

# EXHIBIT 34

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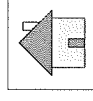


# **Fluoropolymers in the Environment: EPA's Current Understanding of Sources and Pathways**

**December 9, 2003**

A "Road Map" for a  
Path Forward

Draft 12-09-2003 EPA



# Proposed Path Forward

- EPA has reviewed its Data Needs Tables and the data available thus far. Based on this review EPA identified outstanding data needs which would enable it to better understand sources of PFOA entering the environment and pathways leading to human exposures.
- Some of EPA's Data Needs have been met by industry; others are included in LOI commitments or ECA proposals, and some are still outstanding.
- All of EPA's Data Needs are critical to understanding and prioritizing sources and pathways.

# Proposed Path Forward

## (continued)

- This presentation is a “Road Map” which describes EPA’s current understanding of sources and environmental pathways, and identifies basic fluoropolymer data needs which will enable EPA to identify priorities for more extensive testing and monitoring.
- This is an overall summary; the details of the data and EPA’s Data Needs are described in the relevant dockets.

# Primary Questions

- EPA needs to better understand the potential fluoropolymer pathways and sources of PFOA before it is able to prioritize them.
- The tests identified in this presentation are designed to answer some of the fundamental questions regarding which sources and pathways are the most significant.
- Point source releases could result in levels that may be significant; additional information is needed to better understand these sources.

# ECA Tests Proposed, LOI Commitments, and Outstanding Data Needs

- Incineration:
  - Incineration testing to determine incineration byproducts (proposed ECA)
- Article testing:
  - FMG will conduct testing on articles in commerce (LOI commitment)
  - There is an agreement in principle on testing of aged articles (proposed ECA)

# ECA Tests Proposed, LOI Commitments, and Outstanding Data Needs (continued)

- Article testing (continued):
  - Thermal degradation data on fluoropolymers and determination of PFOA FPA contamination of processed fluoropolymer (solid) is also needed and could possibly be included in this testing. (outstanding data need)
- Monitoring:
  - Manufacturing facilities: concentrations in air, surface soil, and additional biota (outstanding data need).



# ECA Tests Proposed, LOI Commitments, and Outstanding Data Needs (continued)

- Monitoring:
  - Off-site from manufacturing facilities: air, surface water, groundwater (background concentrations), wastewater treatment and sludge, soil, and biota.
  - Use facilities and off-site from these facilities: air, surface water, groundwater, wastewater, soil, sludges, and biota.

# Take Advantage of Available Information:

- Basic information (e.g., input and output values, chemical properties (particulate, vapor, etc.), used in modeling conducted by industry, and x-y locations for groundwater samples) has also been requested by EPA.
- These data are needed so EPA can analyze and interpret the data submitted by industry and evaluate the statements made regarding the need for additional monitoring.

