FC Issue Communications Plan

Revised – May 24, 1999

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Introduction

Introduction

Situation

3M has discovered, through its own state-of-the-art analytical methods, trace amounts of a molecule manufactured by the company, perfluorooctane sulfonate (PFOS), among other organofluorines in pooled serum samples from blood banks.

There is no medical or scientific basis to attribute any adverse health effects to 3M products. Studies of production workers exposed to PFOS in manufacturing have shown no association with any health effects. PFOS levels in these workers are 100 times the levels discovered in the pooled serum samples.

3M has notified the appropriate government regulatory agencies. Furthermore, 3M has taken prudent action to accelerate scientific studies on health, safety and environmental issues. In addition, 3M is developing and implementing plans to minimize exposures and emissions.

A comprehensive communication effort is under way to inform our various constitencies of this finding.

Communication Goals

- Protect and enhance 3M's reputation
- Affirm safety and reliability of 3M products
- Reinforce 3M's commitment to providing a safe work environment
- Affirm 3M's commitment to environmental responsibility
- Generate support for chemical business transition, should one occur
- Neutralize false and inaccurate messages from detractors

We will accomplish this by:

- Communicating with key audiences in a timely and effective manner, using persuasive messages
- Demonstrate that 3M is doing the right thing

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Get Audiences To

- See: that 3M is doing the right thing
- Feel: secure, confident, reassured
- Do: continue to trust and support 3M

Strategies

- Be prepared to respond should a public issue emerge.
- Develop a plan for 3M initiated disclosure.
- Engage all four major constituencies, as appropriate:
  - Government regulatory agencies and officials (public)
  - Employees: plant, business and general
  - Customers: business, consumer
  - Investors: shareholders, analyst
- Conduct Wirthlin research to aid decision-making
- Review product lines for links to exposure
- Understand ongoing toxicology and environmental research
- Develop key messages and communication tactics
- Prepare media and opinion leader analysis
- Identify key advocacy groups and industry associations
- Prepare third-party experts and testimonials
- Engage Science Advisory Panel/Battelle Institute
- Establish tracking and feedback mechanisms

Assumptions

- Need for communication is likely to be long-term
- Facts to be assembled into credible, persuasive case
- Each message additive (one message is not enough)
- Maximum flexibility is desirable--keep options open
- Accuracy is essential

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Backgrounder

Backgrounder

3M recently developed a new method for rapidly detecting certain specific molecules at levels a thousand times more precise than previously possible. We believe that 3M is the first to apply this state-of-the-art methodology to achieve such low levels of detection for this chemistry. This breakthrough will be useful in 3M product improvement and environmental stewardship initiatives.

For example, 3M has a long history of making and using synthetic chemicals, such as organic fluorine, for a wide range of beneficial industrial and consumer products. Some of these chemicals, such as perfluorooctane sulfonate (PFOS), are persistent (long lasting). Our new detection method has improved our ability to identify and reduce the levels of this chemical in our products and in our manufacturing emissions.

This innovative new method also has allowed 3M to confirm that PFOS is part of the organic fluorine level found in the general population. It has been known for decades and reported in the scientific literature that organic fluorine, like many other synthetic and naturally occurring chemicals, are present at trace (parts-per-billion) levels in the human body. No human health effects have been associated with the presence of organic fluorine at these levels.

For more than 20 years, 3M has monitored employees who work with organic fluorine. Our studies have found no harm at levels about 100 times higher than that found in the general population. A broad spectrum of scientific studies and a half-century of worldwide beneficial use of our products support this finding.

We remain committed to innovation, product improvement and increased scientific understanding. We will share 3M industrial hygiene and environmental expertise with our customers, and with members of our industry, toward progress in long-term product and environmental stewardship.

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Key Messages

- 3M researchers have developed a new method for rapidly detecting certain specific molecules at levels a thousand times more precise than previously possible. This difference is like using a microscope versus looking at something with the naked eye.

- This 3M breakthrough will be a valuable tool in our ongoing product stewardship and environmental efforts as we enter the 21st century. We expect it to become the model for other companies in our industry.

- Our new detection method has improved our ability to identify and reduce the levels of certain chemicals in our products and in our manufacturing emissions.

- For decades, people have known that many naturally occurring and synthetic chemicals, such as organic fluorines, are present in the human body at trace (parts-per-billion) levels.

- No human health effects have been associated with the presence of organic fluorine at these levels.

- 3M has a long history of making and using synthetic chemicals, such as organic fluorine, for a wide range of beneficial consumer and industrial products.

- One example of an organic fluorine molecule is perfluorooctane sulfonate (PFOS). 3M has manufactured PFOS and related molecules since 1948.

- 3M's new methodology has allowed us to detect PFOS as part of the organic fluorine level found in the general population.

- For more than 20 years, 3M has conducted medical studies among employees who work with organic fluorine. Our studies show no harm at (parts-per-million) levels about 100 times higher than that found in the general population.

- Some organic fluorines such as PFOS are stable, long-lasting (persistent) molecules.

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- As a leader in environmental initiatives and product stewardship, we are committed to a number of action steps:
  - 3M is actively conducting further toxicology and environmental studies to advance our scientific understanding. We are working with a number of leading, independent researchers and scientists on this research effort.
  - We've initiated discussions with government regulatory agencies globally, including the U.S. EPA and FDA, to share our findings and to seek their input and guidance.
  - We have already reduced this molecule in both products and emissions. We are dedicated to innovation, product improvement and advancing scientific knowledge.

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Key Messages

Benefits of FCs

Benefits of Fluorochemicals

Helps Protect Life and Property

Fluorochemicals form tough, yet resilient Fire Fighting Foams ideal for suppressing raging, liquid chemical and organic fires. These foams help reduce environmental impact of oil and petrochemical blazes. The foams can also be used to suppress toxic and obnoxious vapors, odors and dust.

Helps Protect the Environment

3M™ Fluorochemicals can outperform CFCs without harming the Earth's ozone layer. Because of their unique properties, they are the ideal medium for dissipating heat in supercomputers and for cleaning sensitive electronic components during manufacturing.

Helps Improve Many Products

Scotchgard™ Fabric Protectors have been used for more than 40 years to provide soil, stain and water resistance to carpeting, fabrics and leather. These products keep furniture and fabrics looking newer longer. Reduced need for cleaning means less use of energy and cleaning chemicals.

Fluorochemicals in paints and coatings serve as a wetting agent so that paint flows better on a substrate.

Computer keyboards function better with the help of 3M™ Fluorochemicals because they stop the board from shorting out as a result of static electricity or moisture.

Helps Maintain Integrity of Food Packaging

Scotchban™ Protector puts an invisible barrier on paper products, while still making it possible for consumers to recycle the paper. Helps protect the food supply by forming a barrier that stops grease, oil and water on paper, paperboard and molded pulp packaging. Used on pet food cartons and bags, snack food and candy packaging, microwave and frozen food packaging, personal care products and fast food bags and wraps. Since it often replaces film, foil and laminates, as well as other layers of packaging, using the product can reduce bulk.

