'Y GEN. OP. Nos. JC-0307 (2000) at 5, DM-95 (1992) at 5.

If the subject involves an issue within the jurisdiction of the governmental body, any discussion involving a quorum will fall under the Act. For example, discussion of projects under water district's control at informational gathering of landowners at which quorum of water district board members were present, was "deliberation" under the Act. The evidence showed that even though board members did not discuss business amongst themselves, at least one board member asked question and another board member answered questions. That made it a "meeting" subject to the notice and minutes requirement of the Act. *Bexar Medina Atascosa Water Dist. v. Bexar Medina Atascosa Landowners' Ass'n*, 2 S.W.3d 459 (Tex. App. – San Antonio 1999, pet. denied).

"*Quorum*"

To review, remember we are STILL analyzing Section 551.002 of the Act, which provides that, "Every regular, special, or called meeting of a governmental body shall be open to the public, except as provided by this chapter." Section 551.001(4) of the Act defines the term "Meeting" as a deliberation between a quorum of a governmental body, or between a quorum of a governmental body and another person, during which public business or public policy over which the governmental body has supervision or control is discussed or considered or during which the governmental body takes formal action . . ." The Act further defines "Quorum" in Section 551.001(6) as, "a majority of a governmental body, unless defined differently by applicable law or rule or the charter of the governmental body."

So, a meeting or gathering of less than a majority, or quorum, is not a meeting, right? **WRONG**. That would leave out the Attorney General and judicial interpretations regarding subcommittees and advisory bodies; meetings where less than a quorum is physically present in one place but public business is deliberated; and meetings and actions of a member or group of members to knowingly conspire to circumvent the Act's requirements by meeting in numbers less than a quorum.

Quorum not Physically Present but Public Business is Discussed

The Act has been described by persons as erudite as the Attorney General as applying when a quorum of a governmental body is present and discusses public business. However, the Act has been interpreted by the Attorney General and by the courts to apply to situations in which members of a governmental body are not in each other's physical presence. For example, e-mail communications, telephone calls, and written correspondence that ultimately involve a quorum may constitute a violation of the Act, even if the quorum is not physically present at one place at the same moment in time.

Recently, the Attorney General stated in TEX. ATT'Y GEN. OP. No GA-0326 (2005) that in an instance when a quorum of a governmental body was three, when Member A had a discussion with Member B, and Member B then discussed the matter with Member C, and finally Member C had a conversation with Member A, a quorum was formed. In so finding, the Attorney General stated that, "The [Act] does not require that governmental body members be in each other's physical presence to constitute a quorum. (*citations omitted*) As such, we construe Section 55 1.143 to apply to members of a governmental body who gather in numbers that do not physically constitute a quorum at any one time but who, through successive gatherings, secretly discuss a public matter with a quorum of that body. In essence, it means "a daisy chain of members discussing an item, the sum of whom constitute a quorum, can trigger the notice and other requirements of the Act. Tex. TEX. ATT'Y GEN. OP. No. GA-0326, at 3-4.

TEX. ATT'Y GEN. OP. No A-0326 (2005) actually dealt with the criminal conspiracy provision of the Act in Section 551.144. Asked by the requestor to assume that the element of

"knowingly" could be proven, the Attorney General's office found that there was indeed a violation of the Act under the "daisy chain" scenario. TEX. ATT'Y GEN. OP. No. GA-0326 (2005) rests upon fairly extensive judicial precedent, all of which is very fact specific.

A leading case on this topic is *Esperanza Peace and Justice Center v. City of San Antonio*, 316 F.Supp.2d 433 (W.D. Tex. 2001). The case involved the city council of the City of San Antonio. The facts are these: There are ten council members plus the mayor. Thus, a quorum is six. On the night of September 10, 1997, the eve of the budget vote, the Mayor, the City Manager, and several council members met in small groups in the City Manager's office to discuss the budget. While meeting in person with the various members, the Mayor also spoke on the telephone with other members. The Mayor's purpose in meeting with the members was to reach a consensus on changes to the city budget; he wanted to avoid "a whole bunch of amendments from the floor that would take up lots of time" during the next day's open meeting. There was never the possibility of a physical quorum, as only four council members in addition to the mayor were present. Three members spoke with the Mayor on the telephone, and one recalled possibly being on a speaker phone, so the court found that the possibility existed that a quorum could have been present. Indeed, the evidence showed that the participants were careful to avoid the physical presence of a quorum. On several occasions throughout the evening, the City Manager told the group that there were too many people together, and they were at risk of violating the Act. In response to the City Manager's warnings, one or more council members would leave the office and wait in the reception area outside. As individuals moved in and out of the City Manager's office, the conversation in the office continued regarding the budget. No public notice was posted for a meeting of the city council for that evening. The closed deliberations led to unanimous agreement on a series of budget changes. Mayor Peak said that when he left City Hall that night, the budget problems were mostly all solved. All council members signed a final draft of the consensus memorandum prepared by Mayor Peak before the open meeting on September 11, 1997. The agreed changes were incorporated into the proposed budget by the budget office prior to the open meeting and formal vote on September 11, 1997. Most of the changes deliberated in those meetings were never publicly debated. The council members understood the memorandum was not binding, and that any of them could have moved to change the proposed budget or the items contained in the memorandum during the council meeting. None did. There were no amendments offered at the September 11 public meeting and no debate. The budget adopted essentially reflected the agreement in the consensus memorandum.

The court found that the San Antonio City Council intentionally violated the Act. The court stated:

> If a governmental body may circumvent the Act's requirements by "walking quorums" or serial meetings of less than a quorum, and then ratify at a public meeting the votes already taken in private, it would violate the spirit of the Act and would render an unreasonable result that was not intended by the Texas legislature. Thus, a meeting of less than a quorum is not a "meeting" within the

Act when there is no intent to avoid the Act's requirements. On the other hand, the Act would apply to meetings of groups of less than a quorum where a quorum or more of the body attempted to avoid the purposes of the Act by deliberately meeting in groups of less than a quorum in closed sessions to discuss and/or deliberate public business, and then ratifying their actions as a quorum in a subsequent public meeting.

Esperanza, at 476.

Other examples of meetings of less than a quorum that have been held to violate the Act include:

- TEX. ATT'Y GEN. OP. No. DM-95 (1992). The opinion concerned a letter circulated among members of a city council and signed by a quorum of the members. The Attorney General concluded that if a quorum agrees on a joint statement on a matter of governmental business or policy, the deliberation by which the agreement is reached is subject to the Act's requirements, and those requirements are not necessarily avoided by the fact that a quorum was not physically present in one place at one time.

- *Hitt v. Mabry*, 687 S.W.2d 791, 796 (Tex.App. - San Antonio 1985, no writ). The the court upheld an injunction restraining the San Antonio Independent School District board of trustees from arriving at a decision affecting the District by way of private, informal telephone polls or conferences of the board members. Mabry sought to prevent the mailing of a letter to all parents residing in the SAISD advising them of their voting rights and stating the message was a service of the Board of Trustees. The letter was drafted by the board president after he had conducted an informal telephone poll of the board members.

- TEX. ATT'Y GEN. OP. No. LO-95-055 (1995). A city council member violates the Act when he telephones individually a quorum of the council members to express his views about public business that has not been formally considered by the council in an open session.

- *Harris County Emergency Serv. Dist. No. 1 v. Harris County Emergency Corps.*, 999 S.W.2d 163 (Tex.App. - Houston [14th Dist.] 1999, no pet.). The court refused to enjoin board members from discussing district business over the telephone because the evidence did not show that a quorum was involved in the discussions or that the conversations were a meeting. The evidence in *Harris County*, unlike that in *Hitt*, did not show that a quorum of the board ever discussed policy or public business over the phone or that telephone polling occurred. Therefore, unlike *Hitt*, there was no evidence that the members were

attempting to circumvent the Act by using the telephone to avoid meeting in a quorum.

- *Hispanic Educ. Comm. v. Houston Indep. Sch. Dist.*, 886 F.Supp. 606, 610 (S.D.Tex. 1994). The court held that a school district board of trustees, meeting in numbers less than a quorum to discuss the hiring of a board member as superintendent, did not violate the Act. The court observed that " [l]imiting board members' ability to discuss school district issues with one another outside of formal meetings would seriously impede the board's ability to function." In reaching its decision, the court reasoned that " [w]ith fewer than a quorum present, nothing can be formally decided; without a formal decision, no act is taken. Without action, there is no illegality." The court also observed that there was no evidence of any systematic attempt to circumvent or avoid the purposes of the Act. The clear implication from this is that if there had been, the court would have found a violation of the Act regardless of whether the quorum requirement was met. Such an approach balances the Act's "quorum requirement" against the need to prevent circumvention of the Act by conducting public meetings in a piecemeal fashion without a quorum being present.

One scenario, however, that had been previously carved out by courts as not being a violation of the Act was the ability of members to communicate to discuss future agenda items. *See Harris County Emergency Service Dist. No. 1 v. Harris County Emergency Corps*, 999 S.W.2d 163 (Tex. App. – Houston [14 Dist.] 1999, no pet.). In that case, the facts showed that one board member of five-member county emergency service district occasionally questioned another board member about something on the agenda while preparing for future meetings. The court found that the communication did not amount to violation of the Act, and thus, members could not be enjoined, absent any evidence of informal polling taking place or of any attempt to circumvent the Act by meeting in groups that were less than a three-member quorum. So, it was common to advise that members could discuss whether or not to place an item on a future agenda, as long as no final decision or "meeting of the mind" was reached before the item was fully discussed at that future meeting.

However, after the "Alpine" case, that advice is questionable. *Rangra v. Brown,* Slip Op., 2006 WL 3327634, Western District of Texas, November 07, 2006. The City of Alpine, located in Brewster County, Texas, is governed by a city council of five members and an elected mayor. Four members of the city council constitute a quorum. In October, 2004, the decision to award a contract to an engineering firm to design and implement water improvements for the south end of Alpine was pending before the Alpine City Council. Katie Elms-Lawrence, Avinash Rangra, Anna Monclova, Manuel Payne, and Nancy DeWitt were members of the Alpine City Council. On October 21, 2004, Monclova, Rangra, and Payne received an e-mail from Katie Elms-Lawrence. The text of the e-mail was as follows:

Avinash, Manuel ... Anna just called and we are both in agreement we need a special meeting at 6:00 pm Monday ... so you or I need to call the mayor to schedule it (mainly you, she does'nt [sic] like me right now I'm Keri's MOM).. we both feel Mr. Tom Brown was the most impressive..no need for interviewing another engineer at this time ... have him prepare the postphonment [sic] of the 4.8 million, get us his firms [sic] review and implementations for the CURE for South Alpine ....borrow the money locally and get it fixed NOW....then if they show good faith and do the job allow them to sell us their bill of goods for water corrections for the entire city.....at a later date..and use the 0% amounts to repay the locally borrowed money and fix the parts that don't meet TECQ [sic] standards....We don't have to marry them ... with a life long contract, lets [sic] just get engaged!

Let us hear from you both

KT

On October 22, 2004, Rangra responded to the e-mail and copied his response to Monclova and Payne. The text of that e-mail is as follows:

Hello Katie....

I just talked with John Voller of Hibb and Todds of Abilene ... and invited him to come to the Monday meeting.... I asked him to bring his money man also.... these guys work for Sul Ross ... He said ... he will be at meeting Monday....

I'll talk with Tom Brown also after my 8:00 class ...

Thanks for the advice..... and I'll talk with Mickey as per your, Anna, and Manuel directions ... and arrange the meeting on Monday....

We must reach some sort of decision SOOOOOOOOOOOOOON.

Avinash

Katie.... please correct my first name spellings ... Thanks.

The city council held a meeting pursuant to proper public notice, and the issues relating to the proposed water project and the engineers to hire for it were discussed openly and fully. Based solely on the e-mail exchange quoted above, the Brewster County DA brought criminal charges against the city council members. Two city council members retained Dick DeGuerin to sue the DA and the State of Texas and challenged the constitutionality of the Act. The suit alleged that the provisions of the Act defining "Deliberation" and "Meeting" were void for vagueness and that the application of the Act to this e-mail exchange violated their First Amendment right to free speech.

On the free speech issue, the court found that, because the speech at issue was uttered entirely in the speaker's capacity as a member of the city council, and thus is the kind of communication in which he or she is required to engage as part of his or her official duties, it is not protected by the First Amendment from the restriction imposed by the Act. The court found that the Act was not unconstitutional based on vagueness or overbroad in its application. The court did not discuss *Harris County Emergency District #1* or any other precedent. As it stands, based on an e-mail exchange about whether a matter should be placed on a future agenda for a public meeting, the city council members could be sent to jail for up to six months.

Subcommittees and Advisory Bodies

Generally, except as discussed above, meetings of less than a quorum of a governmental body are not subject to the Act. However, when a governmental body appoints a committee that includes less than a quorum of the parent body and grants it authority to supervise or control public business or public policy, the committee may itself be a "governmental body" subject to the act. In *Willmann v. City of San Antonio* 123 S.W.3d 469 (Tex. App. – San Antonio 2003, pet. denied), the city council established a subcommittee consisting of less than a quorum of council members and charged it with recommending the appointment and reappointment of municipal judges. Because the evidence indicated that the subcommittee actually made final decisions and the city council merely "rubber stamped" them, the appellate court found that the Act applied to the subcommittee.

In *Finlan v. City of Dallas*, 888 F.Supp. 779 (N.D. Tex. 1995), the federal district court addressed whether the Act covered an ad hoc committee of the Dallas city council called the Downtown Sports Development Committee. The committee consisted of five of the nine city council members who met with constituents for the purpose of negotiating the establishment of a new arena. The evidence showed that the city council's own rules provided that committees were subject to the Act with no exception made for ad hoc committees. This led the district court to conclude that the city treated the ad hoc committee as a governmental body. On this basis, the district court rejected the city's argument that the committee did not constitute a quorum of city council, noting that only three members were needed to make a quorum of the committee. With five members of the committee in favor of an arena, as well as the Mayor who appointed them, only two more votes would be needed from the remaining members of city council to agree to the deal negotiated by the committee. According to the district court, the city's argument raised the concern that "a real danger exists that the full city council is merely a 'rubber stamp' of the Committee."

Conversely, the general rule is that an advisory committee that does not control or supervise public business or policy is not subject to the Act, even though its membership includes some members, but less than a quorum, of a governmental body. *See* TEX. ATT'Y GEN. OP. No. GA-0232 (2004) at 3-5 (student fee advisory committee established under Education Code § 54.5031 is not subject to the Act); TEX. ATT'Y GEN. OP. No. JM-331 (1985) at 3 (citizens advisory panel

of Office of Public Utility Counsel, with no power to supervise or control public business, is not governmental body). However, if a governmental body that has established an advisory committee routinely adopts, or "rubber stamps," the advisory committee's recommendations, the committee probably will be considered to be a governmental body subject to the act. The fact that a committee is called an advisory committee does not necessarily mean it is excepted from the Act. Some statutory advisory committees are expressly made subject to the Act by the legislature. Examples of "advisory committees" that have been found to be subject to the Act include:

- TEX. ATT'Y GEN. OP. No. JC-0060 (1999). The Attorney General determined that a nine-member "evaluation committee" appointed by a commissioners court to recommend the selection of an architect was subject to the Act because the county judge and one county commissioner were appointed to serve on the committee. The inclusion of the judge and commissioner on the committee led to the Attorney General's conclusion that the committee was more than advisory. If, however, the county judge and one commissioner are excluded from the Committee, it becomes merely an advisory body not subject to the Act.

- TEX. ATT'Y GEN. OP. No. JC-0313 (2000). A component committee of the Board of the Edwards Aquifer Authority is subject to the Act when a majority of the voting members of the Authority's Board, including the committee members, is present at a meeting of the committee, and the Board members "receive information from, give information to, ask questions of, or receive questions from any third person, including an employee of the governmental body, about the public business or public policy" over which the Edwards Aquifer Authority has authority, regardless of whether the committee members or any Board members engage in a deliberation as defined by the Act.

"*Open*"

Section 551.002 of the Act, which provides that, "Every regular, special, or called meeting of a governmental body shall be open to the public." The term "Open" is redundantly defined in Section 551.001(5) of the Act as being "open to the public." This too is a deceptively simple definition. However, there are several important principles that flow from the simple statement that a meeting must be open to the public.

First, if all members of the public are not invited to attend, the meeting is not "open." The Attorney General considered the question of whether a river authority could hold an informational meeting which only certain invitees were permitted to attend, including certain community leaders and members of the press. TEX. ATT'Y GEN. OP. No. GA-0098 (2003). The Attorney General reviewed the invitations issued by the Authority and found that the Authority intended to hold a meeting during which the Authority would, at a minimum, "give information to third persons about 'public business or public policy over which the governmental body has supervision or control.'" Therefore, the Attorney General concluded

that if a quorum of the Authority was physically present on one of the occasions at which such a meeting was held, that meeting would have been a meeting under Secion 551.001(4)(B). Moreover, if, at such meeting, any deliberation occurred between a quorum of the members of the Authority's governing board, or between a quorum of the governing board and another person, that meeting would have constituted a meeting under the terms of Section 551.001(4)(A). In either event, the meeting should have, under Section 551.002, been "open to the public." In fact, the submittal to the Attorney General included information confirming that a quorum of the Authority's board had *not*, in fact, attended the informational meeting. Under those particular facts, the Attorney General stated that if a quorum is not present and does not otherwise participate in the deliberations, an informational meeting of the Authority that is open only to the Authority's invitees is not subject to the Act. In practice, it may be very difficult to know whether a quorum of the members of a governmental body will attend an event to which they are invited and which, if they did attend, is subject to the notice requirements of the Act. The best practice is to post every event to which the governmental body is invited just in case they all show up.

Second, this requirement for an open meeting intersects in interesting ways with the requirement for public hearings in certain administrative law proceedings. In a seminal case, the court found that a meeting at which the Texas Water Commission (a predecessor agency of the Texas Commission on Environmental Quality) violated the Act by issuing a letter ruling on two pending motions for rehearing – one filed by the applicant and one filed by one of the protestants. *City of Stephenville v. Texas Parks and Wildlife Dept.*, 940 S.W.2d 667 (Tex.App.-Austin 1996, writ denied). The Commission through its General Counsel sent a letter to the parties stating its decision to consider certain portions of the Motion for Rehearing filed by the protestants, and all issues raised in the Motion for Rehearing filed by the applicants. The letter also stated: "The Commission is planning to rule on the pleadings that have been filed and will not be entertaining new arguments; however, the Commission retains the privilege of questioning the parties on the above-mentioned issues." Thus, with the June 11 letter, the Commission notified the parties that they had impliedly overruled nearly all of the protestants' complaints on rehearing. The Applicants argued that there was no violation of the Act because the evidence was insufficient to show that two of the three Commissioners communicated with each other and reached a mutual decision. Instead, they argued that each Commissioner reached the identical decision completely on his own without conferring with one another; and each independently informed the Commission's general counsel in a "straw poll" of his informal opinion on the motion. Therefore, according to the applicants, there could be no violation of the Act because there was never any deliberation among the Commissioners.

The court disagreed and found that, given the detail of the June 11 letter, it would be highly improbable that the decision was made without any communication, direct or indirect, between two Commissioners. For the Commissioners to have reached the decision independently, both would have had to make at least seven separate decisions and communicate them to the General Counsel. Based on the record evidence, the Court found that it could not say there was no evidence to support the trial court's findings that the Commissioners conferred with each

other about the disposition of the rehearing motions without a public hearing. Moreover, they could not say that such findings are so contrary to the overwhelming weight of the evidence as to be manifestly improper or unjust. Instead, they found that the evidence was both legally and factually sufficient to support the trial court's finding that two Commissioners communicated with each other about the parties' rehearing motions without a public hearing.

In another Texas Water Commission case, the court held that a meeting between a majority of the Commissioners to discuss among themselves contested issues outside a public hearing violated the Act. *Acker v. Texas Water Com'n*, 790 S.W.2d 299 (Tex.1990). This is known as the "restroom" case because the facts were that during a recess of a public hearing conducted by the three member Commission, two Commissioners were allegedly overheard conversing about a pending application in a restroom. When the public meeting reconvened, those two Commissioners voted to deny the application. The Commissioner who was not in the restroom voted to grant it. But the case is important also because it reconciles the application of the Act with APTRA, which is a topic for another day.

Third, a meeting that is "open to the public" under the Act is one that the public is permitted to attend. The Act does not entitle the public to choose the items to be discussed or to speak about items on the agenda. *See Charlestown Homeowners Ass'n, Inc. v. LaCoke*, 507 S.W.2d 876, 883 (Tex. Civ. App.–Dallas 1974, writ ref'd n.r.e.); *Eudaly v. City of Colleyville*, 642 S.W.2d 75, 77 (Tex. App.–Fort Worth 1982, writ ref'd n.r.e.); TEX. ATT'Y GEN. OP. Nos. M-220 (1968) at 5; JC-0169 (2000) at 1, H-188 (1973) at 2. A governmental body may, however, give members of the public the opportunity to speak at a public meeting, and may set reasonable limits on the number, length, and frequency of speakers, without unfairly discriminating among speakers.

Some governmental bodies have "public comment" or "open mike" sessions for the public or members of the governmental body to address topics not otherwise posted on the agenda. Such comment sessions must be posted, but a governmental body's response to the public comments must be limited to a statement of fact or explanation of existing policy. Any other discussion must be limited to placing the matter on a future agenda for further discussion. This procedure is spelled out in Section 551.042 of the Act. The purpose of the exemption for a response to an inquiry about a subject for which notice was not given is to authorize a governmental body to make a limited response to an inquiry about a subject not included in the posted notice while preventing deliberation or making a decision about the subject matter of the inquiry. *Hays County Water Planning Partnership v. Hays County, Texas*, 41 S.W.3d 174 (Tex. App. – Austin 2001, pet. denied).

Notice

Section 551.041 of the Act provides that, "A governmental body shall give written notice of the date, hour, place, and subject of each meeting held by the governmental body."

In addition, Section 551.043 states that the notice must be posted in a place readily accessible to the general public at all times for at least 72 hours before the scheduled time of the meeting, except for agencies with statewide jurisdictions, which must post notice of a meeting seven days in advance (with some exceptions), and emergency meetings, which can be posted two hours in advance.

The definition of "emergency meetings" is relatively narrow. The statute provides in Section 551.045 that an emergency or an urgent public necessity exists only if immediate action is required of a governmental body because of (1) an imminent threat to public health and safety; or (2) a reasonably unforeseeable situation. The governmental body is required to clearly identify the emergency or urgent public necessity in the notice or supplemental notice under this Section.

The Act specifies the location of the posting for all the various types of governmental bodies (*e.g.*, with the Secretary of State; on a bulletin board outside City Hall; at the offices of the governmental agency; with a county clerk, *etc.*). If a notice is posted in the wrong place, it does not count. Dual postings can help satisfy the requirements that the posting be for at least 72 hours, and in a location accessible to the public. In *City of San Antonio v. Fourth Court of Appeals*, 820 S.W.2d 762 (Tex. 1991), the Texas Supreme Court considered a posting by the city placed on a bulletin board inside the City Hall more than 72 hours prior to the meeting, as well as on a kiosk located outside the City Hall. Because the City Hall building was locked each night, the bulletin board notice was not continuously available to the public between the time it was posted and the time of the meeting. The kiosk in question was a four-sided structure about the same size and shape as an old-fashioned telephone booth. Notices were posted behind glass panes that cover the four sides of the structure, each page of a notice posted separately. The City argued that the requirement of posting notice "at a place convenient to the public" inside the City Hall was satisfied by the bulletin board posting, while the separate requirement of posting notice in "a place readily accessible to the general public at all times for at least 72 hours" before the scheduled meeting was satisfied by the kiosk posting. The Court agreed.

Recent amendments codified in Section 551.106 also require posting on the internet for state agencies, cities, counties, economic development corporations, and junior colleges and school districts. For large entities, the entire agenda (not just the subject matter posting) must be placed on the internet.

The requirements related to the time and place of the posting must be strictly complied with. If the posting requirements are not followed to the letter, then the posting is insufficient

and any meeting held pursuant to such defective notice does not comply with the Act. The only exception is for internet postings, where good faith attempts to continuously post the notice are sufficient in the face of technical difficulties. *See* § 551.043(b). Even if "everybody knows" when the regular meeting of the governmental body is, and "everybody knows" when a major decision is scheduled to be discussed (usually through the media), the duty to follow the notice provisions of the Act must still be followed. *See Coates v. Windham*, 613 S.W.2d 572 (Tex. App. – Austin 1981, no writ), holding that local notoriety or newspaper publicity of proceedings expected in future meeting of a public body cannot supply notice required by the Act, nor can it cure insufficient notice.

If a matter is not posted on the agenda, then it cannot be discussed by the governmental body. If a member of the public (or, for that matter, a member of the governing body) brings up a subject that is not posted on the agenda, the most they can do is give a factual response to any questions and to state that any further discussion will be posted on a future agenda for consideration.

There are a huge number of cases addressing the sufficiency of the description of the subject matter in the posted notice. The basic rule is that the notice must be sufficient to apprise the general public of the subjects to be considered during the meeting. *See Friends of Canyon Lake v. Guadalupe-Blanco River Authority*, 96 S.W.3d 519 (Tex. App. - Austin, 2002, pet. denied); *City of San Antonio v. Fourth Court of Appeals*, 820 S.W. 2d 762 (Tex. 1991).

General postings like "old business" or "real estate" are never sufficient. For example, a County commissioners' meeting agenda stating "presentation by a commissioner" violated the Act because nothing indicated the substance of the presentation, which covered the commissioner's views on development and substantive policy issues of great importance to the county, and the presentation occurred during a portion of the meeting used for mere formalities. *Hays County Water Planning Partnership v. Hays County, Texas*, 41 S.W.3d 174 (Tex. App. - Austin 2001, pet. denied).

How much information is enough? It is a balance. The focus of the analysis in considering the question of the sufficiency of the content of notice under the Act is a comparison between the content of the notice given and the action taken at the meeting. When the facts are undisputed as to the content of a notice being challenged under the Act, a determination of its adequacy under the Act is a question of law. *Friends of Canyon Lake, Inc. v. Guadalupe-Blanco River Authority*, 96 S.W.3d 519 (Tex. App. - Austin 2002, pet. denied).

The Texas Supreme Court's decision in *Cox Enterprises v. Board of Trustees of Austin Independent School District*, 706 S.W.2d 956, 958 (Tex. 1986) still sets the standard. In *Cox*, the posting of the Board of the Austin Independent School District stated that the board would consider "Personnel" and "Litigation." The action taken by the board was the selection of a new superintendent, and discussion of a major desegregation suit pending against the district. The Court stated that "The advance notice under [the Act] should specifically disclose the

subjects to be considered at the upcoming meeting." *Id.* at 959. The purpose of this Section is to "alert the reader to the topic for consideration", *id* at 958, and to provide "full and adequate notice" of the topic to be discussed. *Id* at 959. The court held that "Personnel" did not adequately describe the hiring of a new superintendent, and that "Litigation" did not adequately describe discussion of a major desegregation suit. The Court noted that both of these topics were of "special public interest."

The standard set by *Cox* requires more specific notice than prior appellate decisions. *Cox* states that "full disclosure" is necessary for "substantial compliance" with the notice provisions of the Act, and "full disclosure" requires a correspondence between the likely degree of public interest in a topic and the specificity with which the topic is stated in the notice. (Pre-*Cox* decisions should not be relied upon.)

The post-*Cox* dilemma is how do you know when a particular topic is of "special interest to the public" requiring more specific notice? Here are some examples. (Many more are out there that deal with personnel issues in particular):

- A water district posted a notice indicating that "budget" matters would be discussed; however, taxes were levied. The court found taxes a matter of special public interest and that "budget" was not sufficiently specific to put interested persons on notice that taxes were going to be levied at a meeting. *Parr v. State*, 743 S.W.2d 268 (Tex.App.- San Antonio 1987, writ denied).

- The notice posted by a school board stated: "Consider and approve recommendation of Superintendent on employment of personnel for the 1988-89 school year." The Board hired one high school principal, two elementary school principals, teachers, a band director, a librarian, and a part-time counselor. The question before the court was whether the positions were of "special public interest" and therefore had to be specifically listed on the agenda. Based on testimony relating to the role of a principal, the court found that the notice was insufficient with regard to the hiring of a school principal and the action hiring the principals was void. However, the record contained no evidence as to the importance of the other positions and the school district's actions to hire the teachers, band director, librarian, and counselor were not void. *Point Isabel Independent School Dist. v. Hinojosa,* 797 S.W.2d 176 (Tex.App.- Corpus Christi 1990, writ denied). [Band directors got dissed again in *Stockdale v. Meno,* 867 S.W.2d 123 (Tex. App. Austin 1993, writ denied).]

- Notice of city council meeting which stated that there would be consideration of an ordinance to determine necessity for and authorizing the condemnation of "certain property in County Blocks 4180, 4181, 4188, and 4297 in Southwest Bexar County" was sufficient as to property description. *Vamarie, Inc. v. Ball* 793 S.W.2d 749, (Tex.App.-San Antonio 1990) motion to file mandamus granted, subsequent mandamus proceeding 820 S.W.2d 762.

- Reference in notice of motor vehicle commission's meeting to proposals for decision and other actions in license cases without describing contested case by name was sufficient to apprise public that purpose of meeting included commission's consideration of proposals for decision in dealer-licensing case. *Charlie Thomas Ford, Inc. v. A.C. Collins Ford, Inc.*, 912 S.W.2d 271 (Tex. App. – Austin 1995, writ dism'd).

- Texas Natural Resource Conservation Commission gave sufficient notice that it might take action on issues related to the appointment of a watermaster, where its public notice stated it would "consider" ultimate validity of petitions for appointment of watermaster. *City of San Angelo v. Texas Natural Resource Conservation Com'n*, 92 S.W.3d 624 (Tex. App. – Austin 2002, no writ).

- Irrigation district's notice of public hearing to consider future of recreational land lease to lessees was sufficiently specific to satisfy the requirements of the Act, given that notice informed the public that the district's board members were considering the future of the lease, and informed the public of the location of the land affected by the lease. *Shields v. Delta Lake Irr. Dist.*, 2006 WL 1280863 (Tex. App. – Corpus Christi 2006, pet. filed)

It used to be clear that there is no requirement to be so specific as to provide notice to an individual affected citizen. The Texas Supreme Court had stated, "The intended beneficiaries of the Open Meetings Act are not individual citizens, such as particular landowners affected by city's condemnation, but members of interested public; if reader is given notice, requirement of Act is satisfied and its purpose served, even if notice is not tailored to reach specific individuals whose private interest were most likely to be affected by proposed government action." *City of San Antonio v. Fourth Court of Appeals*, 820 S.W. 2d 762 (Tex. 1991). This position echoed *Cox*, which stated that the notice provided by the governmental body must be sufficiently specific to alert the general public to the topics to be considered at the upcoming meeting.

This concept was followed in a case involving notice of meeting of board of conservation and reclamation authority, indicating it would consider "water purchase contract" among a list of entities and "outline of preliminary agreement concerning joint participation in a treated water supply" for portions of three counties, was adequate under the Act. Notice was challenged because it did not inform the casual reader that precise consequences of identified subjects would be that the Authority was to seek an amendment to its permit that would double its annual take from water reservoir and require construction of $75,000,000 in improvements. The court found the notice sufficient because it informed a reader as a member of the interested public of the topics to be addressed at the board meeting. *Friends of Canyon Lake, Inc. v. Guadalupe-Blanco River Authority*, 96 S.W.3d 519 (Tex. App. - Austin 2002, pet. denied). Another example can be found in a case involving the owner of sexually oriented business who failed to prove that it was denied procedural due process under Act because he had received no notice of county's intent to consider or adopt regulations governing sexually oriented businesses. The

court recognized and affirmed that Texas law did not require personal notice. *1995 Venture I, Inc. v. Orange County*, Tex., 947 F.Supp. 271 (E.D. Tex. 1996).

However, in a recent case, the court found that a meeting notice for county commissioners' court meeting, at which commissioners' court voted to not execute a proposed contract with horse riding club occupying county land, to retain outside counsel to send notice to club that purported lease with county was void and to provide club with 30 days to vacate land, did not satisfy the Act; even though, by stating commissioners' court might consider concerns from riding club that originally had occupied the land, the notice gave the public adequate notice that action might be taken, riding club actually occupying the land was a separate entity, and notice did not indicate that action might be taken against the entity occupying the land. *Odessa Texas Sheriff's Posse, Inc. v. Ector County* 215 S.W.3d 458, WL 3030541 (Tex.App. - Eastland 2006, pet. denied). The ruling seems to require notice sufficient to apprise of the consequences of the action, or to require notice to a particular affected party – the lessee- rather than to the general public.

Minutes of Open Meetings

Section 551.021 of the Act requires a governmental body to prepare and keep minutes or make a tape recording of each open meeting of the body. The minutes must (1) state the subject of each deliberation; and (2) indicate each vote, order, decision, or other action taken.

Section 551.022 of the Act provides that the minutes and tape recordings of an open meeting are public records and shall be available for public inspection and copying on request to the governmental body's chief administrative officer or the officer's designee.

Closed or Executive Sessions

The Act provides certain narrowly drawn exceptions to the requirement that meetings of a governmental body be open to the public. These exceptions are found in Sections 551.071 through 551.088 and are listed below:

Section 551.071	Consultations with Attorney
Section 551.072	Deliberations about Real Property
Section 551.0725	Deliberation by Certain Commissioners Courts about Contract Being Negotiated
Section 551.0726	Texas Building and Procurement Commission: Deliberation Regarding Contract Being Negotiated
Section 551.073	Deliberations Regarding Gifts and Donations
Section 551.074	Personnel Matters
Section 551.0745	Deliberations by Commissioners Court about County Advisory Body
Section 551.076	Deliberations about Security Devices

Sections 551.078 and 551.0785	Deliberations Involving Individuals' Medical or Psychiatric Records
Sections 551.079 through 551.0812	Exceptions Applicable to Specific Entities (Dept. of Insurance; Board of Pardons and Paroles; Credit Union Commission; Finance Commission of Texas; State Banking Board)
Sections 551.082, 551.0821, and 551.083	Certain School Board Deliberations
Section 551.085	Deliberation by Governing Board of Certain Providers of Health Care Services
Section 551.086	Certain Public Power Utilities: Competitive Matters
Section 551.087	Deliberation Regarding Economic Development Negotiations
Section 551.088	Deliberation Regarding Test Item

Section 551.101 states the requirements for holding a closed session. It provides:

> If a closed meeting is allowed under this chapter, a governmental body may not conduct the closed meeting unless a quorum of the governmental body first convenes in an open meeting for which notice has been given as provided by this chapter and during which the presiding officer publicly:
>
> (1) announces that a closed meeting will be held; and
> (2) identifies the section or sections of this chapter under which the closed meeting is held.

§ 551.101.

Thus, a quorum of the governmental body must be assembled in the meeting room, the meeting must be convened as an open meeting pursuant to proper notice, and the presiding officer must announce that a closed session will be held and must identify the sections of the act authorizing the closed session either by section number or content. *Lone Star Greyhound Park, Inc. v. Texas Racing Com'n*, 863 S.W.2d 742 (Tex. App. - Austin 1993, writ denied). The board of trustees of school district failed to comply with requirements of Act by gathering in superintendent's office, awaiting arrival of quorum and, at some point, sending one or two members to auditorium to convene meeting and announce executive session, as, by all appearances, only two members might have been present at the open meeting preceding the closed meeting. *Cox Enterprises, Inc. v. Board of Trustees of Austin Independent School Dist.* 706 S.W.2d 956 (Tex. 1986). If a closed meeting of governmental body is authorized, the governing body must comply with statutorily enumerated procedural steps, whereas, if no exception to general requirement of open meetings applies, then closed meeting violates the Act regardless of whether governing body complies with procedural steps. *Martinez v. State,* 879 S.W.2d 54 (Tex. Crim. App. 1994)

The same notice provisions that apply to open sessions apply to executive sessions, and the notice must be sufficiently specific to alert the general public to the topics to be considered. *Weatherford v. City of San Marcos,* 157 S.W.3d 473 (Tex. App. - Austin 2004, pet. denied).

No judicial decision or attorney general opinion states that a governmental body must indicate in the notice whether a subject will be discussed in open or closed session, but some governmental bodies do include this information. Part of the analysis into the sufficiency of notice will involve consideration of past posting practices. If the notices posted for a governmental body's meetings consistently distinguish between subjects for public deliberation and subjects for executive session deliberation, an abrupt departure from this practice may raise a question as to the adequacy of a notice to inform the public. TEX. ATT'Y GEN. OP. No. JC-0057 (1999).

Members of the governmental body are the only persons with an absolute right to attend executive sessions, but they may allow others to attend if attendance by others would not contravene the purpose of the closed meeting. The general rule is set forth in TEX. ATT'Y GEN. OP. No. JC-0506 (2002), involving the question of whether a county auditor could attend the executive session closed under Section 551.071 to consult with the county's attorney regarding pending litigation or a settlement offer. The Attorney General found that commissioners court may include the county auditor if the court determines that (1) the county auditor's interests are not adverse to the county's; (2) the county auditor's presence is necessary to the issues to be discussed; and (3) the county auditor's presence will not, in effect, waive the attorney-client privilege. *See also* TEX. ATT'Y GEN. OP. No. JM-238 (1984). An unusual exception to the rule that a member of a governmental body has the right to attend an executive session is when one member of a board is suing other members of the same board. In that instance, the Attorney General found that discussion of the case in executive session under Section 551.071 allowed the attorney-client privilege to be invoked, thus permitting the six members of a school board who have been sued by another board member to exclude the plaintiff board member from their executive session meetings held to consult with the board's attorney about the lawsuit. TEX. ATT'Y GEN. OP. No. JM-1004 (1989).

Although there are many sections of the Act that allow a closed or executive session, this paper will on only a few of these exceptions that may be more common to several agencies, boards and commissions.

Consultations with Attorneys

Section 551.071 of the Act provides:

> A governmental body may not conduct a private consultation with its attorney except:
> (1) when the governmental body seeks the advice of its attorney about:
> (A) pending or contemplated litigation; or

(B) a settlement offer; or

(2) on a matter in which the duty of the attorney to the governmental body under the Texas Disciplinary Rules of Professional Conduct of the State Bar of Texas clearly conflicts with this chapter.

§ 551.071.

Subsection 551.071(1) embodies the attorney-client privilege, an attorney's duty to preserve the confidences of a client. It allows a governmental body to meet in executive session with its attorney when it seeks the attorney's advice with respect to pending or contemplated litigation or settlement offers, including pending or contemplated administrative proceedings governed by the Administrative Procedure Act. *See* TEX. ATT'Y GEN. OP No. GA-0334 (2005), holding that a contested permit hearing before the Board of Directors of the Clearwater Underground Water Conservation District is "litigation" within Section 551.071(1)(A).

Subsection 551.071(2) permits a governmental body to consult in an executive session with its attorney "on a matter in which the duty of the attorney to the governmental body under the Texas Disciplinary Rules of Professional Conduct of the State Bar of Texas clearly conflicts" with the Open Meetings Act. Thus, a governmental body may hold an executive session to seek or receive its attorney's advice on legal matters that are not related to litigation or the settlement of litigation. *Weatherford v. City of San Marcos*, 157 S.W.3d 473, 485 (Tex. App.–Austin 2004, pet. denied) (city council did not violate act when it went into executive session to seek attorney's advice about land use provision). *See also* TEX. ATT'Y GEN. OP. Nos. JC-0233 (2000) at 3, JM-100 (1983).

A governmental body may not invoke Section 551.071 to convene a closed session and then discuss matters outside of that provision. "General discussion of policy, unrelated to legal matters, is not permitted under the language of [this exception] merely because an attorney is present." *Finlan v. City of Dallas*, 888 F. Supp. 779 (N.D. Tex. 1995). *See also Gardner v. Herring*, 21 S.W.3d 767 (Tex. App. - Waco 2000, pet. denied); TEX. ATT'Y GEN. OP. Nos. JM-100 (1984); JM-840 (1988). A governmental body may, for example, consult with its attorney in executive session about the legal issues raised in connection with awarding a contract, but it may not discuss the merits of a proposed contract, financial considerations, or other nonlegal matters in an executive session held under Section 551.071. Thus, the consultation with attorney exception to the Act did not allow city council to discuss bids from prospective waste removal vendors in a closed session, even though the council sought advice from legal counsel as to the ramifications of terminating the city's contract with current solid waste removal company in the same closed session. *Olympic Waste Services v. City of Grand Saline*, 204 S.W.3d 496 (Tex.App.-Tyler 2006, no pet. h.). If a reviewing court concludes that the attorney-client privilege does not apply to an attorney-client consultation closed under Section 551.071, it may also find that the governmental body violated the Act. TEX. ATT'Y GEN. OP. No. JC-0506 (2002).

A governmental body's consultation with its attorney held in closed session is not exempt from the requirements of the Act to give notice of the subject matter of its meeting.

Deliberations about Real Property

Section 551.072 authorizes a governmental body to deliberate in executive session on certain matters concerning real property. It provides as follows:

> A governmental body may conduct a closed meeting to deliberate the purchase, exchange, lease, or value of real property if deliberation in an open meeting would have a detrimental effect on the position of the governmental body in negotiations with a third person.

§ 551.072.

Section 551.072 permits an executive session only where public discussion of the subject would have a detrimental effect on the governmental body's negotiating position with respect to a third party. The exception was created to keep governmental entity from having to "telegraph its punch" in open meeting to detriment of the taxpayers, not to use it as blank check to cut a deal in private, devoid of public input or debate. *Finlan v. City of Dallas*, 888 F. Supp. 779 (N.D. Tex. 1995). It speaks to matters that, if disclosed publicly, would put city at negotiating disadvantage. *Id.*

With regard to who can be admitted to an executive session on a matter involving real estate, this exception allows consultation with a governmental body's employees in private regarding purchase or value of real property, but it does not necessarily allow consultation with other third parties in private. *Id.* That is, it is perfectly proper for city manager to inform the city council in closed meeting of the status of his negotiations with third parties regarding real estate, but it is improper to permit that third party access to the committee's deliberations, thereby enabling that person to gain access to city's confidential information which might possibly then be used to negotiate against the city with another entity. *Id.* Similarly, "joint" executive sessions between two different governmental bodies have been found to violate the Act. TEX. ATT'Y GEN. OP. No. MW-417 (1982).

Some entities post all real estate matters under executive session as a matter of course. But, the courts will look beyond the posting and into whether the particular transaction at issue qualified as one that could be considered in executive session rather than closed session. For example, in the leading case, a school district argued that open deliberation of the value of properties it was considering purchasing for new schools would have had detrimental effect on district's negotiations with third persons and thus that the district's discussions were properly conducted in closed meetings under real estate exception to the Act. The court supported this position even though the district already owned or had locked in price for two parcels. The evidence showed that the district had not made a final selection of the school sites before the

closed discussions, and the district was considering locating schools on properties other than the ones already negotiated. Therefore, the court concluded that open discussion of the relative feasibility and desirability of all potential sites would have had a detrimental effect on future negotiations about non-negotiated properties. Further, the school district's discussion of nonmonetary attributes of property to be purchased could also fall within the Act's exception allowing closed meetings to "deliberate the purchase, exchange, lease, or value of real property," provided that the district was deliberating value of those properties in comparison to value of some other property for which district had not negotiated a price and that deliberating in open session would detrimentally affect subsequent negotiations. *Save Our Springs Alliance, Inc. v. Austin Independent School Dist.*, 973 S.W.2d 378 (Tex. App. - Austin 1998, no pet.).

In contrast, another court found that a city council was not entitled to meet in closed session to discuss purchase of real estate from school district under the real estate exception, as the city had already made an offer to school district to purchase the real estate, the school district had already accepted city's offer, and he city had received school district's resolution approving sale and a warranty deed before it posted notice for meeting in question. Under those facts, the court found that an open discussion of the purchase would not have impeded city's negotiations with the school district and the discussion had to be in open session. *City of Laredo v. Escamilla,* 219 S.W.3d 14 (Tex. App. - San Antonio 2006, pet. filed).

Personnel Matters

Section 551.074 authorizes certain deliberations about officers and employees of the governmental body to be held in executive session:

> (a) This chapter does not require a governmental body to conduct an open meeting:
>
> (1) to deliberate the appointment, employment, evaluation, reassignment, duties, discipline, or dismissal of a public officer or employee; or
>
> (2) to hear a complaint or charge against an officer or employee.
>
> (b) Subsection (a) does not apply if the officer or employee who is the subject of the deliberation or hearing requests a public hearing.

§ 551.074.

This Section permits executive session deliberations concerning an individual officer or employee. Deliberations about a class of employees must, however, be held in an open session. *Gardner v. Herring*, 21 S.W.3d 767 (Tex. App.-Amarillo 2000, pet. denied). For example, when a governmental body discusses salary scales without referring to a specific employee, it must meet in an open session. TEX. ATT'Y GEN. OP. No. H-496 (1975). The closed meetings authorized by Section 551.074 may deal only with officers and employees of a governmental body; closed deliberations about the selection of an independent contractor are not authorized. *Swate v. Medina Community Hosp.*, 966 S.W.2d 693 (Tex.App.-San Antonio 1998, pet. denied);

TEX. ATT'Y GEN. OP. No. MW-129 (1980). Section 551.074 authorizes the public officer or employee under consideration to request a public hearing. *City of Dallas v. Parker*, 737 S.W.2d 845 (Tex.App.-Dallas 1987, no writ).