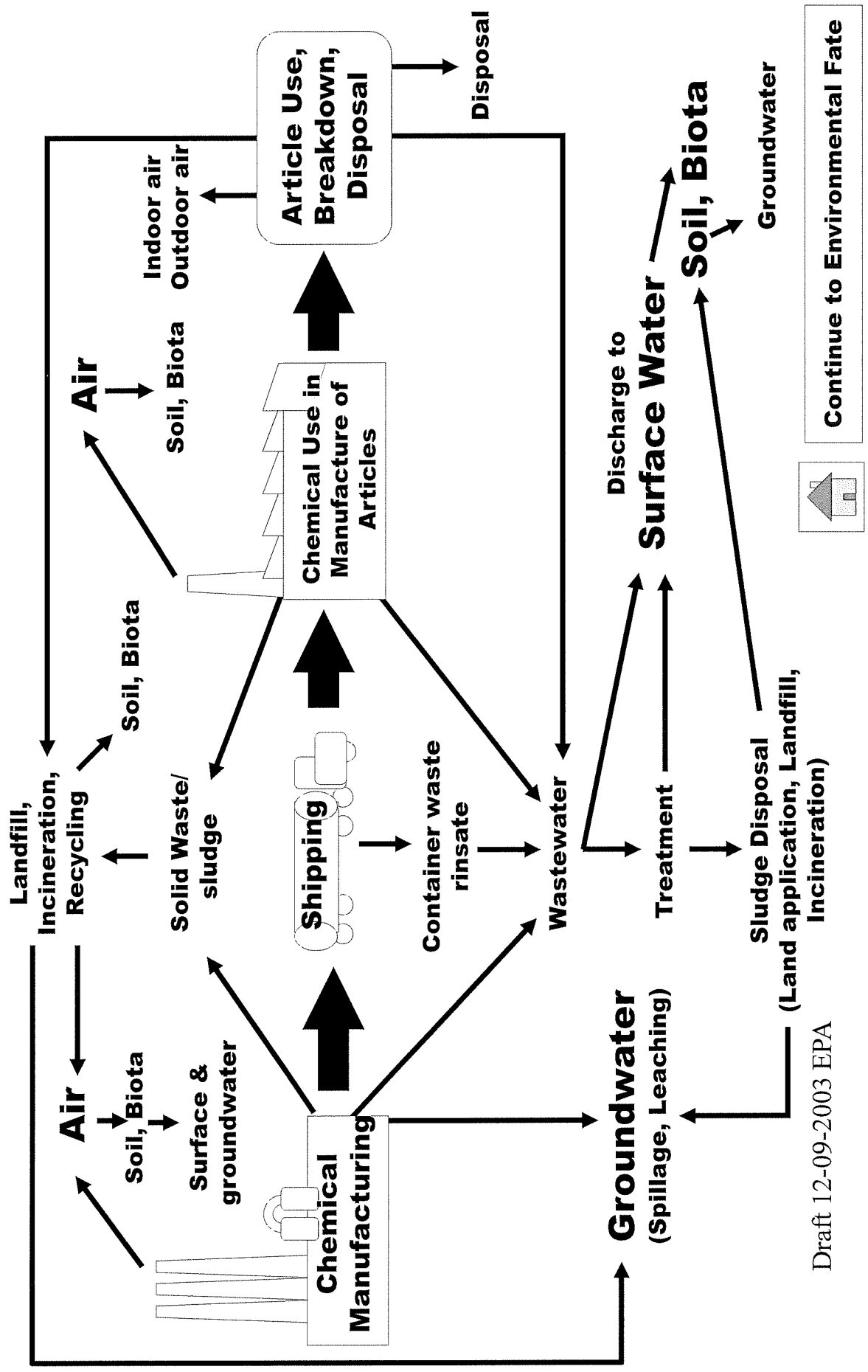
# Possible Future Data Needs - Examples

- Other tests as indicated from results of these tests or available data, for example:
  - Physical/chemical, fate and transport properties of incineration byproducts or of degradation products (to be determined based on incineration results and thermal degradation data)
  - More extensive monitoring (to be determined based on initial monitoring results)