Helps Protect Doctors and Patients

3M Performance Chemicals help medical garments, hospital linens and other nonwoven materials to repel liquids. For example, they are used with 3M™ Steri-Drape™ Surgical Drapes to protect patients and medical personnel from spread of infection and disease.

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Important to Many Industries

3M Fluoroelastomers are used in critical applications for the automotive, pollution control, chemical processing, pulp and paper, petroleum production, aerospace and food processing industries. They can be fabricated into O-rings, bonded seals, reinforced composites, hoses, custom molded goods and coatings.

The mining industry relies on 3M fluorochemicals to help them get more metal out of the ground while reducing their use of other more hazardous chemicals, such as acids. In addition, the fluorochemicals act as a surfactant and form a liquid blanket over the acid baths thus preventing fumes from escaping into the atmosphere.

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Divisions/Products

Division	Product	FC #
Traffic Control Materials	880 Screen Inks & 892 Flow Additive	FC-431
Traffic Control Materials	Treated Beads	FM-3405
Adhesive Systems	Scotch-Weld Epoxy Adhesive	FC-430
Bonding Systems	Industrial Acrylic Foam Tape	FM-4171
Bonding Systems	Industrial Acrylic Foam Tape	R-21666
Automotive	Primers	
Automotive	Tapes	
PCRP	Microporous Film – Garments	FX-1801
Occupation Health and Environmental Safety	Respirator – Middle Film Layer	L-8705
Med-Spec	Cosmetic Component	FM-3559
Medical-Surgical	Surgical Mask	FC 95
Medical-Surgical	3M Scotchcast Splint	FC 280
Medical-Surgical	Sterilization Indicator	FC 824
Medical-Surgical	Surgical Mask	F-7755
Dental Products	Surgical Mask	FX-1801
Construction and Home Improvement Markets	Auto Scotchgard Protector, Cleaner, Leather	FC-228
Spec. Con. Mkt	Scotchtint and Scotchshield	FC-431
Spec. Con. Mkt	Scotchtint and Scotchshield	FC-171
Spec. Con. Mkt	Scotchtint and Scotchshield	F-6272
Spec. Con. Mkt	Scotch-Clad Deck Coating	FC-430
Commercial Graphics	9720/9730 Inks	FC-431
Commercial Graphics	1920DR/1930 Inks	FC-430
Commercial Graphics	820/830 Paint-on-Inks	FC-430
Commercial Graphics	3700 Piezo Inks	FC-430
Industrial Tape and Specialties	854 Polyester Tape	RD-1240
Industrial Tape and Specialties	226 Black PE Masking Tape	
Abrasives	Coated Abrasives	FC-430
Abrasives	Coated Abrasives	FC-129
Abrasives	Scotch-Brite	FC-170
Corrosion	Scotchcast 5400 Resin	FC-430
Automotive Aftermarket	Automix, Marine Sealant, Primer	FC-430
Automotive Aftermarket	Polish, Hand Glaze, Polish Prep	FC-129
Automotive Aftermarket	Paste Wax,	FM-3559

*Requires further review

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Customer Letter

Customer Letter

FC Customer Letter – Follow-up to visits
DRAFT 2/17/99 10:45 a.m.

Dear _____:

This letter is to follow-up on the (date) discussion between (3M attendees' names) and (customer's company, representatives).

3M wishes to inform you, as a valued customer, about continuing technology and product innovations. These initiatives reflect our dedication to product improvement and environmental stewardship.

3M has a long history of making and using synthetic chemicals, such as organic fluorine, for a wide range of beneficial industrial and consumer products. Some of these chemicals, such as perfluorooctane sulfonate (PFOS), are persistent (or long-lived). 3M recently developed a new method for rapidly detecting specific types of organic fluorine molecules at levels a thousand times lower than previously possible. We believe that 3M is the first company to apply this state-of-the-art methodology to achieve such low levels of detection for this chemistry. This innovative approach has improved our ability to identify and reduce the levels of this chemical in our products and in our manufacturing emissions.

This new methodology also has allowed 3M to confirm that PFOS is part of the organic fluorine level found in the general population. It has been known for decades and reported in the scientific literature that organic fluorine, like many other synthetic and naturally occurring chemicals, are present at trace (parts-per-billion) levels in the human body. No human health effects have been associated with the presence of organic fluorine at these levels. For more than 20 years we have monitored our employees who have worked with organic fluorine. Our studies have found no harm at levels about 100 times higher than that found in the general population. A broad spectrum of scientific studies and a half-century of beneficial and worldwide use of our products support this finding.

3M will work in close partnership with you and members of our industry by sharing our industrial hygiene and environmental expertise. We remain committed to innovation, product improvement and increased scientific understanding. We believe that by working together with our customers and other interested parties we will share progress toward long-term environmental and product stewardship.

Please feel free to call me at 1-888-936-3636 if you have questions or would like additional information.

Sincerely,

Dr. Bill Weppner, Director, Environmental, Health, Safety & Regulatory Affairs

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Contact List

Science Advisory Panel

Science Advisory Panel

Gil Omenn, M.D., Ph.D.
Executive Vice President Medical Affairs
University of Michigan

Ray Greenberg, M.D., Ph.D.
Vice President for Academic Affairs
Provost, Medical University of South Carolina

Elaine Faustman, Ph.D.
Co-Chair, Division of Environmental Health
University of Washington

Bob Huggett, Ph.D.
Vice President Research and Graduate Studies
Michigan State University

Don Kennedy, Ph.D.
Bing Professor of Environmental Science
President Emeritus
Stanford University

Key Consultants

Jack Moore, Ph.D., D.V.M.
President and CEO
Institute for Evaluation of Health Risks

Joe Rodricks, Ph.D.
The Life Sciences Consultancy LLC

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Third-Party Experts

Third-Party Experts

To ensure credibility when contacted by the media, 3M should be able to provide the names of independent third-party experts who have been briefed on the issue, including all the available science, and are prepared to respond to questions from representatives of the press or broadcast media.

Available spokespersons will need to be periodically updated on test results and other developments to remain current on the issue.

Currently Available

Elizabeth M. Whelan, Ph.D.
President, American Council on Science and Health
New York, New York
(212) 362-7044

- Comment: Dr. Whelan frequently speaks and writes on health and environmental issues from an industry point of view.

- Status: Dr. Whelan has agreed to act as a spokesperson for 3M, but has not been briefed on the FC issue. ACHS has recently prepared a report emphasizing the need to use good science and the principles of risk assessment to evaluate reports of the present of man-made substances in blood. Report to be finalized and an op-ed prepared.