Minutes of Closed Meetings

The rules for minutes of closed or executive sessions are different than the rules for the minutes of open meetings. Section 551.103 of the Act requires a governmental body to either keep a certified agenda or make a tape recording of the proceedings of each closed meeting, except for a private consultation permitted under Section 551.071 (consultation with attorney). The exception pertaining to the exception for consultations with attorney has been upheld by the courts and the Attorney General's office. *See Lone Star Greyhound Park, Inc. v. Texas Racing Com'n* 863 S.W.2d 742 (Tex. App. – Austin 1993, writ denied); TEX. ATT'Y GEN. OP. No. JM-840 (1988).

It further requires the presiding officer to certify that an agenda kept under Subsection (a) is a true and correct record of the proceedings. The certified agenda must include:

(1) a statement of the subject matter of each deliberation;
(2) a record of any further action taken; and
(3) an announcement by the presiding officer at the beginning and the end of the meeting indicating the date and time.

§ 551.103.

In regard to the "certified agenda" which must be kept by a governmental body meeting in closed session, the agenda must be a true and correct record of the proceedings of the session, and although the agenda need not be a verbatim transcript, more than a one or two word list of the subjects actually discussed is required; ultimately, the question of whether a particular "certified agenda" complies with statute is a fact question for the courts, but in general, the greater the likelihood of violation, the greater the detail necessary. TEX. ATT'Y GEN. OP. No. JM-840 (1988). Many entities just tape record closed sessions.

Although the Act specifically authorizes use of tape recorders at public meetings, it makes no similar provision for use of them at executive sessions of same public bodies. Thus a member of the board of trustees for a school district was not entitled to use her personal tape recorder to record proceedings of board in executive session. *Zamora v. Edgewood Independent School Dist.*, 592 S.W.2d 649. (Tex. App. – Beaumont 1979, writ ref. n.r.e..)

The minutes of a closed meeting are not public. Section 551.104(b)(3) of the Act states that the certified agenda or tape of a closed meeting is available for public inspection and copying only under a court order issued under Subsection (b)(3). Subsection (b) provides as follows:

(b) In litigation in a district court involving an alleged violation of this chapter, the court:
(1) is entitled to make an in camera inspection of the certified agenda or tape;
(2) may admit all or part of the certified agenda or tape as evidence, on entry of a final judgment; and
(3) may grant legal or equitable relief it considers appropriate, including an order that the governmental body make available to the public the certified agenda or tape of any part of a meeting that was required to be open under this chapter.

§ 551.104.

In essence, outside of a lawsuit alleging a violation of the Act, certified agendas and tapes of executive sessions held under the Act are deemed confidential by law. TEX. ATT'Y GEN. OP. No. ORD-495 (1988). The only way for the certified agenda or tape to be released is in accordance with the procedures set forth in the Act. TEX. ATT'Y GEN. OP. No. No. JM-995 (1988). Not even the Attorney General may review certified agendas or tapes of executive sessions to determine compliance with the Act. TEX. ATT'Y GEN. OP. No. ORD-495 (1998). However, a governmental body will have to comply with a court's or an administrative agency's subpoena to produce tapes and transcripts of closed meetings, but the records so produced will be confidential. *E.E.O.C. v. City of Orange, Tex.*, 905 F. Supp. 381 (E.D. Tex. 1995).

A member of a governmental body may review the certified agenda or tape recording of a closed meeting in which the member participated. TEX. ATT'Y GEN. OP. No. DM-227 (1993). A governmental body may also implement a procedure for providing access to the certified agenda of a closed meeting by a member of the governmental body, and should do so in an open meeting. TEX. ATT'Y GEN. OP. No. DM-227 (1993). But, it may not absolutely prohibit review by a member of the governmental body, even if they did not attend the meeting. TEX. ATT'Y GEN. OP. No. JC-0120 (1999). The governmental body may not provide the member with a copy of the tape recording. Nor may the governmental body allow a member to review the tape once the member has left office. TEX. ATT'Y GEN. OP. No. JC-0120 (1999) Also, a member of a governmental body may not copy for his or her own use a tape recording of an executive session of a meeting in which he or she participated, nor may the governmental body allow him or her to do so. TEX. ATT'Y GEN. OP. No. LO 98-033 (1998).

Interestingly, the Act does not prohibit members of a governmental body or other persons in attendance at an executive session from making public statements about the subject matter of that session. TEX. ATT'Y GEN. OP. No. JM-1071 (1989). Local ordinances or bylaws may make disclosure of matters discussed in executive session an offense, but Act itself only pertains to the disclosure of the certified agenda or tape recording itself.

A governmental body is also required to preserve the certified agenda or tape recording of a closed meeting for at least two years after the date of the meeting. If an action involving the

meeting is brought within that period, the governmental body must preserve the certified agenda or tape while the action is pending.

Section 551.145 of the Act makes it a Class C misdemeanor for a member of a governmental body to participate in a closed meeting of the governmental body knowing that a certified agenda of the closed meeting is not being kept or that a tape recording of the closed meeting is not being made.

Section 551.146 of the Act makes it a Class B misdemeanor for an individual, corporation, or partnership that without lawful authority knowingly to disclose to a member of the public the certified agenda or tape recording of a meeting that was lawfully closed to the public under the Act. The discloser may also be liable damages to a person injured or damaged by the disclosure. However, it is a defense to prosecution and an affirmative defense to a civil action that the defendant had good reason to believe the disclosure was lawful; or the disclosure was the result of a mistake of fact concerning the nature or content of the certified agenda or tape recording.

Final Actions

Section 551.102 of the Act provides as follows:

> A final action, decision, or vote on a matter deliberated in a closed meeting under this chapter may only be made in an open meeting that is held in compliance with the notice provisions of this chapter.

§ 551.102.

When the authority to make a decision or to take an action is vested in the governmental body, the governmental body must act in an open session. In *Toyah Independent School District v. Pecos-Barstow Independent School District*, 466 S.W.2d 377 (Tex. Civ.App. – San Antonio 1971, no writ). For example, the Toyah school board sued to enjoin enforcement of an annexation order approved by the board of trustees of Reeves County in a closed meeting. The board of trustees of Reeves County had excluded all members of the public from the meeting room before voting in favor of an order annexing the Toyah district to a third school district. The court determined that the board of trustees' action violated the Act and held that the order of annexation was ineffective. The Toyah Independent School District court thus developed the remedy of judicial invalidation of actions taken by a governmental body in violation of the Act. This remedy is now codified in Section 551.141 of the Act.

It is important that the actual vote or decision on the ultimate issue confronting the governmental body be made in an open session. The governmental body may not vote in closed session, or in an open session by secret ballot. In *Cox*, the court of appeals held that a school board violated the statutory predecessor to Section 551.102 when it selected a board

member to serve as board president. In an executive session, the board took a written vote on which of two board members would serve as president, and the winner of the vote was announced. The board then returned to the open session and voted unanimously for the individual who won the vote in the executive session. Although the board argued that the written vote in the executive session was "simply a straw vote" that did not violate the act, the court of appeals found that "there is sufficient evidence to support the trial court's conclusion that the actual resolution of the issue was made in the executive session contrary to the provisions of" the statutory predecessor to Section 551.102. Thus, as *Cox* makes clear, a governmental body should not take a "straw vote" or otherwise attempt to count votes in an executive session. On the other hand, members of a governmental body deliberating in a permissible executive session may express their opinions or indicate how they will vote in the open session. The court in *Cox* stated: "A contrary holding would debilitate the role of the deliberations which are permitted in the executive sessions and would unreasonably limit the rights of expression and advocacy."

It matters on the issue of voidability whether the final action is taken in a closed or open meeting. For example, a city council's vote to award a waste removal contract to a new vendor was not rendered void by the fact that the council improperly discussed vendor bids in a closed executive session, even though the vote to award the contract was held without discussion immediately following the closed session, because the vote took place in an open, regular session after the violation occurred. *Olympic Waste Services v. City of Grand Saline,* 204 S.W.3d 496 (Tex. App. – Tyler 2006, no pet. h.). In contrast, where the decision of a county to terminate contribution to agricultural extension service activity in the county was reached in a closed session without subsequent action in an open session, the determination was void. *Wells v. Hutchinson,* 499 F. Supp. 174 (E.D. Tex. 1980).

In certain circumstances, a governmental body may make a "decision" or take an "action" in an executive session that will not be considered a "final action, decision, or vote" that must be taken in an open session. The court in *Cox* held that the school board did not take a "final action" when it discussed making public the names and qualifications of the candidates for superintendent or when it discussed selling surplus property and instructed the administration to solicit bids. The court concluded that the board was simply announcing that the law would be followed, rather than taking any action, in deciding to make the names and qualifications of the candidates public. The court also noted that further action would be required before the board could decide to sell the surplus property; therefore, the instruction to solicit bids was not a "final action."

Consequences of Actions Taken in Violation of the Act.

Section 551.141 of the Act provides that, "An action taken by a governmental body in violation of this chapter is voidable." Noncompliance renders the action voidable, but not void. *Carr v. Bell Sav. and Loan Ass'n,* 786 S.W.2d 761 (Tex. App. – Texarkana 1990, writ denied). The provision of Act allowing "action" to be voided for violation of Act means specific acts or

decisions made by governmental body in violation of Act and not all actions taken at meeting. *Point Isabel Independent School Dist. v. Hinojosa* 797 S.W.2d 176 (Tex. App. -- Corpus Christi 1990, writ denied).

Thus, a violation of Act subjects the action taken to judicial invalidation by any interested person to bring an action to void an act of a governmental body allegedly taken in violation of the provisions of the Act. Any interested person may also seek an injunction to prohibit a governmental body from taking action that he suspects is in violation of the Act.

The invalid action may be cured by taking the action again at a subsequent meeting after giving adequate notice. However, the re-adoption of any decision is effective only from the date of its re-adoption. The seminal case is *Lower Colorado River Authority v. City of San Marcos*, 523 S.W.2d 641. (Tex. 1975) In that case, the LCRA adopted a rate increase in a 1972 meeting that it attempted to ratify in a 1973 meeting. The 1973 notice of this meeting concluded with a statement that the Board would consider other matters concerning the Authority's operations including "the ratification of the prior action of the Board taken on October 19, 1972, in response to changes in electric power rates for electric power sold within the boundaries of the City of San Marcos, Texas." The Court held that the attempted ratification of the action taken at the 1972 meeting was ineffective for two reasons. First, it found that the purported ratification cannot be given retroactive operation to increase rates for power sold before the 1973 meeting. Second, since a prior lawsuit had held that the 1972 meeting was not conducted in compliance with the Act, the ratification resolution adopted at the 1973 meeting had no legal effect. However, the Court concluded that the rate increase was effective beginning in 1973.

The "no retroactive effect for ratification" rule has consistently been followed. For example, the failure of the board of directors of the county hospital authority to comply with the requirements of the Act by posting written notice of the date, hour, place, and subject matter of the meeting in question operated to preclude the board from lawfully electing an individual as the director and thereafter precluded the board from ratifying its action at a second meeting by electing the individual as vice-chairman since it could not ratify what it could not have lawfully done in the first instance. *Porth v. Morgan,* 622 S.W.2d 470 (Tex. App. -Tyler 1981, writ ref. n.r.e.). Similarly, the city council cured its violation of the Act, which had occurred when city suspended fire chief and captain of fire department without pay at meeting for which city had failed to provide adequate notice, by modifying its decision at subsequent council meeting and suspending chief and captain with pay. *Markowski v. City of Marlin,* 940 S.W.2d 720 (Tex. App. – Waco 1997, writ denied). *See also* TEX. ATT'Y GEN. OP. Nos. H-419 (1974), GA-477 (2006) .

Subsequent ratification alone, however, cannot cure defects in the first proceeding. A governmental body may not ratify its prior illegal acts. *Mayes v. City of De Leon*, 922 S.W.2d 200 (Tex. App. – Eastland 1996, writ denied).

Mandamus; Injunction

Section 551.142 of the Act provides for mandamus and injunctive relief. It provides:

> (a) An interested person, including a member of the news media, may bring an action by mandamus or injunction to stop, prevent, or reverse a violation or threatened violation of this chapter by members of a governmental body.
>
> (b) The court may assess costs of litigation and reasonable attorney fees incurred by a plaintiff or defendant who substantially prevails in an action under Subsection (a). In exercising its discretion, the court shall consider whether the action was brought in good faith and whether the conduct of the governmental body had a reasonable basis in law.

§ 551.142.

The bar for proving standing as an interested person is fairly low. The question of who has standing to bring an action for mandamus or injunction has been considered by several courts. Standing has been granted to city residents; taxpayers; a county "good government league;" an environmental group and the president of a local homeowner's association; and other governmental entities. The usual standards for injunction apply under the Act – a showing of substantial likelihood of success on the merits and substantial threat of irreparable injury if injunction is not granted. Note that the loser may have to pay attorney's fees.

The statute of limitations for this provision is four years. *Rivera v. City of Laredo*, 948 S.W. 2d 787 (Tex. App. – San Antonio 1997, writ denied).

Closed Meeting; Offense; Penalty

There is also a special enforcement provision pertaining to closed meetings. Section 551.144 provides:

> (a) A member of a governmental body commits an offense if a closed meeting is not permitted under this chapter and the member knowingly:
>
> (1) calls or aids in calling or organizing the closed meeting, whether it is a special or called closed meeting;
> (2) closes or aids in closing the meeting to the public, if it is a regular meeting; or
> (3) participates in the closed meeting, whether it is a regular, special, or called meeting.

(b) An offense under Subsection (a) is a misdemeanor punishable by:

(1) a fine of not less than $100 or more than $500;
(2) confinement in the county jail for not less than one month or more than six months; or
(3) both the fine and confinement.

(c) It is an affirmative defense to prosecution under Subsection (a) that the member of the governmental body acted in reasonable reliance on a court order or a written interpretation of this chapter contained in an opinion of a court of record, the attorney general, or the attorney for the governmental body.

§ 551.144.

Note that proof of "knowingly" calling, closing, or participating in an unauthorized closed meeting does not require proof of a culpable mental sate. Thus, in order to convict a school board president, the jury charge only required the jury to find that appellant acted knowingly with regard to calling, aiding in calling or organizing, or participating in the special closed meeting. The jury charge did not require the jury to find that appellant possessed any mental state with regard to the special closed meeting not being permitted under the Act. *Tovar v. State* 978 S.W.2d 584 (Tex. Crim. App. – San Antonio 1998). The court stated, "The Act places a duty upon members of governmental bodies to hold open meetings and a concomitant duty to find an exception to the general rule if they desire to have a closed meeting; neglect of this duty will subject a member of a governmental body to criminal sanction." *Id.*

The statute of limitations for violations of this provision is two years. *Rangra v. Brown,* Slip Op., 2006 WL 3327634, Western District of Texas, November 07, 2006.

If you still want to know more about the Texas Open Meetings Act, some fine resources are available on the Attorney General's website: http://www.oag.state.tx.us/. The Attorney General also publishes the "2006 Open Meetings Handbook," which is also on-line in .pdf form.

Good luck.

Texas Open Meetings Act

Presented by:
Trish Carls



THREE CENTRAL FEATURES

- Meetings of governmental bodies be **open** to the public
- **Notice** of the subject matters to be discussed at meeting be posted prior to the meeting
- **Minutes** or tape recordings of the meeting be kept



DEFINITIONS

- "Governmental Body"
- "Meeting"
- "Deliberation"
- "Quorum"
- "Open"



These definitions work together to establish which public bodies are subject to the Open Meetings Act and what actions must conform to its requirements.

"Governmental Body"

Definition of "Governmental Body" includes:

- State agencies
- County commissioners courts
- City councils
- School districts
- Special districts created by law
- Corporations organized under Chapter 67, Water Code, that provides a water supply or wastewater service, or both



(Sec. 551.001(3))

"Governmental Body"

By their enabling legislation, other entities are specifically subject to the Act, for example:

- Texas Water Advisory Council
- Economic Development Corporations
- City Zoning Commissions
- Water Supply Corporations receiving funding from certain sources



"Governmental Body"

Courts and the Attorney General have also found certain committees to be subject to the Act on the basis that they are *like* special districts:

- Austin Transportation Study Policy Advisory Committee – appointed by the governor (not legislatively created); "played vital role in transportation in the area"
- Border Health Institute – legislatively created; "played important role in health care and health education in the border area"



"Meeting"



A **deliberation** between a **quorum** of a **governmental body**, or between a quorum of a governmental body and another person, during which **public business or public policy** over which the governmental body has supervision or control is discussed or considered;

OR

A **gathering**:

(i) that is **conducted by** the governmental body or for which the governmental body is responsible;

(ii) at which a **quorum** of members of the governmental body is present;

(iii) that has been **called by** the governmental body; and

(iv) at which the members **receive information from, give information to, ask questions of, or receive questions from any third person.**

(Sec. 551.001(4))

Exceptions to "Meetings"



The definition of "Meeting" excludes:

- **Social functions** unrelated to public business;
- Attendance by a quorum at a regional, state, or national **convention or workshop**; or
- *NEW IN 2007*: attendance by a quorum at a **ceremonial event** or **press conference**;

. . . if

- formal action is not taken and

- any **discussion of public business is incidental** to the event.

- Attendance and testimony at a legislative committee meeting.

(Sec. 551.001(4)); 551.002(B)(iv)

Unexpected "Meetings"



- Breakfast meetings attended by a quorum of the commissioners court where public business or public policy within the commissioners' purview was discussed
- Attendance by a quorum of city council at a zoning commission hearing if the city council members ask or respond to questions or give testimony
- Chatting after a scheduled meeting amongst a quorum about a lawsuit brought by a member of the board against the district

"Deliberation"



A **verbal exchange** during a **meeting** between a **quorum** of a governmental body, or between a quorum of a governmental body and another person, concerning an issue within the jurisdiction of the governmental body or any public business.

(Sec. 551.001(4))

"Deliberation"



"**Deliberation**" = **Discussion**

- oral
- written
- electronic









"Quorum"



A "quorum" is a **majority** unless defined differently by applicable law or rule or the charger of the governmental body.

So, a meeting of less than a majority is not a "meeting" right?

WRONG!

(Sec. 551.001(6))

"Quorum"



Deliberations between less than a quorum can still be a "meeting"

- Daisy chain communications involving a quorum
- Walking quorum
- Circulating a letter for signature of all board members
- Telephone polling to arrive at decision

"Quorum"



E-mails involving a quorum to set an item on a future agenda to discuss can violate the Act

- The "Alpine Case" *Rangra v. Brown*, Slip Op. 2006 WL 3327634, Western District of Texas, November 7, 2006.
- Act not unconstitutionally vague
- Act does not impinge on public official's First Amendment rights

"Quorum"



Subcommittees comprised of members of less than a quorum of the parent body could still be subject to the Act if the parent body routinely "rubber stamps" the decisions of the subcommittee.



"Open"



"Every regular, special, or called meeting of a governmental body shall be open to the public."

- Not "open" if meeting is limited to select invitees
- No "letter rulings" from governmental body on pending motions outside of public meeting
- "Open" means public can attend, but not necessarily participate. (Different than public hearing)
- Reasonable limits on public comment can be set – *e.g.*, on number, length, frequency of speakers as long as the limits do not unfairly discriminate among speakers.

Sec. 551.002

Notice of Meetings

"A governmental body shall give written notice of the date, hour, place and subject of each meeting held by the governmental body."

- The place of posting is specified in the Act for each type of governmental body. The location must be accessible to the public.
- The time of posting is generally 72 hours in advance, except for state agencies - 7 days in advance, and emergency meetings - 2 hours in advance.
- Internet posting now required for state agencies, cities, counties, economic development corporations, junior colleges, and school districts.

Sec. 551.041.

Notice of Meetings

- If a subject is not posted on the agenda for consideration, it cannot be discussed
- If a member of the public or the governmental body brings up a matter that is not on the agenda, discussion must be limited to a factual response or a statement that the matter will be put on a future agenda for discussion.

Notice of Meetings

How much specificity is required in the posting?

- Enough to apprise the public of the subjects being considered at the meeting
- More specificity required if the matter is a topic of "special public interest"

FINAL ACTIONS

A governmental body's final action, decision or vote on any matter within its jurisdiction may be made only in an **open session** held in compliance with the notice requirements of the act.

The governmental body may not vote in an open session by secret written ballot. Furthermore, a governmental body may not take action by written agreement without a meeting.

EXECUTIVE SESSIONS



For a governmental body to hold an executive session that complies with the Act:

- a **quorum** of the governmental body must be assembled in the meeting room,
- the meeting must be **convened as an open meeting** pursuant to proper notice,
- the presiding officer must **announce that a closed session will be held**; and
- the **sections of the Act** authorizing the closed session must be identified.

EXECUTIVE SESSIONS



Common Examples:

- Consultation with Attorney (Sec. 551.071)
- Deliberation Regarding Real Property (Sec. 551.072)
- Personnel Matters (Sec. 551.074)
- Electric or Gas Utility Competitive Matters (Sec. 551.086)
- Economic Development Negotiations (Sec. 551.087)

EXECUTIVE SESSIONS



The actual vote or decision on the ultimate issue confronting the governmental body must be made in an open session.

- There can be **no "straw vote" or attempt to count votes** in an executive session. *Board of Trustees v. Cox Enterprises, Inc.*, 183679 S.W.2d 86 (Tex. App.–Texarkana 1984), *aff'd in part, rev'd in part on other grounds*, 706 S.W.2d 956 (Tex. 1986)
- On the other hand, members of a governmental body deliberating in a permissible executive session **may express their opinions or indicate how they will vote in the open session**. The court in *Cox Enterprises* stated: "A contrary holding would debilitate the role of the deliberations which are permitted in the executive sessions and would unreasonably limit the rights of expression and advocacy."

EXECUTIVE SESSIONS



In certain circumstances, a governmental body may make a "decision" or take an "action" in an executive session that will not be considered a "final action, decision, or vote" that must be taken in an open session.

Examples:

- No final action when the school board discussed making public the names and qualifications of the candidates for superintendent.
- No final action when the school board discussed selling surplus property and instructed the administration to solicit bids. (The court noted that further action would be required before the board could decide to sell the surplus property; therefore, the instruction to solicit bids was not a "final action.")

EXECUTIVE SESSIONS



- Only the **members of a governmental body** have a **right to attend** an executive session
  - except that the governmental body's attorney must be present when it meets under section 551.071 (consultation with attorney).
- A governmental body has **discretion** to include in an executive session any of its officers and employees whose participation is **necessary to the matter under consideration**.
- A governmental body **must not admit to an executive session a person whose presence is contrary to the governmental interest protected by the provision authorizing the session**.
  - For example, a person who wishes to sell real estate to a city may not attend an executive session under 551.072, a provision designed to protect the city's bargaining position in negotiations with a third party.
  - Nor may a governmental body admit the opposing party in litigation to an executive session under section 551.071.

Minutes

- **Minutes of both open and closed sessions must be kept.**
- **Minutes can be kept by tape recording, or by producing a written document.**
- **The minutes must: state the subject of each deliberation; and indicate each vote, order, decision, or other action taken.**

Minutes of open sessions are open records.

Minutes of closed sessions are considered confidential under state law and generally may not be released except under order of district court. **If an official releases the actual tape or certified agenda document, such a release can be prosecuted as Class B misdemeanor.**

The public is entitled to know which members are present for the executive session and whether there is a quorum.



PENALTIES AND REMEDIES



The Open Meetings Act provides **CIVIL** and **CRIMINAL** penalties for violations of its provisions.

- Mandamus, Injunction or Declaratory Judgment
  - command action (mandamus),
  - prevent action (injunction), or
  - determine whether the Act applies or the validity of action taken (declaratory judgment action)
- Monetary Damages
  - For disclosing copy of certified agenda or tape recording of an executive session.
- Voidability of Action Taken

SCENARIO 1



QUESTION:

Can a city official publicly discuss what occurred in an executive session?

ANSWER:

State law does not specifically prohibit officials from publicly commenting on what occurred during the closed portion of a meeting. Nonetheless, many city attorneys advise their officials not to publicly disclose confidential information that may have been discussed in a closed meeting. Additionally, in certain home rule cities, the city charter and/or city ethics ordinance prohibits the council members from taking any actions that may be detrimental to the interests of the city.

SCENARIO 2



QUESTION:

A city council has established three standing committees and several ad-hoc committees to advise it on city business. Each of these committees consists of 2 council members as well as several city residents. The city routinely approves recommendations of the committees. Are the meetings of the committees subject to the Open Meetings Act? (Two members of the city council is less than a quorum.)

SCENARIO 2



ANSWER: Yes.

- *See e.g.*, Tex. Att'y Gen. Op. Nos. H-238 (1974) at 3, H-3 (1973) (the standing committees discuss city business, and the city council routinely approves their recommendations).
- *See also, Willmann v. City of San Antonio*, 123 S.W.3d 469 (Tex. App.–San Antonio 2003, pet. denied)(the Act does apply to a city council subcommittee consisting of less than a quorum of members that recommended the appointment and reappointment of municipal judges because the evidence indicated that the subcommittee actually made final decisions and the city council merely "rubber stamped" them.)

SCENARIO 3



QUESTION:

After the city council's meetings, a quorum of council members routinely get together at an all night diner for coffee and doughnuts. Is this gathering a meeting subject to the Open Meetings Act?

ANSWER:

It depends on what is said. If a quorum attends and members discuss public business between themselves or with others, the doughnut party is a meeting subject to the Act under section 551.001(4)(A) of the Government Code.

SCENARIO 4



QUESTION:

The City Manager sends an e-mail to all members of the city council informing them that the city's bond rating has been lowered. Two council members respond using "Reply All" with suggestions about how to respond to press inquiries. Is this e-mail exchange a meeting subject to the Open Meetings Act?

ANSWER: **Probably**: A quorum of the city council is not together in one physical location, but because a quorum is party to a verbal exchange about public business, this could qualify as a meeting. (JC-0307 (2000))

SCENARIO 5



QUESTION:

In Infirmary City, the City Manager's office forgot to post notice of a regular City Council meeting on the Internet. The City Manager was out; the City Secretary, several Department Heads, and the IT Manager were sick with the flu. Amid all the tissues and pain relievers, no one remembered to post the meeting to the internet. But, it was a regular meeting and everyone in town knew when and where the meeting would be held anyway. Can the meeting be held as usual?

ANSWER: NO.

The meeting has has to re-scheduled to allow for the 72 hour posting rule under the Open Meetings Act.

SCENARIO 6



QUESTION:

The Silver City Town Council and the Mayor all signed a letter asking the governor to disassociate himself with an investigation into the Billy the Kid's death. The letter was never discussed at a Town Council meeting. Was there a violation of the Open Meetings Act?

ANSWER: Yes. For the Town Council to "speak with a unified voice," as the letter represented they were trying to do, the letter had to be approved a a properly noticed Town Council meeting.

SCENARIO 7



QUESTION:

The city council wishes to discuss some highly embarrassing rumors about one of the members.

(a) May it do so in closed session if it considers the information confidential under common law?

(b) What if the council wishes to discuss information clearly confidential under the Public Information Act?

ANSWER:

NO for both questions. "[T]here can be **no implied authority for a governmental body to meet in executive session**, and...exceptions from disclosure under the Public Information Act cannot be grafted onto the Open Meetings Act to permit an executive session where none is authorized by the latter. The Public Information Act does not authorize a governmental body to hold an executive session to discuss particular information merely because the information falls within the exceptions to the Public Information Act. " Tex. Att'y Gen. Op. No. GA0019 (2003) at 6.

SCENARIO 8



QUESTION:

The night before an open city council meeting was to be held, the mayor met with several city council members in the city manager's office and spoke with others by telephone about the city budget.

The mayor met with council members constituting less than a quorum to reach a conclusion; the city manager kept track of the number of council members present so as to avoid a formal quorum; the consensus reached was memorialized in a memorandum containing the signatures of each council member; and the consensus was manifested when adopted at an open meeting. Was there a violation of the Act if at no time a "quorum" was present in one room?

SCENARIO 8, cont'd



ANSWER:

Yes. This is the "walking quorum" case. *Esperanza Peace and Justice Center v. City of San Antonio* 316 F. Supp. 2d 433 (W.D. Tex. 2001). The court stated that it would violate the spirit of the act and render a result not intended by the legislature "[i]f a governmental body may circumvent the Act's requirements by 'walking quorums' or serial meetings of less than a quorum, and then ratify at a public meeting the votes already taken in private."

The Esperanza court said that the Act would apply to meetings of groups of less than a quorum where a quorum or more of a body attempted to avoid the purposes of the Act by deliberately meeting in groups less than a quorum in closed sessions to discuss public business, and then ratifying their actions as a quorum in a subsequent public meeting.

Parting Thoughts

"There are two good reasons for open meetings violations: ignorance or arrogance. Training takes care of the first; jail takes care of the other."

Bell County Attorney Rick Miller
June 2004

Congratulations!



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In 1996 Carls formed Brown & Carls, LLP and expanded her practice to include a municipal law practice, which includes counseling municipalities on a wide variety of issues including land use regulation and subdivision matters, zoning issues, development agreements, economic development agreements, ordinance drafting and enforcement, contracts, and interlocal government agreements.

Carls received her Doctor of Jurisprudence in 1985 from the University of Texas School of Law in Austin, Texas, and her Bachelor of Arts in Economics and English with High Honors from Loyola University in New Orleans, Louisiana, in 1982.

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BENDING SCIENCE

Thomas O. McGarity

Appeals to science are more politically salable than appeals to economics. Talk of science raises the expectation that decisions will be determined by objective criteria, solid empirical data and rational analysis. Nearly everyone believes that society is better off when governmental interventions into private market arrangements to protect health, safety and the environment are driven by sound science, rather than unfounded emotions. Appeals to economics, by contrast, are nearly always motivated by somebody's self-interest, even if over the long haul society as a whole may be better off when governmental decisionmakers attempt to achieve allocatively efficient results. Because appeals to economics are inherently suspect in an increasingly cynical society, it makes sense to frame self-interested claims as appeals to science.

This fundamental political reality was captured very nicely in a recently leaked memorandum from political consultant Frank Luntz (the originator of the "Contract with America") to Republican leaders. In discussing the global warming debate, Luntz observed:

> The economic argument should be secondary. Many of you will want to focus on the higher prices and lost jobs that would result from complying with Kyoto, but you can do better. Yes, when put in specific terms (food and fuel prices, for example) on an individual-by-individual basis, this argument does resonate. Yes, the fact that Kyoto would hurt the economic well being of seniors and the poor is of particular concern. However, the economic argument is less effective than [other listed arguments].
>
> The most important principle in any discussion of global warming is your commitment to sound science. Americans unanimously believe all environmental rules and regulations should be based on sound science and common sense. Similarly, our confidence in the ability of science and technology to solve our nation's ills is second to none. Both perceptions will work in your favor if properly cultivated.

When regulatory agencies use "sound science" to justify their decisions, they are employing a tried and true public relations "framing" strategy for defending politically unpalatable decisions by shifting the focus from economics to science. Similarly, many industrial targets of toxic tort lawsuits and federal regulations have been recasting self-interested appeals to economics as appeals to science for more than two decades. Nor are plaintiffs attorneys beyond employing the “sound-science” - “junk science” distinction.

Both the demand for "sound science" in regulation and the call for the elimination of "junk science" in the courtroom are artfully framed appeals to scientific objectivity that carefully avoid the appearance of self-interest. In reality, neither claim is well-grounded in fact. Both are highly contestable and, indeed, surprisingly vacuous assertions. Stripped of their rhetorical flourish, "junk science" means "their science," and "sound science" means "our science."

"Our science," it turns out, is a strategically manipulated caricature of the scientific process in which perception, not objective truth, is the primary goal. Public relations firms have developed a very effective toolbox of techniques for shaping public perceptions of scientific evidence and for attacking and discrediting the scientific evidence that they cannot effectively mold to fit their needs. In a forthcoming book, Professor Wendy Wagner and I refer to this process as “bending science.”

I. Some Historical Perspective.

The regulatory reform and tort reform movements came together near the end of the George H.W. Bush administration when President Bush created an entity called the Council on Competitiveness and appointed Vice President Dan Quayle to head up an interagency effort to provide both regulatory relief and liability relief to the administration's supporters in the private sector. The Quayle Council was quite taken with the work of a young fellow at the Manhattan Institute named Peter Huber. In 1991, Huber published a polemic entitled *Galileo's Revenge* in which he argued that plaintiffs' claims of causal association between exposures to toxic substances and disease were frequently based upon "junk science." Although the empirical basis for these criticisms was questionable, the Manhattan Institute went to great lengths to publicize Huber's catchy "junk science" claim in the popular press. The Quayle Council eagerly seized upon the "junk science" appellation in advancing its liability reform proposals, six of which related to tightening judicial scrutiny of scientific expert testimony.

Although the Quayle Council's efforts came to a premature end with the 1992 elections, it by no means signaled the end of attempts by regulated industries to manipulate public perceptions about science. In early January 1993, Tom Humber of the public relations firm of Burson-Marsteller sent a memorandum to Ellen Merlo of Philip Morris suggesting a multi-focused strategy for addressing several governmental activities that posed a serious threat to the economic well-being of the tobacco industry: a recently published EPA risk assessment on environmental tobacco smoke (ETS), OSHA's recently announced intention to regulate indoor air quality, actions taken at the state and local level to restrict smoking in public places, and the impending threat of second-hand smoke litigation. The memorandum provides a remarkable entree into one industry's science-based strategy for avoiding responsibility and accountability, and it contains strong hints that this was part of an overall strategy by other risk-producing industries and non-profit think tanks for achieving those ends. Burson-Marsteller was then one of the two or three dominant public relations consultants, and its clientele included many of the major actors in most of the important risk-producing industries.

Humber recommended that the tobacco industry adopt a "political campaign mentality" in pursuit of an all-out effort to, among other things, "hold the line against an escalation of smoking bans, ... discredit the EPA report on ETS specifically and the EPA generally, establish the strongest possible input into OSHA deliberations, blunt the thrust of employer and manufacturer liability suits," and generally "protect the franchise." The memorandum then launched into a science-based strategy for avoiding responsibility for complying with government regulations and accountability at common law.

The first and most important recommendation was: "Sue the bastards!" Humber explained that "there is simply no other action that will accomplish as much across all fronts as effectively." Litigation on all fronts would convey "the substance and symbolism of our principal message: We are right! We shall fight!" Not only would lawsuits "establish[] [both] focus and direction," they would "at the very least, delay or cloud precipitous actions against us." Perhaps more importantly, an immediate show of force would "signal the [anti-smoking groups] and plaintiffs bar that there will be no free ride on this tobacco issue either." This prediction would prove remarkably prescient as the tobacco industry dragged its challenge to EPA's risk assessment through the courts for nearly a decade. The industry also strongly resisted every common law action alleging damage from secondhand smoke with the exception of a Florida settlement with flight attendants, which was forced upon the industry by the need to settle the massive Attorney

General litigation at the end of the 1990s.

The second line of attack was aimed at the media. Humber recommended that the industry seek out stories that demonstrated "the scientific weaknesses of the EPA conclusions in consequential terms," put the risks posed by ETS "in perspective," pointed to "EPA excesses and mistakes unrelated to tobacco," demonstrated EPA "corruption," and "stimulate non-tobacco industries, anti-regulation groups and others to provide their own perspectives in order to portray EPA as an agency correctly under siege." In this regard, Humber offered that "Peter Huber is well positioned to categorize the junk science as parts of the EPA report."

The third focus of the strategy would be on assembling a corps of scientists to attack the EPA report and belittle the risks posed by ETS. Thus far, the industry's scientific effort had "been conducted under industry aegis, and the results--from a public relations perspective--have been less than successful." Humber believed that it was "absolutely critical" that the industry "call upon the scientific experts" already in the industry's stable "for public service" and "to expand their number along a variety of fronts, some of which will not necessarily require discussions of smoking or ETS." Hence, "the recruitment, education and training of a variety of experts must be an integral part of any effort that hopes to advance credibility--or, conversely, successfully diminish that of the other side."

The fourth aspect of the strategy was to build coalitions with other industries and mobilize third parties to attack EPA science. In this regard a small nonprofit think tank called the Institute for Regulatory Policy, headed by Reagan administration OSHA head Thorne Auchter, offered an "existing mechanism that currently is in the best position to assemble and mobilize a wide variety of business groups, corporations, local governments and other parties concerned about or victimized by EPA excesses." Another entity, Citizens for a Sound Economy, headed by former White House aide C. Boyden Gray, already had a "track record of activity," including an August 1992 conference in Columbus, Ohio, featuring Vice President Dan Quayle, and was "well-positioned to undertake a number of coalition-building activities."

II. Recently Developments in Science-Based Regulatory Reform.

The courts were much quicker to respond to science-based appeals than Congress and state legislatures. While tort reform statutes have by-and-large nibbled away at the fringes of tort law and regulatory reform measures have not significantly affected the substance of protective statutes, the rapid assimilation of *Daubert* principles into the law of products liability and toxic torts has had a profound impact on the realities of tort litigation. Although it is too early to tell for sure, it is possible that the appeals to science will achieve similarly profound changes in the practical realities of federal health, safety and environmental regulation. The legal vehicles for these changes will be two appropriations riders that Congress quietly enacted in the late 1990s.

A. Daubert *and Its Progeny*

While the Quayle Council was deliberating, the Supreme Court took up the "junk science" issue in the famous *Daubert* case. Unlike the Quayle Council's tort reform initiative, which precipitated a loud political debate and ultimately failed, the Supreme Court achieved a surprising degree of tort reform through its politically invisible interpretation of the words "scientific" and "knowledge" in the obscure Federal Rules of Evidence. The Court held that Rule 104(a) made district judges "gatekeepers" for "scientific, technical, or other specialized knowledge" in jury trials under Rule 702. Henceforth, trial judges would determine whether expert testimony was

"relevant and reliable" in assessing its admissibility. The reliability of scientific proof would be determined by reference to its "scientific validity" when measured against the methods and procedures of science. Although the Court in *Daubert* and subsequent cases has provided some guidance to the district judges, the ultimate test has remained quite subjective.

If the Court left any doubt in its *Daubert* opinion that lower courts were to exercise their gatekeeper roles aggressively to screen out anything that smacked of "junk science," it resolved those doubts four years later in *General Electric Co. v. Joiner*, where it clarified the trial judge's function of ensuring that the scientific testimony "fit" the judge's view of the relevant issues of the case. Dicta in the *Joiner* opinion clarified that the trial judge is obliged to evaluate the "scientific validity" of the *data and methodologies* upon which an expert relies as well as the expert's overall conclusions. Rule 702 was then amended to incorporate the *Daubert/Joiner* approach to keeping "junk science" out of the courtroom.

It is now clear after more than a decade's experience with *Daubert* that the lower courts have applied it quite vigorously to screen out not only "junk science" but also a good deal of "sound science" as well. Since the plaintiff ordinarily has the burden of proof in tort litigation, this aggressive invocation of the judge's new role as guardian of the purity of scientific evidence has clearly had a disproportionate impact on plaintiffs. A plaintiff's attorney must come to court prepared not only to establish the expert's qualifications, but also to demonstrate to a skeptical trial judge that the testimony forms scientifically reliable conclusions based upon reliable data and that those conclusions "fit" the legal requirements for establishing cause-in-fact. As detailed below, this development matches very nicely the strategy of the risk-producing industries for avoiding accountability for the health and environmental harm that they cause.

B. The Data Access Act

If the Supreme Court was a willing participant in the risk-producing industries' accountability-avoidance strategy, the regulatory agencies have been much less dependable allies, even in avowedly pro-business administrations. Regulatory agencies are supposed to be the repositories of scientific expertise. They have traditionally been able to draw upon that presumed expertise to justify intrusive regulation, even when the scientific data that they rely upon are, in the common pejorative of the regulated industries, "fundamentally flawed." With some notable exceptions, the reviewing courts have thus far been reluctant to second-guess agency technical judgments in a legal regime that signals judicial deference. Consequently, the regulatory reformers have had to struggle harder to force regulatory agencies to base regulations exclusively upon "sound science" than they had to persuade the courts to screen "junk science" out of the courtroom. Indeed, they ultimately had to resort to a legislative strategy aimed at the scientific heart of health and environmental regulation.

In tort litigation, gaining access to data is relatively straightforward. If a party relies upon expert testimony based upon a particular study and if that party or the expert has the underlying data in its files, then the underlying data are discoverable. When an agency promulgates a regulation, the scientific studies upon which the agency relies are typically placed in the rulemaking docket for public inspection and, in many cases, for downloading via the internet. Similarly, any studies upon which outsiders rely in their comments are typically available for public inspection. The underlying data, however, are only very rarely made available to those who would like to challenge the statistical analysis employed in those studies or to subject them to a thoroughgoing reanalysis. Although anyone may file a Freedom of Information Act request for

information in agency files, the Supreme Court in 1980 held that an agency did not have to go to any effort to obtain raw data not physically controlled by the agency, even if the federal government sponsored the studies that produced those data.

During the mid-1990s, the tobacco industry's demands for the data underlying the largest epidemiological study of the health effects of environmental tobacco smoke (ETS) were rejected by the study's academic sponsors, even though the study had been conducted pursuant to a grant from the National Institutes of Health. Soon thereafter, the electric power industry's demands for the data underlying the "six cities" epidemiological study of the health effects of fine particulate matter were similarly rejected. Both studies were highly relevant to ongoing agency rulemaking efforts. These industries joined others in persuading Senator Richard Shelby (R-Ala.) to attach a single-sentence rider, now referred to as the Data Access Act (DAA), to the 4,000-page 1999 appropriations bill. The DAA requires the Office of Management and Budget to amend its "Circular A-110," which governs discretionary federal grants, to "require Federal awarding agencies to ensure that all data produced under an award will be made available to the public through the procedures established under the Freedom of Information Act."

Comments from more than 12,000 scientists and scientific organizations--worried that outsiders would harass government-funded researchers with data requests while they were still engaged in the data-gathering and data-analysis stages of their research--persuaded the Office of Management and Budget (OMB) to limit the scope of proper data requests in its 1999 DAA compliance guidelines to "published" studies. The guidelines also gave publicly funded investigators a "reasonable amount of time" to respond to DAA requests and allowed researchers to demand that data requesters pay the reasonable cost of responding to the requests.

C. The Information Quality Act

Having the underlying data available for critique and reanalysis is an exceedingly useful tool in the regulated industries' arsenal, but is only the rough equivalent of a subpoena duces tecum in private litigation. They still needed the regulatory equivalent of a *Daubert* hearing, conducted out of the view of the ultimate fact-finder (in this case the relevant agency program office), in which they could challenge the "reliability" and "fit" of the information that the agency staff proposed to rely upon in promulgating a rule. Their attempt to obtain that much more useful tool came to fruition two years later when Congress enacted the Information Quality Act (IQA).

The Information Quality Act was an obscure rider to the Treasury and General Government Appropriations Bill for Fiscal Year 2001. It represented the culmination of a multi-year effort by Jim Tozzi, a tobacco industry consultant, to secure a legal vehicle for outsiders to challenge scientific studies disseminated by regulatory agencies. That rider required OMB to promulgate "policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by Federal agencies." The agencies were in turn required to promulgate their own guidelines and establish procedures under which affected persons could "seek and obtain correction of information that does not comply with the guidelines."

D. Techniques for Bending Science

With the enactment of the DAA and IQA, risk-producing industries are ready to do battle with both plaintiffs' lawyers and the regulatory state. We turn now to some of the techniques that advocates have developed to "bend science" to fit their litigative and regulatory purposes in the

past with only limited success. The DAA and IQA have paved the way for expanded and more aggressive use of these tactics to the great detriment, in my view, of the beneficiaries of protective regulation and of the process of generating policy relevant science. Initially, it is useful to view these techniques in a "before" and "after" sense. Some techniques are more useful during the time that scientific information is being generated and vetted prior to governmental intervention by way of regulation or litigation. Some are more useful after governmental action has been threatened or initiated.

III. Bending Science in Anticipation of Governmental Intervention

Advocates have developed many science-bending strategies for use in anticipation of litigation or regulation. First of all, to the extent that the industries are the ones conducting or contracting for the relevant health and environmental studies, they have a great deal of influence over how the studies are conducted, and they can frequently control whether adverse results ever see the light of day. The following discussion, however, will focus primarily upon the techniques that advocates can employ to bend science that they do not control to their own ends.

A. Counter-Science: Deconstructing Science with Adverse Implications

Professor Joseph Sanders has observed that "much of what goes on at trial in America is a process of deconstructing science." Much the same is true of the regulatory process. In fact, the process of deconstruction begins long before there is a trial or a notice of proposed rulemaking. The planned obfuscation begins when the first scientific studies and reports begin to appear, and it continues well beyond the point at which most reasonable members of the scientific community have drawn scientific conclusions based upon the weight of the available evidence.

1. Attacking Studies Prior to Publication

Advocates frequently get wind of a study that has been submitted to a journal for publication before it has been accepted or rejected. Sometimes the scientist presents some or all of the study at a scientific conference that is attended by industry consultants or by scientists sympathetic to the industry's position. Sometimes scientific journals submit studies under consideration to industry employees or consulting companies for peer review because they are experts in the relevant area. These occasions afford the regulatees an opportunity to keep the study's conclusions out of the public eye altogether by providing negative peer reviews or by otherwise urging the journal not to publish the "fatally flawed" study.