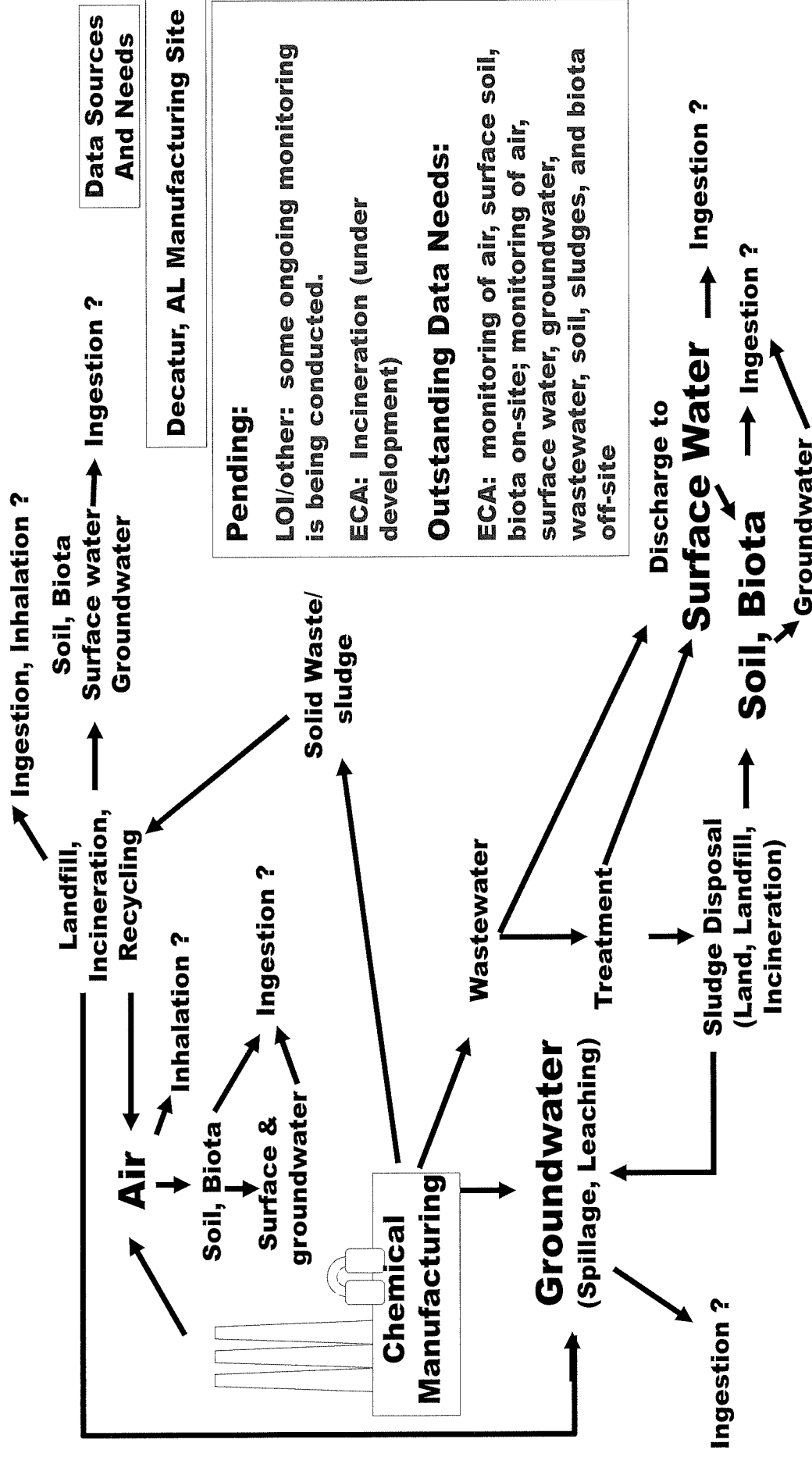
# Fluoropolymers: The Road Map

A Summary of the Fluoropolymer  
Life Cycle; Potential Sources and  
Pathways; Data Which Are  
Available, Pending, and Needed;  
And EPA's Rationale for  
Additional Data Needs

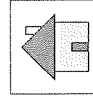
# Product Life Cycle: Fluoropolymers



# Manufacture of Fluoropolymers (Parkersburg, WV Facility)



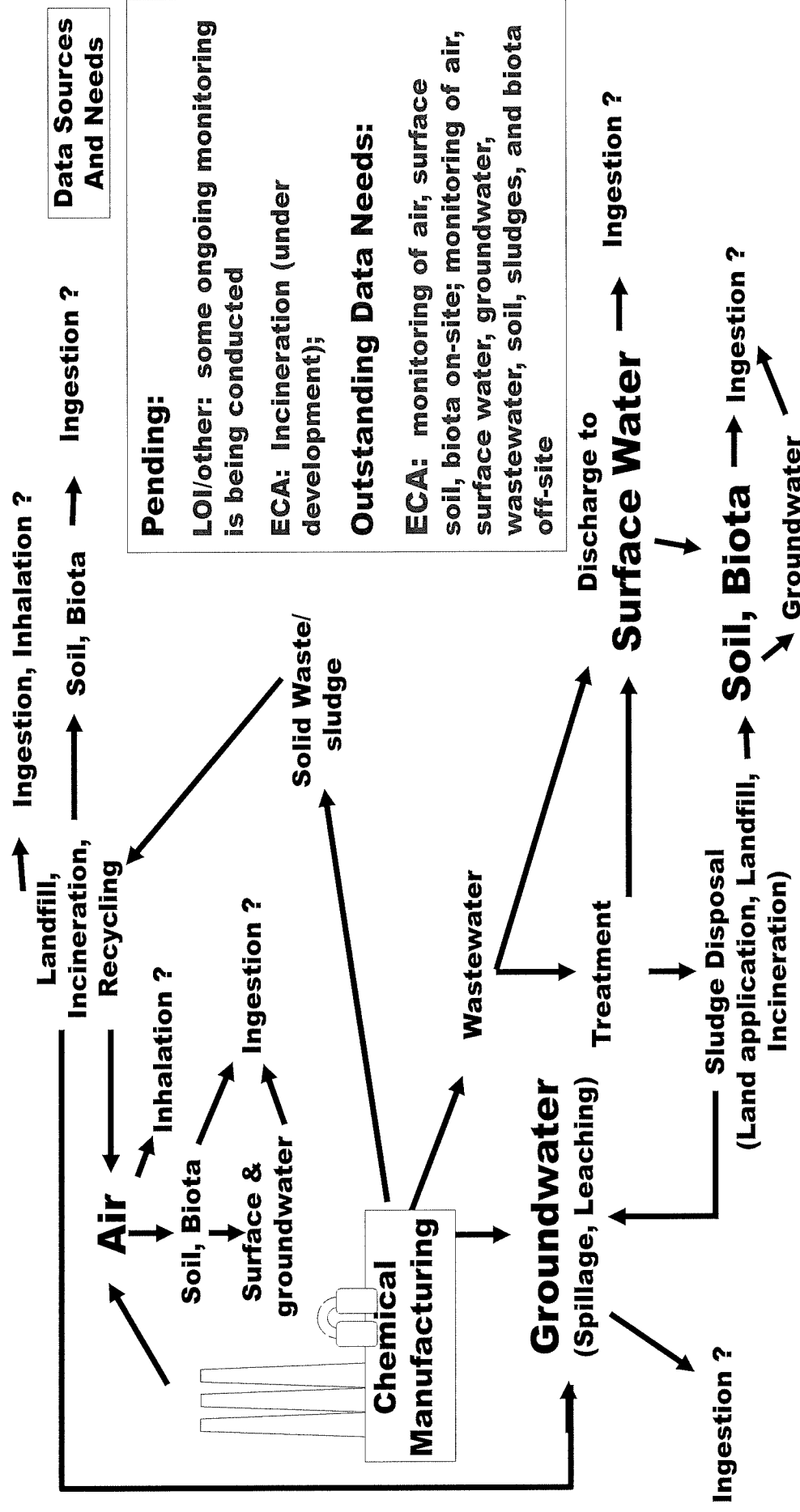
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# Manufacture of Fluoropolymers (Decatur, AL Facilities)