Chris Wilkinson, Ph.D.
Past President, Society of Regulatory Toxicology
and Pharmacology
Vice President
Jellinek, Schwartz & Connolly, Inc.
Arlington, Virginia
(703) 312-8518

- Comment: Dr. Wilkinson is a toxicologist and consultant to 3M; he is expected to be a particularly effective spokesperson for the more technically oriented print media on the health aspects of the issue.

- Status: Dr. Wilkinson has been fully briefed on the science; he currently is writing a review, for publication, of the data historically available on PFOS.

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Gail Charnley, Ph.D.
HealthRisk Strategies
Washington, DC
(202) 543-2408

- Comment: Dr.Charnley, a toxicologist, is the former executive director of the Presidential/Congressional Commission on Risk Assessment and Risk Management and before that with the Toxicology and Risk Assessment Program at the National Academy of Sciences. She is the current president of the Society for Risk Assessment and a consultant with the Harvard Center for Risk Analysis.

- Status: Dr. Charnley has been fully briefed on the science and has been provided with 3M's submission to the FDA on the safety of food packaging applications. She is expected to focus on the health aspects of the issue. She has indicated a desire for media training before any on-camera interviews. She has recently been provided with information on PCBs and blood to provide perspective on the PFOS issue.

Joseph Rodricks, Ph.D.
The Life Sciences Consultancy
750 17th Street, NW
Washington, D.C.
(202) 785-7420

- Dr. Rodricks is a toxicologist and an Adjunct Professor, The John Hopkins University School of Public Health. He is the former Deputy Associate Commissioner for Health Affairs (Science), U.S. Food and Drug Administration.

- Status: Dr. Rodricks has been fully briefed on the science. He recently wrote the 3M submission to the FDA on the safety of food packaging applications.

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Jack Mandel, Ph.D.
Division of Environmental and Occupational Health
School of Public Health
University of Minnesota
Minneapolis, Minnesota

- Comments: Co-author of 3M studies on workers occupationally exposed to PFOA (Olsen et al., 1998; Gilliland & Mandel, 1993, 1996).

- Status: Dr. Mandel has been briefed. There is no need to ask him to be a spokesperson, but Jack Mandel will inform him of the possibility of media contact.

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High-Priority Candidate Spokespersons

Candidate spokespersons from the following list will be contacted regarding their willingness to act as spokespersons. If they agree, they will be contacted by Mr. John Allison of the 3M Legal Department to arrange confidentiality and consulting agreements. The candidates will be briefed by the 3M Medical Department and provided with relevant documents, studies and papers to review. Candidates will then be contacted in a follow-up interview to confirm their willingness to serve as spokespersons. Once their assent has been obtained, the spokespersons will be added to the list of currently available spokespersons.

Jessica Herztein, M.D.
Environmental Health Resources
Lexington, Massachusetts
(781) 674-1060

- Comment: Dr. Herztein is a medical toxicologist and specialist in evaluating occupational and laboratory studies.

- Status: Dr. Herztein has agreed to be a spokesperson and has been sent a confidentiality agreement. Once signed, she will need to be briefed on the science.

Daniel P. Boyd, Ph.D.
Daniel P. Boyd and Company
Queenstown, Maryland
(410) 827-6244

- Comments: Dr. Boyd is the former head of health and safety standards for the Occupational Safety and Health Administration (OSHA) and a well-respected consultant on worker health and safety. Dr. Boyd could help with 3M customer questions regarding occupational hygiene.

- Status: John Allison to send contract to Dr. Boyd. Larry Zobel to forward Dr. Boyd's resume to the 3M Occupational Hygiene department.

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Don Molinar, M.D.
Preventive and Occupational Medicine
Mayo Clinic
Rochester, Minnesota
(507) 284-2511

- Comments: Specialist in occupational medicine; Mayo Clinic has national reputation for excellence in health care.

- Status: John Heinze and John Allison have contacted. Mayo Clinic has restrictions on consulting on matters that may become legal issues. Larry Zobel to set up a direct consulting relationship focused on tissue bank and other research issues. Dr. Molinar will then need to be briefed on the science. Possible spokesperson role to be further considered at a later date.

Bob Moser, M.D.
Canyon Consulting Corporation
Chama, New Mexico
(505) 756-2806

- Comments: Dr. Moser is a Professor at the University of New Mexico Medical School (Albuquerque) and the former head of the American College of Physicians and Surgeons, and has been very effective in speaking out on the health issues involving NutraSweet.

- Status: Miles Martel has contacted Dr. Moser, who has been briefed by the 3M Medical Department. Dr. Moser indicated his willingness to be part of a team of spokespersons on the issue but provided extensive comments and questions on the medical briefing. 3M Medical Department to determine best response.

Philip Cole, M.D.
Department of Epidemiology
School of Public Health
University of Alabama
Birmingham, Alabama
(205) 934-4011

- Comments: Dr. Cole is an international known expert on cancer epidemiology.

- Status: John Heinze contacted; Dr. Cole indicated he would only be interested in consulting if the issue involved cancer epidemiology. He recommended Prof. Delzell (below). Jeff Mandel indicated that he knows Dr. Cole well enough to convince him to become interested in the issue.

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Elizabeth Delzell, Sc.D.
Department of Epidemiology
School of Public Health
University of Alabama
Birmingham, Alabama
205-934-5857

- Comments: Philip Cole of the University of Alabama recommended Prof. Delzell, who is a recommended Prof. Delzell, who is a specialist in occupational medicine. She would provide an Alabama-based expert for responding to any inquiries from the Decatur or Alabama media.

- Status: John Heinze contacted; M.D. credentials preferred.

Dan Woltering, Ph.D.
The Weinberg Group, Inc.
1220 Nineteenth Street, N.W., Suite 300
Washington, DC
(202) 833-8077

- Comments: Dr. Woltering is an expert in environmental toxicology, risk assessment and communications, and the immediate past president of the Society of Environmental Toxicology and Chemistry. He is the former head of the Human and Environmental Safety Division of The Procter & Gamble Company.

- Status: John Heinze has contacted, and Dr. Woltering has indicated interest in serving as a spokesperson on environmental aspects of the issue.

John P. Giesy, Ph.D.
University Distinguished Professor of Fisheries and Wildlife
Institute for Environmental Toxicology
Michigan State University
East Lansing, Michigan

- Comments: Advisor to 3M's environmental studies.

- Status: Dale Bacon to query Prof. Giesy regarding his interest in acting as a spokesperson.

An additional third-party spokesperson candidate for Belgium needs to be identified in case of questions from the Antwerp or Belgian media. An additional spokesperson candidate for Illinois may be helpful, but is of lower priority since PFOS is not manufactured at the Cordova plant.

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Courtesy Calls To 3M Third-Party Experts

3M employs a number of independent experts who may be contacted by the media should the FC issue become public. These experts need to be briefed concurrently with the state and local health authorities so that they are fully informed should the issue become public. Briefings to be conducted by the 3M Medical Department.