2. Demanding that Journals Retract or Correct Published Scientific Studies

Once a paper has been published in a scientific journal, scientists in the employ of companies threatened by the study can demand that it be retracted or corrected. Epidemiologist Devra Davis relates the story of a global assessment of the adverse health effects of burning fossil fuels that a team of experts from the World Health Organization, EPA, Harvard University, and World Resources Institute submitted to the prestigious British medical journal, *The Lancet.* The study concluded that particulate matter emissions from continued consumption of fossil fuels at the current pace would by the end of the second decade of the twenty-first century cause 8 million avoidable deaths. Soon after the paper was published, Davis received an urgent fax from the journal relating "what appeared to be a very serious set of charges about our paper, claiming that our data were flawed and our analysis was wrong." After some effort, Davis ascertained that the

fax had come from a scientist at the industry-sponsored Citizens for a Sound Economy Foundation who had not published a single peer-reviewed article in the field of environmental health and whose most recent work consisted primarily of "letters to the editor and other attacks on groups that had estimated public health impacts of air pollution." Davis spent more time persuading the journal that this was not a serious scientific critique than the team had spent in responding to the original peer reviewers' substantive comments.

3. Financing Critical Letters to the Editor After Publication

All good scientific journals provide a formal opportunity for scientific give-and-take via sometimes lengthy and detailed letters to the editor. Letters to the editor not infrequently contain charts and tables containing reanalyses of the data that were presented in the original study. Risk-producing industries frequently hire scientists to find flaws in adverse studies, reanalyze the data and highlight them in letters to the editor. For example, the tobacco industry paid thirteen scientists a total of $ 156,000 to write letters to scientific journals criticizing early papers on the health effects of environmental tobacco smoke. In addition to undermining the study's conclusions, such letters allow the companies to make the case in subsequent litigation or regulatory proceedings that the study was "highly controversial." One scientist referred to such tactics as "a systematic effort to pollute the scientific literature."

4. Assembling a Panel of Sympathetic Experts to Evaluate Adverse Studies

A very typical industry response to the publication of an adverse study or government report is to appoint a "Blue Ribbon Panel" of carefully chosen experts to re-evaluate the study or report. The purpose of these excursions is to "manufacture uncertainty" about the validity of the studies. The industry-assembled experts invariably conclude that one or more aspects of the study could be improved, thus permitting the sponsoring industry to take the position in public fora that the study was "fatally flawed." For example, when an article published in the *New England Journal of Medicine* concluded that the diet drug Fen-Phen caused a very serious heart valve disease, the manufacturer created an expert panel to evaluate the cases that were the subject of the publication. The experts traveled to the city where the data were gathered, met with the researchers and examined their files, and, not surprisingly, reached a different conclusion. Sometimes the relevant industry will even send such panels on "road tours" to highlight the flaws at scientific meetings or other important venues.

5. Harassing Scientists

Although scientists whose research produces important new discoveries are often rewarded with peer recognition and even prestigious prizes, new discoveries are not always greeted warmly by organized interests whose power and economic capital depends upon status quo understandings of the natural world. Discoveries suggesting that certain products or activities pose environmental or health risks are likely to engender condemnation and harassment from scientists in the employ of companies whose products or activities might be adversely affected by new scientific knowledge. This subtle and sometimes not-so-subtle harassment can take many forms.

One way to threaten a scientist is to complain to the scientist's superiors that the scientist is biased or otherwise incompetent and hope that pressure from above will cause the scientist to modify or even retract the damaging conclusions. For example, after learning that Dr. Peter

Breysse of the University of Washington had presented a paper to the National Environmental Health Association warning of the health risks of human exposure to formaldehyde, the Formaldehyde Institute hired a consultant to meet with Dr. Breysse's superior at the University of Washington to "discuss the standards employed by Mr. Breysse in conducting his tests and publishing his findings concerning formaldehyde." This strategy, however, is not likely to prove highly successful in the context of academic research where academic freedom is a strong tradition and scholars with tenure have little to fear from irritated superiors.

A much more viable threat to the settled life of an academic scientist is the threat of a lawsuit. In 1986, Carlos Santos-Burgoa, a Ph.D. candidate who was also a medical doctor conducted an epidemiological study in which he determined that workers exposed to high levels of the chemical butadiene were more than six times more likely to contract cancer than other similarly situated workers. The rubber industry "threatened to sue the university if Santos-Burgoa used these data in his [doctoral] dissertation." When Randolph Byers, a pediatrician at the Boston Children's Hospital, discovered that children who had been successfully treated for lead poisoning were still experiencing profound learning problems, the lead industry's response to this unwelcome development was to threaten to file a million dollar lawsuit.

To address the serious problem of fabrication, falsification, and plagiarism of data, Congress established the Office of Research Integrity (ORI) to investigate federally funded researchers who are alleged to have engaged in such scientific misconduct. Sometimes industry scientists attempt to destroy the reputations of scientists who publish unwelcome studies by taking advantage of these formal channels. For example, after Herbert Needleman published a study in the *New England Journal of Medicine* concluding that lead caused impaired mental development at very low exposure levels in children, a lead industry consultant filed a formal complaint against Needleman with EPA. After Needleman persuaded the agency that his report was correct, the consultant shifted the forum to the National Institutes of Health where she and another consultant charged Needleman with scientific misconduct for failing to cooperate with them in their investigation of his studies. Needleman's university then convened a formal inquiry, which found no evidence of misconduct, but recommended further investigation. Subsequently, Needleman demanded an open hearing to confront his accusers publicly. The second inquiry concluded that although Needleman's research methods were "sub-standard," there was no evidence of scientific misconduct. The matter was then referred to ORI for still another hearing, after which ORI cleared Needleman of any scientific misconduct. This did not, however, prevent the lead industry from continuing to publicize the accusations. According to one observer, "Needleman spent more than ten years and thousands of dollars facing repeated challenges, including demands for all his original data, legal subpoenas to reproduce his files, and efforts to discredit him personally."

It is easy enough for companies or scientists in their employ to maintain that interpretations and analyses with which they disagree constitutes scientific misconduct, and it is very difficult and time-consuming for accused scientists to answer these charges. Because such claims can be devastating to an academic career, enormous damage can be done even if the charges ultimately prove to be groundless. Scientists contemplating research that might adversely affect the economic interests of risk-producing industries will no doubt think twice before they head down that road.

6. Sponsoring "Counter Research" Aimed at Producing Contradictory Results

Professor Wendy Wagner has suggested that risk-producing industries sometimes react to

adverse studies by attempting to "manufacture uncertainty" about the implications of those studies. One unassailable technique for accomplishing this end is to offer to conduct additional studies on the same topic. Not only is this response fully consistent with the scientific norm of reproducibility, but it frequently has the advantage of buying time while the additional study or studies are being completed. When FDA proposed to regulate certain ephedra supplements as drugs on the basis of the agency's own analysis of adverse event reports from doctors treating patients suffering illnesses allegedly caused by ephedra, an industry group, euphemistically named the Council for Responsible Nutrition, contracted with "independent" toxicologists to conduct their own reviews of FDA's adverse event reports. The industry consultants concluded that any adverse effects were associated with misuse of ephedra and that it was safe when used correctly.

7. Abuse of the Peer Review Process

Scientific journals frequently ask industry scientists and consultants who have expertise in relevant subject areas to provide peer reviews of papers submitted to scientific journals. This provides an excellent opportunity for industry consultants and academic researchers whose work is heavily funded by industry to attempt to keep studies that the industry opposes out of print. For example, on December 14, 1982, tobacco industry consultant Francis J.C. Roe wrote to Philip Morris scientist Manuel Bourlas "in strictest confidence" to provide a photocopy of a paper on mutagen levels in the urine of nonsmokers submitted for publication to the prestigious *British Medical Journal.* Dr. Roe recommended that the paper not be published. Moreover, although the peer review process is supposed to be confidential, industry scientists and consultants are not above leaking the drafts to the companies so that they can begin preparing to deconstruct the studies as soon as they are published. Thus, Dr. Roe made the tobacco industry aware of the existence of the mutagen study just in case it was published.

B. Demanding and Reanalyzing Scientific Data

When an academic or government researcher has undertaken scientific research that suggests that a company's products or activities are causing harm or posing unreasonable risks of harm, the company does not have immediate control over the relevant information. If the company can obtain access to the underlying data upon which the adverse studies are based, however, it can hire its own scientific experts to "re-analyze" the data with the anticipation that the reanalysis will yield a different result.

For example, when EPA in the late 1990s was revising the National Ambient Air Quality Standards for particulate matter, it relied heavily upon a large epidemiology study of mortality in six U.S. cities. The American Petroleum Institute, the electric utility industry, and the diesel trucking industry launched a major effort, assisted by Citizens for a Sound Economy and the Center for Regulatory Effectiveness, to characterize EPA's epidemiological work as "junk science." During the rulemaking proceedings, the United States Chamber of Commerce demanded access to the data underlying the Six Cities Study so that they could have their consultants reanalyze the data. The industry even hired unemployed actors and dressed them in laboratory coats to picket Harvard's School of Public Health with signs demanding that the researchers "Give us your data." Partially as a result of these shenanigans, Congress passed the previously described data access rider to the 1999 appropriations bill.

IV. Bending Science in Response to Governmental Intervention

A. The Corpuscular Approach

1. The Corpuscular Approach in *Daubert* Litigation

In a common law tort action, the plaintiff has the burden of establishing both "general causation" and "specific causation." To establish general causation, the plaintiff must prove that human exposure to the toxic agent at issue is capable of causing or exacerbating an identifiable disease from which the plaintiff suffers. To establish specific causation, the plaintiff must prove that his or her exposure to the toxic material caused the plaintiff's particular affliction. The first showing generally requires scientific data in the nature of epidemiological studies demonstrating a statistical association between exposure to the substance and an increase in the incidence of the plaintiff's disease. The second showing typically requires direct or expert testimony on the extent to which the plaintiff was exposed to the toxic agent at issue, and some courts require additional expert testimony to the effect that the particular plaintiff's particular affliction was more likely than not caused by the plaintiff's exposure to the substance at issue.

In the wake of *Daubert* and *Joiner,* most courts have adopted a "corpuscular" approach to determining the admissibility of expert testimony in toxic tort cases. Under this approach, the party offering scientific expert testimony must establish the relevance and reliability under the *Daubert/Joiner* criteria of each individual study upon which the expert relies as well as the relevance and reliability of the expert's overall conclusions. If the plaintiff fails to establish the relevance and reliability of a sufficient number of the individual studies, the trial judge must exclude the expert's testimony. As a practical matter, the corpuscular approach means that the plaintiff must bear the burden of "validating" each of the studies relied upon by the plaintiff's experts as well as the burden of establishing the scientific reliability of their overall conclusions. It invites defendants to focus upon flaws in the corpuscles of data underlying the testimony, rather than upon the scientific reliability of the expert's overall conclusions.

Because epidemiologists encounter great difficulties in designing and executing studies in a world in which health and mortality records are notoriously bad, data must frequently be drawn from human recollections, and it is impossible to control against every possible confounding factor or source of bias, the conclusions of individual epidemiological studies can never be stated with a high degree of certainty. The corpuscular approach invites parties seeking to exclude expert testimony to search every detail of each epidemiological study for possible flaws in the statistical analysis and to speculate at great length about potential confounding factors and other possible sources of bias. Given the practical impossibility of conducting a perfect epidemiological study, the search is nearly always fruitful.

The corpuscular approach effectively prevents the expert in toxic torts cases from applying the "weight-of-the-evidence" approach that scientists typically employ in assessing the risks that toxic substances pose to human beings. Under the weight-of-the-evidence approach, the scientist considers all of the proffered studies and determines the weight to be afforded to each study on the basis of the identified strengths and weaknesses of that study. Some studies are so poorly conducted that they are entitled to no weight at all, but many studies that are otherwise flawed in one or more regards may be appropriately considered to the extent that they add to or detract from conclusions based upon studies in which the agency is inclined to place more confidence. Animal studies are properly considered under the weight-of-the-evidence approach, as are meta-analyses of epidemiological studies that may be flawed to some extent. The weight-of-the-evidence approach, in fact, closely resembles the fact-finding function of the jury in civil trials in

which testimony of varying degrees of quality and credibility is offered from percipient witnesses.

The weight-of-the-evidence approach focuses upon the totality of the scientific information and asks whether a cause-effect conclusion seems warranted. Given the inevitability of flaws in individual studies and the fact that some of the studies were not undertaken with the litigative or regulatory process in mind, this necessarily involves the exercise of scientific judgment grounded in scientific expertise. The corpuscular approach focuses upon the inevitable flaws in individual studies and asks whether a sufficient number of unflawed studies that are sufficiently relevant to the causation issue remain to support a conclusion that is in itself relevant and reliable. Under the corpuscular approach, a study is either valid or invalid, and it is either relevant or irrelevant. A conclusion based upon invalid or irrelevant studies cannot be relevant and reliable and must therefore be rejected.

2. The Corpuscular Approach Under the Information Quality Act

As interpreted in OMB's 2002 Information Quality Guidelines, the IQA appears to be a perfect vehicle for a corpuscular attack on the science underlying health and environmental regulatory decisionmaking. Professor Wagner observes that IQA petitioners "can allege, through a formal process, that a study should be excluded from regulatory decisionmaking because it is too unreliable to be useful, an allegation taken more seriously if the study plays an 'influential' role in a policy decision." This is, of course, precisely the objective of litigants employing the corpuscular approach under *Daubert.*

Another early commenter on the Information Quality Act, Professor Sidney Shapiro, has noted "the potential that administrative appeals will become part of the litigation strategy of regulated entities to slow, or even stop, the government from disseminating information that is legally or politically inconvenient for them." Not only is there a potential for such abuse, the opportunity to dismantle health and environmental regulation through corpuscular IQA challenges may be precisely what the risk-producing industries that were responsible for the appropriations act rider had in mind. Although it is too soon to tell whether the strategy will ultimately be successful, many of the challenges that have been filed so far are at the very least troubling. Professor Shapiro has concluded that "some of the complaints that have been filed certainly suggest that agencies will have to cope with complaints filed for strategic purposes."

The combined science-based strategy to avoid responsibility and accountability was revealed with crystal clarity in a challenge to EPA's "Guidance for Preventing Asbestos Disease Among Auto Mechanics." With the newly available tool of the IQA to facilitate corpuscular attacks on government documents, the law firm of Morgan, Lewis & Bockius attempted in 2003 to force EPA to withdraw a 1986 publication aimed at protecting auto mechanics from asbestos-caused diseases. Who would go to the trouble of hiring a high-powered Washington, D.C. law firm to launch a corpuscular attack on an aging guidance document? Companies who were the targets of toxic tort claims from thousands of auto mechanics who had contracted asbestos-related diseases in the workplace.

B. The Elusive Coup de Grace for Regulation-Regulatory Daubert

The final triumph for the science-bending strategy would be for the courts to employ so-called "*Daubert* principles" in reviewing agency action. Not surprisingly, a number of corporate lawyers and academics have advocated just that in several recent law journal articles. No court has held that rejected Information Quality Act claims are independently subject to judicial review, and the

Fourth Circuit has held that the statute gives no legal right to third parties to challenge agency action. The possibility that the courts will begin to apply so-called *Daubert* principles in reviewing agency risk assessments and regulations, even in the absence of the Information Quality Act, is a very real one.

V. The Proper Role for Quality Controls on Scientific Proof

A. Tort Law

In my view, courts have an important role to play in controlling the quality of scientific proof in tort litigation. Trial judges unquestionably have a profound role to play in determining the relevance of scientific information or any other information that the parties would present to the jury, and the courts were playing that role long before *Daubert* was decided. The judges understand the legal issues that provide the context for the trial, and sometimes legal considerations depart from the common sense considerations that would otherwise lead a juror to permit testimony that is legally irrelevant to affect his or her conclusion about questions of fact.

How one comes out on the question of whether *Daubert* has encouraged trial judges to go too far in excluding science-based expert testimony greatly depends upon the degree to which one trusts juries to discount or disregard unfounded scientific theories. While I am perhaps more inclined to trust juries than some of my fellow torts professors, I certainly understand the concerns that many have for the possibility that wily trial lawyers will sell snake oil to unsophisticated jurors.

I believe that the judges have a less profound, but still important role to play in assessing the scientific underpinnings of science-based expert testimony. The courts should not allow experts for plaintiffs (or defendants either, for that matter) to try out in the courtroom theories that have not been tested in the scientific community. While the *Frye* "general acceptance" standard is probably too high, the expert's position should at least command the support of a substantial minority of the members of the relevant scientific community.

Even judges who conscientiously play their "gatekeeper" role are too likely, in my view, to be swayed by sophisticated, but ultimately unscientific corpuscular attacks on expert testimony. The judges should consider the possibility that judges are not a great deal more sophisticated than jurors in discounting the science-bending strategies that risk-producing industries employ to avoid accountability for the harm that their products and activities cause. I fear that trial judges are insufficiently skeptical of corpuscular attacks on expert testimony aimed at preventing the experts from doing what scientists always do when asked to draw conclusions from incomplete and conflicting scientific information--evaluate the weight of the evidence. In addition, trial judges are probably insufficiently sensitive to the very real possibility that the studies upon which a plaintiff's expert relies have already suffered withering attacks in other fora, such as pre-publication demands for correction, post-publication letters to the editor, reviews by panels assembled by the defendant or its trade association, and even unfounded charges of scientific misconduct.

The courts must also recognize that the policy-relevant conclusions of scientific studies are never based exclusively upon science. Policy considerations frequently have an impact on interpretations of raw scientific data. More importantly, policy nearly always drives the inferences that an expert draws from scientific studies. This being the case, the question boils down to what entity should be determining the policies that drive the decisions. Negligence law generally entrusts to the jury the highly policy-dominated determinations of fault and proximate cause,

while reserving to the court the equally policy-relevant questions of duty. On the critical question of cause-in-fact, the post-*Daubert* courts have been seizing the power that *Daubert* gives them in their "gatekeeper" role to make these policy-driven determinations in the guise of assessing the reliability of scientific testimony. This process should at the very least be made more transparent.

I would further urge the appellate courts to be more sensitive to the realities of scientific proof in their continuing refinement of the *Daubert* principles at the theoretical level. Separate *Daubert* hearings can be quite expensive, consuming many hours of attorney and expert witness time. The prospect of shepherding expert witnesses through depositions and *Daubert* hearings in which opposing attorneys launch intensive attacks on the corpuscles of the relevant scientific studies, as well as on the expert witnesses' own conclusions, may be enough to discourage even the most aggressive trial attorney from taking even the most meritorious cases in which causation in fact is a seriously contested issue. More importantly, that prospect plus the very real risk that their scientific integrity might be challenged in public fora may discourage credible experts from venturing into the area of tort litigation in the first place.

B. Administrative Law

Whatever the merits of *Daubert* in the common law context, applying *Daubert*-like quality controls in the administrative law context is, in my view, wholly unwarranted. Unlike juries, agencies have expertise in the technical areas that they regulate. Unlike judges, agencies have experience in evaluating the weight of scientific evidence, and agencies are generally more adept at identifying unwarranted and abusive attacks on scientific studies and the scientists that produce them. In short, agencies are much better qualified to distinguish between "sound science" and "junk science" than judges.

In a broader sense, however, the issue is not whether or not "junk science" should drive decisions with important health, environmental and economic consequences. No reasonable person would argue that it should. However, the case that agencies routinely rely upon deeply flawed scientific studies in their day-to-day decisionmaking and information dissemination has never been convincingly made. Indeed, Professor Wagner has very exhaustively demonstrated that the charge that regulatory agencies routinely rely upon "bad science" in regulatory decisions is by-and-large a fiction perpetrated by regulated industries and the think tanks that they support.

The critical question is whether the benefits of the better decisions that should result from additional quality controls will outweigh the costs that such additional procedures will impose on regulatory beneficiaries, on the regulatory process and on the integrity of regulatory science. No screening device is perfect. Some bad science will insinuate itself into the process after the implementation of extra screening procedures and enhanced judicial review, and much bad science will continue to be screened out of the process even if no additional procedures are put into place.

For me, this question has an easy answer. There is little reason to conclude that the correction procedures provided for in the IQA and more stringent *Daubert*-style judicial review will enhance the quality of the resulting decisions, and there are many reasons to believe that they will produce much mischief.

First, as discussed above, there is little evidence that the scientific information that the agencies are currently using and disseminating is unreliable. Virtually all of the challenges that have been filed so far under the IQA have involved disputes over interpretations, inferences, models and similar policy issues, and not the "soundness" of the underlying data. If, as Professor

Wagner has demonstrated, complaints about the reliability of information that health and environmental agencies rely upon are little more than "'bad science' fiction," there is little reason to believe that additional procedures and more stringent judicial review will bring about improvement in agency decisions.

Second, science-based reforms will almost certainly damage the administrative decisionmaking process. When agencies must implement procedures, like those specified in the Information Quality Act and its implementing regulations, to allow challenges to science, the result can only be added expense and delay in the decisionmaking process. Although Information Quality Act challenges are trivial to file, they can tie up precisely the agency staff with the expertise needed to move the regulatory process forward. Interlocutory challenges to scientific information in the rulemaking context in particular can unnecessarily consume large amounts of agency and judicial resources, because parties already have an adequate opportunity to challenge an agency's reliance on low quality scientific studies at the appropriate time for judicial review of the rule. This, of course, may be just what the advocates of such reforms have in mind. In that case, however, they should be prepared to make the case for less regulation, not better science. Their inability to make this case, however, is exactly why they are now advocating "sound science" reforms.

Third, science-based reforms may deprive decisionmakers of important information with a resulting increase in the number of bad judicial and agency decisions. Providing an explicit opportunity for aggressive corpuscular attacks on scientific studies will discourage agencies from relying upon useful but imperfect studies under a weight-of-the-evidence approach. Just as it is hard to see how more information from additional tests of cattle for mad cow disease would be scientifically undesirable, it is difficult to see how the additional information from even flawed studies is not usefully considered "for what it is worth." The opportunity for IQA challenges and "regulatory *Daubert*" judicial review will probably pervert the process of health and environmental risk assessment by encouraging lawyer dominated attempts to exclude unwelcome studies, even when their scientific underpinnings would pass any reasonable quality assurance test.

Fourth, science-based reforms will probably harm the delicate process of generating policy-relevant science. Once procedures are available for challenging the quality of scientific information, risk-producing industries are likely to engage in illegitimate science-bending strategies in an effort to persuade decisionmakers to "exclude" from agency consideration or public discussion scientific studies that are damaging to their interests. Companies already have a great incentive to do whatever they can to deconstruct adverse scientific studies and to launch ad hominem attacks on the scientists that produce those studies. Creating fora specifically for the purpose of entertaining attempts to bend science will only reward well-coordinated and vicious attacks on science and scientists. This in turn will discourage scientists from engaging in policy-relevant research.

Finally, there is absolutely no reason to believe that adding another layer of judicial review or increasing the stringency of judicial review will add to the quality of the information that agencies disseminate. It is far more likely that a court will be persuaded by corpuscular attacks on the science underlying an agency action to substitute its own judgment for that of the expert agencies to which Congress delegated decisionmaking power. Judges frequently demonstrate, in the memorable words of Professor Richard Pierce, a "remarkable instinct for the capillary" in reviewing agency rules. In the context of an IQA challenge, this instinct will probably translate into a sympathetic acceptance of corpuscular challenges and a resistance to the weight-of-the-evidence approach. Under the regulatory *Daubert* approach, corpuscular attacks stand a good

chance of producing the desired result--a regulatory process malfunction.

VI. Conclusion

Appeals to science are an easier sell in the political arena than appeals to economics because they do not necessarily correlate with the self-interest of companies desiring to avoid accountability and shirk responsibility. Although it is always possible that sound scientific information will point in the direction of increased liability or more stringent regulation, "sound science" advocates in the business community can generally rest assured that in the vast majority of litigative and regulatory battles they encounter, the rules of engagement will be structured in such a way that appeals for more or better science will work to their advantage. Understanding that, they have over the years developed a wide range of techniques for bending scientific information to fit their economic needs. Left unchecked, this strategy will result in an invisible, but massive shift of wealth from the victims of environmentally caused diseases to the management and shareholders of the companies in the industries that are carefully coordinating the strategy. More importantly, the continued success of the already highly successful science-based tort reform and regulatory reform initiatives will leave a legacy of human tragedy for future generations.

Bending Science: How Advocates Bend Science and Why They Get Away With It

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University of Texas School of Law

Policy-Relevant Science in the Legal System



Rescuing Good Science from a Sea of "Junk Science"



Oops!



Solving the Problem with "Sound Science"

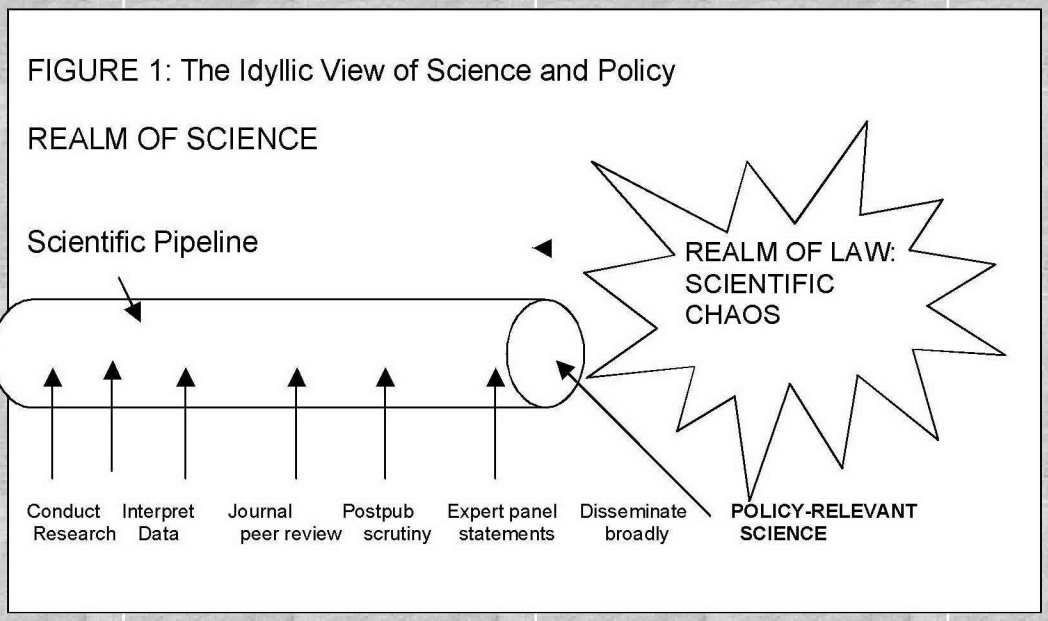


"Sound Science" Reforms: Daubert, IQA

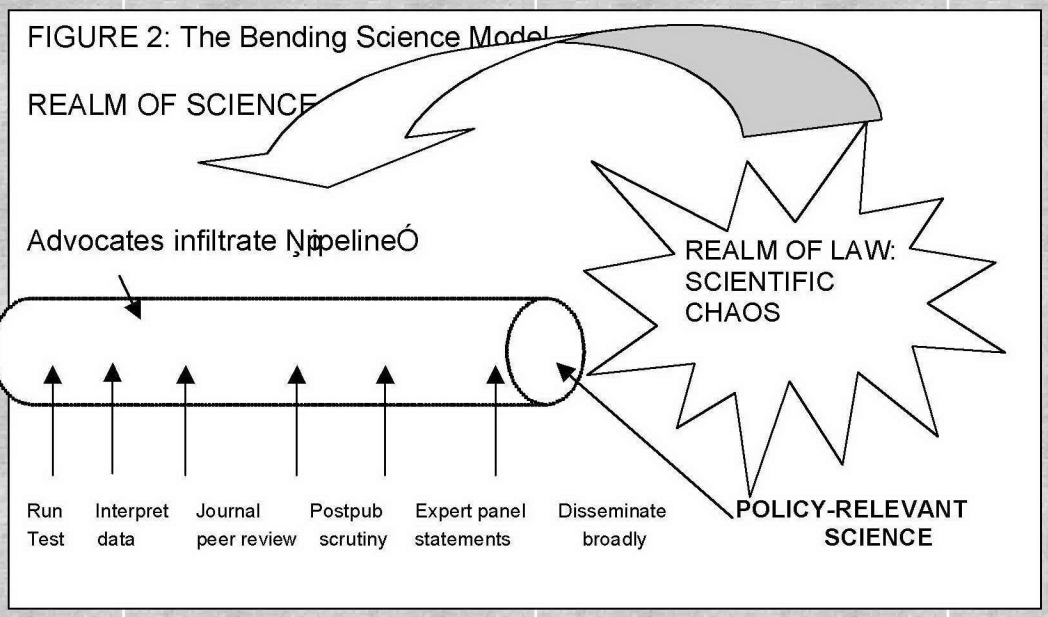
Oh Well - Maybe Not



The Idyllic View



Bending Science



Short Biography
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Thomas O. McGarity holds the Joe R. and Teresa Long Chair in Administrative Law at the University of Texas School of Law. He has taught Environmental Law, Administrative Law and Torts at UT Law school since 1980. Prior to that he taught at the University of Kansas School of Law.

After clerking for Judge William E. Doyle of the Federal Court of Appeals for the Tenth Circuit in Denver, Colorado, Professor McGarity served as an attorney-advisor in the Office of General Counsel of the Environmental Protection Agency in Washington, D.C.

Professor McGarity has written widely in the areas of Environmental Law and Administrative Law. He has written two books on federal regulation. *Reinventing Rationality* (1991) describes and critiques the implementation of regulatory analysis and regulatory review requirements that were put into place during the Carter and Reagan Administrations. *Workers at Risk* (1993) (co-authored with Sidney Shapiro of the University of Kansas) describes and critiques the implementation of the Occupational Safety and Health Act during its first twenty years.

Professor McGarity is President of the Center for Progressive Reform, a nonprofit organization consisting of scholars who are committed to developing and sharing knowledge and information, with the ultimate aim of preserving the fundamental value of the life and health of human beings and the natural environment.

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ENVIRONMENTAL CASE LAW UPDATE

By:
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The area of environmental law is continuously changing, keeping those of us in its wake on our toes, and this year was no exception. This paper provides a discussion of several of the significant environmental law cases decided in the last year, but is not an exhaustive recount of recent environmental case law. The cases included in this paper were chosen because of their significance to our practices, as well as their significance to the industries the decisions likely affect.

1. *United States v. Atlantic Research* [Volunteer PRPs have § 107 cause of action to recover costs incurred].

The *Atlantic Research* case is a breath of fresh air (for some) in the unpredictable world of Superfund law, holding that potentially responsible parties ("PRPs") may bring a cause of action regardless of whether they have been sued or have been the subject of a enforcement action by the government. This decision is comforting, particularly in light of the line of decisions follwing *Cooper Industries, Inc. v. Aviall Services., Inc.*, 125 S.Ct. 577 (2004) because PRPs who voluntarily clean-up a site now are able to seek contribution from other PRPs.[1]

In *Atlantic Research*, the Supreme Court held that potentially responsible parties can pursue a cost recovery claim under Section 107 of the Comprehensive, Environmental, Response, Compensation, and Liability Act ("CERCLA" or "Superfund"). A unanimous court read the statutory language of Section 107 to authorize claims by parties who themselves are potentially liable parties, thus allowing suits by those who volunteer to clean up contaminated sites, *i.e.*, those who do not perform a cleanup due to an enforcement action under §107 or 106. The disputed language was what "other persons" may sue under §107(a)(4)(B) - - any person not identified as a PRP, or any person other than the United States, a State or an Indian tribe. The Court interpreted the statute to say that any private party may bring a §107 cost recovery action and has, therefore, answered an important question left open by the *Availl v. Cooper Ind.* and *Key Tronic* opinions. Under *Availl*, a PRP is barred from bringing a §113 contribution action unless that PRP is subject to a §107 or §106 action. *Atlantic Research* likely will encourage "volunteer" cleanups or those in response to state (non-CERCLA) enforcement.

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[1] In *Cooper Industries*, the Supreme Court held that a cause of action under Section 113(f) of CERCLA was not available to a PRP, as it historically had been, unless the PRP had been the target of an action under Section 106 or 107 of CERCLA.

The *Atlantic Research* opinion will allow volunteer PRPs who clean up sites to obtain joint and several liability rulings against other PRPs, who may be forced to bring §113 contribution actions against others. (This has long been the federal government's preferred strategy when pursuing §107 enforcement actions.) Another implication of the decision is that the §107 plaintiff need not prove up the proportionate shares of all defendants, or even the orphan share. Furthermore, a different statute of limitations applies to §107 actions, (6 years from the initiation of onsite construction of the remedy) compared to §113 claims (3 years from specified triggers such as a judgment).

The *Atlantic Research* decision leaves open several important questions. First, only "costs incurred" by the PRP are covered by the ruling; costs reimbursed to others are excluded. Thus, the (not uncommon) circumstance of a party reimbursing the United States plus doing further site work is not directly addressed by *Atlantic Research.* Can a PRP who incurs certain costs in response to CERCLA enforcement recover them under §107(a), 113(f), or both? (These would be compelled, rather than voluntary costs of response.) Is the "contribution protection" afforded to parties who settle with the government affected, and how does that protection apply against a §107 claim? *Atlantic Research* acknowledges, but does not answer, these CERCLA "overlapping remedies/claims" issues. Also left unanswered is whether §107(a) creates an implied right to contribution for those not eligible for relief under §113(f).

2. *Humboldt Baykeeper v. Simpson Timber Co.,* No. C 06-04188CRB, 2006 WL 3545014 (N.D.Cal. Dec. 8, 2006)(slip copy) [No Early Dismissal for Individuals in Position of Authority at Polluting Companies].

This decision reaffirms the litigation risks faced by corporate officers under environmental statutes. Plaintiffs sued numerous entities under the Resource Conservation and Recovery Act ("RCRA") and the Clean Water Act ("CWA") for allegedly polluting Humboldt Bay. Among the defendants was the President of Preston Properties, Patrick O'Dell. The court denied both a motion to dismiss from defendant Preston Properties and one from O'Dell, who argued for dismissal because the Plaintiffs made "no specific allegations of wrongdoing against him as an individual, nor any allegations that would support an attempt to pierce the corporate veil of Preston Properties." *Humboldt Baykeeper*, 2006 WL 3545014 at *3.

The court rejected O'Dell's argument by explaining that both RCRA and the CWA "permit the imposition of penalties, even criminal penalties, against individuals merely because they are in positions of authority at polluting companies." *Id.* at *4. The court also pointed out that courts consistently have held that individuals whose acts or omissions have led to pollution may be responsible individually. O'Dell argued that plaintiffs' complaint failed to allege that he knowingly violated any environmental laws. The court, however, held that, even though plaintiffs did not include the words "knowingly" or "intentional" in their complaint, the facts alleged that O'Dell and his company had been involved in attempting to clean up the site, among other things, which lead to further contamination of the Bay. *Id.* at *5. The facts alleged by the plaintiffs were sufficient that a reasonable jury could find that O'Dell acted with knowledge or intentionally.

3. *Friends of the Earth, Inc. v. EPA*, 446 F.3d 140 (D.C. 2006). [Statutory Directive Controls EPA Authority to Regulate Water Discharges on a Daily Basis]

The decision in *Friends of the Earth* was limited to Total Maximum Daily Loads ("TMDLs") for the D.C. area, but is forcing the U.S. Environmental Protection Agency ("EPA") to issue all TMDLs in daily time increments. Here, several environmental groups brought suit against the EPA, challenging its approval of new total maximum daily loads ("TMDLs") for pollutants discharged into the Anacostia River. EPA approved TMDLs set by the District of Columbia after testing results showed its dissolved oxygen content was low and is turbidity was high. EPA approved the District of Columbia's TMDLs that limited *annual* discharges of oxygen-depleting pollutants and limited *seasonal* discharges of pollutants containing turbidity.

The district court agreed with EPA's argument that Congress' intent when passing that portion of the Clean Water Act ("CWA") afforded the EPA some discretion on how to implement the TMDL standards and that an annual or seasonal limitation on certain pollutants met the requirement of a "TMDL". The D.C. Circuit, however, reversed the opinion of the district court and held that, pursuant to the standards set in *Chevron USA, Inc. v. Natural Resources Defense Counsel, Inc.*, EPA's interpretation of the phrase "total maximum daily load" was not correct. The court noted that nothing in the pertinent statutory language "even hints at the possibility that EPA can approve total maximum 'seasonal' or 'annual' loads." *Friends of the Earth, Inc.*, 446 F.3d at 142.

The court noted that EPA could have avoided the necessity of issuing TMDLs for all pollutants, but for its own 1978 regulation. Congress' intent in that portion of the CWA was perfectly clear: EPA was only to approve TMDLs for 'suitable pollutants.' In 1978, EPA passed a rule that declared "all pollutants" suitable for the issuance of TMDLs. Because EPA declared all pollutants suitable for the issuance of TMDLs, all pollutants were subject to the statutory requirement of daily limitations. In response to EPA's arguments that some pollutants are not suitable for daily limitations, the D.C. Circuit explained that, if there was an issue with the statutory language, the problem should be addressed at the congressional level, because their intent was clear when they said "daily" in the Clean Water Act.

On January 16, 2007, the Supreme Court declined to grant *certiorari* to review the decision, after the District of Columbia Water and Sewer Authority, an intervenor, petitioned it for review.

4. *United Haulers Ass'n, Inc. v. Oneida-Herkimer Solid Waste Mgmt Auth.*, 127 S.Ct. 1786 (April 30, 2007) [Flow Control Favoring Publicly Owned Facilities Legal].

In *United Haulers,* the Supreme Court clarified the *per se* prohibition of flow-control laws it set forth in *C&A Carbone v. Town of Clarkstown*, 511 U.S. 383 (1994), and provided clarity to a topic on which the circuit courts were split. In 1994, this Court held that "a so-called flow control ordinance, which require[d] all solid waste to be processed at a designated transfer station before leaving the municipality," discriminated against interstate commerce and was invalid under the Commerce Clause because it "depriv[ed] competitors, including out-of-state firms, of access to a local market." 511 U.S. 383, 386 (1994). In this case, two counties in New York passed ordinances requiring all waste collected within the county limits to be transported to a local transfer station owned by the municipalities. The flow control ordinances clearly favored publicly-owned solid waste facilities.

The court decided that the public benefits of the ordinances outweighed the incidental burdens on interstate commerce, and therefore the ordinances do not violate the dormant Commerce Clause. The Court distinguished this case from the *Carbone* decision because *Carbone* involved an ordinance that favored privately-owned waste facilities. The Court maintained that an ordinance that favored a privately-owned business likely would be a violation of the Commerce Clause.

5. *State of New Mexico v. General Electric Co.*, 467 F.3d 1223 (2006)[No Claim for NRD Damages Unless Needed to Restore the Damaged Natural Resources].

In *New Mexico v. GE*, the U.S. Tenth Circuit Court of Appeals held that a state law claim for natural resource damages not intended for restoration of the damaged natural resources is preempted by CERCLA.

The District Court granted had summary judgment to defendants, and The New Mexico's Attorney General ("AG") argued that the State Trustee was entitled to an unrestricted award for money damages for contamination of a deep groundwater zone, which supplied drinking water to two cities. The AG also argued that the EPA-ordered remediation effort was inadequate, leaving a contamination plume from the CERCLA site.

Ultimately, the Tenth Circuit determined that the AG's claim for damages amounted to "cash compensation earmarked for the State's general treasury." The District Court held, and the Tenth Circuit affirmed, that the AG did not present any significant evidence to demonstrate that contamination existed that would not be adequately addressed by the EPA remedy. The Tenth Circuit also noted that CERCLA prohibits review of a CERCLA remedy until the completion of the remedy. The Tenth Circuit affirmed the District Court's summary judgment on the loss-of-use theory and stated that "if a natural resource such as groundwater can be replaced in a timely manner pending restoration," the State would have difficulty proving any significant loss of use.

This opinion provides precedent for two significant points: (1) that "permitting the State to use an NRD recovery, which it would hold in trust, for some purpose other than to 'restore, replace, or acquire the equivalent of' the injured groundwater would undercut Congress' policy objectives [under CERCLA] . . . ." and (2) that a state is not entitled to NRD recovery for loss

of use of a resource that was being used in virtually the same manner as it had been prior to the contamination.

6. ***South Coast Air Quality Mgmt Dist. v. EPA*, 472 F.3d 882 (D.C. Cir. 2006) [Vacating EPA's Rules for Implementing New Ozone NAAQS].**

In its original opinion, the D.C. Circuit rejected portions of EPA's rules for implementing the eight-hour ozone National Ambient Air Quality Standard. Among the portions struck down by the court were rules allowing certain ozone nonattainment areas to be regulated under provisions granting them more time to come into attainment and EPA's failure to maintain, in the new rules the provisions under the old one-hour ozone standard for permitting, rate-of-progress plans, contingency plans, motor vehicle conformity, and penalties for not achieving the ozone standard.

The court vacated the entirety of EPA's rules, which led to substantial confusion regarding the requirements for submission of state implementation plan revisions for the eight-hour standard. On June 8, 2007, the court ruled on petitions for rehearing, maintaining its position on the substantive issues, but clarifying that it was only vacating those portions of the rules that it had determined were invalid.

7. ***Massachusetts v. EPA*, 127 S.Ct 1438 (Apr. 2, 2007)[EPA Authority over Global Warming].**

The Supreme Court held that EPA had authority under the federal Clean Air Act to regulate carbon dioxide and other "greenhouse gas" emissions from new motor vehicles. EPA had been urged to undertake the regulation to address global warming concerns, but EPA stated that it lacked the authority. The Court also rejected EPA's position that even if it had the authority to regulate greenhouse gases, it was inappropriate to regulate them at this time, holding that EPA must regulate those emissions unless it can demonstrate that the emissions do not contribute to global warming or provide a reasonable explanation why it cannot or will not make the determination whether the emissions contribute to global warming.

EPA will have to respond to the ruling which may result in regulation of carbon dioxide. Significantly, the Court's rationale regarding EPA's statutory authority over greenhouse gases will likely be extended to many other sources of greenhouse gases. The case is also significant for its finding that Massachusetts and the other plaintiffs had standing to bring the suit.

8. ***Env'l Defense v. Duke Energy Corp.*, 127 S.Ct. 1423 (Apr. 2, 2007)[Definition of Modification for Permitting].**

The Supreme Court upheld EPA's current rules that define "modification" for air quality permitting as changes that result in a significant net emissions increase, measured on an annual basis. Duke had urged that under the federal Clean Air Act, modification required a finding of an increase in emissions as measured on an hourly basis. EPA had, however, proposed to change the rules to provide that a modification requires an increase in hourly emissions. Subsequent to

the Duke decision, EPA has revised its proposal to require an increase in both hourly and annual emissions to constitute a modification.

The decision reflects deference to EPA's interpretation of the Clean Air Act, which expanded the number of required permits for modification. EPA is now proposing to revise the definition of modification in a way that would likely result in fewer permits for modifications at electric generating units.

9. *Borg-Warner Corp. v. Flores*, No. 05-0189, Texas Supreme Court, June 8, 2007 [Plaintiff Must Prove Defendant's Product is a Substantial Factor in Causing Alleged Harm].

In the asbestosis case, *Borg-Warner Corp. v. Flores*, the Texas Supreme Court came down with an opinion on causation potentially affecting all toxic tort cases in Texas. In *Borg-Warner*, Arturo Flores, plaintiff, was a mechanic claiming that asbestos fibers from Borg-Warner brake pads he installed over approximately 35 years caused him to develop asbestosis. 2007 WL 1650574, No. 05-0189, June 8, 2007, at *1. Plaintiffs provided two experts who testified that Flores contracted asbestosis from his exposure to respirable asbestos fibers that became airborne as he grinded down the brake pads, which contained chrysotile asbestos fibers. *Id.* at *1-2. Plaintiffs' experts could not, however, testify as to how much friable asbestos was in the air as a result of the grinding of the brake pads, other than to say that the plaintiff was exposed to "some respirable fibers." *Id.* at *2-3. The Court determined that plaintiff's evidence was insufficient to establish that Borg-Warner's brake pads caused his asbestosis. *Id.* at *8.

The Court held that plaintiffs must go beyond the requirement set out in the *Lohrmann v. Pittsburgh Corning Corp.* decision, which set "the standard most widely used in asbestos cases." The *Lohrmann* decision requires plaintiffs to provide evidence of "exposure to a specific product on a regular basis over some extended period of time in proximity to where the plaintiff actually worked," otherwise known as the "frequency, regularity, and proximity" test. *Id.* at *4. The Court pointed out, however, that *Lohrmann* also referred to Section 431 of the Restatement of Torts, which requires the plaintiff to prove that the defendant's product was a "substantial factor" in causing the plaintiff's injuries. *Id.* at *4. The Court held, in *Borg-Warner*, that although plaintiff put forth evidence of frequency, regularity, and proximity, he failed to provide any evidence about how much of the product he was exposed to, or any evidence that the amount he was exposed to is sufficient to cause asbestosis. *Id.* at *6.

The significance of this case is yet to be seen, but it likely will have impacts beyond the arena of asbestos litigation. The holding that plaintiffs must specifically provide, although not with "mathematical precision," evidence relating to the approximate dose to which plaintiff was exposed and evidence that the dose was a substantial factor in causing the plaintiff's injuries could have the effect of paralyzing some sets of toxic tort lawsuits.



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Mr. Eldridge has completed such matters as the following:

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- Successfully argued Fifth Circuit appeal of a CERCLA statute of limitations ruling.
- Won a trial involving a shopping center in Houston contaminated with dry cleaning solvents.
- Negotiated complex indemnity and cleanup agreement with the City of Houston involving a contaminated maintenance facility, allowing a multi-million dollar real estate acquisition to proceed.
- Defended and resolved toxic tort suit involving 1300 plaintiffs
- Won summary judgment on behalf of major international oil company involving pollution claims by successor owner of a refinery in East Texas.
- Assisted several companies by performing internal investigations of alleged criminal violations.
- Evaluated and negotiated around environmental risks associated with several $100+ million IPOs involving industrial and pipeline properties (representing issuers and underwriters).
- Obtained risk based closure certificate for large contaminated Houston industrial plant, allowing multi-million dollar asset sale by bankruptcy trustee.
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Online Publications

- *Open Door to LNG Imports Closes Bit as Developers Seek New Sites*
  As seen in the Houston Business Journal, June 25, 2004

McNulty, Thompson and Spector

If one replaces the other, will the third be necessary?