Ken Sexton, Ph.D.
Division of Environmental and Occupational Health
School of Public Health
University of Minnesota
Minneapolis, Minnesota

- Comments: Assisted with 3M study of workers occupationally exposed to PFOA (Gilliland & Mandel, 1993)

- Status: Dr. Sexton has been briefed on the science.

Frank D. Gilliland, M.D., Ph.D.
Epidemiology and Cancer Control Program
School of Medicine
University of New Mexico
Albuquerque, New Mexico

- Comments: Co-author of 3M studies on workers occupationally exposed to PFOA (Olsen et al., 1998; Gilliland & Mandel, 1993, 1996)

Nancy Dickey, M.D.
President of the American Medical Association
Physician practitioner in Texas

- Comments: Closely involved in the National Patient Safety Foundation funded by 3M; colleague of Dr. Carol Ley, 3M Medical Department

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Issues and Detractors

Issues and Detractors

Endocrine Disruption

The Issue	A scientific hypothesis that man-made chemicals in the environment having hormonal (endocrine system) activity are impacting fish (e.g. in the Great Lakes) and wildlife (e.g. Florida alligators, marine birds & animals), and may be impacting human health (e.g. breast, prostate and testicular cancer, sperm counts, children's learning and behavior, or virtually any adverse trend in human health).
Key Point	Even low levels of exposure (oral doses of 2 and 20 micrograms/kilogram body weight/day before birth) may produce permanent effects on offspring.
Key Organizations	World Wildlife Fund (WWF-U.S.) — "Our Stolen Future" by Theo Colburn, Dianne Dumanoski and John P. Myers (W. Alton Jones foundation); PR by Fenton Communications/Environmental Media Services.
Links (U.S.)	Activists scientists: – Fred vom Saal, University of Missouri (low dose effects). – Ana Soto, Tufts Univ. School of Medicine (screening tests). – Nicolás Olea, University of Granada, Spain (low level exposures). – John Sumpter, Brunel University, U.K. (environmental exposures). – Richard Sharpe, MRC Reproductive Biology, Edinburgh, U.K. (male reproductive effects, low dose effects). – John McLachlan, Tulane (synergy of mixtures, report withdrawn). Breast cancer activists – EDSTAC testing, estrogens as risk factor for breast cancer. Greenpeace – phaseouts of soft PVC in children's toys and shoes. Environmental Defense Fund – global warming, HPV chemical testing. National Environmental Trust – global warming, low dose effects, TRI expansion. Natural Resources Defense Council – EDSTAC testing, use of "Precautionary Principle" (no risk assessment). World Resources Institute – Precautionary Principle, breast cancer, low dose effects.

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Links (Outside U.S.)	WWF-Canada – called for phase out & consumer deselection of surfactant used in consumer products. World Wildlife Fund for Nature (global) – numerous local allies in U.K., Europe and Far East. U.K – Friends of the Earth ("Poisoning our Children" brochure). Japan – Children's Fund (public workshops, extensive media coverage). Korea – Korean Consumers/Environmental Federation (media coverage). Malaysia – Consumers Association of Penang (media coverage).
Links (U.S. Government)	EPA – Office of Prevention, Pesticides, and Toxic Substances (sponsor of National Academy of Sciences' report on the state of the science, EDSTAC testing program, U.S. lead on Persistent Organic Pollutants treaty). – National Exposure Effects Laboratory (unofficial list of E.D.s). – Region 5 (sponsors public workshops for Great Lakes region). Centers for Disease Control and Prevention — National Center for Environmental Health (adopted Theo Colburn's list of E.D.s, monitoring of human exposure). National Science and Technology Council (White House Office of Science and Technology) — Committee on the Environment and Natural Resources (CENR) (coordination of research among 14 U.S. government agencies). Illinois EPA -- Office of the Director (list of E.D.s to prioritize state activities).
Links (International)	International Joint Commission -- U.S. and Canada treaty organization focused on Great Lakes (activist dominated, has called for virtual elimination of persistent toxic chemicals). Organization for Economic Cooperation and Development (29 member countries including U.S.) — Working Group on Endocrine Disrupters Testing and Assessment (test methods and interpretation). United Nations Environment Program (UNEP) — (International workshops with EPA and CENR on E.D., Persistent Organic Pollutants treaty).

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International Program on Chemical Safety (World Health Organization, International Labor Organization and UNEP) — Steering Committee on Endocrine-Disrupting Chemicals (global research inventory, science assessment report).

Status

1. Low public awareness in U.S. but EPA has initiated research and massive testing program (EDSTAC).

2. Activists moving increasingly to attacks on specific products by name.

3. In U.S. & Europe, recent product deselection (soft PVC) in children's toys and shoes due to activists' concerns in Europe.

4. In Japan, product deselections (noodle cups, school lunch plastic tableware) due to media coverage & public concerns.

5. Phase-outs in progress (selective chemicals / applications in Denmark, Sweden & OSPAR) or recommended (UK Consultative Report) or being considered (EU Parliament).

Specific Issues

1. PFOS broad human exposure (at levels NOT considered low by E.D. activists), persistence in the body, toxicity to newborn animals in reproductive studies — BUT no evidence of E.D. activity.
   Likely activist position: PFOS is a suspected endocrine disruptor and should be banned.

2. Study of PFOS-exposed workers showing no health effects is unpublished and the report of the study is not available for distribution.
   Likely activist position: 3M has no credible scientific information to demonstrate that exposure to PFOS is a NOT a risk to human health and the environment.

3. Spectrum of biological activity of FC's including neurological & behavioral effects (Key et al., 1997; Friends of the Earth, 1998) — BUT no evidence of such effects with PFOS.
   Likely activist position: PFOS is likely to produce its most severe effects on children, including neurological & behavioral effects.

4. Available toxicology data indicates that PFOS mechanism of toxicity is on cellular energy production.
   Likely activist position: Endocrine disruption mechanism has not been examined.

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Food Safety

The issue

The Food Quality Protection Act of 1996 mandates that EPA develop a screening and testing program to identify pesticides or other residual compounds on foods which might have cumulative estrogenic or other endocrine activity. The Safe Drinking Water Act amendments of 1996 have a similar mandate for compounds found in drinking water.

Key Points

1. EPA has interpreted Congress as providing a mandate for initiating a broad screening and testing program for possible endocrine-mediated environmental and human health effects.

2. To provide guidance on the screening and testing program, EPA convened the Endocrine Disruptor Screening and Testing Advisory Panel (EDSTAC).

3. As a result of EDSTAC's recommendations, highly directed by EPA and activist organizations, the program will consider all manmade chemicals (except high molecular weight polymers), initially focusing on "high" production volume chemicals (>10,000 pounds/year), with any human exposure.

4. Initial focus of screening will be on estrogen, androgen and thyroid receptor mediated effects.

Key Organization

U.S. EPA — Office of Prevention, Pesticides and Toxic Substances (Lynn Goldman personally involved in EDSTAC meetings).

Links (U.S.)

World Wildlife Fund (Theo Colburn was on EDSTAC panel)
Natural Resources Defense Council (had representative on EDSTAC panel).

Breast cancer activists (had representative).

Other activists frequently provided testimonials at public sessions (on Superfund site pollution, multiple chemical sensitivities, etc.).

Links (outside U.S.)

Organization for Economic Cooperation and Development (29 countries, including United States) will recommend screens and tests for endocrine disruption, based (in part) on EDSTAC recommendations.

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Status

1. EDSTAC group has completed its report, which has been accepted by EPA.

2. EPA now in process of validating automated prescreen test to prioritize all 15,000 high production volume chemicals based on their ability to interact with the estrogen, androgen and thyroid hormone receptors in a test tube (*in vitro*) laboratory test.

Specific Issue

1. PFOS is a very stable compound with broad human exposure but low toxicity. 3M is taking all appropriate steps to identify, reduce and eliminate human exposure to PFOS. There is no evidence of an endocrine mechanism, and PFOS is unlikely to interact with estrogen, androgen or thyroid receptors based on chemical structure and mechanism of toxicity. Every effort is being taken by 3M to generate a complete testing profile. However, the toxicology and environmental testing profile is incomplete.
   Like activist position: PFOS should be a priority chemical for the EDSTAC testing process based on known human exposure. 3M has manufactured PFOS for 40 years and known that humans have been exposed to fluorochemicals for over 30 years. 3M efforts to reduce human and environmental exposure are too little, too late. There is simply no excuse for 3M not to stop manufacturing PFOS and all related products until the safety of PFOS can be assured.

Children's Health

The Issue

Are current regulatory practices adequately protective of children's unique sensitivities to chemicals?

Key Points

Concerns are with increased rates of some childhood cancers (possibly due to in utero exposure), increased rates of children's asthma, especially among minority children, and increased exposure of minority children to pollution and toxic chemicals (particularly air pollution, lead and pesticides).

Key Organizations

U.S. EPA — Carol Browner and others at policy level.
Greenpeace — Campaign on dioxin and organochlorines, PVC and children's exposure to "endocrine disruptor" plasticers in soft PVC used for children's toys.

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Status

1. Low public concern in U.S. with environmental chemicals as significant issue for children's health.

2. Food Quality Protection Act of 1997 mandates that EPA consider an additional 10-fold safety factor for children's cumulative exposure to pesticides.

Specific issues

1. PFOS broad human exposure suggests possible children's exposure.
   Likely activist position: Assume PFOS affecting children's health.

2. PFOS toxicity to offspring in animal tests suggests possible effects on newborns of highly exposed parents.
   Likely activist position: PFOS is likely cause of spontaneous miscarriage and premature births in highly exposed human populations. Make PFOS "chemical of the week" for children's health risk.

High Production Volume Chemicals Testing

The Issue

Lack of publicly available test data on high production volume chemicals (U.S. production >1 million pounds/year). The tests required are those needed to fulfill the minimum requirements of the Organization for Economic Cooperation and Development's Screening Information Data Set (SIDS), which requires, among other information, data on acute, chronic, & reproductive toxicity, mutagenicity, ecotoxicology and environmental fate, including estimates of environmental and human exposure levels.

Key Points

1. Plan for testing announced Oct. 9, 1998. Many details still to be resolved.

2. EPA to publish list of 2,800 high production volume chemicals by Nov. 1, 1998.

3. Dec. 1, 1999, companies, consortia or trade associations must identify all testing needed on each high production volume chemical, and commit to conducting the tests, or face an EPA test rule (under the Toxic Substance Control Act, TSCA) requiring testing.

4. Status of testing (and data?) to be posted on an Internet web site available to the public, beginning Jan. 1, 1999.

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5. An environmental and human health risk assessment must be compiled, based on the SIDS test data, as part of the OECD SIDS assessment process; it is unclear whether this safety assessment will be posted to the Internet site and, if so, when in the process this will occur. Until this is publicly available, activists' organizations will likely make their own interpretation of the test data.

Key Organizations

Environmental Defense Fund (EDF) — Published "Toxic Ignorance" report which publicized lack of publicly available test data.

Vice President Al Gore — On Earth Day, 1998, announced the administration's position that U.S. industry should provide all the missing data within three years.

EPA — High Production Chemicals Division, Office of Prevention, Pesticides and Toxic Substances (charged with administering the program under voluntary agreement with threat of using the Toxic Substance Control Act to require testing).

Chemical Manufacturers Association — Has negotiated with the EDF and EPA on provisions of the testing program and timing.

Specific Issue

1. Precursor to PFOS (POSF) is a high production volume chemical, 95 percent produced by 3M
   Likely activist position: 3M should have publically disclosed human monitoring results on PFOS as soon as these were confirmed. Complete toxicology and environmental test data set should have been generated on PFOS many years ago. Then the public would know the risk to human health and the environment from this chemical. PFOS becomes latest proof of need for high production volume chemical testing.

Persistent Organic Pollutants

The Issue

The United Nations has recently passed a treaty banning the production of 12 notorious "persistent organic pollutants" (POPs), including DDT, PCBs and ten organochlorine pesticides which have been banned in the U.S., Canada, the European Union and Japan for many years. Some of these chemicals, particularly DDT and some of the other pesticides, are still produced and used in Russia and Third World countries.

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Key Point

1. Current focus is on expanding the list of POPs. This discussion is expected to be continuous but endocrine disruptors are a likely target.

2. The Criteria Expert Group of the UN Environment Program is developing recommended procedures for expanding the POPs list. The approval process is likely to take several years.

Specific Issue

PFOS is persistent, some of the products made from PFOS are likely to be bioaccumulative (based on predicted high octanol-water partitioning coefficients) and PFOS may be considered toxic to newborn animals based on 8e filing data.
Likely activist position: PFOS should be added to the list of persistent organic pollutants for immediate international restrictions on production, distribution and disposal. PFOS becomes newest example of need to expand the list of persistent organic pollutants.

Toxic Release Inventory

The Issue

Under current U.S. law, yearly reporting of estimated releases of specified "toxic chemicals" are required by each production facility releasing more that 10,000 pounds per year of the chemical, including releases to waste treatment, off-site recycling and licensed disposal facilities. The release data are compiled by the EPA into a publicly available database, the "Toxic Release Inventory" (TRI). Recently, the Environmental Defense Fund (EDF) has posted TRI data on the Internet in a format that allows easy links of releases to individual manufacturing sites, based on postal zip codes. This is an attempt to make the TRI database easier to use and thus to put more pressure on local manufacturing facilities to further reduce their TRI emissions.