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MCNULTY, THOMPSON AND SPECTOR:

If one replaces the other, will the third be necessary?

I. Introduction

On December 12, 2006, United States Deputy Attorney General Paul McNulty issued the revised United States Department of Justice ("DOJ") guidelines on white-collar prosecutions ("McNulty Memorandum"). The McNulty Memorandum was billed as full relief from the prior guidelines set out in the January 20, 2003, DOJ guidelines issued by Deputy Attorney General Larry D. Thompson ("Thompson Memorandum"). Both the Thompson Memorandum and the McNulty Memorandum dealt with the heavily criticized provisions regarding cooperation, voluntary disclosure of attorney-client and work product protected information and material and payment of attorneys' fees. With the McNulty Memorandum, did anything really change from the practices under the Thompson Memorandum?

Federal prosecutors still retain powerful leverage over corporations in criminal investigations under the McNulty Memorandum. Is the potential power to be wielded by prosecutors under the McNulty Memorandum too much? A lot of people think so. The American Bar Association has spoken out about the potential for misuse of power and the erosion of the attorney-client privilege. The United States Sentencing Commission ("Sentencing Commission") has revised the comments to the Sentencing Guidelines. United States Senator Arlan Spector has introduced legislation that would bar federal prosecutors from requiring companies under criminal investigation to waive the attorney client or the attorney work-product protections. A federal rules reform committee is investigating a proposal to change Federal Rules of Evidence, Rule 502, to embrace and codify the limited waiver concept.

II. Background

A. Principles of Federal Prosecutions

Pre Enron, the DOJ did not have clear guidelines on how to conduct the investigation and prosecution of corporations. Christopher A. Wray and Robert K. Hur, *Corporate Criminal Prosecution in a Post-Enron World: The Thompson Memo in Theory and Practice,* 43 Am. Crim. L. Rev. 1095, 1000-01 (2006). On June 16, 1999, the DOJ issued the memorandum from Eric Holder, Deputy Attorney General, Department of Justice, to Component Heads and United States Attorneys, Bringing Criminal Charges Against Corporations (June 16, 1999) ("Holder Memorandum"). The Holder Memorandum was the genesis of the DOJ's "authority" for using a) requests for privilege waivers; and 2) payment of employees' attorney's fees while companies were under investigation. Holder Memorandum, at VI.A-B.

The Thompson Memorandum replaced the Holder Memorandum on January 20, 2003. Like the Holder Memorandum, the Thompson Memorandum outlined factors that the DOJ prosecutors should consider in determining whether to criminally charge a corporation. Unlike

the Holder Memorandum, however, the Thompson Memorandum nine factors were viewed as mandatory and not discretionary.

The cover memorandum to Thompson Memorandum set out the principles of Federal prosecution of business organizations that will "enhance [DOJ] efforts against corporate fraud." Thompson Memorandum, at 1.

> The main focus of the [Thompson Memorandum] is increased emphasis on and scrutiny of the authenticity of a corporation's cooperation. Too often business organizations, while purporting to cooperate with a Department investigation, in fact take steps to impede the quick and effective exposure of the complete scope of wrongdoing under investigation. The [Thompson Memorandum] make clear that such conduct should weigh in favor of corporate prosecution. The [Thompson Memorandum] also address the efficacy of the corporate governance mechanisms in place within a corporation, to ensure that these measures are truly effective rather than mere paper programs.

Id. The "steps to impede the quick and effective exposure of the complete scope of wrongdoing under investigation," according to the DOJ, included the payment of attorneys' fees for officers, directors, and employees, all of whom may be entitled to such a benefit under corporate by-laws and/or state law.

Under the McNulty Memorandum, prosecuting corporate crime remains "a high priority for the Department of Justice. By investigating wrongdoing and brining charges for criminal conduct, the Department plays an important role in protecting investors and ensuring public confidence in business entities and in the investment markets in which those entities participate." McNulty Memorandum, at 1. The McNulty Memorandum also explicitly sets out the DOJ's belief that the DOJ should not treat corporations any more leniently or more harshly because of a corporation's artificial nature. "Indicting corporations for wrongdoing enables the government to address and be a force for positive change of corporate culture, alter corporate behavior, and prevent, discover, and punish white collar crime." *Id.* at 2. Under the McNulty Memorandum, the principles set out in the Thompson Memorandum remain, albeit with minor (and some would say significant) changes. The decision on whether or not to charge a corporation with a crime can take into account the extent of the corporation's cooperation, *i.e.* the corporation's "timely and voluntary disclosure of wrongdoing and its cooperation with the government's investigation *may be relevant factors*." *Id.* at 7 (emphasis added).

B. The Thompson Memorandum

The Thompson Memorandum reiterated the DOJ policy regarding the prosecutions of business entities. The Thompson Memorandum was heavily criticized by the private bar and the business community because of its perceived over-reaching. Initially, the criticism of the Thompson Memorandum was aimed at the factors considered by the DOJ in whether a business entity should be charged, and, even more specifically at Section II. 4. That Section provided, in part:

> In conducting an investigation, determining whether to bring charges, and negotiating plea agreements, prosecutors should consider the following factors in reaching a decision as the proper treatment of a corporate target:
>
> . . .
>
> 4. the corporation's timely and voluntary disclosure of wrongdoing and its willingness to cooperate in the investigation of its agents, including, if necessary the waiver of corporate attorney-client and work product protection . . ..

Thompson Memorandum, at 3.

In effect, the Thompson Memorandum reinforced the concept that those organizations that the government believed had not fully cooperated with the DOJ's investigation, would be more likely to be prosecuted and to face potentially catastrophic criminal penalties. In evaluating an organization's cooperation, the Thompson Memorandum instructed prosecutors to consider several factors. These included: 1) whether the company agreed to waive its protections under the attorney-client privilege and the work product doctrine for internal investigation materials such as otherwise protected interview notes and memoranda; and 2) whether the company was paying attorneys' fees or indemnifying its "culpable employees." *See* Thompson Memorandum, at 6-8. It was ultimately this last factor that prompted Judge Lewis A. Kaplan of the Southern District of New York to hold the prosecution's use of the Thompson Memorandum to be unconstitutional. *United States v. Stein,* 435 F. Supp. 2d 330, 336 (S.D.N.Y. 2006) ("*Stein*").

C. Criticism of the Thompson Memorandum

The Thompson Memorandum was heavily criticized and the criticism came not only from the defense bar. The criticism came from a broad and diverse constituency which included former senior DOJ officials, the United States Chamber of Commerce, the American Bar Association, the American Civil Liberties Union, the National Associate of Manufacturers and the Retail Industry Leaders Association.

Prosecutors largely ignored this criticism despite the fact that, for example, in refusing to waive attorney-client privilege, organizations were merely availing themselves of a right that has existed in the common law for more than 400 years. It is beyond reproach that the attorney-client communication privilege is absolutely essential to the proper functioning of our system of justice; and that once it is waived in favor of the government it is then waived for all purposes, including the attendant class action, toxic tort, and other civil litigation that very often follows. Such a waiver unfairly and needlessly exposes innocent parties, such as the shareholders of a company, to serious financial harm for which they are not culpable. Moreover, in paying or indemnifying employees for attorneys' fees, companies are often merely complying with their perfectly valid legal obligations under state corporate law, the corporation bylaws, or an employee's employment agreement. Thus, the Thompson Memorandum created what has been characterized as a DOJ culture where prosecutors routinely demanded waiver of privilege and work product as evidence of an organization's cooperation with an investigation.

The National Law Journal reported in its January 22, 2007, issue that a survey by the Association of Corporate Counsel found that seventy-five percent (75%) of outside and inside

counsel said that government agencies expect a company under investigation to waive privileges; and that in the past five (5) years, fifty-one percent (51%) of outside counsel and thirty percent (30%) of inside counsel reported that the government expected waivers in order for the organization to be entitled to leniency. Experienced environmental crimes defense lawyers around the country consistently report, on an anecdotal basis, that waiver of privilege is an issue in almost every environmental crimes investigation.

In addition to the fire storm of criticism of these policies, several other developments put the final nails in the Thompson Memorandum coffin and may have motivated the DOJ to issue the McNulty Memorandum.

1. The Sentencing Commission

The Sentencing Commission, after considering concerns voiced by the defense bar, and after accepting testimony in March 2006, voted unanimously in April 2006 to remove language from the Sentencing Guidelines commentary that could be read to provide cooperation "credit" to an organization for waiving privilege. The Sentencing Commission amendment deleted the following guidance from Sentencing Guideline Section 8C2.5, App. N. 12: "[w]aiver of attorney-client privilege and of work product protections is not a prerequisite to a reduction in culpability score. . . unless such waiver is necessary in order to provide timely and thorough disclosure of all pertinent information known to the organization." *See* USSG § 8C2.5(g), comment (n.12).

2. *Stein*

Stein involved KPMG's long-standing practice of advancing legal fees to its partners and employees in the defense of any civil or criminal case. On August 29, 2005, KPMG signed a deferred prosecution agreement in which KPMG admitted that it provided fraudulent tax advice, that it would pay a $456,000,000.00 fine, and agree to comply with the government's "cooperation" terms. One of the supposed terms was that "the government would take into account KPMG's legal obligations, if any, to advance legal expenses, but referred specifically to the Thompson Memorandum as a point that had to be considered." *Stein*, at 341-44. As a result of the "cooperation" terms, KPMG cut off the advancement of fees. After hearing evidence, Judge Kaplan held that the Thompson Memorandum unconstitutionally interfered with the defendants' right to counsel of choice because it "discourages and, as a practical matter, often prevents companies from providing employees and former employees with the financial means to exercise their constitutional rights to defend themselves." *Id.* at 357.

3. Congress

On September 12, 2006, the Senate Judiciary Committee held a hearing concerning "The Thompson Memorandum's Effect on the Right to Counsel in Corporate Investigations." Senator Arlen Spector (R-PA) then introduced a bill, the Attorney-Client Privilege Protection Act of 2006. ATTORNEY-CLIENT PRIVILEGE PROTECTION ACT OF 2006, S.30, 109th Cong. (2nd Sess. 2006). The bill proposes to prohibit federal prosecutors and civil enforcement counsel from seeking waivers of the attorney-client privilege and from considering a company's advancement of attorney fees in making charging decisions. The 109th Congress did not take any action on the bill, but it has been re-introduced in the 110th Congress.

III. The McNulty Memorandum

Apparently in response to these assaults on the Thompson Memorandum, the DOJ reconsidered its policies. The McNulty Memorandum appears to be a strategic response by the DOJ to the fire storm of criticism and appears to be a tactical retreat by the DOJ in the face of the broad push-back/criticism against the DOJ's attack on attorney-client privilege, attorney work-product, and the legitimate payment of employees' attorneys' fees. The retreat is a retreat only as far as is absolutely necessary in the eyes of DOJ and the retreat is being implemented on the DOJ's own terms. The McNulty Memorandum reinforces the DOJ policy of using a company's decisions to avail itself of the well-established and fundamental protections of attorney-client privilege and work product protection as a basis for a decision to prosecute the company criminally.

A. What Does It Do

The McNulty Memorandum preserves the nine factors set out in the Thompson Memorandum that prosecutors are obligated to consider when determining whether to charge a corporation. McNulty Memorandum, at 4. The McNulty Memorandum does, however, recraft the provisions addressing the advancement of fees and privilege waiver. In practice, however, there may not be much change as the real change only adds a layer of approval within the process.

1. Advancement of Fees

The most positive component of the McNulty Memorandum, as compared to the Thompson Memorandum, is that the McNulty Memorandum instructs prosecutors that, except in very limited circumstances, they cannot consider an organization's payment of employees' attorneys' fees when evaluating a company's cooperation with a government investigation. However, under the McNulty Memorandum, the prosecutor can take into account whether the corporation is protecting its culpable agents and employees. If the corporation retains the employees without sanctioning them or if they enter into a joint defense agreement, the government can consider this information in determining how much the corporation is cooperating with the investigation. McNulty Memorandum, at 11.

Unlike the Thompson Memorandum, however, under the McNulty Memorandum, prosecutors "generally should not take into account" whether the corporation is advancing legal fees to its employees or agents under investigation. *Id.* Many state corporation statutes give corporations the power to indemnify corporate officers and employees under investigation, many corporations contain such agreements in employee contracts and also in their charters and by-laws. The McNulty Memorandum makes clear that compliance with governing state law and contractual obligations "cannot be considered failure to cooperate." *Id.* However, the McNulty Memorandum also makes it clear that it can take into account the advancement of attorneys' fees in "extremely rare cases" when doing so "was intended to impede a criminal investigation." *Id.* If this is the case, prosecutors must seek approval from the Deputy Attorney General to consider this factor in making a charging decision. *Id.*

2. Privilege Waiver

The McNulty Memorandum makes it clear that the waiver of the attorney-client privilege and the work-product exemption is not necessarily a prerequisite for cooperation. McNulty Memorandum, at 8. Under the McNulty Memorandum, prosecutors can only request the corporation waive its attorney-client privilege and its work-product exemption "when there is a legitimate need for the privileged information to fulfill their law enforcement obligations." McNulty Memorandum, at 8. Merely because it is "desirable or convenient to obtain privileged information" will not suffice. *Id.* at 8-9. To establish need, the government must balance the policy behind the privileges with the government's need to enforce its laws. Under the McNulty Memorandum:

> Whether there is a legitimate need depends upon:
>
> (1) the likelihood and degree to which the privileged information will benefit the government's investigation;
>
> (2) whether the information sought can be obtained in a timely and complete fashion by using alternative means that do not require a waiver;
>
> (3) the completeness of the voluntary disclosure already provided; and
>
> (4) the collateral consequences to a corporation of a waiver.

Id. at 9. Prosecutors are directed to seek "the least intrusive waiver necessary to conduct a complete and thorough investigation." *Id.* Prosecutors are directed to take a "step-by-step approach to requesting information." *Id.*

a. Levels of Waiver

The McNulty Memorandum creates two categories of information that the government can request from the corporation under investigation based on the government's need; Category I and Category II information.

Category I information includes "purely factual information." *Id.* The information in this category "may or may not be privileged." *Id.* As the McNulty Memorandum sets out, [e]xamples of Category I information could include, without limitation, copies of key documents, witness statements, or purely factual interview memoranda regarding the underlying misconduct, organization charts created by company counsel, factual chronologies, factual summaries, or reports (or portions thereof) containing investigative facts documented by counsel." *Id.* Regardless of how the government describes it, and although this information may be factual, any presentation of this information will undoubtedly contain the attorney's mental impressions simply by how it is organized, prioritized and presented. The biggest change from the Thompson Memorandum era is that before requesting Category I information, the prosecutor "must obtain written authorization from the United States Attorney who must provide a copy of the request to, and consult with, the Assistant Attorney General for the Criminal Division before granting or denying the request." *Id.* The corporation's response to a Category I waiver request

"may be considered in determining whether a corporation has cooperated in the government's investigation." *Id.*

If Category I information does not provide the government with what it needs to "conduct a thorough investigation," then prosecutors can request Category II information. *Id.* at 10. Category II information is "attorney-client communications or non-factual attorney work-product." *Id.* Category II information by definition would then include attorney notes, reports or memoranda containing mental impressions and conclusions, legal determinations reached based on an internal investigation, or legal advice given before, during, and after the underlying misconduct occurred. If the prosecutor should, in the "rare circumstances," seek Category II information, the United States Attorney must get written authorization from the Deputy Attorney General. *Id.* The waiver request must set forth the government's legitimate need for the information and identify the scope of the waiver it seeks. If the corporation does not waive Category II information, prosecutors "must not consider this declination against the corporation in making a charging decision." However, prosecutors "may always favorably consider" a waiver of Category II information in determining if the corporation has cooperated with the government. *Id.*

b. Voluntary Waivers

Prosecutors do not need authorization if the corporation voluntarily provides privileged documents. *Id.* at 11. The only McNulty Memorandum requirement regarding "voluntary waivers" is that the must be reported to either the United States Attorney or the Assistant Attorney General in the appropriate division. *Id.* In fact, it is the opinion of some that the McNulty Memorandum provides an incentive for a prosecutor to pursue an implicit "don't ask, don't tell" policy. That is, if you are a prosecutor, you do not explicitly seek a privilege waiver; therefore, you will not have to seek written permission from your superiors. Instead, a prosecutor may use a more discrete way to put the waiver issue in play. For example, a prosecutor may simply inquire of a defense lawyer whether his or her client intends to provide the results of counsel's internal investigation as part of the company's efforts to cooperate. As a practical matter, this is the way it often occurred in the Thompson era.

B. What It Does Not Do

First, the McNulty Memorandum is only a statement of DOJ policy. It does not afford the protection of statutory law (like Senator Specter's Bill) or decisional law (like *Stein*). The McNulty Memorandum is not enforceable at law, and there is no real remedy should prosecutors choose to ignore them. The United States Attorney's Manual states that the Department guidance "[i]s not intended to, does not, and may not be relied upon to create any rights, substantive or procedural, enforceable at law by any party in any matter civil or criminal." USAM § 1-1.100. Though the DOJ Office of Professional Responsibility could investigate a complaint lodged against a prosecutor, the McNulty Memorandum itself provides no mechanism for punishing those who fail to follow its guidelines.

Second, while the McNulty Memorandum provides that prosecutors "generally should not take into account" whether the corporation is advancing legal fees to its employees or agents under investigation and that complying with state law and contractual obligations "cannot be considered failure to cooperate" such consideration is still permitted. McNulty Memorandum, at

11. The McNulty Memorandum does permit consideration of the payment of fees in the "rare" case when a company appears to be using fees to "circle the wagons." This broad, general language is problematic, even for a policy statement. These were the words used by a lead prosecutor in the *Stein* case to justify the conduct which the court found unconstitutional. *Stein,* at 363. What does "generally should not take into account" mean? Does that mean it can take the advancement of legal fees into account in some circumstances? If so, what are those circumstances? Under the McNulty Memorandum, is the DOJ the sole judge of when, and whether, a company that has paid attorneys' fees has done so to obstruct an investigation?

Third, the McNulty Memorandum also still allows the government to base charging decisions on a corporation's decision to waive attorney-client and work-product privileges. Even though the corporation is only producing "purely factual information" by providing Category I information, providing the government with this information constitutes a waiver. Under the McNulty Memorandum, the process by which such waivers are sought is now intended to be more regularized and formalized. It remains to be seen how rigorous that review and approval process will be in practice. This is the most problematic issue with the McNulty Memorandum because it does nothing to change the Thompson Memorandum in this regard. There is also a troubling lack of clarity in the definition of Category I versus Category II information. How does one determine what is "purely factual" information from what would reveal the mental impressions of an attorney? It is certainly no easy task. Indeed, in the seminal case on work product, the United States Supreme Court noted that an attorney's interview notes show what facts the attorney deemed important enough to record and in what order and thereby reveal much into that attorney's thinking about the case. *See Hickman v. Taylor*, 329 U.S. 495 (1947). In short, the very concept of a "purely factual memorandum" may be a misnomer because it will virtually always reveal the mental impressions of its author.

As to the new approval process, to the extent that there really is an approval process (as opposed to a rubber stamp), it appears on the face of the McNulty Memorandum that prosecutors can easily satisfy the requirements for obtaining Category 1 information. As a practical matter, obtaining the United States Attorney's approval may not be a meaningful protection for a corporation because United States Attorneys inevitably back their Assistants. Further, the McNulty Memorandum only requires the United States Attorney to "consult" with the Assistant Attorney General of the Division. What does that mean? It does not appear on the face of the McNulty Memorandum that this offers corporations any meaningful protection.

Despite the McNulty Memorandum's characterization of Category I materials as "purely factual information" related to the alleged misconduct, this may not really be the case. For example, interview memoranda are typically core work product as they reflect the mental impressions and judgment of counsel. The threat of disclosure of this type of exempt work product information has an adverse effect on the proper functioning of our judicial system. It will have a potential chilling effect on witnesses and on lawyers conducting internal investigations as counsel may not explore certain areas or at least not a deeply. Alternatively, counsel may not reduce to writing particularly sensitive material for fear it may ultimately be disclosed to the government. Even if counsel does detail the sensitive information, counsel may be tempted do so in more cryptic, handwritten notes, rather than a typed interview memorandum. All of these will impede a corporation's ability to do a candid and complete internal investigation.

As a comfort, the McNulty Memorandum directs that "Category II information should only be sought in rare circumstances." McNulty Memorandum, at 10. Category II information is at the heart of the attorney-client privilege and the attorney work-product exemption. Disclosure of Category II information will undoubtedly chill communications between an attorney and the client. It can also serve as a huge disincentive for the corporation to engage in its own investigative fact-finding mission. Nonetheless, the McNulty Memorandum provides an exception that could threaten to swallow the rule. Companies that "voluntarily" waive privilege are not subject to the approval process. Voluntary waivers are favored by the DOJ. Could informal signals from a prosecutor induce a "voluntary" waiver without the initiation of the formal approval process?

The impact of the McNulty Memorandum is difficult to gauge in the short term. The McNulty Memorandum provides that it was never the intention of the Department to discourage "full and candid communications between corporate employees and legal counsel." McNulty Memorandum, at Intro. On the other hand, the DOJ appears to categorize the criticisms of the Thompson Memorandum as criticisms of perception advising prosecutors that they "should be mindful that confidence in the Department is affected both by the results we achieve and by the real and *perceived* ways in which we achieve them." *Id.* As Deputy Attorney General Paul J. McNulty stated in prepared remarks: "As an initial matter, let me point out that the Thompson Memorandum was not intended to encourage practices that chill attorney-client communications, as is currently *perceived* by some. The revised guidance addresses that concern . . .. I disagree that there is such a culture but to the extent that the *perception* exists, this new memorandum and the new practices it requires thoroughly address the issue." *See* Deputy Attorney General Paul J. McNulty, Prepared Remarks of Deputy Attorney General Paul J. McNulty at the Meeting of the Lawyers for Civil Justice Membership Conference Regarding the Department's Charging Guidelines in Corporate Fraud Prosecutions (Dec. 12, 2006) (available at http://www.lettermark.net/postschell/lhead/businesslaw.Litigation.map) (emphasis added).

IV. What Others are Saying

Cynical views that the McNulty Memorandum will not bring about any substantial change are prevalent, but certainly not universal. According to a former Assistant United States Attorney who spent twelve years with the Los Angeles United States Attorneys Office prosecuting white collar and securities fraud cases, the McNulty Memorandum "is likely to substantially curtail waiver requests from line prosecutors." David Z. Seide, *Department of Justice McNulty Memo Curtails Controversial Portions of Thompson Memo–Legislation Introduced in the Senate*, December 13, 2006. (Available at http://www.wilmerhale.com/publications/whPubsDetail.aspx?publication=3507). Requiring prosecutors to run waiver requests up the flagpole will be a time-consuming process. These requests will require prosecutors to write lengthy memoranda and will involve significant internal review. "This hurdle provides a sensible check on local prosecutorial discretion while assuring nationwide consistency in the application of waiver demands." *Id.*

According to one commentator, the McNulty Memorandum was a missed opportunity for the DOJ to reconsider its policies on prosecuting business organizations. *See* William M. Sullivan, Jr., *The McNulty Memorandum: New DOJ Policies On Attorney-Client Privilege and Attorney Work Product Protections*, The Metropolitan Corporate Counsel, February 2007, at 34. (http://www.metrocorpcounsel.com/current.php?artType=view&artMonth=February&artYear=2

007&EntryNo=6208). Because it is much easier to investigate individuals in the organization that are guilty of misconduct, considering the prevalent use of corporate control mechanisms and the paper trail left by e-mail, it makes less and less sense to prosecute businesses and hold the entire organization accountable for the misdeeds of a few identifiable bad apples. Such prosecutions hold innocent shareholders, directors, officers, and other employees responsible for acts that they did not commit or even know about. Since the purpose of criminal prosecution is to punish those individuals responsible for committing crimes, "criminal prosecution of business organizations should be an exceedingly rare undertaking." *Id.*

A. The American Bar Association

On December 12, 2006, ABA President Karen J. Mathis issued a statement addressing the McNulty Memorandum. *See* www.abanet.org/abanet/media/statement/statement.cfm ?releaseid=59. In the statement, Ms. Mathis stated that the guidelines "fall far short of what is needed to prevent full erosion of fundamental attorney-client privilege, work product, and employee protections during government investigations." The memorandum does not eliminate waiver requests, but merely requires that prosecutors get approval from higher levels of the DOJ in order to make the requests. "As such, the McNulty Memorandum threatens to further erode the ability of corporate leaders to seek and obtain the legal guidance they need to effectively comply with the law." Ms. Mathis urged Congress to pass Senator Specter's bill in order to protect the privileges and prevent the government from seeking these waivers.

B. Federal Legislation

On January 4, 2007, Senator Specter introduced the Attorney-Client Privilege Act of 2007 ("Act"), presumably in response to the McNulty Memorandum. The purpose of the Act is "to place on each agency clear and practical limits designed to preserve the attorney-client privilege and work product protections available to an organization and preserve the constitutional rights and other legal protections available to employees of such an organization." Act, at § 2(b). The Act applies to "any Federal investigation or criminal or civil enforcement matter." Act, at § 3(b). It covers "any agent or attorney of the United States." *Id.* The Act prohibits federal officials from conditioning treatment of an organization based on a waiver. Act, at § 3(b)(1). The Act also provides that federal officials cannot decide whether or not to charge an organization or its employee if the organization: (1) asserts the attorney-client and/or work-product privileges; (2) provides counsel to or contributes to the legal fees of an employee; (3) enters into a joint-defense, information sharing, or common interest agreement with an employee if the organization and the employee have a common interest in defending themselves; (4) shares information that is relevant to the investigation or enforcement matter with an employee; or (5) fails to terminate or sanction an employee based on his decision to exercise his constitutional rights or other legal protections. Act, at § 3(b)(2).

C. Federal Rules of Evidence

The Advisory Committee on Evidence Rules in proposed Rule 502 considered including a "selective waiver" provision and sought public comment on its merits. The proposed Rule 502(c) released for public comment provided that a disclosure to a federal regulator does not operate as a waiver in favor of non-governmental persons or entities. *See* Memorandum from Honorable Jerry E. Smith to Honorable David F. Levi (May 15, 2007) (available at

http://www.uscourts.gov/rules/Reports/EV05-2007.pdf). In April, 2007, however, the Judicial Conference Advisory Committee voted to reject selective waiver protections under the propsed Rule 502(c). *See* National Law Journal, Federal Court Review, Monday May 14, 2007.

V. Practical Suggestions

While the theories are fine, what does one do in the trenches? Why does the government need organizations to waive privilege and work product? Such requests are not just unfair and unjust, they are unnecessary. The government has at is disposal all of the tools necessary to gather the evidence that it legitimately needs. The government has the USEPA Criminal Investigation Division, the FBI, and other agencies. The government has subpoena powers and grand jury investigations. The government has the power to compel testimony (not just attendance of witnesses) through compulsion and immunity orders. In other words, the deck is already stacked in the government's favor. So why does the government do it? Our government does it that way probably to save time and effort on its part. Keep in mind, there are other ways to cooperate with the government without waiving privilege; however, understand that waiver is always a possibility.

As a first step, review the rules concerning privilege and exemptions. The attorney-client communication privilege protects all confidential communications between an attorney and his/her client for the purpose of obtaining legal advice. It does not apply to facts. The attorney work product exemption protects documents prepared in anticipation of litigation. There are two types of work-product: opinion work product and factual work-product. If an investigation is being undertaken, make sure that everyone involved knows and understands the privileges and exemptions and the difference in the waiver of each. This includes and experts that you may retain to assist you.

As a second step, no matter what overarching strategy is employed for the investigation, assume that all documents and communications will be disclosed. The investigation should be done only by retained outside counsel and the purpose of the investigation and the authority for undertaking it should be clearly set out in an engagement letter. Every step should be documented especially every method utilized to ensure the confidentiality of the investigation. This includes how draft investigatory documents are treated, especially their destruction. This includes the "Upjohn Warnings" prior to conducting employee interviews. *United States v. Upjohn*, 449 U.S. 383 (1981). One example of the Upjohn Warning is as follows: "We represent the company. We do not represent you. Anything we discuss is privileged, but it is not your privilege, it belongs to the Company. The Company may decide to waive that privilege, by, for example, cooperating with the government's investigation. Whatever the Company decides, it is the Company's call. Neither you nor I have the authority to discuss the contents of this interview." Because of the assumption of disclosure, it will be beneficial to undertake the discussion about waiver a key issue up front. If possible, make that decision at the outset of the investigation. If the decision is made that waiver is the best way to go, the investigation can be structured with waiver in mind. The key is to position the corporate entity to do the right thing and obtain whatever cooperation credit available. There is a downside to determining waiver up front. First, the waiver is complete. The facts disclosed to the government are now available to the plaintiffs' bar. Second, the waiver of privilege may be determined to be a complete waiver so that disclosure of some facts may destroy protections as to all facts, a so-called subject matter waiver. This may also lead to a waiver of analytical work product.

Third, separate fact gathering from analysis. One firm may be tasked with gathering the facts, another firm with providing the analysis of those facts. Waiver of the first will not be a waiver of the second. An organization can do this in a number of ways such as separate projects, production of separate work product, conducted by separate lawyers or separate firms. A variation on that is to designate the fact gathering process as unprivileged with the legal analysis based upon those facts. For example, rather than disclose who told you what (a waiver), you tell the government: here is what we learned (i.e. fact x, y and z) and this is who we interviewed to reach our conclusions. That information directs the government to the persons that it needs to interview and is thus extremely helpful to the government, yet at the same time respects the privilege.

Fourth, when you find yourself in the position of having to disclose information to the government, try to do it in steps pursuant to a confidentiality agreement. Use the so-called "puppet show." The "puppet show" is where the law firm undertaking the investigation makes an oral presentation to the government. The law firm can steer the government toward information or inquiries that are the most relevant to the government investigation. This eliminates the paper trail. A company can clearly cooperate without waiving important privileges. The company can make witnesses available and can voluntarily produce documents. In other words, cooperation is not inconsistent with a company's decision not to waive privileges

Finally, there is selective waiver. Relying on selective waiver is a dangerous option. Only two cases were found where selective waiver was recognized. *See Diversified Industries, Inc. v. Meredith*, 572 F.3d 596 (8th Cir. 1988) and *In Re Cardinal Health Inc. Securities Litigation*, No. C2 04 575 ALM, 2005 WL 495150 (S.D.N.Y. Jan. 26, 2007). Most courts do not recognize selective waiver.

VI. Conclusion

It may be too early to gauge the impact of the McNulty Memorandum. Although the DOJ takes the position that the McNulty Memorandum addresses the real and perceived issues with the Thompson Memorandum, many in the defense bar maintain that their concerns have not been addressed. At this early stage, it will be difficult to determine whether the new internal controls will create a more deliberative process that will prevent the willy-nilly waiver of an ancient privilege and a sacrosanct constitutional protection, or if they will simply create an organizational rubber stamp, unlikely to impede the progress of an overly zealous prosecutor. Only time will tell.

On May 14, 2007, Deputy Attorney General Paul McNulty announced his resignation. Mr. McNulty announced that he would remain at the DOJ until this fall or until the United States Senate approves his successor.

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Walter D. James III focuses his practice primarily on environmental counseling and environmental litigation, which includes civil and criminal enforcement, cost recovery litigation and toxic tort/property damage matters. Mr. James has extensive experience in counseling clients in remediation matters nationally, both at federal and various state sites, including Voluntary Cleanup Programs. His environmental litigation experience also covers administrative proceedings under various federal environmental statutes. His civil litigation experience includes defending and prosecuting cost recovery litigation under both state and federal law, in both state and federal court, and defending citizen suits. Mr. James has served as common counsel and coordinating counsel for several defense groups and potentially responsible party groups. Mr. James has also counseled and defended clients faced with environmental criminal enforcement, from the grand jury stage through trial and appeal. His experience includes the defense through trial and appeal of multiple defendants under a multi-count indictment alleging felony allegations under the Resource Conservation and Recovery Act ("RCRA"), the Clean Water Act ("CWA"), the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA" or "Superfund") and the Marine Protection Research and Sanctuaries Act (more commonly called the "Ocean Dumping Act"). He also has an extensive practice in the defense of toxic tort matters relating to chemical exposure and related property damage claims as well as the prosecution and defense of property damage claims. Mr. James has also successfully defended clients in product liability and catastrophic injury litigation.

Representative Cases:

Cost recovery:

Anglo Metal, Inc. v. TRW Automotive Products, Inc., et al., Civil Action No. B-99-141, In the United States District Court for the Southern District of Texas, Brownsville Division.

Texas Industries, Inc. v. City of Dallas, Cause No. 95-12561-H, In the 160th Judicial District Court of Dallas County, Texas.

Heath and Company, v. General Battery Corporation, Civil Action No. 3:93- CV0581-D, In the United States District Court for the Northern District of Texas, Dallas Division.

NL Industries, Inc. v. Allied-Signal, Inc., et al., Civil Action No. CA3-9-2623-R, In the United States District Court for the Northern District of Texas, Dallas Division.

United States v. Marvin Pesses, et al., Civil Action No. 90-0654, In the United States District Court for the Western District of Pennsylvania.
McRae Newell Company, Inc. and Phillip J. McRae v. Exide Corporation; Cause No. DV-98-04564-D in the 95th Judicial District Court of Dallas County, Texas.

Clear Lake Properties v. Rockwell International Corporation, et al., Civil Action No. G-95-288, In the United States District Court for the Southern District of Texas, Galveston Division.

San Diego Unified Port District v. Bay City Marine, Inc. et al., Civil Action No.950355B, In the United States District Court for the Southern District of California

Environmental Crimes:

United States v. Odfjell Westfall Larsen, CR-87-220, In the Southern District of Texas, Houston Division (Thirty seven county indictment under the Marine Protection, Research and Sanctuaries Act, the Clean water Act, the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation and Liability Act).

United States v. Baytank, 934 F.2d 599 (5th Cir. 1991).

Toxic Tort:

Larry Lee Martin, et al. v. Commercial Metals Company, et al., Cause No. 02- 4312-K, In the 192nd Judicial District Court of Dallas County, Texas.

James Clarence ("JC") Morris II, et al. v. Hydro Conduit Corporation, et al., Cause No. DV00-04222-E, In the 101st Judicial District Court of Dallas County, Texas.

Trena McGree, Individually, and as Next Friend of Darius Montreal McGree and Shaquala Antonique McGree, Minors, et al v. Exide Corporation and NL Industries, Inc.; Cause No. DV99-01006-J in the 191st Judicial District Court of Dallas County, Texas.

Linda Patricia Flores-Gonzales, a Femme Sole v. Exide Corporation and NL Industries, Inc.; Cause No. 02-09605 in the 191st Judicial District Court of Dallas County, Texas

Richard Amerson, et al. v. TXU Electric Company, et al., Cause No. 29,433, In the 76th Judicial District of Titus County, Texas.

John Alford, Jr. et al. v. TXU Electric Company, et al., Cause No. 01-275-B, In the 87th Judicial District of Freestone County, Texas.

Robert Abernathy, et al. v. TXU Electric Company, et al., Cause No. 2001-333, In the 4th Judicial District of Rusk County, Texas.

Jose Luis DeLeon, et al. v. Exide Corporation, et al., Cause No. DV98-2669, In the 44th Judicial District Court of Dallas County, Texas.

Earline Jackson, et al. v. Waste Management of North America, Inc., et al., Cause No. 91-04-47,386, in the 40th Judicial District Court of Ellis County, Texas.

In re Lone Star Steel Mill Litigation, Master File No. 1, In the 76th Judicial District Court of Morris County, Texas.

Marquis R. McGee, et al. v. RSR Corporation, et al., Cause No. DV-99-05472-B, In the 44th Judicial District Court of Dallas County, Texas.

Elzina Avalos, et al. v. Atlantic Richfield Company, et al., Civil Action No. H89-3487, In the United States District Court for the Southern District of Texas, Houston Division.

Lester Curette et al. v. Atlantic Richfield Company, et al., Civil Action No. H89-3487-A, In the United States District Court for the Southern District of Texas, Houston Division.

Rose Ann Barrett, et al. v. Atlantic Richfield Company, et al., Civil Action No. H89-3487-C, In the United States District Court for the Southern District of Texas, Houston Division.

Linda Adolph et al. v. Atlantic Richfield Company, et al., Civil Action No. H90- 3657, In the United States District Court for the Southern District of Texas, Houston Division.

Mary Alston et al. v. Atlantic Richfield Company, et al., Civil Action No. 1:90CV626, In the United States District Court for the Eastern District of Texas, Beaumont Division.

Rose Marie Dumes, et al. v. Houston Lighting and Power Company, et al., Civil Action No. C - 90-330, In the United States District Court for the Southern District of Texas, Corpus Christi Division.

Ida Trevino, et al. v. Houston Lighting and Power Company, et al., Cause No. 92-2996-B, In the 117th Judicial District Court of Nueces County, Texas.

Personal Injury:

Tommy Nelson Foster v. Westinghouse Elevator Company, Cause No. 89-00312, In the 157 Judicial District Court of Harris County, Texas.

Tommy Nelson Foster v. Westinghouse Elevator Company, No. C-07-96-322-CV, In the Court of Appeals for the Seventh Judicial District of Texas.

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John Francis Clayborn, Jr. v. Autozone/ Autozone, Inc. v. YUASA-Exide, Inc. and Exide Corporation; Cause No. 97-5167-G in the 319th Judicial District Court of Nueces County, Texas.

Michael Cleaver v. Montgomery Ward & Co., Inc. and Exide Corporation; Cause No. 98-08251 in the 250th Judicial District Court of Travis County, Texas.

Thomas Harper v. Exide Corporation; Cause No. CJ-2000-80 in the District Court of LeFlore County, Oklahoma.

Gloria Trevino and Spouse, Rene Trevino v. Jaime Argelio Camacho and Exide Corporation, Cause No. C-2159-01-C in the 139th Judicial District Court of Hidalgo County, Texas.

Federal Superfund Sites:

RSR Corporation Superfund Site, Dallas, Texas
Sapp Battery Superfund Site, Cottondale, Florida
Interstate Lead Company Superfund Site, Leeds, Alabama,
Malone Service Company Superfund Site, Texas City, Texas
NL/Taracorp Superfund Site, Granite City, Illinois
Poly-Cycle Industries, Inc./Tecula Site, Tecula, Texas
Poly-Cycle Industries, Inc./Jacksonville Site, Jacksonville, Texas
Ramona Park Superfund Site, Utica, Michigan
Ross Metals Company Superfund Site, Rossville, Tennessee
Refined Metals, Inc. Site, Memphis, Tennessee
Refined Metals, Inc. Site, Beach Grove, Illinois

State Remediation Sites:

Anglo Metals, Inc. San Juan East Site, San Juan, Texas (Common Counsel)
Four County Landfill Site, Delong Indiana
Dixie Metals/Heflin Site, Heflin, Louisiana
Jerrel B. Thompson Site, Canton, Texas
JCS Company Site, Canton, Texas
Materials Recovery Enterprises, Inc. Site, Ovallo, Texas (Coordinating Counsel)
Poly-Cycle Industries, Inc./Palmer Site, Palmer, Texas (Coordinating Counsel)
Poly-Cycle Industries, Inc./Tecula Site, Tecula, Texas
Poly-Cycle Industries, Inc./Jacksonville Site, Jacksonville, Texas
Wortham Lead Site, Wortham Texas

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Chairman/Vice-Chairman/Co-editor/Author: American Bar Association's Section of Environment, Energy and Resources Law, Environmental Enforcement and Crimes Committee Newsletter (2001 - present).

Co-Author, *Environmental Crimes and Enforcement Committee 1996 Annual Report*, Natural Resources, Energy and Environmental Law 1996 Year in Review (1996).

Author/Speaker, *The Investigation of Environmental Crimes: How to Prepare, React and Protect Yourself*, Nuts and Bolts of Environmental Law, Houston Bar Association (March 15, 1996).

Co-Author, *Environmental Crimes and Enforcement Committee 1995 Annual Report*, Natural Resources, Energy and Environmental Law 1995 Year in Review (1995).

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Co-Author, Stormwater Discharges: New Regulations and NPDES Permit Requirements -Clean Water Act - Enforcement Mechanisms, Four Seasons, Houston (June 1992).

Co-Author, *Strategies to Protect Yourself and Your Company from Liability*,
Criminal Enforcement of Environmental Laws, Loews Anatole Hotel - Dallas (February, 1992).

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Co-Author, *Lender Liability on Environmental Issues*, 1989 Spring Conference, Texas Banking: Preparing for the '90s (1989).

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Listed in *The Best Lawyers in America* since 1989 and the Chambers USA Guide *America's Leading Business Lawyers* since 2003

First woman to receive the Travis County Bar Association's Distinguished Lawyer Award, 2003

Recognized by *Texas Monthly* and *Law & Politics* as a "Texas Super Lawyer" since 2003, one of the "Top 50 Central and West Texas Super Lawyers," 2003 through 2005, and one of the "Top 50 Female Super Lawyers," 2003 and 2004

Admissions and Affiliations

Board Certified in Administrative Law by the Texas Board of Legal Specialization

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Summary

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Publications, Speeches, and Presentations

Publications

- "Something in the Air," *Texas Lawyer*, December 1999

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- "Administrative Trends in Environmental Litigation," 17th Annual Advanced Administrative Law Course, State Bar of Texas, Austin, September 22 and 23, 2005 (live) and December 8 and 9, 2005 (video)
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and Houston, August 2000

- "Standing," Advanced Administrative Law Course, State Bar of Texas Professional Development, Austin, September 1999

Sustainability in the Developing World

By David Rothbard with Duggan Flanakin

David Rothbard is president of the Committee For A Constructive Tomorrow (CFACT), a Washington, D.C.-based public-interest organization he co-founded in 1985 that addresses issues of environment and development.

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Sustainability in the Developing World

By David Rothbard with Duggan Flanakin

This paper will argue that sustainable development in the developing world can be seen as just about any locally agreed upon development that creates wealth for the poor to help meet present-day needs without sacrificing opportunities for long-term prosperity at all levels. This means that people whose livelihoods currently fall below sustainability levels must not be subjected to superimposed requirements that stifle wealth creation or prevent them from participating in the creation of wealth from resources on their lands.

Sustainable development in poor nations therefore does not include projects that use up the resources of poor nations but whose primary purpose is to benefit or assuage the guilt of first-world people – for instance, projects that generate small quantities of energy for the poor but sizable pollution offsets for the rich. Nor does it include the sequestering of local resources so as to prevent their use and development for purposes of wealth creation. Justice demands that the poor have an opportunity to utilize their own resources to generate wealth for their families.

Introduction

When Craig Rucker and I founded the Committee For A Constructive Tomorrow (CFACT) back in 1985, we had little idea that 22 years later we would be in the middle of the fight for economic freedom for the world's poor. For years, in speeches, articles, and on our daily radio commentary, "Just the Facts," we have argued for positive approaches to solving environmental problems through technology and human ingenuity – and that people are the earth's greatest resource.

Our work soon took us around the world – to environmental summits and world trade conferences in places like Kyoto, Buenos Aires, Istanbul, Cairo, Marrakesh, and Bonn – where we listened to and occasionally confronted the movers and shakers who sought to dictate policy to the rest of the world. In September 2003, while attending the World Trade Organization meeting in Cancun, we were presented with a challenge that ultimately changed the nature of our work and mission and in the process changed our very lives.

That challenge was a simple one – we joined a coalition of organizations in a project to get to know the people of Cancun who worked in the luxury hotels at which the WTO congregants were staying. Our mission led us far outside our comfort zone to the village of Valle Verde, home to one of many enclaves of newcomers to Mexico's Yucatan boomtown who by day work in the hotels or on construction crews in the city, and by night live in handmade huts without paved streets, running water, flush toilets, or even electricity.

Cancun, we had learned, had grown from a sleepy town of 25,000 in 1980 to a metro area of nearly a million people in just 25 years, far outpacing the ability of the Mexican government

to provide ordinary human services. Most of these new residents had migrated from interior Mexico or even Central American countries to find work and make new lives for themselves in a city far away from their extended families.

We handed out two tons of food to the wonderful people of Valle Verde who scratched their heads at the environmentalist groups who complained because some of the corn products were genetically modified. We also learned that all of these people had dreams and hope for their children's future – and that they knew quite well what their families needed and were willing to work hard, start their own businesses, and build their own community – and to work to change their own laws to make a better future more accessible.

Suddenly it hit us – that poor people around the world know what they need and are grateful for outsiders who will treat them as equals and work side by side with them as partners. These partners must also be advocates who will encourage them to speak for themselves – to share their dreams for development and freedom and a future for their families – and then stand with them to shield them from reprisals and ensure that their voices are heard. Such partners also deserve to share in the wealth they help to create – and not, as has all too often been the case, to profit at the expense of their "friends" in the developing world.

So we went back to Washington and began totally revamping our organization, starting with our mission statement. We realized that all of our hard work for the environment meant little to people living at or near subsistence levels. Our top priority soon became developing and pursuing strategies to increase the likelihood that people in even the poorest nations may attain to a sustainable livelihood, with access to food, water, energy and other essential human services.