Key Points

1. EDF and the National Environmental Trust have called on the EPA to expand the list of chemicals whose reporting is required under the TRI regulation, including any chemical claimed to be an endocrine disruptor.

2. EPA has agreed to some expansion of the TRI reporting requirements, e.g. for dioxin, and has proposed that any amount of dioxin be reported.

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Specific Issue

1. PFOS and related materials are not subject to TRI reporting requirements.
   Likely activist position: EPA should immediately add PFOS and related materials to the TRI list. PFOS becomes the latest example of a toxic chemical to which people near manufacturing facilities are 'highly" exposed but for which industry is not even required to report emissions to the environment.

REDACTED

Tox Research Summary

Toxicology Research Summary

Situation

3M's toxicologists' focus is on the scientific process of the toxicology studies currently under way. It is both inappropriate and unethical, from a scientific process standpoint, to discuss preliminary results, initial results or any other speculative aspect of the studies underway. No information will be given to anyone, even those who approved the funding for the study.

3M's policy on scientific studies is to withhold any comment on a study until it is completed, with final results in, analyzed and reported. The same is true here.

The set of data points we will have on the toxicology studies currently underway is considered within the scientific community to be a common set of data. It will include information on the effects of high dosages (in order to create an effect) on mammal species in the following areas:

- Carcinogenicity
- Reproduction
- Toxicity
- Teratology (birth defects)
- Metabolism (excretion route, half life)
- Absorption Rates
- Diffusion (rate at which chemical breaks down)

Objectives

Defend, maintain and enhance the scientific integrity 3M has achieved over the years.

Place the results and analysis of the tox studies into proper perspective.

Protect researchers from interference in work and protect audiences from damaging speculation.

Audiences

Third-party experts
Scientists/Toxicologists
Academia
Science reporters
Scientific journals
General consuming public
Employees

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Process	Choose a representative for the toxicologists. (My recommendation is Dr. Jeff Mandel.) Only that representative is authorized to speak about the studies. Once the representative is chosen, messages for individual studies may be developed. Such messages would include: type of study, what the study will yield, expected final result timeframe (e.g. "We're currently working on a study to review oral teratology in rabbits. This is a common study that will give us an indication of how high doses of PFOS may impact rabbits in terms of birth defects. We expect to have results in January 1999.") Any internal and external requests for information about the studies should be cleared through the representative; any comment on the studies should be made by the representative. The representative should be involved in any decision to submit a study for peer review and publication.
Messages	We will not comment on any scientific study until the results are in, analyzed and reported. To comment prior to that time would be irresponsible. 3M is mainly a materials science company. As such, we rely heavily on scientific studies with solid methodology. We realize that these studies may shed some light how these substances interact with the bodies of mammals. Our best evidence is in the 20 years of study on the population with the most exposure – our employees. These studies show there is no health effect, even at levels much higher than the general public.

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Endocrine Disruption

- No evidence of effect on tested hormones in our employees.
- No apparent effect on mating behavior, fertilization, implantation or fetal resorptions in two generation rat study. Decreased litter size and perinatal mortality was seen at high doses. The apparent no effect level is comparable to the no effect levels seen for other forms of toxicity. (This data is preliminary - complete report is months away.)

Cancer

- No current evidence of genotoxicity. It does not cause genetic mutations in or chromosomal abnormalities in commonly used tests.
- The test typically used to assess cancer causing potential is a two year feeding study. Results from this test will not be available until late 2000 or early 2001. Interim test results are not indicative of tumor related activity.

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Environmental Research

Environmental Research

Message: We believe that 3M fluorochemical releases do not cause significant harm to the environment. Nevertheless, 3M is taking no chances. We are conducting extensive environmental sampling and testing to ensure that no significant harm is caused.

Significant studies are planned or underway to answer the following questions:

- How much human and ecosystem exposure is due to releases from plants, from the application of products, from the use and disposal of products?
- How and in what forms are fluorochemicals transported through environmental media, e.g. air, soils, ground water, surface water, the surface film of water?
- What is the distribution of fluorochemicals throughout the biosphere? Near manufacturing plants? In remote areas?
- Could the concentrations of fluorochemicals detected in the environment affect the functioning of any part of the ecosystem?

The following major study projects are proposed or underway:

1. Improve understanding of exposure by conducting sampling at up to 12 US cities, six where exposure might be expected to be highest and six where concentrations might be expected to be lowest. Sample ambient air, water (drinking water and wastewater, influent and effluent), fish and food (locally obtained), and landfill leachates.. Testing has been initiated in Decatur, AL, and Dalton, GA. Analysis will be completed in the first quarter of 1999. The location of additional sampling sites will be determined in part by what we learn from the above analyses and computer modeling based on new information being generated on the physical/chemical properties of the fluorochemicals.

2. Further improve understanding of exposure by developing a plan to conduct sampling in northern hemisphere locations to be determined. The plan is expected to be developed by mid-January and executed over a period of several years. The plan may include sampling of air, water, fish (in the middle of the food chain), and predatory animals. The program will add considerably to understanding of exposure by sampling to provide data for modeling, using the results to determine new sampling and then conducting further sampling and modeling.

3. Better understand if PFOS and methyl-FOSE alcohol bioaccumulate in fish by conducting a fish protocol on the two chemicals. The protocol will be initiated in March and will take up to two months to complete. Its purpose will be to determine if these two chemicals bioaccumulate in fish and if they do, in which tissues. It should be noted that some data is available from earlier tests, but was not obtained using up-to-date methods and is considered unreliable.

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4. Better understand any acute and chronic affects of fluorochemicals by conducting environmental toxicology testing. Acute tests will be conduced from January through March and chronic tests from March through year-end. Acute tests will be conducted at four trophic levels: fish, daphnia (and marine shrimp), algae and bacteria. Chronic tests will be conducted on fish and either daphnia or shrimp. In addition, three kinds of related tests will be conducted at a time yet to be determined:
   - Acute toxicology testing on mallard ducks to determine what levels it would take to induce mortality.
   - Toxicology testing on frogs to look for any developmental abnormalities,
   - Endocrine disrupter testing. This is such a new area that no established protocol exists. We are working with the agency and the independent testing lab to develop details of the test.

5. Better understand what parts of the environment might be exposed by conducting tests to determine the physical/chemical properties of fluorochemicals. This information will be fed into models and will provide better understanding and a guide to what kinds of additional testing should be done. The following specific tests will be done:
   - Solubility to determine likelihood of transport through water, vapor pressure to determine likelihood of transport through air, boiling point and melting point. These tests are being conducted from November through March.
   - Partitioning tests to determine movement of these chemicals from air to water, water to octanol, water to fish (bioconcentration) and possibly water to soil. These tests will take place from January through November.

6. Better understand the distribution of fluorochemicals in the biosphere through the use of modeling. This will be a long-term effort where information from many areas of study will be used to support initial modeling and results will indicate where additional sampling can be most beneficial. This will be a process of sampling followed by modeling, followed by sampling, followed by modeling, etc., with the result being an increasing understanding of distribution.

7. Better estimate fluorochemical releases via production use and disposal using a mass balance approach. This will require a massive effort because of the number of products and processes involved. Currently existing data will be used as well as any additional sampling that may be necessary. We anticipate that a draft report will be available in mid-March.

8. Better understand the fate of products with three kinds of tests:
   - Biodegradability to determine if bacteria will change the molecules. These are being conducted from October through August.
   - Hydrolysis tests to see if a reaction with water causes a change in the molecule. These tests are being conducted from October through March. No results yet.
   - Photoysis tests to determine if light will change the molecule. These tests are being conducted from November through March.

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Manufacturing Fluorochemical (FC) Assessment

Wastewater Emissions

Preliminary result:

- An estimated five to 10 tons per year of chemicals of interest were discharged in wastewater from the Decatur facility based upon data collected in wastewater material balance sampling. A more precise estimate is expected from a second wastewater material balance sampling, now under way, using the most current analytical methods. This will be available in the first quarter of 1999.

Important considerations:

- This estimate is preliminary and comes from a Wastewater Emission Reduction Team established to: 1) understand the wastewater discharges of the chemicals of interest from the manufacturing operations, 2) understand the fate of the chemicals of interest in on-site wastewater treatment systems, and 3) reduce the emissions of the chemicals of interest from the site as much as possible. The immediate goal of the team was to reduce wastewater discharge levels of chemicals of interest. The effort was focused primarily at Decatur as the largest producer of parent product. The team plans to implement useful solutions at other facilities as appropriate.

- Unproven methods limit our ability to analyze the entire mix for individual chemicals in all media (sludge, concentrated waterstreams, tars).

- On-site wastewater analytical testing capability has been established for FCs, however, operation of equipment in the field has proven more difficult than expected.

- A carbon treatment system for some materials of interest has begun operation at Decatur with removals at 100 percent. Evaluation of the system is under way. Operational understanding is being developed.

- One long-term treatment solution (discotherm) is being designed and is anticipated for implementation at Decatur within the next 18 months. This will remove materials from a process believed to be a significant source of the chemicals of interest. Antwerp and Cordova already have the discotherm system in place.

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- Pilot tests to evaluate removal technologies are planned. Sampling of the process wastewaters to be used in the pilot tests has begun. An evaluation of the first round of sampling is expected before the end of the first quarter of 1999. Use of new technologies will depend on this and future tests and evaluations.

Air Emissions

- FC air emissions at Decatur are approximately _____ thousand pounds a year. Chemicals of interest constitute a percentage of this total, although the percentage has not yet been determined. Sources (of chemicals of interest) believed to be significant are being incorporated into testing planned for 1999.

- Chemicals of interest are being incorporated into a site emissions control plan to address significant air losses.

Challenges of Manufacturing Assessments

- The plant has a very large throughput of products, but specific chemicals of interest constitute a small quality of the total throughput.

- Tracking of information of intermediates and byproducts is not easily achieved using existing reporting systems. Improvements are under way to better track the specific product steps on interest.

- Batch manufacturing operations result in high loading of short duration, which are sometimes difficult to quantify. A large number of individual process steps are in the product family. Measurement systems are designed for more continuous processes.

- Analytical methods do not allow for complete speciation of FC constituents. Complexity and variability of the media pose challenges. The Environmental Lab is working to provide more complete characterization. Lack of analytical methods inhibits efforts to quantify FC sources.

- The presence of FC in low concentrations makes wastewater treatment at the end of the pipe difficult and expensive. Wastewater has characteristics that are unique and complicate treatment solutions.

- Fate, degradation and chemical characteristics are not well understood. The Fate Assessment Team is conducting a separate effort to determine key chemical properties. Models using the chemical property data will provide information where data gaps cannot presently be filled.

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Scientific Journals

Scientific Journals

Publication of scientific and technical information on the FC issue should follow a strategic plan so that key findings can be understood in the context of the published scientific literature. Under this strategy, the science needed to evaluate the safety of PFOS (i.e. the available occupational and toxicology studies) will be published -- or in press -- and thus available to be cited when the publication on serum levels in the general population is published. This will allow the serum level findings to be placed in an understandable, credible context which demonstrates that there is no medical or scientific basis to attribute any adverse health effects to 3M products. In this strategy, the analytical methodology will be published concurrently with the serum level findings.

The strategy is described as a series of steps with a timeline for each activity. The strategy begins with a brief summary of the scientific and technical studies published or publicly available:

Key Studies and Reports Available

Ubel, F.A., and others, "Health status of plant workers exposed to fluorochemicals - a preliminary report," *American Industrial Hygiene Association Journal*, vol. 41, pages 584-589, 1980. (*Published study of 3M workers showing no ill health effects of occupational exposure to fluorochemicals.*)

Gilliland, F.D. and Mandel, J.S., "Mortality among employees in a PFOA production plant," *Journal of Occupational Medicine*, vol. 35, pages 950-954, 1993 (*Published study of 3M employees showing no increased mortality due to occupational exposure to PFOA.*).

Gilliland, F.D. and Mandel, J.S., "Serum perfluorooctanoic acid and hepatic enzymes, lipoproteins and cholesterol: a study of occupationally exposed men," *American Journal of Industrial Medicine*, vol. 29, pages 560-568, 1996 (*Published study of 115 3M employees showing no toxicity to the liver due to occupational exposure to PFOA.*).

Key B.D., and others, "Critical review: Fluorinated organics in the biosphere," *Environmental Science and Technology*, vol. 31, pages 2445-2454, 1997. (*PFOS is described as "important commercially as a surfactant and as a precursor of other fluorinated surfactants," as "resistant to biological attack," and as an inhibitor of "gap junction intercellular communication (GJIC) in rat liver epithelial cells cultured in vitro." The paper reports that "inhibition of GJIC has been implicated in tumor promotion during carcinogenesis, teratogenesis and reproductive dysfunction."*)

Reich, C., "Re: TSCA Section 8(e) — Perfluorooctane Sulfonate — Docket Numbers 8EHQ-1180-373; 8EHQ-1180-374; 8EHQ-0381-0394," 3M letter to Office of Toxic Substances, United States Environmental Protection Agency, May 15, 1998. (*This document, which will soon become publicly available through the TSCA 8e Office, reports the presence of very low (part per billion) levels of PFOS in blood sera samples for individuals with no known occupational exposure to fluorochemicals.*)

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Olsen, G.W., "An epidemiologic investigation of reproductive hormones in men with occupational exposure to perfluorooctanoic acid," *Journal of Occupational and Environmental Medicine*, vol. 40, pages 614-622, 1998. (*Study by 3M Medical Department showing no significant hormonal changes in 191 men occupational exposed to PFOA.*).