Sustainable Development Must Meet Needs

As we developed our new template, we reviewed the work of the World Commission on Environment and Development, which in its 1987 report, "Our Common Future," defined "sustainable development " as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs."

The Commission also identified four elements of sustainability – environmental, economic, social, and political – and sought ...

> *to recommend ways concern for the environment may be translated into greater co-operation among developing countries and between countries at different stages of economical and social development and lead to the achievement of common and mutually supportive objectives that take account of the interrelationships between people, resources, environment and development.*

In her Foreword to "Our Common Future," then-Chairman Gro Harlem Brundtland, who later became Director General of the World Health Organization, acknowledged that, "Poverty is not only an evil in itself, but sustainable development **requires** meeting the basic needs of all

and extending to all the opportunity to fulfill their aspirations for a better life."

Chairman Brundtland went on to state that, "A world in which poverty is endemic will always be prone to ecological and other catastrophe." In her view, "Meeting essential needs requires not only **a new era of economic growth** for nations in which the majority are poor, but an assurance that those poor get their fair share of the resources required to sustain that growth."

We thus realized that we, too, were advocates of true sustainable development – that is, our mission in the developing world is to encourage and assist people and their governments to take the steps necessary to transform their stagnant, dependent societies into forward-looking, prosperous communities so that they will have the resources at hand to address environmental and human health concerns over the long term.

We are confident that, once today's poor have created "sustainable" societies – once their children have a decent chance of living to adulthood, getting an education, and earning a living for themselves and their families -- they will have the energy and wisdom to properly care for their environment.

The Vision from Valle Verde

Our friends in Valle Verde already understand what they need to be able to do to improve their health and their environment. They strongly desire to have running water, proper sanitation, and other environmental essentials – they just lack the means to secure those blessings for themselves at the time.

My colleague Duggan Flanakin and I returned to Valle Verde in summer 2005 to find that the village had already gotten electric power along with a rudimentary elementary school building. We brought them solar ovens, which proved to be very useful after the village was hit hard by a hurricane that fall, and we worked on plans to help villagers start small businesses to provide services to their neighbors.

We also met with government, business and university leaders in the city to discuss the needs of the village, and laid out a plan for creating an umbrella group to assist budding entrepreneurs in business management. As we prepared to leave the village once again, our friend Francisco Mendez Olan, president of the village committee, expressed his joy that Valle Verde had provided us with a model for our new approach to sustainable development and hoped that his community could help even more, noting that there are many people around the world whose lot in life is far worse than their own.

We came back from Cancun two years ago with a renewed commitment to sharing our new vision for the developing world – one in which communities of affluence help emerging communities in poor nations, one village at a time. This vision involves building partnerships in which people with resources and influence make themselves available to people in poor communities who need help in creating wealth and building a sustainable future.

We already knew that all across the developing world, there are faith-based and other grassroots missions which have built strong relationships with local villagers but which typically have had a narrow focus – digging wells, starting schools, providing medical care, and maybe even helping villagers obtain micro-financing.

We also knew that entrepreneurs around the world are always looking for new ways to create wealth – and that wealth creation is at the very least the secret dream of many villagers who are being served in some way by these various missions. Similarly, there are educators eager to teach, builders of infrastructure looking for new construction projects, and so on. What is typically lacking is an integrated vision for real growth that allows for both personal and corporate endeavors – or any entity capable of soliciting the various kinds of expertise needed to foster growth and wealth creation at the village level.

Sustainable Development Must Be Indigenous

Now, most of these resources are readily available to would-be entrepreneurs and community leaders in the U.S., where thousands of Horatio Algers started with little or nothing and created either great wealth or great works that benefitted many people. In many nations, however, the obstacles to the creation of either personal or public wealth are almost impossible to overcome without outside help – and all too often that outside help has been part of the problem.

For example, just before our visit to Valle Verde in 2005, new attention was focused on poverty in Africa by the G8 summit at Gleneagles and the Live 8 concerts held worldwide. It is widely known that half a trillion dollars in aid to sub-Saharan Africa has to date lifted only a very select few of the citizens of these former colonial lands out of abject poverty. At Gleneagles, the G8 nations pledged another $60 billion, but Bono said the commitment, which included little new money, was little more than "Euro-babble" that masked broken promises.

Two years later, the London *Telegraph* asked its readers whether Bono and LiveAid founder Bob Geldof are better friends to Africa than the G8. The paper wanted to know whether the impassioned rhetoric of rock stars or the policies of professional politicians had been more effective in solving the problems in a continent in which people struggle every day, often breaking numerous environmental principles, just to survive the threats of disease, war and genocide, a lack of adequate healthy food, and even wild animal attacks.

The sad truth is that, while the rich and the popular vie to be seen as better friends to Africa's poor, neither group has been willing to admit that both are in far too many ways seeking to advance a new colonialism upon those whose liberty and prosperity they claim to be supporting. All too often, this neocolonialism is dressed up in environmental terminology.

Westerners of all stripes have, perhaps unwittingly, declared that Africa is, first and foremost, environmentally pristine and must stay that way – that preserving its unique environmental qualities is far more important than feeding its people, protecting them from

disease and lessening the chances of war. Thus, true development in Africa has been stymied as Western institutions have placed burdensome conditions on any funding for infrastructure – highways, power generating stations, and the like – and even for agriculture and commerce.

In our view, misguided interpretations of such terms as "sustainable development" and the "precautionary principle" stand in the way of African progress and the development of an indigenous African environmental movement capable of making its own decisions about what is worth preserving and what may be used wisely to create wealth, secure peace, and address longstanding vestiges of the colonial era.

The real answer to ending poverty in Africa and elsewhere around the world is simple – unleash the power of free markets to create wealth and of political and economic freedom to ensure that wealth created trickles down to the poorest in societies. Eritrean economist and former finance minister Gebreselassie Tesfamichael laid down the gauntlet in a July 24, 2005, op ed in the *Washington Post*:

> *For decades, we had watched governments throughout the continent compromise their sovereignty as they adopted economic models imposed on them by both the West and the East in order to get aid. We could not help noticing how aid distorted the development process. For instance, donor organizations emphasize the social sectors – health and education – while almost entirely ignoring the commercial and business sector.... We wanted. . .a partnership rather than a donor-client relationship.*

Tesfamichael exposed the error of the G8-Live 8 approach to assisting Africa's poor with his simple statement that, "It's what Africans do themselves that will determine how far and how fast we move forward.." Africans today want to know whether Western nations, and Western businesses, will be part of the problem or partners in the solutions.

Sustainable Development Cannot Be Neo-Colonialist

One widely held viewpoint in the West is that "sustainable development" must be limited to what is allowable under the "precautionary principle." This principle was defined in the 1998 Wingspread Statement to mean that, "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically." Clearly, this principle is functionally neo-colonialist and thus does not comport with true sustainable development in poor nations.

The precautionary principle disregards the question that actual or potential benefits of the action may far exceed even the theoretical harm it might cause. For this reason, advocates insisted that poor nations could not use the pesticide DDT to control malarial mosquitoes (as rich nations had done a few years earlier) – not even through semiannual indoor residual spraying in small quantities. Adherence to the precautionary principle in this case was a major factor in the

loss of 50 million lives to malaria since DDT was banned. Even today, there is major pressure to prevent poor nations from using this life-saving pesticide.

Another problem with the precautionary principle arises from these questions: Who defines what is a "threat of harm"? What if there are conflicting threats of harm? Which takes precedence given such conflicts – human health or the environment? For example, in 1997 a 14-year-old boy lost in a wilderness area in New Mexico was spotted by a helicopter, but the U.S. Forest Service warned that any landing to rescue the child would violate the Wilderness Act. Yet the Service just months later apparently saw no legal conflict when it allowed another helicopter to land in a wilderness area to rescue an injured gray wolf.

The Clean Development Mechanism is another product of the Kyoto Protocol that is touted as a tool for sustainable development. This mechanism also fails to meet the standards of true sustainable development for poor nations specifically because it was designed to enable first-world countries with carbon reduction commitments under Kyoto to purchase offsets (and thus continue emitting carbon). The "mechanism" is investment in emission-reducing projects in developing nations in which the cost per credit gained is almost certainly to be far lower than the cost of reducing carbon emissions at domestic facilities.

The problem is that the investments under which the rich gain carbon credits are designed to meet the needs of first-world nations – not those of developing countries. Thus, the CDM is largely just a new instrument of colonialism, inasmuch as poor nations are cajoled into accepting CDM projects that do not fit within their own development priorities (for example, highway construction, petroleum refineries, or nuclear power plants are probably not "clean development") as the only alternative to getting no development money at all.

The CDM also exacerbates another perennial problem in developing nations – corruption. According to one observer, aid (and, by inference, CDM investment) makes the poor passive recipients of largesse rather than active participants in their own economic betterment. The result is that projects that would benefit the poor are shelved in favor of projects that benefit power brokers at home and neo-colonialist interests abroad.

It is, of course, possible that a given CDM project might actually fit the developing nation's needs – but one reason the CDM has been only mildly successful is that many nations are aware that their priorities are not well served solely by "clean" projects.

New Hope for Sustainable Development

After 20 years, it should be clear that the Brundtland Commission's goal of meeting people's basic needs has not been met in sub-Saharan Africa. Since the 1960's, sub-Saharan African nations have received an estimated $500 billion in foreign aid, yet the entire continent today accounts for just 2% of global gross domestic product despite having 13% of the world's people.

Sub-Saharan Africa is in very short supply of energy and power, and therefore electricity, and overland trade is greatly hindered by an almost total lack of infrastructure, including highways. Millions die each year from diseases that are rare in first-world nations, and scores of millions more are beleaguered by diseases that stem in large part from the lack of clean water and sanitation facilities and from burning wood and dung . And yet there is hope for change.

As noted by our colleague Dr. Holger Thuss, director of CFACT-Europe, the European Union in June 2006 adopted a new "EU Sustainable Development Strategy" which listed as key objectives both environmental protection and economic growth . In so doing, the EU pledged to return to a more market-based approach to sustainable development and away from the previous approach, which according to Thuss "relied heavily on ideologies that prioritized social engineering [as more important than] prosperity and the advancement of individual liberties."

Thuss contends that, despite the lip service Chairman Brundtland gave to economic growth and ending poverty as critical elements of sustainable development for poor nations, the Commission, and the United Nations as a whole, failed to recognize that true sustainable development can only be achieved by enabling people – not the state – to improve their own well-being and that of others. Instead, government bureaucracies stepped in to "guide" development instead of merely encouraging (or even cajoling) the development of functional democratic institutions to expand civil liberties, free markets, the rule of law, and strong property rights.

Thuss also contends that sustainable development, already burdened down by the UN's adherence to central planning, was further stifled by the doctrine of "deep ecology" and the "precautionary principle," in which the "needs" of nature are prioritized as of more value than the needs of human beings. Out of this marriage of centralized planning and deep ecology was born Agenda 21, which was unveiled at the Earth Summit in Rio de Janiero in 1992.

In concert with Agenda 21, the EU in 1992 announced its 5th Environmental Action Plan, which sought (among other things) to "de-couple environmental impacts and degradation from economic growth" and to integrate environmental concerns into other policies. By 1998, the EU backed further away from consideration of economic growth as an important factor in sustainable development for poor nations. The new "Cardiff Process" aimed instead at gradual integration of environmental considerations into every EU policy and activity.

According to Thuss, the Europeans eventually realized it was incompatible to ask people to refuse to seek a higher standard of living and at the same time to adhere to economic growth as a basis for achieving higher living standards. The EU now says that its new "Lisbon Strategy"for growth and jobs and its new sustainability strategy will work together to ensure that economic development is seen as essential in facilitating the transition to a more sustainable society.

Thuss says that, "Something substantial has changed." The EU is now focused clearly on prosperity, development through growth, environment, competitiveness and progress for the developing world. He wishes the EU had also stated more adamantly that the heart of its sustainability policy is empowering people in developing nations to solve their own problems.

One Example of Real Sustainable Development - Guinean Bauxite

The nation of Guinea in west Africa is rich in gold, diamonds, uranium, and high-grade iron ore; it is also home to a third or more of the world's resources of bauxite, the ore from which we get aluminum. Yet Guinea's people are among the world's poorest.

All this may be about to change, thanks to a new $3 billion refinery that will start to turn Guinea's bauxite ore into alumina. The project, a joint venture between Canada's Global Alumina Corporation and the United Nations Development Programme, appears to be a model for large-scale sustainable development in the developing world.

The only other bauxite refinery in Africa is a smallish operation that supplies alumina for aluminum smelters in Russia and the Ukraine. According to Haskell Sears Ward, who spearheaded the Guinean agreement, his company from the outset of negotiations (back in 2001) "placed special emphasis on seeing to it that Guineans at the community level see benefits from this project."

Indeed, the company sought out the opinions of nearly all of the target community's 4,000 residents and then promised to build two new villages with sanitary sewers, schools, and dispensaries, to compensate people for lost trees and land parcels, and to pay special attention to upgrading the status of women. Maybe that is why Global was able to complete this deal without paying bribes.

To assist the project, Global entered into a partnership with the Africa Development Foundation to foster community participation and create opportunities for Guinean enterprise development. A second partnership will train Guineans for skills needed in the construction and operation phases so they can fill most of the 4,000 construction jobs and 2,000 permanent jobs – as well as for the thousands of spinoff jobs to be generated in the region. The partnership has also set aside funds for financing micro-enterprises as well as for midwife training and various poverty alleviation programs.

There are still major obstacles to the potential success of this project, including a recent national strike followed by imposition of martial law, looting, killing of demonstrators, and a near total collapse of commerce. This violence was very likely brought on by the inability of Guineans to afford fuel and food, thanks in large part to inflation. Yet these very problems demonstrate very clearly the immediate need for new jobs and investment.

Despite these concerns, Alcoa Inc.-Alcan has signed agreements for another alumina refinery, and negotiations are under way with other key players in that industry. Ward earlier this year held out hope for a major economic take-off, but only if the country can avoid chaos until the paychecks start flowing out to the citizenry.

Ward acknowledged that "the roads are bad, electricity unreliable, skilled labor in short supply, and political uncertainty exists" – that is the template for far too much of the sub-Saharan landscape. But, he said, Guinea has never expropriated or nationalized any foreign assets and has been a hospitable destination for investors. And why not? One village elder, whose family was paid for 50 lost trees, explained, "I want the project to develop as quickly as possible. We ourselves think of development, and that's why we accepted to be relocated."

Sustainable Development Challenges

Anyone looking for sustainable development challenges need look no further than Haskell Ward's own comments about Guinea, which are equally applicable almost everywhere in sub-Saharan Africa. Bad roads, unreliable energy and power supplies, a lack of education and job training, and political instability – not to mention disease and malnutrition – all play major roles in keeping people poor.

While the common wisdom cries out for more and more and still more foreign aid, the fact is that Africa is very rich in resources and is in much greater need of at-risk investment coupled with the entrepreneurial energy that sent explorers of old around the world in wooden ships, built a railroad across the American desert, and created and defended the institutions of liberty that have made it possible for anyone to rise from abject poverty to great wealth and/or influence in a single generation.

One key element in sustainable development in Africa is the removal of the stigma from the use of fossil fuels. Last November, at the United Nations Climate Change Conference in Nairobi, OPEC Secretary General Mohammed Barkindo made it clear that, "Energy is fundamental for economic development and social progress. While the use of all forms of energy is welcome, it is clear that fossil fuels will continue to satisfy the lion's share of the world's growing energy needs for decades to come."

Earlier last year, Barkindo chided first-world nations for failing to provide promised investment capital, capacity building, and technology transfer to developing nations and noted that "technological options that allow the continued use of fossil fuels in a carbon-constrained world must be actively promoted."

Nigeria, Barkindo's home country, is but one of major African nations with sizable quantities of petroleum reserves, but the full benefit of petroleum resources cannot be tapped until there are locally based refineries that provide local access to the many valuable byproducts of gasoline production.

The lack of highways across Africa is perhaps the most glaring evidence of the continuing influence of colonialism on the economies of African states. About a year ago, at the U.S.-Africa Infrastructure Conference, David Wheeler of the World Bank's Development Research Group presented a paper showing how a capital investment of $30 billion over a 5-year period plus another $1.8 billion annually for maintenance and security could build a 100,000-kilometer highway network to connect every capital city and every other city of half a million people or more throughout sub-Saharan Africa.

Such a highway system, Wheeler said, would more than pay for itself in a short period by generating an additional $250 billion in overland trade between nations and providing an estimated 14 million jobs for the continent's rural poor. Even more revenue would be generated, he added, from trade expansion within individual countries and with non-African countries and from induced growth in urban and rural areas.

Clearly, not everyone has an extra $6 billion a year to toss around, but significant portions of such a highway network can be built for far less so as to connect cities in nations ready to trade with one another. Kenya hopes to complete construction of the Mombasa-Nairobi-Addis Abada highway by 2009, and the Economic Community of West African States has been building large sections of the Trans West African highway network. For years, South Africa has relied on private funds to build toll roads that will one day revert to public ownership.

A third macro-level challenge could be to help rebuild (or perhaps better yet, reinvent) the African university system, which is in a state of near-total collapse according to Lydia Polgreen of the *New York Times*. Polgreen reports that the decrepitude "is forcing the best and brightest from countries across Africa to seek their education and fortunes abroad and depriving dozens of nations of the homegrown expertise that could lift millions out of poverty."

The Commission for Africa, a British government research organization, in 2005 harshly concluded that Africa's universities had become warehouses for a generation of young people for whom society has little use and who can expect to be just as poor as their uneducated parents. Perhaps this crisis can be addressed in part through distance learning, utilizing the Internet, and through multi-purpose laboratories in which students learn by assisting at hospitals, factories, and other entities that require laboratory facilities.

On other key fronts, business consultant C. K. Prahalad has stated that innovation is rampant in the developing world, because people there must focus on conserving resources through eliminating, reducing, or recycling wastes they cannot afford. The poor, he added, must not be seen as victims or as a burden but as resilient and creative entrepreneurs and value-conscious consumers. In short, as people who may one day teach the rich how to live more abundantly, yet sustainably.

Economist Hernando de Soto has shown that the world's poor are in reality sitting on vast wealth that, once unlocked, can provide the springboard to economic growth through commerce.

And visionary Michael Strong has provided evidence that economic freedom is perhaps the critical factor in achieving peace – echoing the words of Montesquieu, who said over 250 years ago that "peace is the natural effect of trade."

But What Can Ordinary People Do?

While the multi-billion-dollar alumina project in Guinea may provide a significant breakthrough for sustainable development in that nation, and other large-scale projects may provide similar benefits for other nations, even ordinary citizens can play a valuable role in true sustainable development in the developing world.

Growing out of its efforts in Valle Verde, Mexico, CFACT is currently creating a program of Social Entrepreneurship and Free-Enterprise Development known as SEFED. The program will involve ordinary people engaged in missions of a secular or religious nature becoming true servants of the people in whose communities they live and work (or just visit for short time periods). These are the people who know their indigenous neighbors as partners and friends and who can work with them to prepare business plans and community-serving projects.

This is the template for our newest project in the nation of Uganda. There, CFACT is developing pilot research projects in three impoverished rural villages that can have more thorough and long-term impact through reliance on integrated, holistic approaches; expanded property rights, entrepreneurial opportunities, and other market-oriented mechanisms; and increased cooperation among governmental, non-governmental, academic, philanthropic, and other actors in the field, as well as greater interaction between local village leaders and outside experts.

The CFACT projects will also look at how the resources and strengths of the faith-based community in general, and local churches in particular, can be more effectively brought to bear on poverty alleviation programs in Africa, and throughout the developing world.

In one case, CFACT is looking at working with local villagers to start a poultry and pig training and production facility, where Ugandan families can learn how to raise and care for the animals, and then use the proceeds for school fees, a small hydro project, a health clinic, or other local priorities. Elsewhere, the program is working with local farmers to build a maize mill where corn can be ground and more easily transported and sold at market for higher prices.

In each of these cases, it is the initiative of local villagers that is driving the selection of the first projects, and will lead to subsequent projects of economic growth and poverty alleviation as relationships are established and solidified.

Conclusion

In summary, CFACT's position on sustainable development for the developing world is very much the same position espoused 20 years ago by Chairman Gro Brundtland – that "sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfill their aspirations for a better life," and that meeting these essential needs "requires not only **a new era of economic growth** for nations in which the majority are poor, but an assurance that those poor get their fair share of the resources required to sustain that growth."

Moreover, CFACT's methodology for sustainable development in the developing world is akin to that recently adopted by the European Union, which our colleague Dr. Thuss interprets as a clear new focus on prosperity, development through growth, environment, competitiveness and progress for the developing world.

CFACT, however, is adamant that the heart of any true sustainability policy must be to empower people in developing nations to create and manage their own wealth, develop their own free and healthy institutions, and solve their own environmental and human health problems as best they see fit.

We will never forget the words of Cameroonian journalist Jean-Claude Shanda Tonme (*New York Times*, July 15, 2005): "They still believe us to be like children that they must save us, as if we don't realize ourselves what the source of our problems is."

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David Rothbard

David Rothbard is President of the Committee For A Constructive Tomorrow (CFACT), a leading public-interest organization he co-founded in 1985 that is on the cutting edge of today's environmental debate.

With the support of more than 40 internationally-recognized scientists and experts, and the backing of some 40,000 citizen supporters nationwide, Rothbard is one of the primary voices seeking to provide positive market-oriented and technological solutions to current concerns relating to environment and development.

Based in Washington, D.C., Rothbard is called upon to provide expertise to a wide range of government, media, and industry forums, and has been an active participant in various international meetings including recent United Nations summits in Cairo, Istanbul, Kyoto, Bonn, Marrakesh, Buenos Aires, Cancun, and The Hague.

He is a frequent guest on radio and television talk shows across America, and his informative articles have been printed or critiqued in such important publications as USA Today, Newsweek, the Houston Chronicle, St. Louis Post-Dispatch, Washington Times, and The Wall Street Journal.

Rothbard, with CFACT executive director Craig Rucker, co-hosts a daily national radio commentary called "Just the Facts" that has been airing for twelve years on some 200 radio stations from coast to coast. Their work has been termed "invaluable" by the Arizona Republic, they have been lauded for their "effort to bring sound science to the environmental debate" by a former president of the National Academy of Sciences, and been praised by a respected Boston Globe columnist for "a record of supplying absolutely solid information."

A native of Bridgeport, Connecticut, Rothbard received his Bachelor of Arts degree from Fairfield University and now resides near Baltimore, Maryland with his wife and three daughters.

Bio

Philip Trowbridge, P.E.

Mr. Trowbridge is the Manager of Corporate Responsibility at Advanced Micro Devices, Inc. (AMD) and is based in Austin, Texas. In this role he manages AMD's corporate responsibility strategy development and implementation as well as internal and external corporate responsibility communications. He has a bachelor's degree in engineering and an MBA. He has been with AMD for nearly 12 years, working initially in the Environmental Section and moving into a corporate role working on product stewardship and corporate responsibility issues. He has authored nine non-financial annual reports for AMD including seven sustainability reports using the Global Reporting Initiative (GRI) reporting guidelines.

Sustainability

The Next Industrial Revolution



Brenda Harrison
Vice President and Manager, WW Environmental, Safety and Health

Paul Westbrook
Sustainable Development Manager, International Facilities

Outline

- Sustainability and the Industrial Revolution
- The impact of buildings
- TI RFAB project
  - What is a fab and what are the opportunities
  - The path to implementation
  - LEED done on a large scale
  - A green building that cost LESS
- The spread of sustainability

Revolutionary Idea

Natural Capitalism



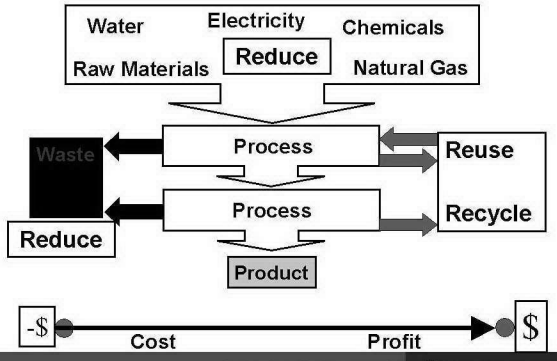
First Industrial Revolution:
People are scarce and nature is abundant – increase labor productivity



Next Industrial Revolution:
People are abundant and nature is scarce – increase **resource** productivity

REUSE
REDUCE
RECYCLE

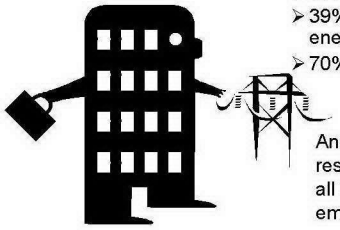
Which Business Model Do You Use?



Buildings

Buildings consume:

- 12% of the potable water
- 40% of the raw materials
- 39% of all primary energy used in the US
- 70% of all U.S. electricity



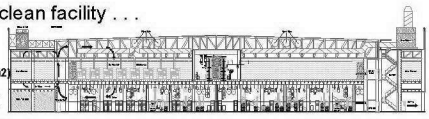
And buildings are responsible for 48% of all U.S. carbon emissions

Source: 2006 DOE Buildings Energy Data Book and USGBC

What is a wafer fab?

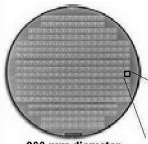
A very big, clean facility . . .

Total space:
1,100,000 gsf (102,000 m2)
Clean room space:
220,000 sf (20,400 m2)



. . . that fabricates very small chips on large silicon wafers





300 mm diameter
1500-5000 chips ea
30,000 wafers/mo
1 billion chips/yr

2 mm
39nm
2 mm
86nm
Gate = 39 nm dia

Hair = 80,000 nm dia





DNA = 2 nm dia
Atom = 0.1 nm dia

The Opportunity

- Very tight temperature and humidity requirements . . .
  - 70F+/-2 (21C+/-1) and 45% RH +/- 3%
- Combined with a large amount of exhaust and subsequent make up air . . .
  - 650,000 cfm (307 m3/sec) = 41 Macy's Snoopy balloons a minute



- Combined with the need to recirculate a large volume of air through the filters for cleanliness . . .
  - 4,400,000 cfm (2077 m3/sec) = 22 Goodyear blimps a minute

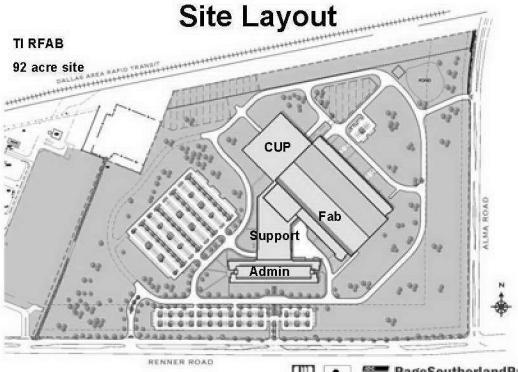


- Combined with hundreds of process tools with vacuum pumps, RF generators, and support equipment . . .
- Combined with extensive use of deionized (DI) water to rinse the wafers during processing . . .

Could lead to annual power consumption of 170,000 mWh (10,000+ homes worth) and water consumption of 3 million gallons/day (6,000 homes worth)
Annual utility bills could total $20M - $25M

Site Layout

TI RFAB
92 acre site



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The Next 100

TI Path to Sustainability

- Strategy Team - Fabscape
  - 5 strategy teams were formed in advance of project
  - Generated early white papers on a number of ideas
- Tour (Westbrook House – www.enerjazz.com/house)
  - Invited 3 VP's to tour active/passive solar home
  - Low utility bills for "normal" house spurred interest
- Design Charrette
  - Teamed up with Rocky Mountain Institute (RMI)
  - Held 3-day design charrette to brainstorm ideas
  - Generated 15 "Big Honkin' Ideas" to carry forward along with a large list of other good ideas
  - Made a first pass at LEED score sheet

Big "Honkin" Ideas

H – Holy Cow

O – Over the Top

N – No Nonsense

K – Knock You Out

I – I don't know why I didn't do this before…

N – Now… because it will save a _____ load of money and time

What is LEED?

Leadership in **E**nergy and **E**nvironmental **D**esign

- The **LEED** Green Building Rating System™ is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. There are 5 broad categories that force an emphasis on a holistic approach to design:
  - Sustainable Sites
  - Water Efficiency
  - Energy & Atmosphere
  - Materials & Resources
  - Indoor Environmental Quality

Charrette - Interesting Outcome

- **First Industrial Revolution**
  - increase labor productivity
- **Next Industrial Revolution**
  - increase resource productivity



Q. What Did People Really Focus On?

A. The number of LEED points we could attain!

- The competitive nature of people is a strong force and can be harnessed for good. We like to save energy and reduce emissions – we love it when we score a point for doing so.

The Challenge … Cost Reduction … Friend or Foe?

- Project Goals – safety, cost, schedule, and green
- The design team was challenged with reducing the fab cost by 30% from the previous fab!
  - Forced space efficiency (2 level vs. 3 level)
  - Forced us to question everything
  - Couldn't just copy previous design – had to innovate
  - All of this led to . . . . Engineering!
- Project was registered with **LEED**
  - **GOLD** for Admin and **SILVER** for Fab
  - Provided a focusing mechanism for team



Sustainable Sites

☑ SS Prerequisite 1 Erosion and Sedimentation Control

Used compost filled tubes instead of typical silt fence



Typical silt fence





Compost tubes

☑ SS Credit 4.1 - Alt Trans, Public Transportation Access

Free shuttle to rail station 1 mile away. Free annual public transportation pass for all TI employees.

☑ SS Credit 4.2 - Alt Trans, Bicycle Storage & Changing

Provided covered bicycle parking and showers / lockers







Sustainable Sites

☑ SS Credit 4.4 - Alt Transportation, Parking Capacity

Preferred parking spaces for hybrid cars, vanpools, carpools.

☑ SS Credit 5.1 - Reduced Site Disturbance, Protect or Restore Open Space

Site was a originally a wheat field. Restored large sections with native grasses and wildflowers.

Typica



☑ SS Credit 5.2 - Reduced Site Disturbance, Development Footprint

Sustainable Sites

- ☑ SS Credit 6.1 - Stormwater Management, Rate and Quantity
- ☑ SS Credit 6.2 - Stormwater Management, Treatment



Pond collects runoff from most of the 92 acres. 2.7 million gallon base + 2 million gallon buffer. The pond meters runoff and settles sediment. Pond water is used for all site irrigation.

Windmill drives an air compressor to aerate the pond. >



Sustainable Sites

- ☑ SS Credit 7.1 - Landscape & Exterior Design to Reduce Heat Islands, Site – *reflective concrete, shade trees*
- ☑ SS Credit 7.2 - Landscape & Exterior Design to Reduce Heat Islands, Roof



Sustainable Sites

- ☑ SS Credit 8 - Light Pollution Reduction

Full cutoff down light



Down light for flag



Bollard – L.E.D. light, solar powered





Water Efficiency

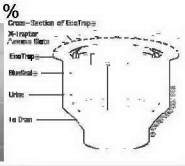
- ☑ WE Credit 1.1 - Water Efficient Landscaping, Reduce by 50%
- ☑ WE Credit 1.2 - Water Efficient Landscaping, No Potable Use or No Irrigation – *Pond is our irrigation source*
- ☑ WE Credit 2 - Innovative Wastewater Technologies
- ☑ WE Credit 3.1 - Water Use Reduction, 20% Reduction
- ☑ WE Credit 3.2 - Water Use Reduction, additional 10% Reduction: Admin = 39% and Fab = 41%





Water turbine powered sensor faucet





Water Efficiency (FAB)

- Though it's not counted in LEED, there are a number of process water reclaim and reuse steps incorporated:
  - RO Brine is used in the cooling towers
  - Primary Mixed Bed Water is used for CMP polishers
  - Secondary UF for additional water recovery from UF and Polish Beds
  - Secondary rinse bath DI water reclaim
  - IW water used for POU abatement and large exhaust scrubbers
  - Segregate and collect sulfuric acid waste
  - MUA condensate sent to site pond for irrigation use

Energy and Atmosphere

- ☑ EA Prerequisite 1 Fundamental Systems Commissioning
- ☑ EA Prerequisite 2 Minimum Energy Performance
- ☑ EA Prerequisite 3 CFC Reduction in HVAC&R Equipment
- ☑ EA Credit 1.1 - Optimize Energy Performance, 15% New, 5% Existing (above Energy Code Std)
- ❑ You earn an additional point for every 5% improvement up to a max of 10 points in this category. 5 points (~38% better than code).

ENERGY SAVINGS APPROACH

- ✓ Tools and Support Equipment
- ✓ Shell efficiency
- ✓ Facilities systems integration and efficiency

Danger: Analysis Paralysis

- What is the payback of the following items?

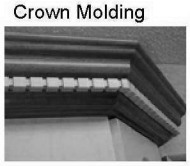
Solar Water Heating



Leather Seats



Crown Molding



- Chances are no one ever asks about payback on the last two, but the first one (which actually has payback) will get analyzed to death.

Integrated Design

- An example of making the connections
  - Light Fixture Selection





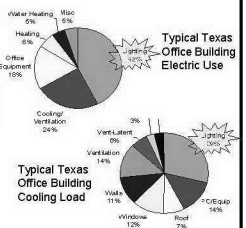
Standard cost = $125
op cost = $40/yr

Ergolight cost = $375
op cost = $25/yr

Simple payback = 16.7 years STOP

However, we need 30% fewer Ergolight fixtures. Simple payback down to 6.7 years.

Efficient lighting also saves cooling energy. Simple payback down to 6.0 years.



Typical Texas Office Building Electric Use

Typical Texas Office Building Cooling Load

Add the contribution from dozens of similar projects (lighting, reflective roof, light shelves, sun shades, quality windows, extra insulation, vacuum pumps, ...)

Enough cooling load disappears to avoid buying a $1M chiller . . . and the cooling tower, pumps, pipes, and even the space needed to install it.



Simple payback is now 0.0 years. The total net capital cost is the same, or even less, and the operating costs are lowered forever.

Energy Savings – Shell and Admin

- Passive solar orientation with exterior shading
- Energy and Daylight modeling
- Optimized glazing (high VLT, low SHGC, low U value)
- Reflective roof (high reflectivity, high emissivity)
- Natural daylighting with light shelves
- High efficiency lighting (motion + daylight sensors)
- Demand controlled ventilation (control on CO_2)
- Attention to detail on insulation and infiltration



Energy Savings – Tool Loads

- Vacuum Pumps (*reduced cooling load by >300 tons*)
  - Met with suppliers to assess developments in pump efficiency, current OEM testing, and future plans
  - Worked with Sematech and vendors to agree on an idle signal protocol
- Exhaust (*reduced exhaust load by >100,000 cfm*)
  - Return some general exhaust (heat) to space
  - Identify top tool internal constraints and work w/suppliers
- PC Water (*reduced system flow by >3,000 gpm*)
  - Reduce pressure drop and increase delta T on tool and support equipment heat exchangers

Energy Savings – Central Utilities Plant

- Chiller Plant (25% of fab load)
  - Split plant to match needs to capacity
    - 40 deg F for dehumidification (.44 - .51 kW/ton)
    - 54 deg F for all other loads (.32 - .50 kW/ton)
  - Heat Recovery on 54 degree plant (75% of CHW load)
    - More constant load year round
    - Minimal energy penalty for free hot water
    - Reduced boiler count from 6 to 2 (500HP each)
  - Utilize variable primary distribution
  - Redundancy is 1 x 40F chiller for both 40F and 54F (blending for 54F)

Energy Savings - Pumps, Fans, & More

- Utilize the Big Duct, Small Fan & Big Pipe, Small Pump Idea – minimize friction loss
- Utilize Variable Frequency Drives and minimize balancing valves (drive with accelerator, not brake)
- Continue to use premium efficiency motors

COULD HAVE DONE EVEN BETTER

- × Underfloor air distribution / displacement ventilation
- × More daylighting / skylights – especially in the core
- × Piping distribution friction minimization – some progress
- × Enthalpy wheels and Munters HCU

We did a good job. We can do even better.

Materials and Resources

- ☑ MR Credit 2.1 - Construction Waste Management, Divert 50%
- ☑ MR Credit 2.2 - Construction Waste Management, Divert 75%
  Almost 90% of construction waste was recycled
- ☑ MR Credit 4.1 - Recycled Content, Specify 5% p.c. or 10% p.c. + p.l.
- ☑ MR Credit 4.2 - Recycled Content, Specify 10% p.c. or 20% p.c. + p.l. Admin achieved 35%, Fab was 57%
- ☑ MR Credit 5.1 - Local/Regional Materials, 20% Manufactured Locally Admin=76%, Fab= 73%
- ☑ MR Credit 5.2 - Local/Regional Materials, of 20% Above, 50% Harvested Locally Admin=71%, Fab= 30%+
- ☑ MR Credit 7 - Certified Wood
  Admin=79%, Fab= 100%



Indoor Environmental Quality

- ☑ IEQ Prerequisite 1 - Minimum IAQ Performance
- ☑ IEQ Prerequisite 2 - Envir Tobacco Smoke (ETS) Control
- ☑ IEQ Credit 1 - Carbon Dioxide (CO2) Monitoring
- ☑ IEQ Credit 3.1 - Construction IAQ Mgmt Plan, During Construction
- ☑ IEQ Credit 3.2 - IAQ Mgmt Plan, Before Occupancy
- ☑ IEQ Credit 4.1 - Low-Emitting Materials, Adhesives & Sealants
- ☑ IEQ Credit 4.2 - Low-Emitting Materials, Paints
- ☑ IEQ Credit 4.3 - Low-Emitting Materials, Carpet
- ☑ IEQ Credit 4.4 - Low-Emitting Materials, Composite Wood
- ☑ IEQ Credit 5 - Indoor Chemical and Pollutant Source Control
- ☑ IEQ Credit 7.1 - Thermal Comfort, ASHRAE 55-1992
- ☑ IEQ Credit 7.2 - Thermal Comfort, Permanent Temperature & Humidity Monitoring
- ☑ IEQ Credit 8.2 - Daylight and Views, Views for 90% of Spaces



TI RFAB



Cost / Benefit

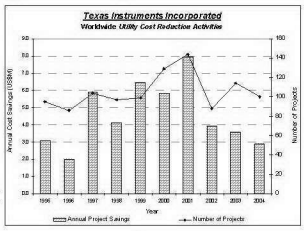
- We will invest <1% of the project cost (<$1.5M) in LEED related items – predominately efficiency improvements that we would consider regardless of LEED
- But remember that the overall project cost 30% **LESS** than our previous 300mm fab.
- The first full year we should recover $1M in operating savings
- At full build out we will save >$4.0M per year in operating costs`
  - 20% energy reduction
  - 35% water use reduction
  - 50% emissions reduction

www.ti.com/rfab



Before & Beyond One Project

- Utilizing LEED for our most recent project helped highlight many good programs we already have in place – sometimes for decades
  - Corporate Energy Management Group formed in 1973
    - Energy Efficiency projects reduced our consumption by 1 billion kWh between 1995-2006.
    - In the late 80's we installed 2.7 million gallons of thermal storage capacity, then added 5 million gallons in the early 90's.



Before & Beyond One Project

- Decades of operational recycling efforts with a current recycling run rate = 87% of non-hazardous solid waste
- Extensive water reuse and reclaim – about 1.5 billion gallons per year



- The first lead-free (Pb-Free) semiconductor component in 1989. More than 30 billion Pb-Free TI components are now in products around the world.



- A few "cool" roofs even before they were cool

What Else Is Happening?

- All new major projects at TI will be LEED registered
- LEED-EB for all of our existing sites by 2011
- GRI sustainability report, 2007
- Dedicated capital for utility savings projects
- Working externally to address specific fab areas of importance
- Working together with our tool suppliers and equipment manufacturers to improve resource efficiency in all areas
- Sharing our story

Summary

- The best designs work WITH nature and use our resources in a sustainable manner to achieve better results with less impact on the planet.
- The competitor in all of us is just waiting for an opportunity to win… counting the points was the game
- It's not easy and you have to be persistent… lots of credible people and sources will tell you it can't be done
- It's a journey… we know we can do better and we know we can do more
- Small teams… big dreams



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PERSONAL BIOGRAPHY

As the Environmental, Safety and Health Manager and Vice President for Texas Instruments (TI), Brenda oversees activities for worldwide operations, including North America, Asia/Pacific, Europe, and Japan. The team of ESH professionals is responsible for administering regulatory requirements, implementing proactive resource conservation and safety activities, and leading/supporting various community activities. Brenda is a Senior Member of the Technical Staff and holds leadership positions with the Semiconductor Industry Association (SIA) Environmental, Safety and Health Task Force, Global Environmental Management Initiative (GEMI), International Sematech, National Center for Manufacturing Sciences (NCMS) and AESF.

Prior to this position, Brenda managed TI's Dallas Operations, the ESH and Chemical Distribution System construction activities for 2 major semiconductor facilities, and ESH and Process Engineering for TI's Defense Systems and Electronics Group.

Brenda has a B.S. in Chemistry from South Dakota School of Mines and Technology and makes her home in Plano, Texas with her husband and youngest daughter.

SUSTAINABLE DEVELOPMENT, REFINERIES AND CHEMICAL PLANTS

By Jim Blackburn and Abi Johnson

Prepared for Texas Environmental Superconference, August 2-3, 2007

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I. Introduction

II. Worldwide Support and Call to Action

III. USA- Slow to Act

IV. Practical Concepts of Sustainable Development
1. Meeting Basic Needs
2. Community Empowerment
3. Eco-efficiency
4. Ecology and Place

V. Endpoints

> Sustainability is the [emerging] doctrine that economic growth and development must take place, and be maintained overtime, within the limits set by ecology in the broadest sense—by the interrelations of human beings and their works, the biosphere and the physical and chemical laws that govern it… It follows that environmental protection and economic development are complementary rather than antagonistic processes. [1]
>
> - William Ruckelshaus, *Scientific American*, September 1989

I. Introduction

Sustainable development is a concept that was unveiled in the World Commission on Environment and Development's 1987 report titled *Our Common Future*.[2] In this groundbreaking publication, the global problems of poverty, biological diversity loss, stratospheric ozone depletion, population growth and even climate change were identified along with an innovative approach to address these problems called sustainable development.

Sustainable development was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".[3] The premise is simple – we should not deplete the Earth in a manner that prevents future generations from achieving a similar standard of living, adding inter-generational equity to past considerations of development. Sustainable development can be seen as a way to maintain our ecological and social integrity while generating economic capital through human action.

Robert Solow, the Nobel Prize winning economist, has described sustainability as an obligation to conduct ourselves so that we leave future generations the option or the capacity to be as well off as we are today, which implies that sustainable development is capitalism with ethics.[4] The Business Council for Sustainable Development has analogized sustainable development with living off of a trust fund.[5] The concept is to live only off the income gained and preserve the principle of the trust. These concepts do not prohibit resource utilization, but they do require consideration of the long-term implications of certain resource consumption patterns.

Herman Daly, an economist, discusses sustainability in terms of the flow of materials and energy through the economy in his book *Beyond Growth*. Dr. Daly speaks of "empty world" thinking verses "full world" thinking, with sustainable development being a prime example of "full world" thinking.[6] Dr. Daly claims that we humans developed our thoughts regarding society, law, economics and even science during a time when relatively few humans were on the Earth. As a result, "empty world" thoughts currently dominate our thinking as the Earth becomes full of humans and human impacts. As Albert Einstein once said,

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[1] William Ruckelshaus, "Toward a Sustainable World," *Scientific American*, September 1989, p. 114.
[2] World Commission on Environment and Development. *Our Common Future*. 1987. Available at http://www.un-documents.net/wced-ocf.htm
[3] *Ibid.*
[4] Robert Solow, "An Almost Practical Step Toward Sustainability." *Elsevier*, (19):3, 162-172.
[5] Stephan Schmidheiny, World Business Council on Sustainable Development, *Changing Course: a global business perspective on development and the environment*, (MIT Press: 1992)
[6] Herman Daly, *Beyond Growth*, (Beacon Press: 1992).

> "the world we have created today as a result of our thinking thus far has problems that cannot be solved by thinking the same way as we were thinking when we created them."[7]

This quote describes the role of sustainable development – to create an alternative framework of thought from the one we used when we created many of our problems, in order to solve them.

II. World-wide Acknowledgement and Call to Action

The push for sustainable development has become apparent throughout the global arena. In 1992 at the United Nations Conference on Environmental and Development held in Rio de Janeiro, every major country in the world signed a document called the *Rio Declaration on Environment and Development*. The declaration, consisting of 27 major sustainable development principles, was augmented by an international guidebook, *Agenda 21*.[8] Since the conference, countries around the world have adopted the concept of sustainability by utilizing this guide to direct their development.

In 2002, ten years after the Rio Earth Summit, a follow-up conference called the World Summit on Sustainable Development was held in Johannesburg, South Africa. At the conference, Tony Blair, the Prime Minister of the UK, stated:

> "We know the problems. A child in Africa dies every three seconds from famine, disease or conflict. We know that if climate change is not stopped, all parts of the world will suffer. Some will even be destroyed, and we know the solution—sustainable development."

The conference reaffirmed the global commitment to sustainable development as a means of solving not only environmental problems, but also economic and social development issues. The goals set at the summit were more specific than those originally laid out in 1992 and included several partnerships and pledges to further advance sustainable development in third world countries.[9]

In 2005, the UK released a new sustainable development strategy (in addition to the one released in 1999) that integrates sustainable practices into every government department by requiring individual development plans for each sector. In addition, the government has committed to buying and operating cleaner cars, offsetting the carbon emissions for unavoidable air travel, and hiring a third party government watchdog to complete reviews of sustainable development progress.[10] On a countrywide scale, the government has four major priorities—sustainable consumption and production, climate change, natural resource production, and sustainable communities. The plan of action includes establishing community awareness and engagement programs, evaluating environmental taxes to determine their effectiveness, participating in the EU carbon emission-trading scheme, committing to GHG emissions reduction of 20% below 1990

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[7] Albert Einstein quoted in Stephan Schmidheiny, World Business Council on Sustainable Development, *Changing Course: a global business perspective on development and the environment*, (MIT Press: 1992).

[8] United Nations, "The Rio Declaration on Environment and Development, " 1992. Available at http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163

[9] UN, "Key Outcomes from the World Summit on Sustainable Development," September 2002, Johannesburg, South Africa. http://www.un.org/jsummit/html/documents/summit_docs.html

[10] UK Government. "Securing Our Future: the UK government sustainable development strategy." March 2005. Available at http://www.sustainable-development.gov.uk/

levels by 2010, working with businesses to improve resource efficiency, reduce waste production and minimize emissions, and several other progressive initiatives.[11]

The UK is not the only country that has gone above and beyond what global treaties have requested to ensure sustainable development is firmly and rapidly established in their country. Several European countries and others throughout the world have taken the lead on sustainable development by integrating the concept into laws, education, and society. [12]

III. USA- Slow to Act

To date, the United States has been slow to implement sustainable development practices. While various documents and forms of guidance exist in many US government agencies, there is no overriding law requiring either the federal government or corporations to apply sustainable principles to their operations. In fact, there is virtually no leadership at all from the federal government in regards to sustainable development.

Although the US government has failed to take any actions that bind businesses to operate in a sustainable manner, they have supported voluntary actions and openly stated that it is necessary for businesses, specifically the oil and gas industries, to incorporate sustainability into their future development. The EPA has a Natural Gas STAR program that assists industries in voluntarily reducing their greenhouse gas emissions, and a 2004 Department of Energy Report stated:

> "Sustainable development of our resources will depend on sustaining innovation. Tomorrow's pioneers in the natural gas and oil industry will rely on such diverse disciplines as geology, environmental science, engineering, and information technology. The continued advancement of technology in the oil and gas industry—and the inevitable environmental improvements that will result from these advances—will be constrained only by the level of commitment, imagination, and resourcefulness of those focused on its pursuit."[13]

The government has acknowledged the need, but is leaving the decision to pursue sustainable development up to businesses. Many businesses and industries are not opposed to the idea and think it is appealing but want regulations to ensure that their competitors will have to take the same measures as they do so that their business can remain competitive in the market.[14]

> "The truth is only Government can create and police the framework within which progress can be made. I am not a historian but I think it is true to say that at moments of a fundamental shift of values, the leadership role which has enabled society to keep making progress has been the responsibility of Government."[15]

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[11] *Ibid.*

[12] UN Division for Sustainable Development. "National Information." June 2007. Available at http://www.un.org/esa/sustdev/natlinfo/natlinfo.htm+

[13] United States Department of Energy, "Sustainable Development of North America's Oil and Natural Gas: Ensuring Plentiful Energy and a Clean Environment," April 2004.

[14] US Climate Change Partnership. "A Call for Action." Available at http://www.us-cap.org/

[15] Lord Browne, BP Chief Executive, "Energy and the Environment, 10 Years On," speech given at Stanford University, April 26, 2007.

Despite the lack of active government support and regulation, many corporations within the United States have proceeded to adopt policies directed at sustainable development for various reasons. Some international corporations have operations in countries requiring sustainable development assessments and policies. Others work with major lenders, such as the World Bank, which have requirements associated with sustainability for their major development projects.[16] However, some are simply interested in the promises offered by sustainable development, which in some cases include lower energy costs, waste reduction, public image enhancement, and new, profitable product markets.

One thing about sustainable development is clear. Done correctly, it requires the integration of ecological, economic, and social considerations. It is a distinct way of thinking about development, driven by an innovative balance of costs and benefits for all parties included. It requires new methodologies and alternative ways of thinking about old problems. Many companies believe that the key to success in the 21st Century will be found through the integration of sustainable development concepts into business operations, particularly those companies who have interests in international development where implementation of the concept is well underway.

The idea of sustainable development is robust. It is applicable at the national level, the state level, the corporate level, the city level and even the household level. While the issues and scale will be different, most of the general principles remain the same. That is what makes this concept exciting – it has several faces and meanings for different people, corporations and countries.

A quick review of corporate policies will demonstrate the widespread appeal of sustainable development. However, there are relatively few examples of the chemical industry and refineries applying sustainable development concepts to their operations. In this paper, two case study situations that offer insight into particular issues regarding corporate sustainable development will be discussed.

IV. Practical Concepts of Sustainable Development

For purposes of this paper, an attempt has been made to extract some practical applications of sustainable development from a petrochemical plant and refinery along the Texas Coast. It is important to note that this paper addresses existing industries and accepts this status quo, meaning that these industries are operating today and will continue to do so. This paper does not address the long-term sustainability of the use of gasoline or plastics in society. In that sense, this paper is practical. It takes existing situations and works with them, rather than detailing an ideal, theoretical approach that has no chance of being implemented on the Texas coast. For this reason, approaches to sustainable development such as the Natural Step were not wholly utilized, although they were consulted and considered.[17]

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[16]World Bank. "Operational Manual: Safeguard Policies." July 2005. Available at http://wbln0018.worldbank.org/institutional/manuals/opmanual.nsf/284229c803270fad8525705a00112597/4f259df5b66ff0ee8525705c0022f931?OpenDocument

[17]The Natural Step Network, "The Natural Step International Gateway," 2003. Available at http://www.naturalstep.org/com/nyStart/

One case study involves Formosa Plastics, a $2.5 billion integrated plastics plant located in Point Comfort, Texas, whose air, construction, and wastewater permits were challenged by a shrimper, Diane Wilson, and one of the authors of this paper, Jim Blackburn, in the early 1990's. To address this dispute, three contracts were signed, including the Blackburn-Formosa audit/performance agreement, the Wilson-Formosa Zero-Discharge Wastewater Agreement and the Sustainable Development Agreement.[18] The second case study arose from community challenges to Motiva's proposal in 2005 to rebuild and expand its Port Arthur refinery in order to double its capacity to 650,000 barrels per day.[19] In this case, Hilton Kelly and the community group, Community In-power and Development Association, Inc.(CIDA, Inc.), of West Port Arthur, reached an agreement called "The Community Enhancement Agreement" with Motiva concerning social conditions in West Port Arthur. In the recitations of that agreement, it is stated that CIDA, Inc. and Hilton Kelly believe this agreement to be an "excellent example of the social side of sustainable development."[20]

Together, these agreements focus on four specific aspects of sustainable development: (1) meeting basic needs; (2) community empowerment; (3) eco-efficiency; and (4) ecology. It should be noted that there is substantial overlap between these issues and the boundaries between the inquiries are not exact.

1. Meeting Basic Needs

A focal point of *Our Common Future* was addressing poverty by finding a source of income for populations in destitute regions of the world, which is somewhat different than examining poverty in the context of United States' communities in the vicinity of a refinery or chemical plant.[21] However, the poverty in West Port Arthur is quite serious, and the quality of life and housing is inadequate to say the least. According to an EPA Brownfield site investigation in the community of West Port Arthur, "40 percent of the West Side's minority residents live below the poverty level and almost 50 percent are unemployed."[22] The community is in disrepair; virtually all retail has left the area to move to the Mid-County area leaving most of the buildings in nearby downtown Port Arthur abandoned and boarded up. While there may be an economic boom on the Texas coast, West Port Arthur has been left far behind.

In the context of sustainability, the economic engine--the corporation or the facility—must be maintained, meaning it must be profitable. Corporations and their facilities require revenues to remain open, provide employment opportunities, and maintain production. This necessity is often overlooked or dismissed by protesters even though it is a key component of sustainable development. Without profit, the company will not exist—jobs, capital, and investments will all be lost. It is that simple.

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[18]Formosa Plastics Corporation, "Historical Highlights," 2004. Available at http://www.fpc.com.tw/enfpc/suba1-2.htm

[19] CIDA, Inc., "Environmental Issues." 2005. Available at http://www.cida-inc.org/pressrelease.htm

[20] CIDA,Inc., "Precedent Setting Settlement: Refinery and Community Group Reach Agreement on Future of West Port Arthur." November 8, 2006.

[21] World Commission on Environment and Development.*Our Common Future*. 1987. Available at http://www.un-documents.net/wced-ocf.htm

[22] US EPA, "EPA Brownfield Assessment Pilot Factsheet: Port Arthur, TX." May 2000. Available at http://www.epa.gov/swerosps/bf/html-doc/aportart.htm

A more difficult inquiry is the relationship between the refinery or chemical plant and the host community. Communities have basic needs that may or may not be addressed by a proposed major investment in a plant. It is reasonable to ask, "Who or what community is at risk and will benefit or suffer from the facility expansion? Will local residents be employed? Will the plant or corporation support local institutions? Will the community be forced to suffer from exposure to high levels of pollutants from the plant that may compromise their health? Will the community be better off with an expansion?"

Meeting the community's needs became a major focal point in the Motiva Agreement. West Port Arthur is enveloped by two large chemical plants and two large refineries, including the existing Motiva facility. When discussions began on the proposed expansion of Motiva, the community expressed opposition, which was mainly based on air pollution concerns. It soon became clear that certain key pollutants had been, or would be, adequately controlled by Motiva to satisfy the community needs and this cooperation provided an opportunity to settle the remaining issues in an innovative manner.[23]

One concern of community members was whether or not Motiva would be willing to hire local residents to either work in the plant or on the construction project. Motiva was very receptive to the request for local employment but explained that they had encountered problems finding trained workers from the community that met Homeland Security requirements for working within a refinery. Motiva had been and continues to support job training at a local community college and expressed a willingness to work with off-site contractors in cooperation with CIDA, Inc. Although not explicitly included in the agreement, this issue was included within the scope of the community fund discussed below. [24]

The bulk of the Community Enhancement Agreement was dedicated to the redevelopment of West Port Arthur. Motiva and CIDA, Inc. agreed to establish a fund "to foster the economic and social revitalization of the communities of Port Arthur in the vicinity of the refinery."[25] The specific purposes of the fund were to:

1. Improve the quality of housing in the adjacent communities;
2. Foster new commercial development in the adjacent communities;
3. Facilitate the establishment of community programs that provide recreational, social or economic opportunities for residents of adjacent communities; and
4. Support the establishment of projects impacting the adjacent communities' quality as supplemental environmental projects by the TCEQ.

To implement these goals, Motiva donated an initial $2 million to the fund with provisions for the amount to be increased to $5 million over time, if not more. This fund provides seed money to develop innovative projects for the revitalization of West Port Arthur and is jointly administered by Motiva and CIDA, Inc. through a seven-member panel, which will be discussed further in the community empowerment section of this paper.

In addition to West Port Arthur revitalization, this Community Enhancement Agreement devoted significant attention to concepts intended to ensure greater

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[23] CIDA-Motiva. "Community Enhancement Agreement," November 6, 2006.
[24] *Ibid.*
[25] *Ibid.*

compatibility between the plant and the community. This agreement would have never been accepted by community members without the sophisticated air pollution controls proposed by Motiva. However, concerns remained about certain sulfur compounds and particulate matter. To address this concern, a new stationary monitoring station will be constructed adjacent to the community to monitor carbon monoxide, sulfur dioxide, hydrogen sulfide, carbon disulfide, PM2.5 and total suspended particulate matter. Significant improvements were also agreed to with regard to the community warning system and Motiva agreed to accelerate implementation of a fugitive control program within the plant.[26]

The Motiva Agreement represented one approach to community relations with a plant. Motiva refused to buy out local homes, insisting that housing development and refinery operations could and would coexist. Many members of the West Port Arthur community wanted a buy-out, but they eventually settled for a redevelopment agreement, partially due to the extensive air-pollution controls promised and Motiva's good operating record.

A different approach was taken at Formosa Plastics. [27] Formosa initially did not want to make a buy-out of surrounding homes part of their agreement, but as a result of pressure from the community members, they reassessed their position and agreed to buy out anyone's home in the area who wanted to leave. Many other refineries and chemical plants have done the same for homeowners near their factories in areas including Corpus Christi, Texas City, and Baytown. Over 162 of approximately 380 houses in Point Comfort have been sold to Formosa at fair market value over a fifteen-year time period. Renters currently occupy approximately 60 of these 162 houses. The initial group of residents bought out by Formosa was concerned about plant performance and health issues, whereas many of the later purchases have been to assist those who simply needed to move elsewhere. This process was definitely beneficial to the individuals who wanted to leave; yet, a small city that has lost cohesiveness was left behind.[28]

Both the community enhancement approach and the buy-out approach have merit. If the local community has faith in the pollution controls and the company's ability to operate the facility, then community redevelopment can be advantageous. In terms of meeting basic needs, the question is whether a facility can bring together a community with jobs, long-term security, and possibly even redevelopment, or whether it will threaten the community's health and long-term welfare while offering no new local employment opportunities. In large cities, green space buffers near facilities make excellent sense and the loss of community cohesion can be integrated into a larger community base, which makes buy-outs in urban areas a mutually beneficial option for the community and business. In smaller cities, the choices are more difficult, because the loss of population to buy-outs can be substantial enough to have a major impact on the cities' economy and growth.

Community and worker safety is clearly a major component of meeting basic needs. A company has to be able to operate its plant without accidental explosions or accidental releases. If the community is to live with a facility, they must be safe and feel safe. When the Formosa Agreements were signed, many members of the community did

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[26] CIDA-Motiva. "Community Enhancement Agreement."
[27] Formosa Sustainable Development Agreement
[28] *Ibid.*

not feel safe. This issue of community health and plant performance was addressed in the first Formosa agreement that brought in specialists to assess worker safety, examine emergency releases, and propose changes to the facility's operations. Under the agreement, Formosa was bound to accept these recommendations if two of three members of a Technical Review Commission voted in favor of them. Over 800 recommendations for change in practices within the Formosa facility were adopted on subjects as diverse as worker safety, compliance with air, solid waste, wastewater and product safety management regulations, mechanical integrity of new construction, fire prevention and emergency releases. Today, the performance of the plant reflects these changes. Although one major accident occurred in 2006, the overall trend has been toward a much safer facility. The injuries of the work force went from 6.52 per 200,000 work hours in 1993 to 0.67 in 2006 [See Figure 1].[29] Today, Formosa's plant is safer and generates much less negative impacts due to these agreements.

To further meet the basic needs of the community, both Formosa and Motiva implemented monitoring systems. Formosa now has a Fourier Transform Infrared Spectroscopy monitoring system to provide data about chemical constituents in the air crossing the boundaries.[30] Motiva agreed to provide CIDA with CERES HOUNDS handheld monitoring devices to allow citizens to monitor their own air quality. Motiva also agreed to improve the transmission system for warnings regarding releases, making these warnings available in English, Spanish, and Vietnamese, as well as providing radios and other equipment to transmit warnings in community areas such as schools and churches.[31]

The bottom line regarding meeting basic needs is that some needs are being met better than others. Some members of the community have not benefited from plant construction and expansion in the past, while others in the community have. It is the equitable provision for the community that is most often lacking. It is important for the entire community, and particularly the community most at risk from the facility, to have their needs considered and met as part of a company's sustainable development framework. In order for their needs to be heard and considered it took two things in the previous examples, action and empowerment, both of which are addressed later in this paper.

2. Community Empowerment

In order for there to be a healthy relationship between a community and corporation or facility, the community must feel like they are being recognized and their interests and well-being matter to the businesses and plants that they must live amongst. According to the World Bank's Community Empowerment and Social Inclusion program, community empowerment is comprised of four major elements: (1) access to information, (2) inclusion/participation, (3) accountability, and (4) local organizational

[29] Formosa, "Reportable Annual Workforce Injuries, 1993-2007."
[30] Formosa "Sustainable Development Agreement"
[31] Motiva-CIDA Agreement

capacity.[32] First, it is necessary that the community be informed of any actions that corporations or facilities plan to take and they must be able to understand what the implications of these changes will be. Second, they must not only be aware of the company's or facility's actions, but they must be included in the planning/development process and have a participatory role in the decision-making process when it comes to issues that will affect their community, such as an expansion. Third, businesses and plants must also be held accountable for their actions by taking responsibility for any mistakes they have made. Finally, a key to community empowerment is local organization capacity, which means that the people of the community must be able to unite into a group, organize their interests, and mobilize movements that protect their interests. [33]

As a general proposition, communities and community activists in the United States have been empowered by environmental and governmental transparency and disclosure laws. Citizen participation is a key element of various environmental laws and acts such as the federal Freedom of Information Act and Texas Open Government Act ensure that information will be publicly available. Citizens, therefore, have access to documents filed with both state and federal agencies as well as internal government documents.

As part of the permitting process, citizens have the right to access permit applications, request public meetings, and ask for contested case hearings as a means of challenging whether permits meet legal requirements or not. However, this procedural pathway is a limited one, extending only to permit issuance as opposed to the operation of the facility, unless extended by the innovative use of settlement concepts.

The larger issue concerns the relationship of the facility to the community over time. Once the construction permit is issued, the community has a very limited opportunity to formally affect a facility's performance. To address this void, most plants have chosen to participate in Community Advisory Panels (CAPs), which provide a chance for the public to meet with plant officials, obtain briefings, ask questions and get information. However, many citizen activists have become disenchanted with this process because many companies control the informational flow and balance of power, which leads to an inequity in the decision-making process. At their worst, CAPs are little more than a company's public relations (PR) tool.

True community empowerment grants substantial rights to locals verses the PR ploys used to enhance a facility's public image that minimally weigh the opinions of community members in operations and decision-making processes. The Formosa and Motiva agreements empower the public/community in several ways

In the Motiva conflict, Hilton Kelley and CIDA Inc. of West Port Arthur protested against the facility's plan to double its size in their community where unemployment was recorded as high as half the population, the air quality had already reached non-attainment levels, and Motiva was employing less than one percent of the

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[32] The World Bank, "Community Empowerment and Social Inclusion," 2007. Available at http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/CESILPROGRAM/0,,menuPK:459702~pagePK:64156143~piPK:64154155~theSitePK:459661,00.html

[33] Deepa Narayan, Senior Advisor, PREM, "Empowerment and Poverty Reduction: A Sourcebook for World Bank Staff," April 2002.

population.[34] According to the University of Texas Medical Branch, one in two men and one in three women in West Port Arthur will die from cancer and the public generally blames the emissions from surrounding chemical plants and refineries for the high cancer mortality rates.[35] When Mr. Kelly and CIDA, Inc. learned of the Motiva expansion, they assumed it could only hurt them. However, they were willing to sit down and work through the pollution issues, leading to the basis for the Community Enhancement Agreement.

As discussed earlier, the agreement included Motiva establishing a West Port Arthur redevelopment fund and the formation of a community-based steering committee to make grants and awards from this fund to aid and assist the redevelopment of West Port Arthur. The initial funding of $2 million is seen as seed money to entice foundations and other sources to join in to help West Port Arthur rediscover and redefine itself. More money will be forthcoming if the initial efforts are successful.

The Motiva agreement provides the community with funding and a major role in the selection and establishment of a committee to make grants and oversee projects. The power sharing between CIDA, Inc., an activist organization that had been critical of Motiva, and this Port Arthur refinery reflects a major concession in the relative political power structure. CIDA Inc. and Motiva each get to select two of the seven members for the committee to oversee the fund, and they each get approval authority over the remaining members that are nominated from the community. Here, empowerment is both real and perceived among the members of the community, which is very important.

The Formosa Agreement provided public interest involvement of quite a different type. In this case, the issue was whether or not Formosa was willing and able to clean up their operations. The initial Blackburn-Formosa Agreement was a binding agreement with subject matter control over virtually all environmental and safety issues at the facility. Matters under this agreement were to be determined by a three-member committee called the Technical Review Commission (TRC) comprised of Ken Mounger, the plant manager, Dr. Davis Ford, the third party and Jim Blackburn. Here, two of three parties were outside parties. Under this agreement, the TRC had authority to hire auditors to determine if Formosa was complying with federal and state environmental regulations and/or using best management practices. The TRC would receive these audits and give them to Formosa who could either accept or reject the recommendations. If the recommendations were rejected, then the TRC could vote to force Formosa to implement them. Interestingly, a vote has ever been required for the over 800 recommendations that Formosa has received.

The Wilson-Formosa Zero Discharge Agreement was a mediation agreement involving a shrimper/critic named Diane Wilson, the TRC, a Formosa representative, the TNRCC and the EPA. Under this agreement, Formosa agreed to study zero discharge and to implement steps toward zero discharge if such actions were economically beneficial and environmentally superior to the status quo.

The third agreement – the Sustainable Development Agreement – led to Diane Wilson and Jim Blackburn assisting the company in developing a sustainable

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[34] KPFT News, "Port Arthur Suffers Health Problems." November 29, 2002. Available at http://www.kpft.org/news/080802story4.html

[35] Houston Independent Media Center. "No VX in Port Arthur Texas," 2003. Available at http://houston.indymedia.org/archives/archive_by_id.php?id=883&category_id=1

development policy for the plant. The document resulted in a proposed sustainability position for the Point Comfort facility that was never published and circulated but not adopted. The results of the agreements are presented in the next section.

The Formosa Agreements brought in outside parties to participate in decision-making at the Formosa facility. It was an amazing empowerment of a few members of the community/public to come in and help bring about change at Formosa. The Motiva empowerment was more limited, yet it represents a true empowerment of the local community.

3. Ecoefficiency

The World Business Council on Sustainable Development defines ecoefficiency as "creating more value with less impact." The council decided on seven main targets to achieve ecoefficiency—save natural resources, save energy, emit less harmful substances, look for more recycling, use renewable resources, look for long-lasting products, and look for useful, efficient products.[36] These targets require a full life-cycle analysis of facility operations from natural resource consumption to waste generation. This analysis requires analyzing and understanding what Herman Daly refers to as the "flow of materials and energy through society." [37]

Environmental compliance is the key starting point for ecoefficiency. In the Formosa agreements, a unique, participatory audit process was used to ensure compliance with government regulations, which had been a problem for the plant in the late 1980s and early 1990s. Under the original Blackburn-Formosa agreement, the TRC was granted the authority to hire consultants for the review of regulatory requirements and industry best practices, and as a result, environmental compliance has not been a major issue at the facility since the TRC began its compliance operations. The environmental compliance record reflects this improvement even with the facility essentially quadrupling in size from the early 1990s into the 21st Century.

The next level of inquiry into ecoefficiency is pollution prevention and resource use reduction. Here the Formosa agreements were quite effective. As a result of the best practices audit, the release of reportable quantities of certain hazardous substances was significantly reduced even though the facility's output was substantially increased. From 1993 to 2006, the reportable quantities (RC) of pollutant releases were reduced from 16 per year to 9 per year while the plant has more than quadrupled in size [See Figure 2].[38] In addition, over the same time period the number of TNRCC violations and permit violations have significantly decreased. Arguably it was in both the economic best interest of the company and of the community for these RQ releases, violations, and exceedances to be lowered.

A more difficult commitment to sustainable development requires reducing emissions below that which the state and federal governments allow by permit or regulation. The Wilson-Formosa Zero-Discharge Agreement was quite successful in its evaluation of water usage and wastewater generation for the facility. Each waste stream

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[36] World Business Council for Sustainable Development, "Eco-efficiency," August 2000. Available at http://www.wbcsd.org/web/publications/eco_efficiency_creating_more_value.pdf

[37] Herman Daly, *Beyond Growth*, (Beacon Press: 1992).

[38] Formosa, "Reportable Quantity Releases, 1993-2007."

generated within the plant that contributed to the total discharge of 7.9 million gallons per day (MGD) was assessed. As a result, a number of streams that could be recycled were discovered. The evaluation criteria developed under the discharge agreement required that pollution reduction make sense from both an economic and an environmental standpoint. This methodology led to the discovery of 2.5 MGD of wastewater that could be recycled economically, resulting in a drastic reduction of water usage and wastewater production within the plant.

Under this agreement, pathways were found that would lead to zero wastewater discharge into Lavaca Bay. However, one waste stream that was 26% brine proved to be a major impediment to the concept. This stream originated from a nearby salt dome and was piped to the plant as a raw material input. In the plant's wastewater scheme, this stream was diluted with other wastewater streams for dilution prior to discharge into Lavaca Bay. If the company or EPA had been thinking holistically at the time of permitting, it would have been relatively simple to return this spent brine to the salt dome. Some ten years after the initial zero-discharge work, Formosa applied for and received a deep well injection permit to discharge this brine back into the subsurface saltwater formations beneath the plant. Once this is constructed, the facility will be poised to undertake further recycling options and to implement reverse osmosis for full wastewater recycling.

The brine disposal issue demonstrates how pollution reduction extends beyond the boundaries of the plant. In order to fully understand the impacts of a facility, a life cycle analysis must be completed that identifies the resources and residuals contributing to production at the facility and, if possible, traces the products to their final resting place. Such an analysis was conducted at the Formosa facility as required by the Sustainable Development Agreement. The ultimate goal of the study was to provide information about the production of pollution and use of resources over the life cycle of the product in order to better understand the total resource and pollution burden and provide metrics for making reductions in both.

The conceptual diagram for Formosa shown in Figure 3 illustrates certain obvious components of the life cycle that are easy to identify, such as energy use, water, and pollution, which includes the generation of plastic waste. This diagram clearly identifies plastics recycling as a major component of a closed-loop life cycle, a cradle-to-cradle process verses a cradle-to-grave process resulting in waste generation. The cradle-to-cradle approach to plastics, as well as other products, has not been addressed by industry or society. In this specific case, plastic products are ending up on the street rather than being recycled and reused, which adds to the overall pollution burden from the plant producing the plastic. It should be noted that the full life cycle analysis for Formosa included understanding the resource and pollution attributes of the production of naptha, raw condensate, natural gas, brine, and water.[39]

In the Formosa life cycle analysis, an attempt was made to quantify energy and water inputs and identify pollution generated on a per unit of production basis. In this manner, various products can be compared on the basis of the amount of resources required and pollution produced per pound of product. A flow chart from the study of environmental metrics at Formosa Plastics is shown in Figure 4.[40] Here, the general flow

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[39] Jim Blackburn and Susan Locke, "Formosa Environmental Metrics Report," January 2000.
[40] *Ibid.*

of materials and energy through the chemical complex in shown. It is essential that a methodology exist in order to "allocate" electricity, water, emitted pollution, etc. on a product-by-product basis if decisions are to be made based upon "product footprint," a key aspect of material product substitution inquiries under ecoefficiency.

Dematerialization is another component of ecoefficiency. Recent online, digital download stores, such as iTunes, are perfect examples of dematerialization, because they sell media and information directly over the internet as opposed to selling recordings at stores where they must be shipped, bound by hard plastic, and further wrapped in thin-film plastic packaging. Dematerialization is a difficult task for an individual plant to tackle, and it generally must be addressed as a headquarters sustainability issue, a supply chain sustainability issue and a society sustainability issue rather than at the plant level. It may not be in the interest of companies to dematerialize if it could hurt them economically. For example, Formosa Plastics sells plastic products and, therefore, probably would not encourage and help implement ways to decrease society's plastic product use.

Durability of products and machines is another component of ecoefficiency. If you have to replace a product or machine every five years instead of ten, then there is twice the amount of waste over ten years and twice the amount of cost than would have been incurred if the product or machine bought had a ten-year verses five-year lifespan.

General Electric (GE) has a relatively new line of eco-efficient products called the "Ecomagination" line. They make light bulbs that use less energy and last longer, airplane engines that are 15% more fuel efficient and release 94% less emissions than those required by 2008 laws, and paint replacement film that can make cars more light-weight and reduce the amount of VOCs released from paint into the environment.[41] GE's Ecomagination products are not only lowering energy costs and consumption, but they are also saving customers money over the long-run while simultaneously GE's sales and profits are skyrocketing. According to one of GE's statistics,

> "If every household in the U.S. replaced **just one** 100-watt incandescent light bulb with a GE compact fluorescent light bulb, over the bulbs' lifetime, we would save enough energy to power more than one million U.S. homes for an entire year."[42]

This ecoefficient product line is helping consumers, the environment, and the company, bringing together and mutually benefiting all three legs of the sustainability stool.

Ecoefficient practices will cause the matriculation of environmental issues from "end of the pipe" to "strategic." Practices that address environmental problems, such as dematerialization and efficiency maximization, are beneficial for businesses and facilities, socially and financially, as demonstrated in the previous examples. Therefore, businesses and facilities should look to ecoefficiency as an opportunity, not a hindrance, to their successful operation. Ultimately, this issue may determine the fate of many companies, not to mention industries.[43]

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[41] General Electric, "Ecomagination: Imagination at Work," 2007. Available at http://ge.ecomagination.com/site/index.html#pair

[42] *Ibid.*

[43] William McDonough and Michael Braungart, *Cradle to Cradle: Remaking the Way We Make Things* (North Point Press: New York, 2002).

4. Ecology and Place

In many respects, ecology is one of the more difficult issues to effectively integrate into a facility or plant structure. For the most part, refineries and petrochemical plants are already constructed and operating with modifications continuously being made to the existing, developed sites, and with relatively few new, greenfield facilities being constructed. As a result, the natural system where these facilities are located has been converted to industrial uses for decades.

Another aspect of the relationship between ecology and the corporation is mitigation. Mitigation is usually required when natural resources are negatively impacted by plant construction or expansion, such as when wetlands are filled. Mitigation is required by federal and state law, but does not represent anything other than damage replacement. Much more is required if a facility is to mitigate for all impacts, such as climate change. To date, climate change impact mitigation has been limited in scale but it will most likely expand rapidly in the future.

Environmental carrying capacity is the major regulatory focus of wastewater permitting and, to some extent, air permitting. For example, the TCEQ required Formosa to complete computer modeling of Lavaca Bay's ability to assimilate to the proposed waste discharge. In order for the permit to be issued, it had to be proven that the wastewater released into Lavaca Bay would not compromise the bay's ability to support fish populations. Additionally, monitoring of effluent quality and bay-receiving water quality was required. According to reports to date, bay productivity has not been impeded. Similarly, computer modeling of air pollution levels has been undertaken to demonstrate compliance with health-based air quality criteria that also serves to protect natural features of the landscape.

The problem with carrying capacity analyses is that they imply we understand ecological relationships and the impact of pollutants on ecological pathways. Many citizen protesters have concerns about toxicity thresholds and the impact of chemicals for which modeling has not been undertaken. These people have pushed for zero discharge. Another issue with carrying capacity analyses is citizen's lack of trust in the professionals completing these analyses.

A different type of carrying capacity analysis is necessary for surface or groundwater impacts, which industries in Texas are generally not required to address. As indicated by the wastewater/brine example at Formosa, many relative ecological impacts are not even considered because they do not fall within any regulatory program. Another prime example is the ecological impacts of carbon dioxide emissions and climate change, an issue where concerns for sustainable development should lead to additional requirements beyond those mandated by state and federal law, if in fact a company truly cares about sustainability.

The overall relationship between a facility and the ecological system in which it operates is based on the concept of stewardship. In the Formosa sustainability work, this was labeled as the "Aldo Leopold step" in recognition of Leopold's groundbreaking concept of "the land ethic," which was, in fact, ecological stewardship.[44] The understanding and appreciation of place is key to the ecological component of sustainability. The more a corporation embraces its place and understands and protects its

[44] Aldo Leopold, *A Sand County Almanac*, (Ballatine Books, 1949).

ecological setting, the more in tune with sustainability the business and its employees will be.[45] From a stewardship perspective, the Formosa facility was viewed in the context of its ecological setting, or "place." For most Texas refineries and petrochemical facilities, their setting is the Texas Gulf Coast, which is home to millions of migratory waterfowl and neotropical songbirds, as well as wetlands that are being lost to unregulated filling activities. As a tribute to their ecological place, Formosa had several hundred acres set aside and converted to wetlands for waterfowl and other species as part of their sustainability agreement.

A reasonable manner for a corporation to incorporate ecology into its concept of sustainable development would be to foster the understanding of their relative ecological place. Houston Wilderness is a group with collaborated environmental and business interests dedicated to preserving and comprehending the unique ecological diversity surrounding the Houston metropolitan area. With the assistance of Conoco Philips, Inc., Houston Wilderness published the *Houston Atlas of Biological Diversity* in 2007 and it is currently distributed by Texas A&M Press. This guide combined with an Aldo Leopold ethic could make a major contribution to ecosystem preservation in Texas and the United States.

V. Endpoints

As a society, we are far from being sustainable. However, movement toward sustainability is both possible and, in fact, occurring. Sustainability will not be accomplished with one big step, but rather, through a series of small steps. Sustainable development thinking – "full world thinking" – is new and different, representing change. Change generates fear – fear of failure, and yes, even fear of looking foolish.

During change, it is sometimes helpful to envision endpoints. Here, there are two important endpoints. The first concerns economics; economic value is not simply income and operating costs. There is a larger view of economic value that comes from thinking sustainably. There is dollar value from good community relations – from negotiation rather than litigation, from compromise rather than dispute. There is dollar value in a permit modification being issued without objection from the community. There is dollar value from fewer accidents and fewer fines. There is value in efficient operation that requires less consumption of natural resources that may not be available, and there is value in finding more efficient ways to make products and deliver benefits for the population.

Secondly, one can envision two types of partnerships as an endpoint – a partnership between the facility and the community and a partnership between the facility and the ecological system. Success in sustainable development terms requires that the corporation, the community and the ecological system all survive and prosper.

This is development—the right way. This is the future.

Motiva and Formosa are trying to do the right thing, and their examples have proven that even businesses that are thought by some to be the opposite of sustainable can integrate important elements of sustainability into their operations. The incorporation of such elements can significantly benefit all parties at stake—habitats, local

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[45] Shell Corporation. "CNOOC Petrochemicals: Overview." 2006. Available at http://www.shellchemicals.com/nanhai/1,1098,1894,00.html

communities, and future generations. It is obvious these specific businesses may never be sustainable by certain definitions, and it is not being claimed that they will be the end product of sustainable development in these industries. Rather, these case studies show us positive steps in the right direction. With enough small steps, we can walk anywhere.

Figure 1: Recordable Injuries at Formosa Plastics, 1993-2007

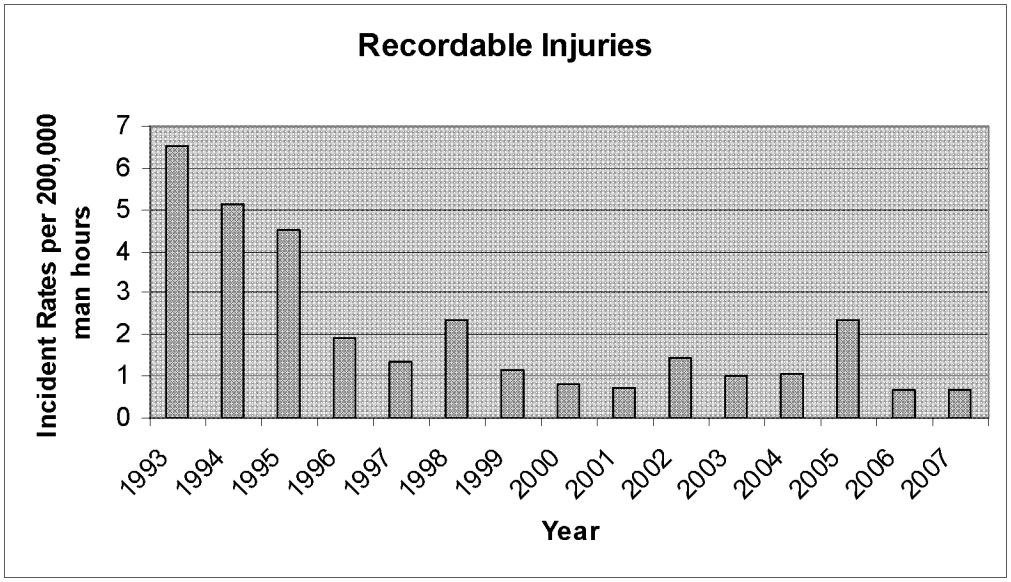


Figure 2: Recordable Quantities Released at Formosa Plastics, 1993-2007

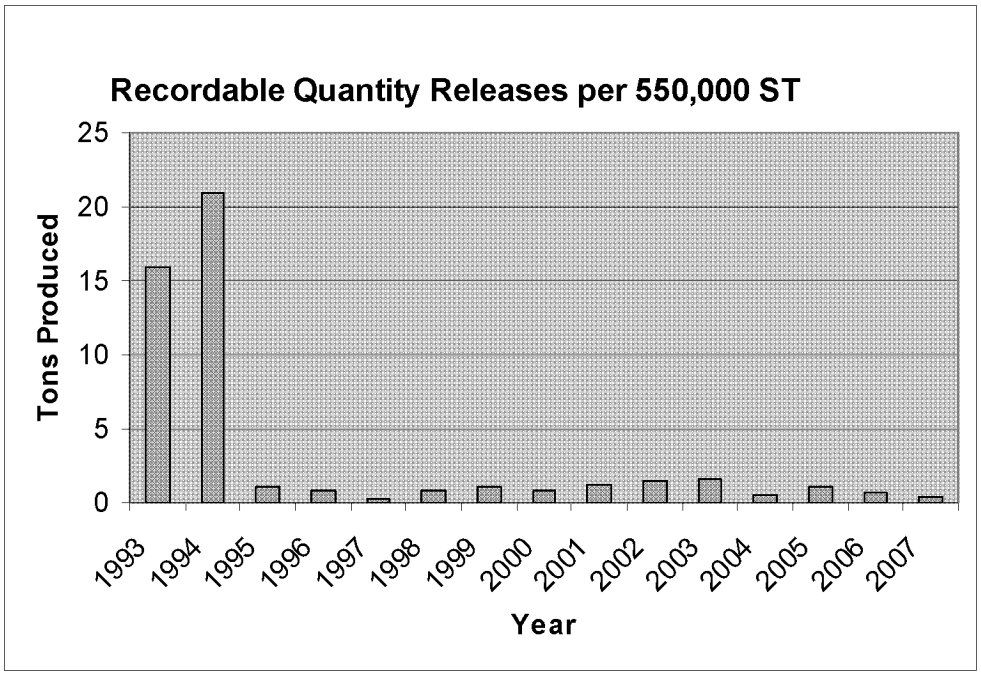


Figure 3: Formosa Conceptual Diagram

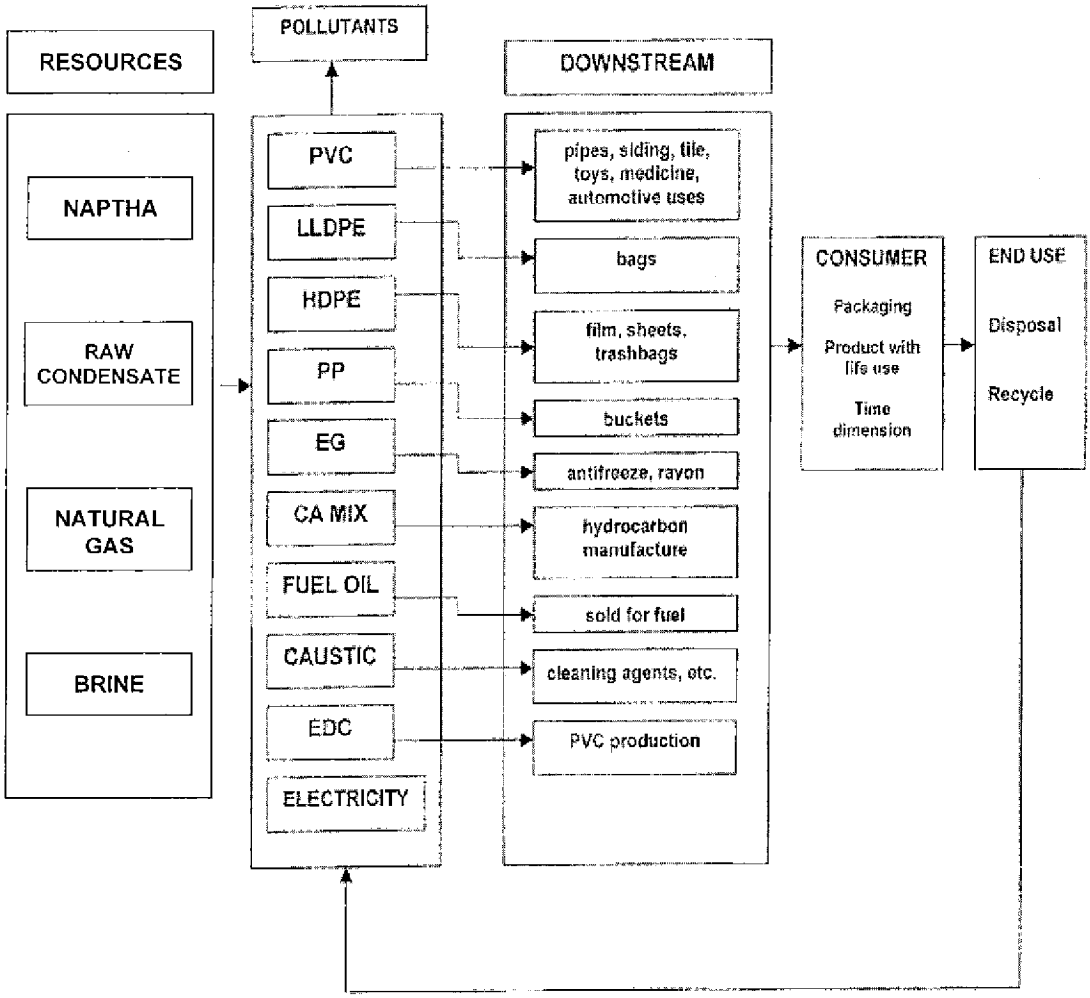
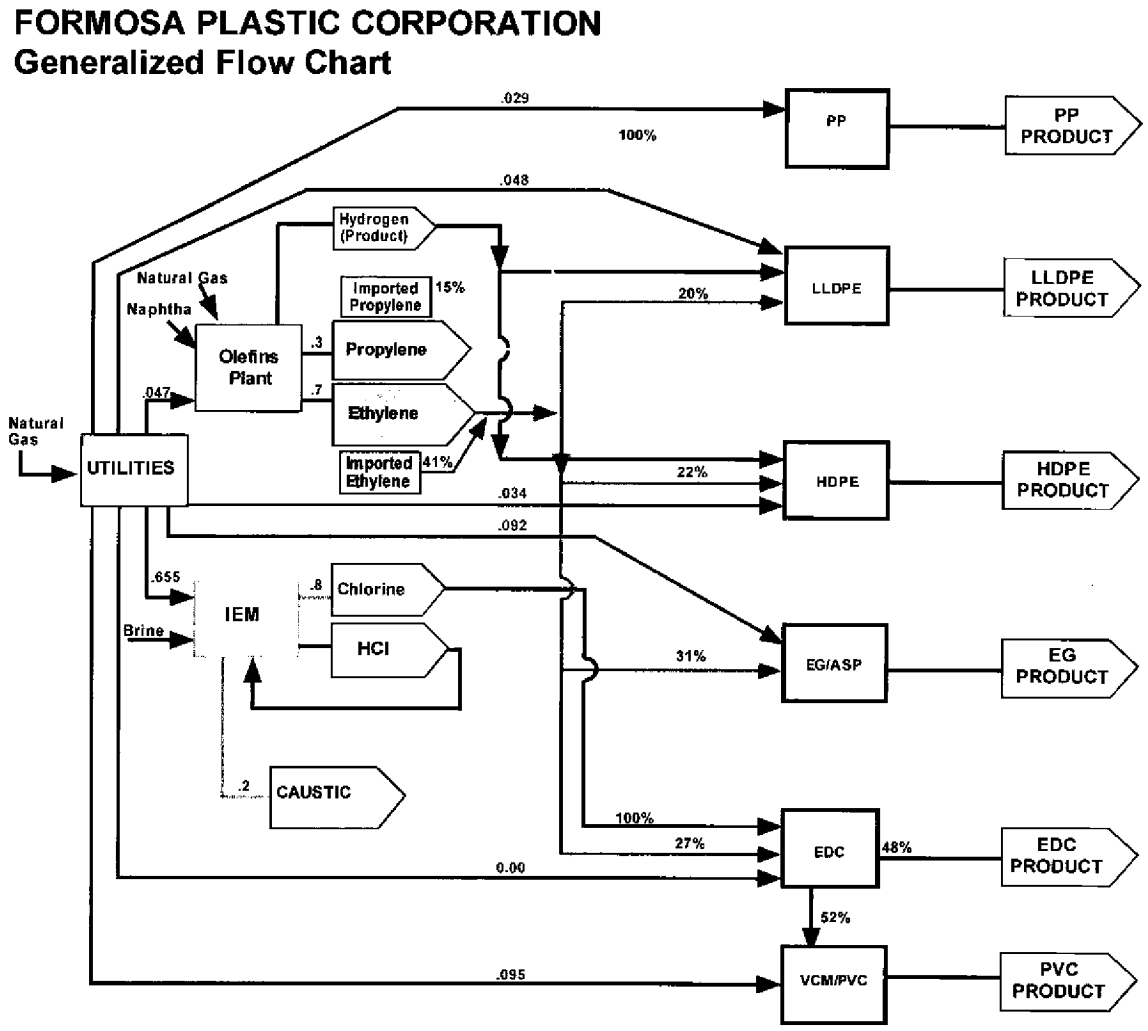


Figure 4: Generalized Flow Chart from Formosa's Life Cycle Analysis

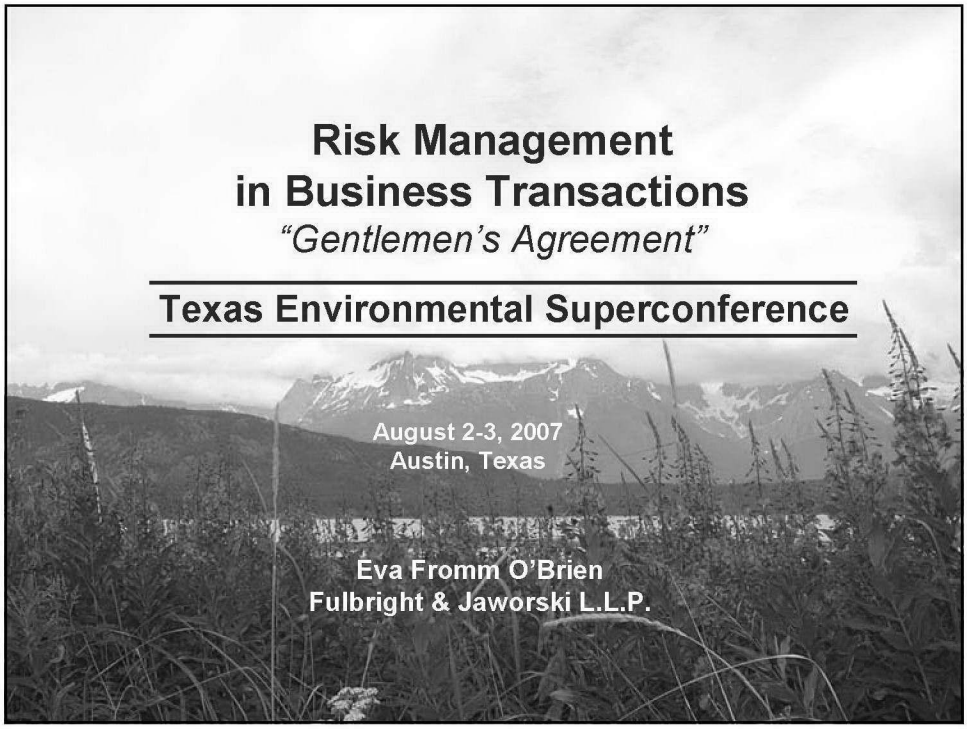


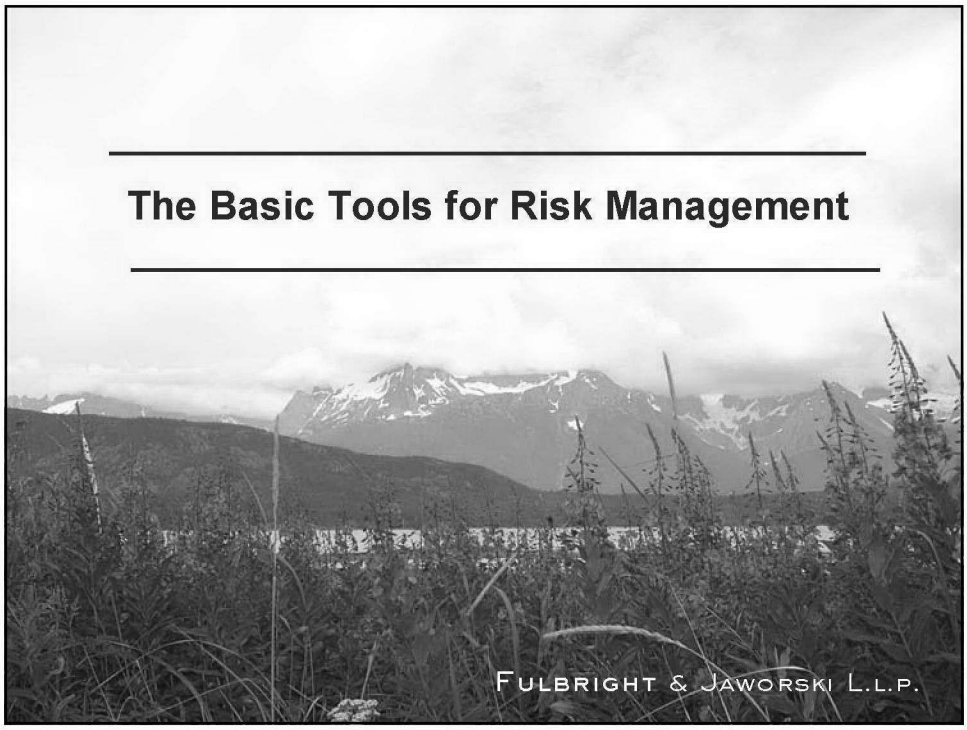
James B. Blackburn, Jr., J.D.
Attorney
Blackburn Carter (Houston, Texas)

An attorney for more than 30 years, Jim Blackburn is a partner at Blackburn Carter, a firm devoted to environmental law and planning. Cases include federal environmental impact and wetlands litigation, state contested cases regarding air pollution, wastewater and solid waste, sustainable development planning and environmental dispute resolution. Blackburn is a Professor of the Practice in Environmental Law in the Department of Environmental Sciences and Engineering at Rice University, teaching courses in global environmental law, sustainable development and U.S. environmental law. Among his honors, he received the National Conservation Achievement Award in 2001 from the National Wildlife Federation and the Bob Eckhardt Lifetime Achievement Award for coastal preservation efforts from the General Land Office of the State of Texas in 1998. He was awarded an honorary membership in the American Institute of Architects for legal work associated with urban quality of life issues in 2003. His book titled *The Book of Texas Bays*, which focuses upon current environmental health of bays in Texas and the efforts undertaken to protect them, was published by Texas A&M press in 2004. He is now working on a second book on Sustainable Development and the Texas Coast. Blackburn received both a B.A. in History and a J.D. at the University of Texas at Austin and an M.S. in Environmental Science at Rice University.