Reich, C., "Re: TSCA 8(E) SUBSTANTIAL RISK NOTICE ON: N-Ethyl Perfluorooctyl sulfonamido ethanol and Perfluorooctane Sulfonate, Docket Numbers 8EHQ-1180-373; 8EHQ-1180-374; 8EHQ-0381-0394," 3M letter to Office of Toxic Substances, United States Environmental Protection Agency, September 14, 1998. (*This document, which will become publicly available through the TSCA 8e Office, reported that PFOS, when administered to female rats at oral doses of 1.6 or 3.2 milligrams per kilogram body weight per day during pregnancy, significantly reduced pup survival. PFOS also reduced the average gain in body weight of the female rats during pregnancy, with the weight gain at the 3.2 milligrams per kilogram dose of only 87% of the control (no PFOS) rats.*)

Strategy for Publication of Key Studies

1. The PFOS worker study, prepared by Dr. Jeff Mandel and others in the 3M Medical Department, is in final review before submission to an occupationally-focused medical journal. (*This paper will report no adverse biological health effects from exposure to PFOS, based on medical monitoring of workers.*) Comment: publication of this paper is key to demonstrating there is no medical or scientific basis to attribute any adverse health effects to exposure to PFOS.

Recommendations:

- The journal should be selected on the basis of interest in the paper and ability to ensure peer review as quickly as possible.
- Target submission of the paper by December 15, 1998; acceptance for publication within three months of submission.
- With this plan, this key study could be cited as early as March 15, 1999.

2. PFOS mitochondria study, by Dr. Ken Wallace of the University of Minnesota School of Medicine in Duluth, is being prepared for submission to a peer-reviewed science journal. (*Paper will demonstrate PFOS's mechanism of action on energy metabolism in a test tube (in vitro) system.*) Comment: this paper will be useful for demonstrating a possible mechanism of toxicity of PFOS. However, without the toxicology studies discussed below, the findings are of limited utility for a safety assessment.

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Recommendations:

- The journal should be selected on the basis of interest in the paper and ability to ensure peer review in a timely manner.
- Target: submission of the paper by March 1999; acceptance for publication within six months of submission.
- With this plan, this study could be cited by September 1999.

3. The PFOS teratology study, conducted by the 3M Toxicology Department, has been completed. A manuscript of the results, possibly including blood level measurements, could be prepared for publication or presentation at a science conference. (*Paper will demonstrate that exposure to high doses of PFOS to pregnant animals does not cause birth defects in the offspring. The blood level measurements will allow correlations between doses administered in this study and blood levels in animals and humans.*) Comment: since the study reports largely negative findings (no birth defects), it may be difficult to publish even with the blood level measurements. Consideration should be given to combining this study with the results of the 3M and published subchronic toxicity studies discussed below.

Recommendations:

- Dr. Chris Wilkinson, a well respected toxicologist with Jellinek, Schwartz & Connolly, Inc., in Washington, D.C., who has been briefed on the FC issue, should be hired to review the study and provide a recommendation on publication of a paper on the teratology study and blood level measurements.
- Assuming that Dr. Wilkinson and the 3M Toxicology Department agree to submit a paper on the teratology study, Dr. Wilkinson should draft the paper, make final revisions based on 3M review and comments, and submit the paper for publication in a peer reviewed toxicology journal.
- Target: one month for the recommendation and decision on publication. If the decision is made to proceed with publication, target is three months for completion of the draft paper, one month for 3M review and comment, one month for final revision and submission to a peer-reviewed toxicology journal and three months for acceptance.
- With this plan, the teratology study could be cited as early as August 1999.

4. PFOS subchronic toxicology studies, conducted by 3M or reported in the scientific literature, could be summarized and a manuscript prepared for publication. (*The paper would review what is known about the toxicity of PFOS from animal studies, prior to conduct of the current studies by 3M.*)

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Recommendations:

- This paper should review, or at least cite, other published toxicity studies on PFOS in addition to the subchronic studies, i.e. all of the published toxicity studies discussed under "Summary of Toxicology Studies" in the "Current Summary" document.
- Dr. Wilkinson should be hired to review the studies and draft a paper for publication.
- Target: six months for completion of the draft paper, one month for 3M review and comment, one month for final revision and submission to a peer-reviewed toxicology journal and three months for acceptance.

5. The analytical methods developed to allow specific detection of PFOS in serum levels with a low part per billion detection limit should be written up for publication in a peer reviewed analytical chemistry journal. (*This paper would need to contain data on PFOS levels in serum to document the utility and accuracy of the analytical method.*)

Recommendations:

- Dr. Wilkinson should be asked to recommend an analytical chemist to prepare a paper for publication on the analytical methods.
- Assuming that Dr. Wilkinson's recommendation is acceptable to the Analytical Department, the analytical chemist consultant should draft the paper with Dr. Wilkinson's assistance, make final revisions based on 3M review and comments, and submit the paper for publication in a peer reviewed analytical chemistry journal.
- Target: one month for the recommendation and decision on the consultant. Once a decision is made on the consultant, the target is three months for completion of the draft paper, one month for 3M review and comment, one month for final revision and submission to a peer-reviewed toxicology journal and three to six months for acceptance.
- With this plan, the analytical study could be cited as early as August 1999.

6. Additional serum level data is needed to document blood levels of PFOS for publication of a peer reviewed science publication. (*This paper would document what is known about PFOS levels in serum and assess the safety of current exposure levels based on the worker study [paper #1 above], and the toxicology studies [papers 2-4 above] that have been completed. The*

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paper would need to reference the analytical methods cited in paper #5).

Recommendations:

- A decisions should be made by the 3M Medical Department with the advise of the Legal Department and the Core Team as to what additional data is needed and a plan developed to generate the needed data.
- The 3M Medical Department should supervise the collection of serum samples with analysis of PFOS levels by the Analytical Department or a contract laboratory approved by them.
- Dr. Wilkinson should be hired to review the serum data and draft a paper for publication.
- Target: finalize plans by January 1, 1999, three months to collect samples and analyze the data, three months for completion of the draft paper, one month for 3M review and comment, one month for final revision and submission to a peer-reviewed toxicology journal and three months for acceptance.
- With this plan, the serum study could be cited as early as November 1999.

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Division Guidance

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Jim Palmquist – General Counsel – 220-11E-03
Kim Price – General Counsel – 220-12E-02
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Peter Rowcliffe – General Counsel – 220-11E-03
John Scanlon – General Counsel – 220-12E-02
Nelson Schmidt – General Counsel – 220-12E-02
Dan Shapiro – General Counsel – 220-12E-02
John Stoxen – General Counsel – 220-12E-02
Brad Sweet – General Counsel – 220-12E-02
Steve Witort – General Counsel – 220-11E-03

M. I. Dougherty – Chemical Markets Group – 225-1S-15
D. A. Sonstegard – Environmental Technology & Safety Services – 42-2E-26
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