Abigail Johnson

Ms. Johnson is a student at Rice University majoring in Civil and Environmental Engineering and Policy Studies. She has recently returned from South Africa where she was studying international environment and development for the spring semester. Ms. Johnson is a summer intern at Blackburn Carter as part of the Leadership Rice Program and is currently studying sustainable development.


Risk Management
in Business Transactions
"Gentlemen's Agreement"
Texas Environmental Superconference
August 2-3, 2007
Austin, Texas
Eva Fromm O'Brien
Fulbright & Jaworski L.L.P.


The Basic Tools for Risk Management
Fulbright & Jaworski L.L.P.

The Basic Tools

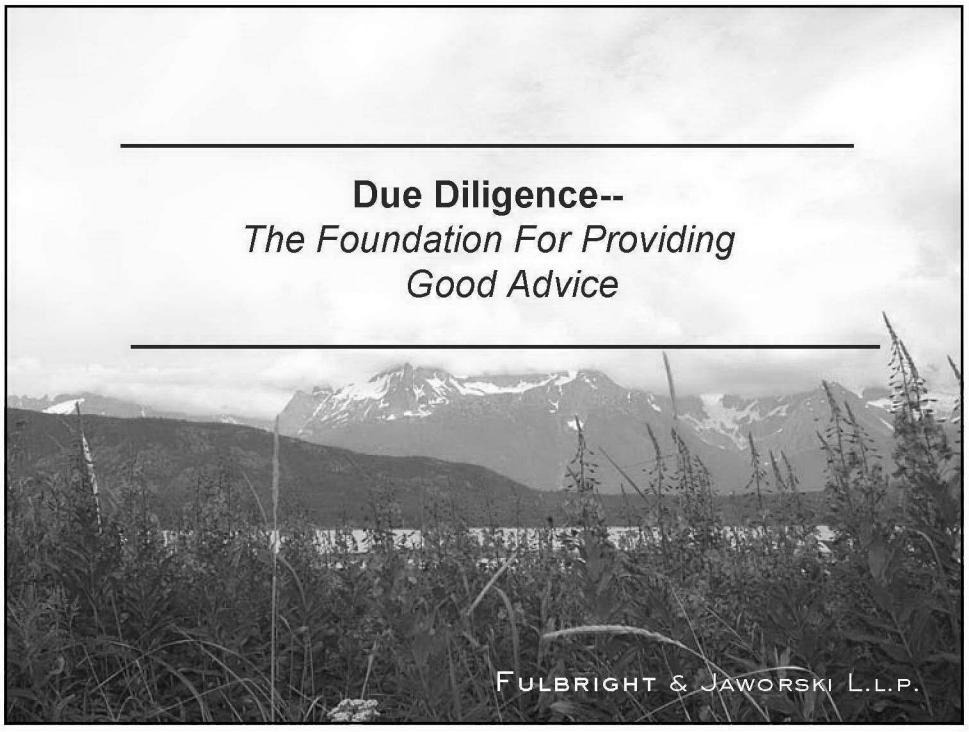
- Due Diligence
  - Scope:
    - All Appropriate Inquiries Standard
    - New Phase I Standard
    - Ability to Conduct a Phase II
    - Timing
  - Confidentiality Agreements
- Representations
  - Tied to Definitions
  - Who
  - What
  - When

The Basic Tools

- Indemnities/Limitations of Liabilities
  - Coverage and Exclusions
  - Risk Allocation Tools
  - Cleanup Issues
  - Insurance
  - Enforcement
  - Tax Issues
  - Survival
  - Formalities (Choice of Law)

The Basic Tools

- Other issues
  - Responsibility for Transfer of Permits
  - Excluded/Orphan Assets and Previously Owned Assets



Due Diligence

- Due Diligence Can Consist of:
  - Reviewing Seller's Documents
  - Conducting a Phase I Environmental Site Assessment (ESA)
  - Conducting a compliance assessment
  - Conducting a Phase II ESA (Soil, Groundwater testing)
  - Conducting testing for asbestos or lead-based paint
  - Conducting a wetlands delineation on property that is planned to be developed
  - Developing ranges of potential exposure for remediation costs and third party claims

Due Diligence – Language Considerations

- Ensure that the client enough time to conduct due diligence.
- If the client wants the right to conduct a Phase II Environmental Site Assessment, this right should specifically be spelled out in the PSA or SPA. (May want to negotiate this at the Letter of Intent stage.)
- Understand the limits of the Confidentiality Provisions (some regulations may require disclosure of contamination).

Due Diligence Pitfall #1

- Pitfall 1: Not understanding what a Phase I covers.
  - A Phase I is a mechanism for identifying potential contamination of the property either through on-site releases or spills of chemicals or wastes, or through migration of materials on-site from a neighboring property.
  - It does not cover whether the facility has been operating in compliance with laws or permits.
  - It may identify that asbestos or lead-based paint could be present, or that the site potentially contains wetlands, but it will not provide definitive advise on these issues.

Due Diligence Pitfall #2

- Pitfall 2: Choosing the environmental consultant without consulting with an experienced environmental transactional lawyer.
  - All consultants are not created equal, just as all lawyers are not.
  - There are good and bad consulting firms. You need to choose wisely or the whole foundation of your advice may be faulty.

Due Diligence Pitfall #3

- Letting the seller conduct the due diligence and provide the client (purchaser) with the report.
  - The client will have no privity of contract with the consultant. Therefore, the client will have no remedy if the consultant misses or does not cover something, either intentionally or unintentionally.

Due Diligence Pitfall #4

- Pitfall 4: Having the corporate attorney review the consultant's environmental report and advise the client without the assistance of an environmental lawyer.
  - Again, all consultants are not created equal. The report that the corporate attorney is reviewing may not be prepared by a competent consultant and therefore the conclusions may be incorrect or incomplete.
  - Experienced environmental transactional attorneys read between the lines.
  - They can read a report and tell whether the risks are significant.

Due Diligence Pitfall #4-Example

- In connection with a transaction, I requested that I review Phase I and II reports that one of the company's corporate lawyers had already reviewed.
- The firm represented an investor/lender.
- The Phase II concluded that there was soil contamination. No comments on how significant.
- There was soil contamination at 5 feet. In another location in the report, the consultant reported that groundwater was encountered at 6 feet. Never mentioned possibility of groundwater contamination.
- Cleanup of the site eventually cost $950,000.

Due Diligence Pitfall #5

- <u>Pitfall 5:</u> Not providing enough time to complete due diligence.
  - A Phase I will normally take a good 3 weeks. There are many government reports that the consultant can not obtain in a shorter time frame.
  - A Phase II will normally take 4 weeks after the Phase I is completed. Can possibly be done in 1-2 weeks if the client is willing to pay double or triple.
  - If the client is trying to get insurance, the carrier will want at least 3 or 4 weeks to review the above, *after* the work has been completed.

Due Diligence Pitfall #6

- Pitfall 6: Not looking at the overall picture.
  - Client has a Phase II conducted but is considering obtaining insurance. If the Phase II test results are bad, the carrier will likely not cover the property.
  - Buying a building "AS IS" but failing to request that the Phase I include testing for asbestos or lead-based paint.
  - Not discussing the potential liabilities associated with off-site migration (*i.e.*, property damage and personal injury litigation).

Other Due Diligence Tips

- You get what you pay for. The cheapest consultant is likely not the best.
- Several states have property transfer statutes, not just New Jersey. The environmental lawyer should be consulted to determine what these statutes can mean in the transaction.
- The consultant will not be able to provide an estimate of the cleanup costs after the Phase II, but an environmental attorney may be able to provide you with an educated guess as to whether it is a small or large problem.
- Where the client is concerned about the compliance of the seller, in some states you can trigger a compliance audit under state law and get immunity from penalties.

New Phase I Standards

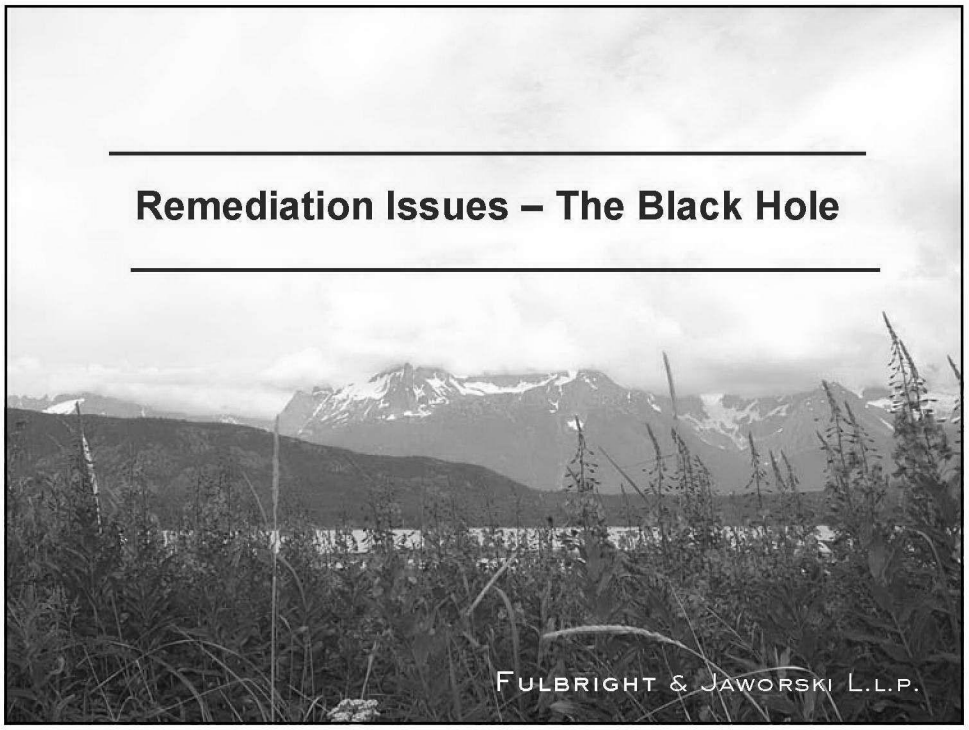
- Know what the All Appropriate Inquiry ("AAI") means.
- AAI first arose as an element of the innocent landowner defense to CERCLA in 1986.
- To be eligible for the innocent landowner defense, a party must show:
  - Acquired the property after the disposal of hazardous substances; and
  - At the time of acquisition, the party did not know and *had no reason to know* any hazardous substances were disposed on the property.

AAI and the New Phase I Standards

- To establish "no reason to know", CERCLA requires a party to prove it carried out "all appropriate inquiries" into the previous ownership and uses of the facility in accordance with generally accepted good commercial and customary standards and practices.
- On November 1, 2005, EPA issued the final rule on the standards and practices for AAI which sets forth the procedure for parties to follow in order to receive protection from CERCLA liability.
- When the final rule becomes effective on November 1, 2006, a party must use the new rule if it wants to qualify for the applicable CERCLA defenses.

Major Differences

- New Phase I will be more costly and take longer.
- Cannot rely on any Phase I more than one year old.
- Must update all Phase Is over 180 days old.
- Includes a more comprehensive investigation, a property valuation analysis and an adjoining property analysis.
- Requires steps to be taken after the acquisition, including taking reasonable steps to: (1) stop continuing releases, (2) prevent future releases, and (3) cooperate with relevant authorities.



Remediation Issues

- These issues need to be discussed with the client early in the transaction:
  - Whether to include cleanup standards in the agreement.
  - What the client intends to do with the property (*i.e.*, flip it right away, move to a new location in the long-term, or continue operating indefinitely). Note that we need to know if the property is leased.
  - Whether the client wants to control the cleanup, and the pros and cons associated with the same.

Other Remediation Issues

- Other issues to consider in drafting:
  - Including language regarding what will trigger the indemnification obligation.
  - Specifying the standards (industrial versus residential) for remediation.
  - Addressing leased properties differently from owned properties.
  - Excluding permitted areas from areas requiring remediation.

Other Remediation Issues

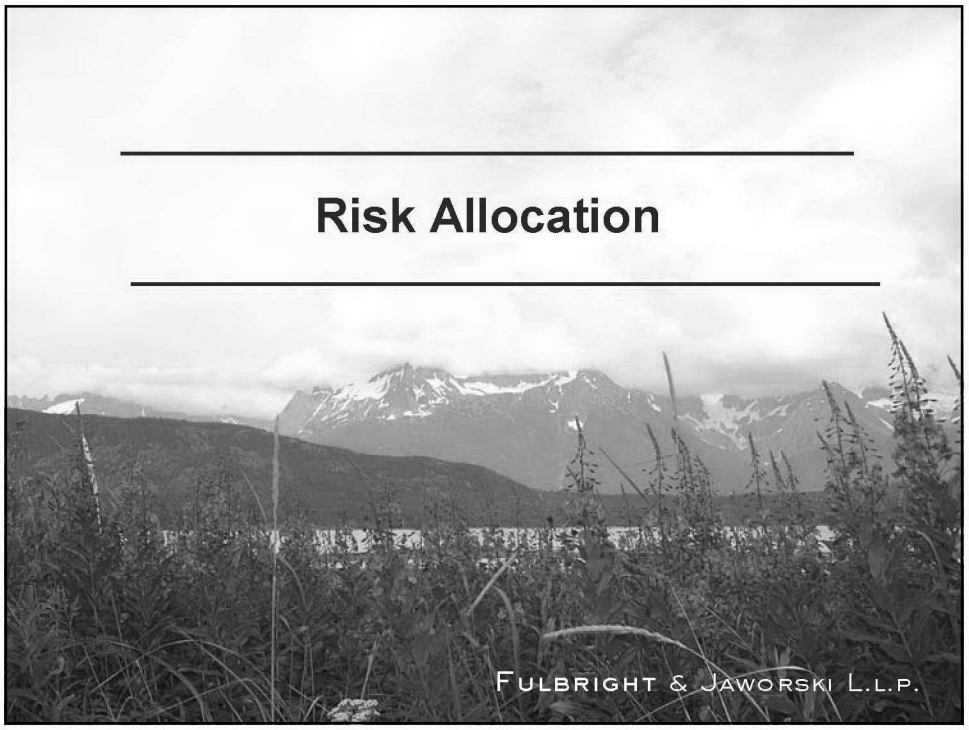
- More issues to consider in drafting:
  - Including language to specify when the cleanup is completed such as receipt of a no further action letter or a certificate of completion. May need an engineer's certificate in lieu of this.
  - Ensuring that where the seller controls the clean up, the buyer still has the ability to contact the agency and participate in discussions.
  - Ensuring that the client may review and comment on report submissions prior to submission to the agency.

A Lawsuit We Handled

- No cleanup standards included in agreement.
- Hazardous Materials were defined as any materials . . . regardless of whether the presence of the same was in violation of environmental laws.
- No specific requirement for triggering remediation – just that "Hazardous Materials" were present above background levels.
- The purchaser continued to operate the sites as industrial locations.
- Purchaser cleaned up all the properties to residential standards or unrestricted use.

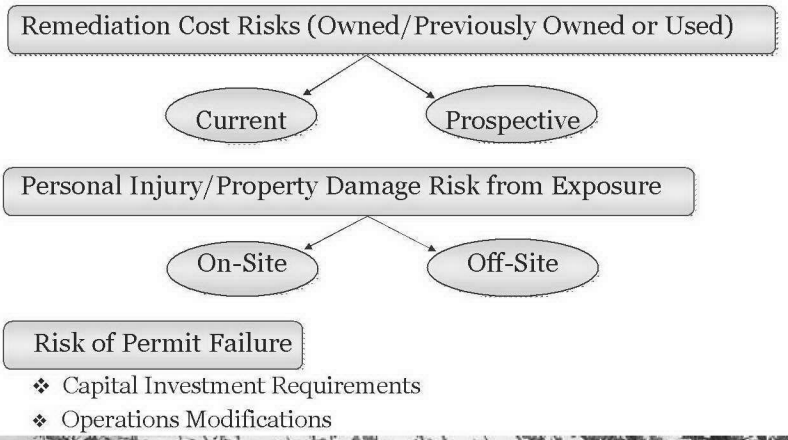
The Lawsuit (Cont.)

- Cost differential between residential and industrial – over $25 million.
- Purchaser included costs to remove materials in permitted landfills.
- Need to do a better job of advising the client in this area, and documenting when the client fails to follow our advise.
- Again, need to bring up these issues early in the transaction.



What Risks Do We Wish To Allocate

ENVIRONMENTAL RISKS



- Capital Investment Requirements
- Operations Modifications

What Are The Risks Do We Wish To Allocate

- Products Liability Risks
  - Product Sold Pre-Closing
    - Manufacturing Defect Risks
    - Design Defect Risks
  - Product Sold Post-Closing
    - Design Defect Risks

What Are The Risks Do We Wish To Allocate

- Other Risks
  - Patent Failure
  - Pending and Threatened Claims (e.g. civil rights, antitrust, breach of contract .....)
    - Claims for Damages
    - Claims for Equitable Relief

What Risks Do We Wish To Allocate

- Problems Surrounding Specifications of Risk Parameters
  - Punitive Damage Claims
  - Joint and Several Liability
  - Time Horizon
    - ❖ Remediation Obligation (Indefinite)
    - ❖ Personal Injury/Property Damage (Discovery Rule/Minors Rule)

Tools for Allocating Risk

STOCK DEAL V. ASSET DEAL GREAT DIVIDE

Tools for Stock Deal

- Good Due Diligence
- Representations and Warranties
- Hold Backs
- Insurance

Tools for an Asset Deal

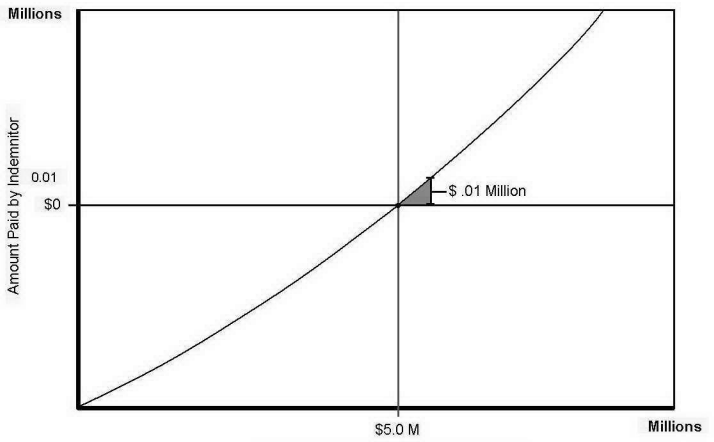
- Good Due Diligence
- Contract Provisions for Transferring Risks
  - Representations and Warranties (Issues on Knowledge Qualifier)
  - Indemnities (Since Disfavored at Law Formal Requirements Important: Conspicuousness and Inspired Words)
  - Reverse Indemnities
  - Environmental Provisions
    - Remediation Agreements
    - Excluding/Orphaning Assets

Tools for an Asset Deal

- Five Tools For Limiting Risk Exposure By Limiting Damage Recovery Amounts
  1. De Minimus Amounts (Aggregating and Non-Aggregating)
  2. Baskets (Tipping and Non-Tipping)

Tool 2 - Baskets

Non-Tipping

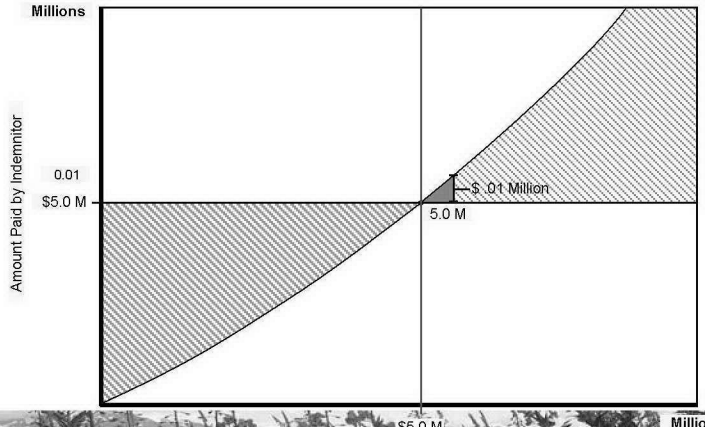


$5.01 Million Loss Suffered by Indemnitee

FULBRIGHT & JAWORSKI L.L.P.

Tool 2 - Baskets

Tipping



$5.01 Million Loss Suffered by Indemnitee

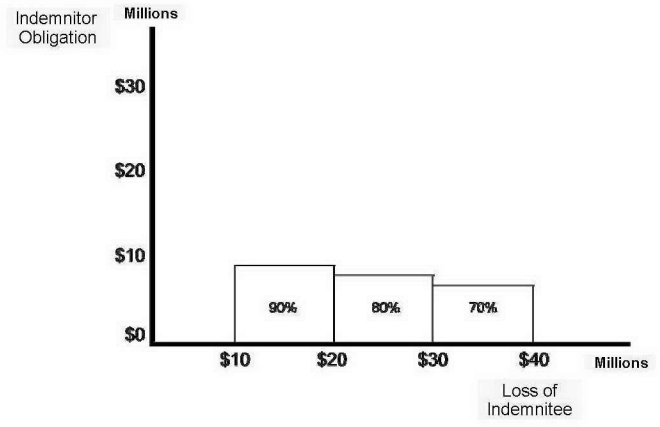
FULBRIGHT & JAWORSKI L.L.P.

Tools for an Asset Deal

- Five Tools For Limiting Risk Exposure By Limiting Damage Recovery Amounts
  1. De Minimus Amounts (Aggregating and Non-Aggregating)
  2. Baskets (Tipping and Non-Tipping)
  3. Tranches
     - Amount Tranche (Declining Block and Jumping Blocks)
     - Time Tranches

Tool 3 - Tranches

Declining Block Tranche



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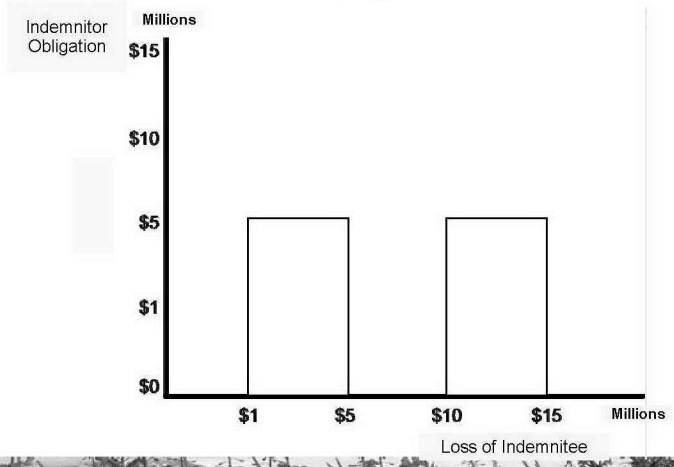
Tool 3 - Tranches

Jumping Block Tranche



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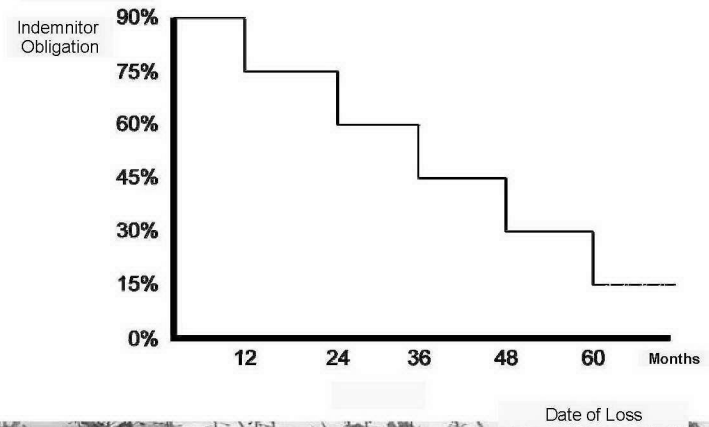
Tool 3 - Tranches

Time Tranche



FULBRIGHT & JAWORSKI L.L.P.

Tools for an Asset Deal

- Five Tools For Limiting Risk Exposure By Limiting Damage Recovery Amounts
  1. De Minimis Amounts (Aggregating and Non-Aggregating)
  2. Baskets (Tipping and Non-Tipping)
  3. Tranches
     - Amount Tranche (Declining Block and Jumping Blocks)
     - Time Tranches
  4. Caps
  5. Tax Benefit Recapture

Tools for an Asset Deal

- Limiting Risk Exposure By Limiting Period for Damage Recovery
  - ❖ Survival Periods
    - (i) Breach of Warranties and Representations (1 year to 2 years)
    - (ii) Products Claims (5 years to 7 years to indefinite)
    - (iii) Environmental Claims (5 years to 7 years to indefinite) (Cutoffs for Ongoing Environmental Remediation)
  - ❖ Survival Period Start Dates
    - Claims Made Date
    - Cause of Action Arises Date

Tools for an Asset Deal

- Limiting Risk Exposure By Limiting Claims Permitted
  - Exclusion of Certain Claims (e.g., Punitive Damages)
  - Need to Cut Off Common Law and Statutory Indemnity and Contribution Claims
    - Exclusive Remedies Provisions (Waivers disfavored, Formalities important)
    - Covenants Not to Sue (Waivers disfavored, Formalities important)

Enforcement Issues

- Arbitration v. Courthouse
- Arbitration:
  1. Scope (need to be express on consequential damages, punitive damages, attorneys fees)
  2. Specification of Rules
  3. Panel selection/Number of Arbitrators
  4. Venue
  5. Local Law Requirements

Covenant Issues

- Transfer of Permits
- Management of Ongoing Lawsuits (Precedent Issues, Injunction Issues)
- Choice of Law
- Follow Up



FULBRIGHT
& Jaworski L.L.P.

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Industries
- *Environmental*
- *Mergers & Acquisitions*

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Denver
Los Angeles
Minneapolis
San Antonio
St Louis
Beijing
Dubai
Hong Kong
London
Munich
Riyadh

Eva Fromm O'Brien
Partner

AREAS OF CONCENTRATION

- Permits
- **Environmental Law**
- Environmental Crimes
- Environmental Litigation
- Mergers and Acquisitions
- Enforcement Controversies
- Crisis Management

EXPERIENCE

Eva Fromm O'Brien, who joined the firm in 1986, is a partner in Fulbright & Jaworski L.L.P.'s Houston office, where she heads up the firm's Environmental Law Department. Her legal practice focuses on environmental consulting and advising (solid and hazardous waste, superfund, underground storage tank, wastewater, and remediation issues), property damage and toxic tort litigation, business transaction matters, contested permit matters, and administrative and civil enforcement cases. She has also handled several criminal enforcement matters. Her administrative practice before the environmental agencies includes handling contested permit hearings and enforcement proceedings, oversight of remedial actions under various federal and state programs, and contribution/cost recovery actions. Ms. O'Brien also regularly provides advice to clients on questions involving regulatory interpretations. In addition, she utilizes her engineering background in conjunction with her legal experience to conduct and supervise environmental compliance audits.

Ms. O'Brien also assists the firm's corporate, real estate, and trust and estate attorneys with the environmental aspects of mergers and acquisitions and problems that arise from management of contaminated properties. She conducts the environmental aspects of the due diligence in these transactions, provides necessary contract language, and supervises the environmental consulting firms to ensure that the appropriate investigations are accomplished. In trust and estate matters, Ms. O'Brien provides counseling on management and ownership issues concerning contaminated or industrial properties.

Having a dual assignment in Fulbright & Jaworski's Litigation Department, Ms. O'Brien also handles environmental and toxic tort litigation. Ms. O'Brien has represented plaintiffs and defendants in superfund contribution and cost recovery actions. She represents clients in property damage and toxic tort matters where the damages result from air, water, or soil contamination. Ms. O'Brien has also represented a number of corporations in criminal proceedings.

PROFESSIONAL ACTIVITIES AND MEMBERSHIPS

Ms. O'Brien is a past secretary, vice-chair and chair of the Houston Bar Association's Environmental Law Section. She is the former chair of the American Bar Association's Real Estate and Probate Section's RCRA and Underground Storage Tank Committee.

FULBRIGHT & Jaworski L.L.P.

BIOGRAPHY: Eva Fromm O'Brien

PROFESSIONAL HONORS

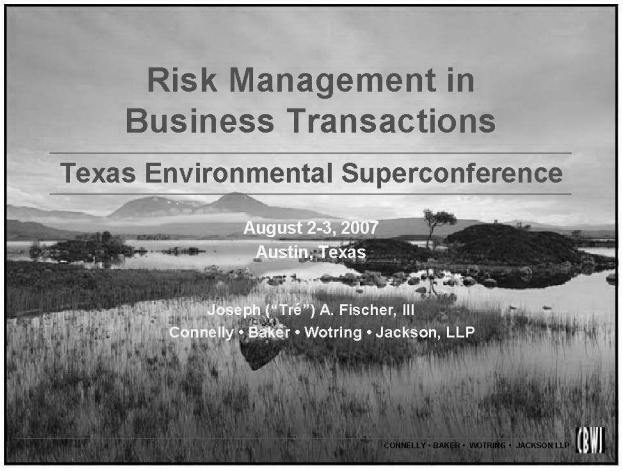
She is included in *Who's Who in American Law*, *Who's Who in America*, and *Who's Who in American Women*. She was also ranked among the top attorneys in Environment Practice Field in Texas according to Chambers & Partners, USA.

EDUCATIONAL BACKGROUND

Ms. O'Brien received a B.S. in Chemical Engineering in 1978 from Syracuse University and a J.D. in 1985 from the University of Houston Law Center. She was admitted to practice in Texas in 1985.

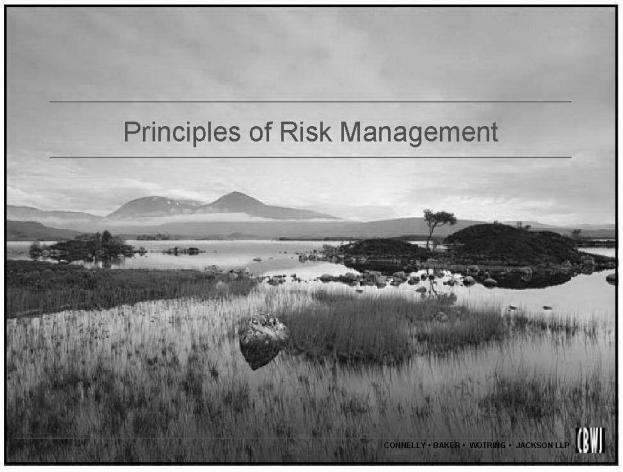
LANGUAGE CAPABILITIES

- French - Limited Proficiency
- German - Limited



Outline

I. Principles of Risk Management.
II. Risk Management Tools—Overview.
III. Limitations of Risk Management Tools.
IV. Comprehensive Approach to Transactional Risk Management.
V. Case Studies.



Purpose

- The purpose of risk management is to make risk transparent to the achievement of business objectives.
- In the context of transactions, this translates to the ultimate goals of
  - Ensuring that risk, particularly unidentified risk, does not impact the client's achievement of the short and long-term business objectives sought through the transaction.
  - Ensuring that the client incurs risk only in proportion to benefit.
  - Managing risk in a manner which facilitates and enables the transaction on desired business terms consistent with the client's risk tolerance.
- Effective risk management presents particular opportunities to facilitate difficult transactions or transactions which otherwise would fail due to risk.

Process

- Risk management is a continuous, forward-looking process that is an important part of our clients' daily business and technical management processes.
- A transaction is simply one facet of that. Take advantage of your client's developed processes where available and appropriate.
- Remediation issues are a primary concern both early on and throughout all project phases attendant to a contaminated property.
- However, transactional risk management must consider all internal and external sources for cost, schedule, technical, and litigation risk.

Process, con't

- Risk management can be divided into three parts:
  - Defining a risk management strategy;
  - Identifying and analyzing risks; and
  - Managing identified risks, including the implementation of risk mitigation plans and programs when needed.
- Effective risk management includes early and aggressive risk identification through the involvement of relevant stakeholders.

Risk Management Strategy

- The risk management strategy should be guided by a common vision of success that describes the client's desired, realistic goals.
- A comprehensive risk management strategy addresses items such as:
  - The scope of the risk management effort.
  - Methods and available resources to be used for risk identification, risk analysis, risk mitigation, risk monitoring, and communication and the time available.
  - Project-specific sources of risks.
  - How these risks are to be organized, categorized, compared, and consolidated.
  - Parameters, including likelihood, consequence, and thresholds, for taking action on identified risks.

Risk Management Strategy, con't

- Parameters for evaluating, categorizing, and prioritizing risks typically include:
  - Risk likelihood (*i.e.*, the probability of risk occurrence).
  - Risk consequence (*i.e.*, the impact and severity of risk occurrence).
  - Thresholds to trigger management activities (*i.e.*, risk tolerance and materiality).
- Risk parameters are used to provide consistent criteria for evaluating the risks to be managed.
- Establishing categories for risks provides a consistent process for identifying and organizing risks as well as focusing appropriate attention on those risks which can more seriously impact the client's objectives.

Risk Identification

- Early identification of risk is important because it is usually easier, less costly, and less disruptive to develop solutions and make changes earlier, rather than later.
- Risk identification should be an organized, thorough approach to seek out probable or realistic risks impacting objectives.
- The objective is to identify potential issues, hazards, threats, and vulnerabilities that could negatively and materially affect the project or the client's plans.
  - To be effective, risk identification should not attempt to address every possible event regardless of how improbable or inconsequential it may be.

Risk Identification, con't

- Risks must be identified and described in an understandable way before they can be analyzed and managed.
- Consistent use of the categories and parameters developed in the risk management strategy to describe the identified sources of risk provides appropriate discipline and efficiency.
- Often it is useful to aggregate risks based on their interrelationships, and develop options at the aggregate level.

Risk Management Options

- Options for managing risks typically include alternatives such as:
  - Risk Avoidance: Changing or lowering requirements, plans, or objectives while still meeting the client's business objectives. *E.g.*, do not buy this property.
  - Risk Control: Taking active steps to minimize or eliminate risks. *E.g.*, cleanup the property before selling it.
  - Risk Transfer: Emplacing a third party to share risk. *E.g.*, buy insurance.
  - Risk Monitoring: Watching and periodically reevaluating the risk for changes to the assigned risk parameters. *E.g.*, monitor a groundwater plume for evidence of increased probability of offsite migration.
  - Risk Acceptance: Acknowledgment of risk but not taking any action.
- Especially for high risks, more than one approach to addressing a risk should be developed.

Risk Management Options, con't

- In many cases, risks will be accepted or monitored.
- Risk acceptance may be appropriate when the risk or its consequence is judged too small for formal mitigation, or when there is no viable way to reduce or mitigate the risk.
  - If a risk is accepted, the rationale for this decision should be documented.
  - If the risk cannot be mitigated, development of a contingency plan should be considered.

Risk Management Options, con't

- It may be appropriate to monitor risks when there is an objectively defined, verifiable, and documented threshold of
  - performance,
  - time, or
  - risk exposure (the combination of likelihood and consequence)

  that will trigger risk mitigation, but which has not yet occurred.
- If risks are to be monitored, it is important to do so through a scheduled, disciplined, and documented program conducted on a sufficiently frequent interval with documented results.
- Risk avoidance, risk control, and risk transfer all require varying degrees of change and external resources and tools.



Risk Management Tools

- Due Diligence
  - Conduct All Appropriate Inquiry.
  - Understand preexisting conditions, risks, and potential impacts on development.
- Contractual Protections
  - Indemnities.
  - Releases.
  - Representations and warranties.
  - Covenants.
- Regulatory Protections
  - Federal and state statutory protections (*e.g.*, BFPP, VCP).
  - Prospective Purchaser Agreements.
  - No Further Action Letters or other determinations.

Risk Management Tools, cont.

- Institutional Controls
  - Deed restrictions.
  - Environmental land use restrictions.
- Traditional Financial Tools
  - Purchase price adjustment.
  - Escrow accounts.
  - Environmental trusts.
- Additional Financial Tools
  - Financial incentives/penalties.
  - Environmental insurance.
  - Third party liability transfer.
  - Environmental development partner (a third party who assumes responsibility for the cleanup in exchange for a percentage ownership in the development).

Common Environmental Insurance Policies

- Principal coverage types include:
  - Cleanup Cost Cap (CCC).
  - Finite Risk.
  - Pollution Legal Liability (PLL).
  - Secured Lender (SL).
- Policy holders can include buyers, sellers, and intermediary owners (*e.g.*, redevelopment authorities).
- Policy forms and endorsements are often individually tailored for each project or transaction.
  - As the size of project or transaction increases, the greater the extent of manuscripting which occurs.
- Most policies are "claims made" not "occurrence" based, requiring claims to be filed during the policy period.

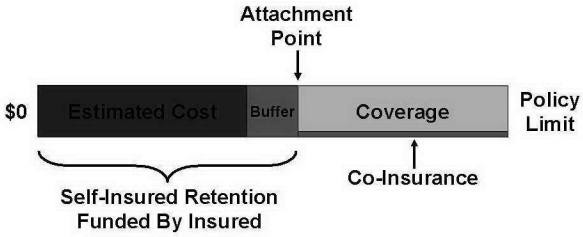
Cleanup Cost Cap Insurance

- Applies to known, preexisting pollution conditions being remediated.
- The coverage provides cost overrun protection resulting from events such as:
  - Changed conditions.
  - New contamination found during clean-up.
  - Changes in regulatory standards.
  - Scope changes.
  - Cost increases.
- Coverage is first party.

Clean-up Cost Cap, con't

- Cost cap claims approach:
  - A self-insured retention (SIR) is established, which is usually equal to the agreed expected cleanup costs plus a buffer.
  - Coverage begins after the SIR is exhausted.
  - Co-insurance is often included, *i.e.*, the insurance may pay only 90% of covered losses.
  - Covered losses also are increasingly limited to direct costs incurred, *i.e.*, no contractor profit.

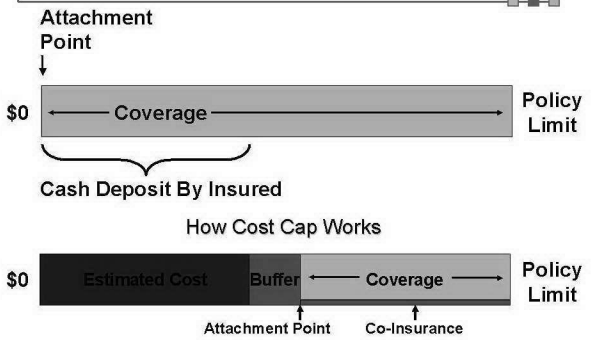
How Clean-up Cost Cap Works



Finite Risk

- Finite risk claims approach:
  - An amount equal to the agreed expected cleanup cost plus a buffer is paid to the insurer at policy inception. These amounts combine with the policy premium to be the overall premium.
  - Insurer then begins paying claims from that point forward.
  - If closure is reached before the funds are expended, the insured receives a refund.
  - Longer term typically available.
  - Can double as both financial assurance of performance and regulatorily required (*e.g.*, RCRA) financial assurance.
  - Insurer provides oversight versus/in addition to client/seller/buyer, which can minimize the potential for later claims disputes.

How Finite Risk Works



Pollution Legal Liability Insurance

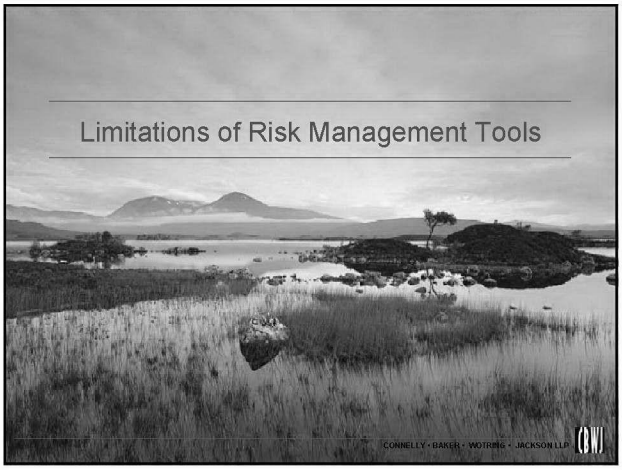
- Intended to provide protection from unexpected expenses and claims.
- Coverages can include
  - Bodily injury or property damage caused by pollution.
  - Cleanup costs for unknown conditions discovered outside of cleanup.
  - Cleanup costs resulting from "re-openers."
  - Business interruption.
  - New conditions.
  - Transportation.
  - Non-owned disposal sites.
  - Natural Resource Damages.

Secured Lender

- Policy pays for covered loans upon loan default where pollution conditions exist.
- Effectively acts as the equivalent of a loan guarantee to insulate a lender from any losses that might arise from a borrower's involvement with an environmental cleanup.
- Policy can cover:
  - Loan balance.
  - Cleanup costs.
  - Legal defense.
  - Contract damages.
  - Bodily injury/property damage.
  - Business interruption/extra expense.

Experience Is Critical

- When considering environmental insurance, make sure the broker is experienced and familiar with the details of the particular environmental insurance products you are considering.
- Many brokers have no or only passing experience with these policies.
  - An informed, experienced broker is a valuable asset.
  - An unfamiliar broker is a liability.
- Likewise, it is important to engage legal counsel who is either experienced or informed about these products.



Limitations

Due Diligence

- Full due diligence may not be possible due to circumstances of the transaction (*e.g.*, timing, prohibition of Phase II investigations by Seller, undiscoverable conditions).
- May later prove to have been incomplete.
- Science evolves.
- Standards change.
- Can never eliminate all uncertainty or risk.
- Additional sampling may affect viability of other risk management tools in some circumstances.
- The potential exists to mitigate limitations with a portfolio approach and probabilistic modeling; not typically available to parties to a single transaction.

Limitations, con't

Contractual Protections

- Willingness to utilize.
- May not fit transaction terms and structure.
- Credit/collection risk.
- Litigation risk.
- Litigation and collection costs.
- Incomplete contractual protection likely (*e.g.*, sunset provisions, caps, exclusions).
- Negative impact on transaction price; exacerbated with "non-risk takers" who over/under value the indemnity depending on role (buyer v. seller).

Limitations, con't

Regulatory Protections

- Willingness and/or ability of regulatory agencies to provide/cooperate.
- Incomplete statutory/regulatory protection.
- Long lead-time to achieve.
- Public comment/involvement may be required, but may not be desirable at this stage.
- Exclusions/unknown conditions.
- Change in standards and other "re-opener" risks.

Institutional Controls

- Willingness of buyer to agree.
- Potential impact on land value.
- Difficult to enforce and monitor, particularly long-term.
- Difficult to predict all necessary restrictions.
- Change in standards.
- Change in neighboring land use.

Limitations, con't

Escrow Accounts; Purchase Price Deductions

- Actual costs may exceed escrowed/deducted amount.
- Transaction may not support value.
- Invites environmental arbitrage, which may complicate other transaction issues and/or derail the overall negotiations.
- May leave the buyer at undue risk in transactions which close without other risk management tools.
- Difficulties in aligning buyer/seller goals increase as risk/uncertainty increases.

Limitations, con't

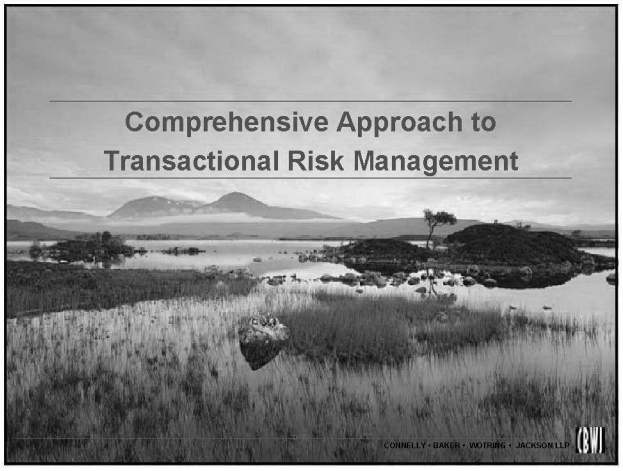
Environmental Insurance

- Availability.
- Cost.
- Underwriting time.
- Exclusions.
- Dollar limits of liability.
- Limited term and renewal conditions.
- Financial strength and rating of insurer.
- Experience/resources of insurer (*e.g.*, commitment, years in the environmental insurance market).
- It is important to ensure that the selected insurer has the necessary resources, financial strength, and claims payment history.

Limitations, con't

Third Party Liability Transfer

- Many vendors:
  - Lack experience and/or adequate resources.
  - Lack significant financial strength.
  - Utilize special purpose entities without assets beyond insurance; credit risk/empty pocket.
  - Include significant clean-up exclusions, and require that variance of actual site conditions from initial assumptions necessitates a change order and increased costs.
  - Offer only limited term and/or only guarantee to a particular regulatory point (*e.g.*, only NFA for a certain site condition).
- There also is a potential for insufficient and even contrary goal alignment depending on buy-out structure and performance standard.
- It is important to ensure that the selected vendor has a demonstrated track record and the necessary resources, financial strength, and experience to discharge the assumed obligations.



Guiding Principles

- The key is to avoid:
  - Unrecognized and/or unaccepted liability gaps.
  - Your client assuming unidentified risks.
  - Your client unnecessarily assuming risks.
  - Your client assuming avoidable risks.
  - Your client assuming risk out of proportion to benefit.
- Of course, the particular site conditions, regulatory status, future intended use of the site, and related details must be understood and integrated into program design from the outset.
- However, this is only the first step.

Guiding Principles, con't

- Understanding stakeholder objectives, limitations, risk tolerance, and concerns and then designing and tailoring the risk management program to them is critical.
  - Often, this is evaluated from only one perspective, with only one stakeholder's interest in mind.
  - Or, worse, it is overlooked completely and gross assumptions are applied.
- Effective risk management dictates consideration and integration of all stakeholder perspectives.

Guiding Principles, con't

- Equally critical is that comprehensive risk management must result in aligned incentives and goals. The greater the alignment:
  - The more likely the program will be successful and
  - The most cost-effective it likely will be.
- Any risk management solution must be both effective and cost-effective.
- Think outside the box, but don't ignore the basics.
- There is no magic wand—each tool has limitations.
- Be creative; mix and match—a combination of tools gets deals done.
- One size does not fit all—every deal is unique.

Guiding Principles, con't

- Think holistically. Environment risk management is a part of the whole and should integrate with and within the overall transaction.
  - It should not be a stand-alone add-on.
  - Nor should it dominate the transaction in most cases where the environmental issues are not the business driver.
- Look for and exploit synergies, common goals outside of the environmental issues, and like opportunities to forge common ground and be more cost-effective.
- Likewise, look for non-environmental risks and issues which could impact the environmental obligations or the ability of the parties to perform and manage them at the aggregate level.

Guiding Principles, con't

- Too often, some parties are overly conservative with environmental risks.
- Many otherwise viable transactions fail or are abandoned when relatively small or manageable environmental risks led the parties to risk avoidance without considering other risk management strategies and tools.
- Environmental risks are manageable.
- Don't be afraid to manage environmental risk or to push back on those who are.

Stakeholder Matrix

- Identify the stakeholders who need something today for the transaction to occur, what they need, and what resources they have to offer—these define what you must do and set the limits of what you can do.
- Identify the stakeholders who need or want something in the future—post-closing—and what those needs and wants are.
  - Will their efforts support the transaction and the risk management program?
  - Or, will their efforts to satisfy their needs and wants create risks and/or undermine the transaction and/or risk management program?
  - Are any such risks effectively mitigated by the risk management program?
  - What additional risk mitigation is needed?

Initial Brownfield Stakeholder Matrix

An initial Stakeholder Matrix in a Brownfield context might look like:

- Seller
  - Timely sale of property.
  - Maximize price.
  - Minimize future liability.
- Buyer
  - Timely purchase and redevelopment.
  - Limit liability.
  - Maximize resale value and flexibility; ROI.
- Lender
  - Not assume any environmental liability.
  - Maximize chance of repayment.
  - Maximize resale value if foreclosure occurs.
- Tenant/End Users
  - Conduct business without interference from or exposure to liability for environmental cleanup and/or BI/PD claims.
- Environmental Regulatory Agencies
  - Cleanup conducted to a level that protects human health and the environment.
- Land Use Regulatory Agencies
  - Achieve maximum economic, social, and environmental benefits from reclamation and reuse consistent with agency priorities and agenda.
- Third Party Claimants
  - Collect damages.
  - Prevent redevelopment.

Aligned Incentives Are Critical

- Again, effective risk management dictates aligning competing and inconsistent incentives and goals.
- Risk sharing is an effective and common alignment tool.
- Reward sharing is often overlooked, but ultimately may be more effective in many transactions.
- Lose-Lose versus Win-Win; an effective program will include both.

Risk Sharing Example

- In the insured/insurer context, deductibles, buffers, co-insurance, direct cost endorsements, and exclusions serve this purpose.
  - Insurers would articulate these as policing the moral hazard inherent in any insurance product.
  - Without them, either premiums must rise to an unacceptable level or the insurance fails across the insurer's book.
- As moral hazard is inherent, these risk sharing provisions also must be inherent.
- However, the more focused these are on particular issues of concern, the more effective the risk management is from the insured's perspective.
  - *E.g.*, exclusion of all groundwater issues, versus exclusion of only a certain aquifer or certain COCs, or versus co-insurance for certain COCs present in certain aquifers, or for certain remedies (*e.g.*, pump & treat versus in situ).
  - Achieving focused coverages requires detailed, technical negotiations, a detailed understanding of the underwriting process, and give and take.
- These same concepts translate across all risk management tools.

Reward Sharing Examples

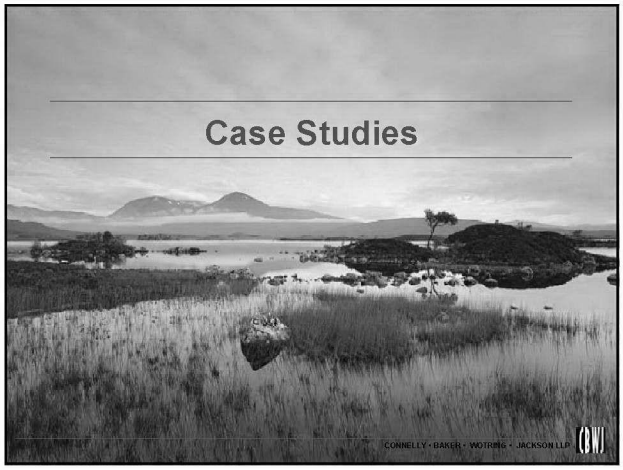
- Also in the insured/insurer context, the finite risk model of Cleanup Cost Cap insurance incorporates reward sharing via return of a portion of the premium if coverage is not accessed.
- Other examples may include retained profit participation for the seller who retained the cleanup obligation in a Brownfield redevelopment in exchange for a lower price initially but a higher ultimate return for both parties.
  - Structured appropriately, it aligns seller and buyer interests in optimizing the level of cleanup and attendant liabilities with ROI on the development.
  - The parties work together versus against each other.
- Another example involves sharing responsibility for cleanup cost overruns and the benefits of underuns post-closing and/or insurance SIRs in the event of overruns.
- In a capitalistic environment, financial incentives motivate behavior. Properly conceived and structured, they can motivate other parties to work to achieve, versus derail, your client's objectives while achieving their own.

Comprehensive Approach

- In many cases, traditional contractual risk management tools and/or price adjustments are all that is required to meet the parties' respective business objectives.
- This is especially true with:
  - Financially viable parties engaged in a traditional "your watch/my watch" allocation with either:
  - Well-characterized environmental issues in a mature regulatory process or
  - A high probability that there are no issues.
- However, even in those cases, specifically crafted contractual provisions can result in better risk management through better aligned incentives and more precise treatment of these issues than mere boiler plate.
  - Also may help avoid future disputes.

Comprehensive Approach, Con't

- Even when traditional contractual risk management tools are sufficient, application of other risk management tools should be evaluated and considered.
- Use of other tools may facilitate greater achievement of business objectives and/or greater value to the seller or buyer.
- This may be as simple as escrowing certain funds with agreed sharing of any remaining proceeds versus "splitting the difference" in price negotiations.
- Of course, when traditional contractual and financial tools fail or are insufficient, you must comprehensively evaluate the risk and available risk management tools to establish a program to mitigate the risk.
- Several case studies illustrate this in practice.



Case Studies

- Former manufacturing facility:
  - *A little bit of everything.*
- Coal-fired generating station:
  - *Focused third party liability transfer and insurance.*
- Bulk petroleum products terminal portfolio:
  - *Focused third party liability transfer and insurance without an underlying transaction.*
- Louisiana refinery:
  - *Innovative use of BFPP protection.*
- Hazardous waste landfill:
  - *Very outside the box.*

Former Manufacturing Facility



Solution

- Seven different risk management tools were employed to optimize cost versus risk management while aligning buyer and seller goals and achieving business objectives:
  - Traditional contractual tools; reps, warranties, releases, etc.
  - The Voluntary Cleanup Program.
  - Deed restrictions.
  - A Trust to oversee cleanup and disburse funds.
  - Deed of Trust against the property.
  - Focused environmental insurance.
  - Financial incentives and rewards.
- The combination of tools resulted in better risk management for lower total costs than any one tool alone while allowing the transaction to occur on desirable business terms.

Contractual Tools

- Traditional contractual tools were employed to transfer responsibility for the cleanup to the buyer.
  - "As is," "where is" sale.
  - Express assumption of responsibility.
  - Disclaimer of reps and warranties by the seller.
  - Full reps and warranties by the buyer.
  - Full buyer indemnity.
  - Full release by the seller.
- Potential credit and performance risks substantially reduce the effectiveness of these tools.

Voluntary Cleanup Program

- In connection with the transaction, the property was entered into the VCP.
- Protects buyer and the Trust as applicants.
- The buyer is obligated to obtain at least a Conditional Certificate of Completion.
- The VCP provides a regulatory framework and increased certainty of achievement of critical milestones.
  - While it does not directly protect the seller, it does ensure that overall site conditions will improve and risks will be reduced amid a structured program.
  - It also provides additional oversight (TCEQ), which is particularly desirable in this case.

Deed Restrictions

- Prior to the sale, a deed restriction was recorded to ensure continued appropriate future land use.
- Helps contain future seller risks from inappropriate redevelopment, land use, or site activities.
- As with all deed restrictions, this may be difficult to enforce and monitor and may not include all necessary restrictions as the situation evolves.

Trust Instrument

- In order to limit financial exposure, provide financial assurance, and provide for a long-term enforcement mechanism in the absence of the seller, a Trust was established.
- The Trust holds agreed cleanup funds, plus, in order to ensure that sufficient funds are available so that the insurance coverage can be accessed, certain agreed insurance deductibles and contingency.
- Carefully considered trust terms limit trustee exposure and involvement except in the event of buyer default, significantly reducing trust costs and increasing buyer willingness to agree.
  - Funded by interest on the trust funds.
  - Facilitated by TCEQ oversight through the VCP.

Trust Instrument, con't

- Payments are made only when agreed milestones are achieved.
  - Milestones primarily are objective milestones tied to the VCP.
  - Reduces disputes and trustee discretion, and thus reduces costs while increasing potential for success.
- In the event of buyer default, the trust assumes the cleanup obligations with remaining funds and insurance.

Deed of Trust

- To provide additional assurance of buyer performance, a Deed of Trust in favor of the Trust was recorded against the property.
- The Trust can foreclose and take title to the property in the event of buyer default.
  - Provides additional assurance of performance.
  - Ensures the Trust can access and control the property if necessary.
  - Provides additional assets to the trust to effect the cleanup in the event of a buyer default.

Focused Environmental Insurance

- A focused insurance policy provided additional risk management—for both the seller and the buyer.
- Cleanup cost cap, PLL, and coverage for third party BI and PD claims were considered.
- Cleanup cost cap ultimately was rejected as offered terms were inconsistent with level of risk transfer provided—buffer, exclusions, and other terms and conditions undesirable given premium
  - This is a consequence of the relative size of the cleanup and other underwriting issues with respect to the property.
- The early and unresolved regulatory process (no APAR) and uncharacterized offsite contamination also initially resulted in undesirable offerings for other coverages.
- Technical advocacy and negotiations resulted in cost-effective terms for PLL and BI/PD coverages with balanced and focused exclusions which automatically are eliminated when certain milestones are achieved.

Financial Incentives and Rewards

- Trust payments structured so that the buyer obtains material payments only upon achievement of the final milestone.
- Similar to a retainage, certain amounts also were withheld from each milestone payment, creating an ever-increasing additional financial incentive to the buyer to achieve the final milestones.
- This helps to ensure that funds remain in the event of a buyer default.
- The overall structure balances ensuring that sufficient funds are available to the buyer to conduct the cleanup with providing financial incentives to do so.
- Finally, the agreed insurance deductibles and contingency held by the trust revert to the buyer in the event they are not used.
  - This provides an additional financial incentive to complete the work and to minimize insurance claims.
  - Reduces performance risks and helps make the insurance more cost-effective and improve its terms by more closely aligning insurer and buyer incentives.
- In combination, these enhanced the potential upside to the transaction for the buyer while increasing the probability of success for all parties.
- This structure not only avoided credit risk, but further incentivized the buyer to succeed in completing the cleanup.

Coal-Fired Generating Station



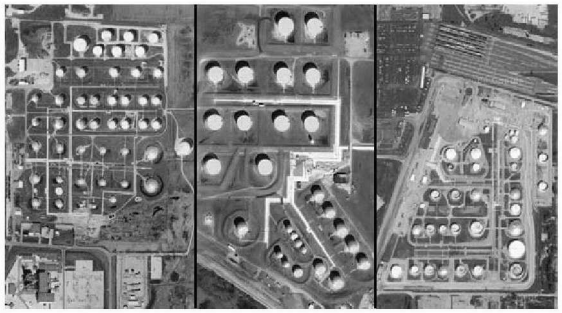
Solution

- Buyer assumes liability, but transfers it at closing via a third party liability assumption contract to an experienced environmental contractor.
- Fixed price, performance based scope of work:
  - Contractor to obtain a No Further Action determination for each AOC.
  - "Re-openers" for all AOCs included for a fixed term (10 year minimum).
  - Responsibility also assumed for unknown preexisting pollution conditions which become actionable during the term.
- This achieved the optimal balance for this transaction between full, perpetual liability assumption and traditional fixed-price, performance based contracting with attendant potential for change orders and exclusions.

Solution, con't

- Financial assurance of performance and second tier risk management provided by a specifically negotiated, narrowly tailored manuscript cleanup cost cap and PLL insurance policy.
  - Focused overages.
  - Manuscripted terms.
  - Specific endorsements and exclusions negotiated for certain AOCs and certain work scope to optimize coverage/premium balance.
- Cash flow issues addressed via a fixed payment schedule over fixed term.
  - Also serves as additional financial assurance of performance.
- Contractor and buyer incentives aligned via negotiated financial and contractual terms.
- Operational and coordination issues resolved via detailed contractual provisions and obligations.

Bulk Petroleum Products Terminal Portfolio



Solution

- Third party liability assumption/transfer to an experienced environmental contractor in conjunction with a narrowly tailored manuscript cleanup cost cap and PLL insurance policy.
- Overall terms and structure very similar to the coal-fired generating station example.
- Key emphasis and distinguishing feature is that the transaction cost-effectively met the owner's ordinary course business objectives in the absence of any underlying transaction.
- Effective risk management transcends application to transactions.
- There are many potential opportunities to meet clients' business objectives through more effective risk management regarding their ongoing compliance obligations and liabilities.
- These should be evaluated on an ongoing basis.

Louisiana Refinery



Solution

- After completing preliminary due diligence, the buyer conducted "all appropriate inquiry," including additional perimeter groundwater sampling to fill identified data gaps.
- Buyer developed and proposed "reasonable steps" to address ongoing cleanup obligations.
- Buyer's contractual assumption of liability and indemnity limited to performance of "reasonable steps."
- Buyer released seller from potential contribution claims.
- No contractual retention of responsibility or indemnity by seller.
- Seller escrowed an agreed amount intended to partially offset the cost of performing "reasonable steps."
- Contractual terms reflect a compromise and balance between seller retention and buyer assumption.

Solution, con't

- Seller's future liability limited to direct claims by governmental authorities under environmental laws as a former owner/operator.
- Buyer innovatively mitigated its future liability beyond performing "reasonable steps" by proactively engaging the Louisiana Department of Environmental Quality pre-closing to evaluate and seek approval of its compliance with applicable BFPP provisions.
- With advocacy, LA DEQ cooperated and issued a written determination pre-closing that the buyer had conducted "all appropriate inquiry" and that its proposed cleanup, if performed, would constitute the required "reasonable steps."
- While this pre-closing engagement (and the additional GW sampling) created certain risks for the seller should the transaction not have closed, the seller was willing to undertake these risks in the overall context of the potential transaction and worked closely with the buyer to manage and mitigate them.

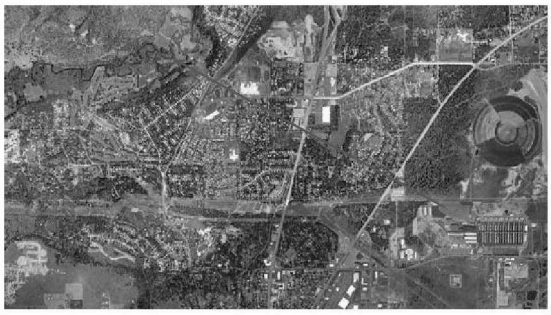
Solution, con't

- The seller cost-effectively mitigated its future risk of direct enforcement regarding re-openers through a focused PLL policy covering only re-opener risks.
- The scope of coverage, the buyer's BFPP determination, the additional GW sampling, and LA DEQ's underlying regulatory approval of the buyer's proposed actions led to very tight underwriting and cost-effective premiums and terms.
  - While neither full site characterization nor an approved remedial action plan are required to obtain environmental insurance, their availability—or, as here, pieces of them—can significantly improve coverage terms and cost.
- To further buttress its intent to have liability only for conducting "reasonable steps," the buyer also is a named insured under the policy and shared in its premium.

Hazardous Waste Landfill



Groundwater Migration to River



Solution

- After significant negotiations, compromises were reached with the regulators resulting in a consent decree ultimately approved by the Bankruptcy Court.
  - Agreements were reached regarding the applicable standards, point of compliance, and related issues in exchange for agreements regarding financial assurance and other concessions.
  - The seller was able to make these concessions due to the focused use of a combination of risk management tools accepted by the regulators.
- The seller established a Custodial Trust to take title to the landfill and sludge pond portion of the Superfund site and manage the future cleanup.
- The seller funded the Trust with funds sufficient to manage the property and conduct agreed monitoring and O&M activities.
- The seller also purchased a thirty-year finite risk cleanup cost cap insurance policy covering only certain identified conditions, including potential active remediation of groundwater.

Solution, con't

- The regulators also agreed to allow a seven year evaluation period for natural attenuation to occur before potentially asserting claims.
- Significant technical advocacy resulted in insurer acceptance that an active groundwater remedy would be unlikely.
- The insurance, then, insures the Trust against the risk that natural attenuation does not result in the standards being met, subject to the seven year evaluation period.
- The success of the regulatory negotiations and compromises were critical to emplacing meaningful insurance in this instance.
- But, the key also was that the insurer—by nature—was able to assume risk that neither the regulators—by nature—nor the seller—due to financial issues—could.

Solution, con't

- Under the consent decree, the seller received a full covenant not to sue and contribution protection, facilitating its successful reorganization.
- The seller was able to sell the remainder of the property for maximum value while achieving a cost-effective and affordable resolution of its long-term liabilities at the site.
- The overall transaction is both unique and resulted in a remarkable result.
- It highlights that any problem can be solved.
- It underscores that gaining a detailed understanding of what all stakeholders need and can give and then reaching compromises through creations of win-wins and creatively employing risk management tools can produce extraordinary results.

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OVERVIEW

Tré Fischer has broad experience with environmental liabilities and contaminated properties; the management, litigation, and resolution of environmental issues against regulatory agencies and private parties; transaction structuring, negotiation, and documentation, including extensive experience with the application and negotiation of environmental insurance policies and other risk management tools to transactions involving contaminated properties and environmental risk transfer; and Brownfield redevelopment. He also has experience in the investigation and litigation resulting from catastrophic explosions and in a wide-range of significant personal injury, toxic tort, and commercial litigation for corporate, individual, and insurance clients; has developed, implemented, and managed environmental, health, and safety audit programs; and has trial and appellate experience in both state and federal courts.

Mr. Fischer has negotiated and documented numerous material transactions and environmental settlements, and has successfully resolved environmental liabilities involving complex issues of contamination in all types of media; Natural Resource Damage claims; third-party litigation for contribution, property damage, and personal injury; contract and indemnity issues; public relations concerns; federal and other governmental PRPs; and cost recovery and insurance issues. He has represented clients at Superfund sites in all ten US EPA regions and at numerous state-lead sites throughout the United States. He also has particular experience with environmental obligations and claims in the context of bankruptcy proceedings.

Mr. Fischer began his practice at the law firm of Mayor, Day, Caldwell & Keeton, LLP; prior to joining Connelly · Baker · Wotring · Jackson LLP, Mr. Fischer was Vice President & Deputy General Counsel for TRC Companies, Inc. and Assistant General Counsel for Kaiser Aluminum. He also served as an adjunct professor at the University of Houston Law Center from 1996 to 2000 teaching civil procedure, legal analysis, and legal research and writing to law students.

REPRESENTATIVE EXPERIENCE

Over the course of several years of environmental risk management and environmental liability transfer experience, Mr. Fischer has represented sellers, buyers, owners, developers, responsible parties, and third-party liability transfer companies in more than two dozen transactions involving sites throughout the United States and frequently requiring customized combinations of legal, regulatory, and financial tools to ensure the appropriate and desired allocation of environmental liability and risk. In this context, Mr. Fischer has obtained significant experience with the wide-range of specialized environmental insurance products available in the market as well as with optimizing their use through combinations with other legal, regulatory, and financial tools such as trust and escrow agreements. Representative examples of his experience include:

- Negotiated the first environmental settlement in Washington State involving the use of a custodial trust and environmental insurance. In this unprecedented agreement, the owner and responsible party transferred a fifty-acre federal Superfund site to a custodial trust negotiated and established for the purpose and which is administered under the supervision of the Washington Department of Ecology and US EPA Region Ten. The transaction also involved the negotiation and purchase of a manuscripted thirty-year finite risk environmental insurance policy. The owner and responsible party obtained a full covenant not to sue and contribution protection under applicable federal and state law. Amid this representation, also represented the owner in its sale of the remaining approximately 200 acres of the former manufacturing facility and neighboring properties to a variety of purchasers utilizing specially tailored risk management tools in each transaction to ensure the long-term protection of the seller. As a result of the carefully optimized and timed sales, the seller ultimately netted positive cash proceeds from the overall resolution and disposition of these properties, including the Superfund site.

- Represented the buyer in its acquisition of two adjacent tracks of land in New Jersey, one of which is a federal Superfund Site and both of which are contiguous to a significant tract of high-profile, high-value wetlands, from a leading energy company. The transaction involved a negotiated assumption of liability by the buyer, a specially designed environmental escrow agreement, and carefully optimized environmental insurance to cost-effectively protect both the seller and the buyer from both known and unknown environmental liabilities, including NRD. Continue to represent the buyer in its efforts to cleanup the sites and to develop one of them as a wetlands mitigation bank to offset some of the costs to be expended in cleanup.

- Represented a third party liability transfer company which assumed multi-million dollar pre-existing environmental liabilities on behalf of the buyer and seller as part the sale of a coal and oil fired generating plant in New Jersey. The transaction involved manuscripted insurance policies and unique issues resulting from the anticipated ongoing operations and planned facility upgrades, requiring the development of unique contractual and risk management and allocation tools.

- Represented a third party liability transfer company in its assumption of multi-million dollar pre-existing environmental liabilities on behalf of a publicly traded master limited partnership which desired to cap its pre-existing environmental liabilities at a diversified portfolio of several terminal and other oil and gas facilities. The transaction involved

multiple insurance coverages, a manuscripted insurance policy and related documents, and a significant insurance underwriting effort due to the nature of the operations and liabilities.

- Represented the buyer of two petroleum terminals in California and Oregon, both of which are contaminated from years of operational impacts and are located amid sensitive habitats and environmental resources and which continue to be operated by tenants. The transaction involved a negotiated assumption of liability by the buyer and carefully optimized environmental insurance to cost-effectively protect both the seller and the buyer from both known and unknown environmental liabilities, including natural resource damage claims. Continue to represent the buyer in its efforts to cleanup the sites and as it is subdividing the properties and reselling them for redevelopment and in some cases continued operation as terminal facilities, ensuring that sales proceed in a manner consistent with the ongoing obligations and with effective risk management.

- Represented the seller in the sale of a former creosote treating facility in Houston, Texas. Designed and implemented a customized combination of environmental liability transfer, an environmental trust, and environmental insurance to allow the transaction to proceed on economic terms and with significant liability protection for the seller and its shareholders.

- Represented the responsible party in a multi-million dollar, multi-site third party liability transfer transaction with a third party environmental liability company. The transaction was approved by the US Bankruptcy Court for the District of Delaware, the US Environmental Protection Agency, and environmental agencies in Louisiana and West Virginia, and resulted in the substitution of the third party for the responsible party on applicable orders and consent decrees.

- Representing the seller, facilitated the sale of a Louisiana refinery with material environmental and closure liabilities, including numerous former spills, several landfills and dump sites in various stages of closure, and several existing solid and hazardous waste facilities, which threatened the transaction. Working closely with the buyer to ensure mutual agreement and the ultimate closing of the transaction, successfully negotiated and implemented an innovative combination of regulatory relief, environmental insurance, and an environmental escrow to maximize the sales proceeds while minimizing any future responsibility for the seller, and obtained court-approved releases for the seller.

- Led all aspects of the sale of a curtailed and environmentally impacted smelter in Tacoma, Washington with material environmental issues, including portions which were in a federal Superfund site, using a combination of regulatory and financial tools to protect the seller, including obtaining court-approved releases for the seller.

- Significant involvement in the negotiation of the resolution and transfer of a responsible party's significant clean-up liability for the Upriver Dam PCB Sediments Site (Spokane River PCB Sediment Contamination Project) in Spokane, Washington. Under the settlement, which was made prior to remedial work beginning, the responsible party—after negotiating favorable and uncommon advance approval of the scope of remedial work to be required with the cognizant regulatory agency—transferred a negotiated amount of cash into escrow to pay a portion of future remediation costs related to the remediation of PCB contaminated sediments and the responsibility to perform the remediation to another responsible party. Through state and federal consent decrees reflecting the settlement, the responsible party

obtained a full covenant not to sue and contribution protection under applicable federal and state law at the time of the settlement, with the other party assuming the responsibility to perform the cleanup.

- Represented the responsible party in third party liability transfer transaction with a third party environmental liability company concerning a high profile site in Florida. The transaction was approved by the US Bankruptcy Court for the District of Delaware, the US Environmental Protection Agency, and the Florida Department of Environmental Protection.

- Represented a responsible party with over 50 years of environmental liabilities at a myriad of contaminated sites across the United States, successfully negotiated a groundbreaking multi-site environmental Consent Decree with three federal agencies, including all ten US EPA regions; the states of California, Rhode Island and Washington; and the Puyallup Tribe of Indians. The agreement resolved nearly $600 million of asserted liabilities at approximately 100 separate Superfund sites, ensured favorable treatment of future claims regarding future sites, and provided a full covenant not to sue and contribution protection under applicable federal and state law, including a release of natural resource damage claims.

PROFESSIONAL EMPLOYMENT

Connelly · Baker · Wotring · Jackson LLP, Houston, Texas.
Of Counsel, February 2006 to Present.
Represent clients in a wide-range of environmental, litigation, and transactional matters, including significant experience with transactions involving contaminated properties and the use of environmental insurance policies and other risk management tools to mitigate and apportion future environmental and financial risks.

TRC Companies, Inc., Houston, Texas.
Vice President & Deputy General Counsel, December 2004 to February 2006.
TRC is a recognized market leader providing environmental and infrastructure engineering services throughout the United States and is regarded as pioneering the environmental risk transfer market. Was primarily responsible for legal issues associated with certain of the company's business units and initiatives, including its industry leading Exit Strategy® environmental risk transfer program.

Kaiser Aluminum & Chemical Corporation, Houston, Texas.
Assistant General Counsel, February 2002 to December 2004.
Senior Litigation & Environmental Counsel, November 2000 to February 2002.
Senior Litigation Counsel, September 2000 to November 2000.
Kaiser was a leading aluminum manufacturer with approximately 5,000 employees operating eighteen major facilities in the United States and abroad. Managed progressively increasing responsibilities for the company's significant litigation, environmental liabilities, and discontinued operations, including a substantial role managing these and other issues through the company's complex Chapter 11 proceedings. Successfully managed significant personal injury, toxic tort, and commercial litigation and a wide-range of environmental obligations and liabilities to favorable outcomes within budget. Negotiated several material transactions and groundbreaking environmental settlements, successfully resolving $100s of millions in

environmental liabilities within budget under aggressive time frames necessitated by the company's bankruptcy proceedings using a wide-range of legal, regulatory, and financial tools.

University of Houston Law Center, Houston, Texas
Adjunct Professor, January 1996 to September 2000.
Taught Civil Procedure, Legal Analysis, and Legal Research and Writing to law students.

Franklin, Cardwell & Jones, PC, Houston, Texas
Attorney, February 1998 to September 2000.
Represented both plaintiffs and defendants in a wide range of commercial and personal injury matters, obtaining first and second chair trial and appellate experience at this litigation boutique.

Mayor, Day, Caldwell & Keeton, LLP, Houston, Texas
Attorney, September 1994 to February 1998.
Associate in the firm's litigation and public law sections representing clients in a wide range of litigation. Lead attorney in numerous hearings, depositions, and mediations and participated in several trials.

EDUCATION

University of Houston Law Center, Houston, Texas; J.D., *magna cum laude*, 1993.

Vanderbilt University, Nashville, Tennessee; Graduate work in Economics, August to December 1990.

Rice University, Houston, Texas; B.A. Mathematical Economic Analysis, Economics, and Policy Studies, 1990.

PROFESSIONAL ORGANIZATIONS AND MEMBERSHIPS

- Member, State Bar of Texas, including State Bar Litigation and Environmental Sections.
- Member, Houston Bar Association, including HBA Environmental Section.
- Admitted to practice before the U.S. Court of Appeals for the Fifth Circuit and the U.S. District Court, Southern, Northern, Western, and Eastern Districts of Texas.

TXU



October 2005 - Perry fast-tracks permit process

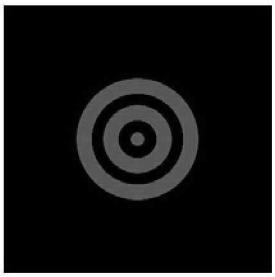


April 2006 - TXU announces coal build-out across Texas



Spring 2006 - Environmental Defense prints “Fair Warning”

Summer 2006 - Environmental Defense plans campaign



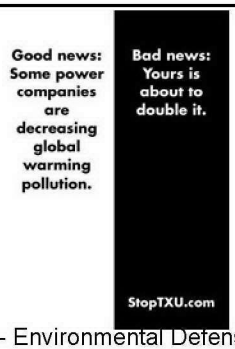




Summer 2006 - Environmental Defense launches StopTXU



Summer 2006 - Environmental Defense launches enewsletter



Summer 2006 - Environmental Defense launches print ads

QuickTime™ and a
YUV420 codec decompressor
are needed to see this picture.

Winter 2006 - Environmental Defense launches TV ads



The New York Times

MONDAY, FEBRUARY 26, 2007

A Buyout Deal That Has Many Shades of Green

By ANDREW ROSS SORKIN

About two weeks ago, Fred Krupp, the president of a nonprofit advocacy group called Environmental Defense, received an unusual phone call.

William K. Reilly, the former administrator for the Environmental Protection Agency under President George H. W. Bush, was on the other end. But its board of directors had approved the bid from Kohlberg Kravis and Texas Pacific for about $45 billion, which would be the largest buyout in history.

The deal was noteworthy not just for its size, but for the confluence of business decisions and environmental concerns that drove the ultimate transaction. Because private equity firms are unregulated and historically

A Bid for Energy Firm Included a Pact With Environmentalists

Wilder, TXU's chief executive, in January with an offer for the company, these people said.

At the time, neither Kohlberg Kravis nor Texas Pacific told TXU about their ambition to

TXU shareholders will receive $69.25 in cash for each TXU share. Goldman Sachs, Morgan Stanley, Lehman Brothers and Citigroup will take small stakes in TXU as well as help finance the debt with J.P.Morgan Chase. In addition, the investor group will assume more than $12 billion of TXU's debt.

The deal represents a 20 percent premium over TXU's clos-

February 2007 - Deal struck, TXU buyers to forego 8 plants

How did this happen?

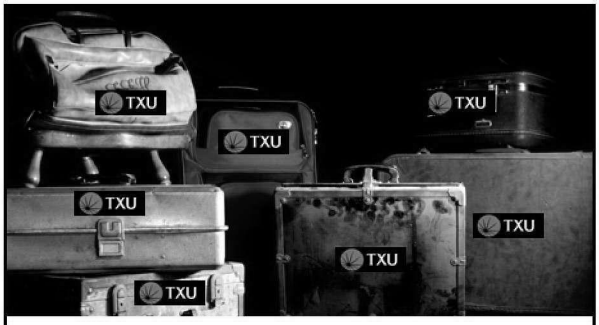


Alcan
Alcoa
American International Group
Boston Scientific
BP America
Caterpillar Inc.
ConocoPhillips
Deere & Co.
Dow Chemical Co.
Duke Energy
DuPont
Environmental Defense
FPL Group
General Electric
General Motors Corp.
Johnson & Johnson
Lehman Brothers
Marsh Inc.
Natural Resources Defense Council
PepsiCo
Pew Center on Global Climate Change
PG&E Corporation
PNM Resources
Shell and Siemens Corp.
World Resources Institute

The world was changing



And so was Texas



TXU had baggage



TXU told remarkable tales



Opposition was broad and diverse....and funded

The New York Times

THOMAS L. FRIEDMAN

Marching With a Mouse

There aren't a lot of environmental groups with their own investment bank consultants, so when you hear that Environmental Defense has just hired the boutique Wall Street firm Perella Weinberg Partners, you know that we're in a new world. Every college activist should study this story, because it is the future. In the old days, when activists wanted something done, they held a sit-in or organized a protest march. Now they hire an investment bank.

O.K., maybe every activist group can't afford Goldman Sachs, but such

Texas Pacific Group not teamed up to offer to buy TXU in February — a deal valued at $45 billion that would be the biggest leveraged buyout ever. But there was a catch: "The buyers did not want to take over a company enmeshed in a war with environmentalists," Mr. Krupp said, "so they came to us and said, 'We only want

The TXU tale shows how to fight online

greenhouse gas plan? ... The markets are ahead of the politicians. The world has changed, and these guys see it."

TXU not only didn't understand that the world was getting green; it didn't understand that the world was getting flat. "Going online," Mr. Krupp said, "we shifted this from a local debate over generating electricity to a national debate over capping and reducing carbon emissions." So, what TXU had hoped would be just a local skirmish was instead watched on computer screens in every global market.

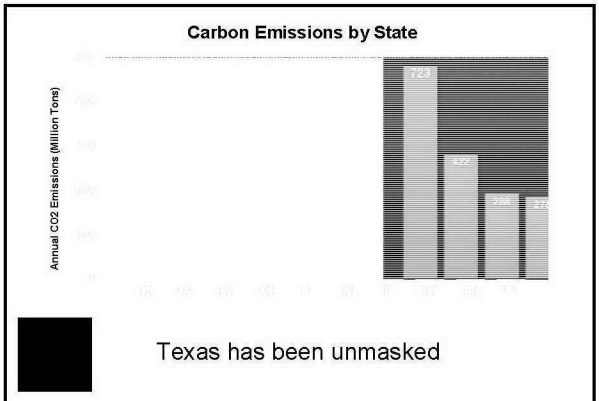
The Internet age is an age of trans-

The world was watching it all online

What are the consequences?



Coal's future has changed



Texas has been unmasked



Global warming was "discussed" at the Capitol

What made the new owners change course?



The New York Times

TXU

BIOGRAPHICAL INFORMATION

JIM MARSTON

Jim Marston is the founding Director of the Texas Office of Environmental Defense, located in Austin, where he has served since its beginnings in 1987. The office is comprised of scientists, attorneys, economists, and policy analysts who address environmental issues related to climate and air, ecosystems, oceans, and environmental health. He holds the position of State Climate Initiatives Director, working in states from California to New England that are initiating legislation and regulation to reduce the emission of global warming gases. He has worked closely with California on the passage of AB32, the first statewide carbon cap legislation that includes all sectors of the economy. His Austin office includes a staff of 27.

Currently, Jim is president of the Texas League of Conservation Voters, and serves on the boards of directors of Texas Observer, Texas Environmental Research Consortium, the Green-e Governance Board, and the Central Texas Clean Air Force. He is the former chair of the U.S. Good Neighbor Environmental Board, Presidential Advisory Committee and served as vice-chairman of the Texas Ethics Commission from 1992 to 1994. He has served on numerous other advisory boards for the State of Texas, the City of Austin, electric utilities, and a university.

JAMES D. MARSTON

Present Position

Director, Texas Office of Environmental Defense
Director, Environmental Defense State Climate Initiative
44 East Avenue, Suite #304
Austin, Texas 78701
(512) 478-5161

Current Civic and Advisory Boards

President, Texas League of Conservation Voters
President, Board of Directors, Texas Observer
Board of Directors, Texas Environmental Research Consortium
Executive Committee, Central Texas Clean Air Force
TXU Sustainable Energy Advisory Board

Former Civic and Advisory Boards

Chair, U.S. Good Neighbor Environmental Board
Vice Chair - Texas Ethics Commission
Chair, Texas Water Commission Study Committee on Water Quality
Lower Colorado River Authority Electric Advisory Committee
Co-Chair, Balcones Habitat Conservation Plan Economic Impact Subcommittee
Chair, City of Austin Campaign Finance Task Force
National Governing Board Member, Common Cause
U.S. Delegation to the Trade and Environment Committee of the O.E.C.D.
Clean Air Texas Subcommittee on Stationary Sources
Member, TNRCC, Risk Assessment Public Advisory Committee
Institute for Corporate Environmental Management (University of Houston Business School)
President, Texas Citizens Action
Miscellaneous Boards: Texas Watch, Texas Rural Legal Aid, Green-e

Prior Legal and Professional Employment

Partner
Doggett, Jacks, Marston & Perlmutter
1980-1988

Assistant Attorney General
Environmental Protection Division
1978-1980

Education

New York University School of Law, New York City
Juris Doctorate, 1978 Honors: Root-Tilden Scholar

Texas Christian University, Fort Worth, Texas
B.A., Political Science, 1975 Honors: Magna Cum Laude, Phi Beta Kappa

Bill Bumpers is an environmental partner in the Washington, D.C., office and heads the firm's global climate change practice group. Mr. Bumpers focuses on the Clean Air Act and climate change issues. He has an active environmental regulatory, litigation, and transactional practice, representing petroleum refineries, investment companies, electric generators, and pharmaceutical and chemical manufacturers. He is regarded as a national authority on new source review issues affecting the electric generation and petroleum refinery industries. He previously served on the EPA's New Source Review Reform Subcommittee of the Clean Air Act Advisory Committee.

Mr. Bumpers also is a leading authority on climate change issues, including carbon trading mechanisms in the United States and internationally pursuant to the Kyoto Protocol. He has been involved with climate change issues since his work on energy policy and climate change as a graduate student in 1977. He served as counsel to the team that performed the feasibility study for the World Bank's Prototype Carbon Fund. He also represented the International Finance Corporation on its carbon purchase program on behalf of the Netherlands. More recently he has been involved in structuring Clean Development Mechanism (CDM) projects in Malaysia, China, and Equatorial Guinea, including the negotiation and drafting of contracts for the purchase and sale of CO_2 emission reductions. Mr. Bumpers also represents a wide range of companies on developing policy and regulatory issues in the United States and regarding the creation and sale of GHG emission offsets.

Representative Engagements

- Noble Energy – representation of Noble Energy in connection with the transfer and sale of CERs from a proposed Clean Development Mechanism ("CDM") Project in Equatorial Guinea
- NYMEX -- Advisor regarding the creation of carbon futures contracts based on various regulatory and voluntary trading programs
- International Carbon Corporation – negotiations for exclusive right to develop CDM projects at palm oil mills in Malaysia and assist with the development of project design document under the CDM
- ChevronTexaco – negotiations with the EPA to resolve global environmental claims against CTX's five domestic refineries
- Mirant Energy – representation on Clean Air Act compliance and enforcement matters
- XCEL Energy Inc. – representation as XCEL's national Clean Air Act counsel for compliance and permitting
- NRG Energy Inc. – serve as national environmental counsel
- Marathon Ashland Petroleum (MAP) – negotiations with the EPA to resolve allegations of Clean Air Act violations involving new source review, new source performance standards, and BWON and LDAR requirements
- Wal-Mart -- representation on climate change transactional and policy issues

Education and Honors

J.D., University of Virginia School of Law, 1984
Editor in Chief, *Virginia Journal of Natural Resources Law*
M.A., economics, Antioch University, 1979
B.A., economics, Hendrix College, 1977

Recognitions and Honors
Chambers USA Guide *America's Leading Business Lawyers* since 2004; *The Best Lawyers in*