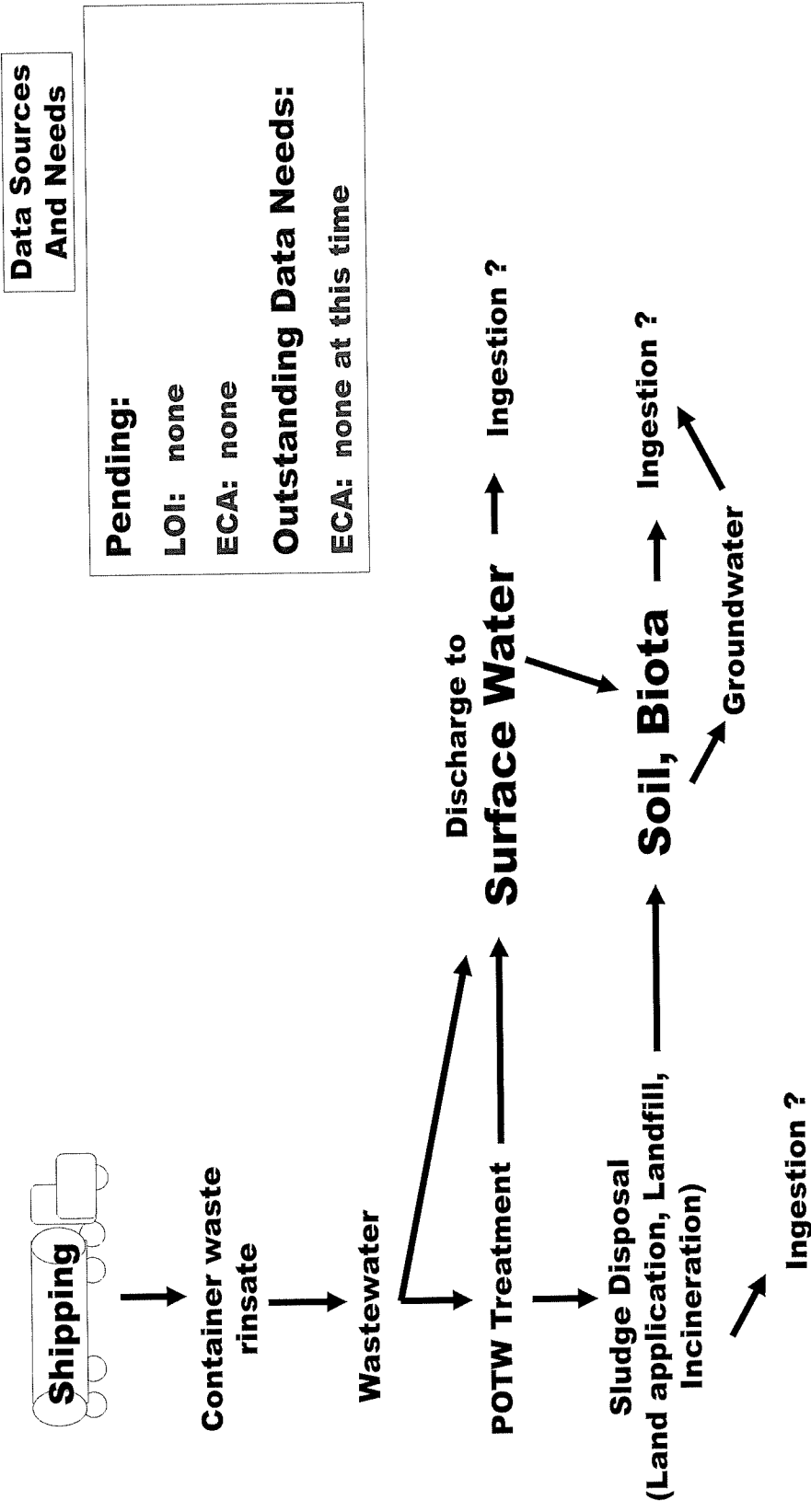
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## Return to Product Life Cycle

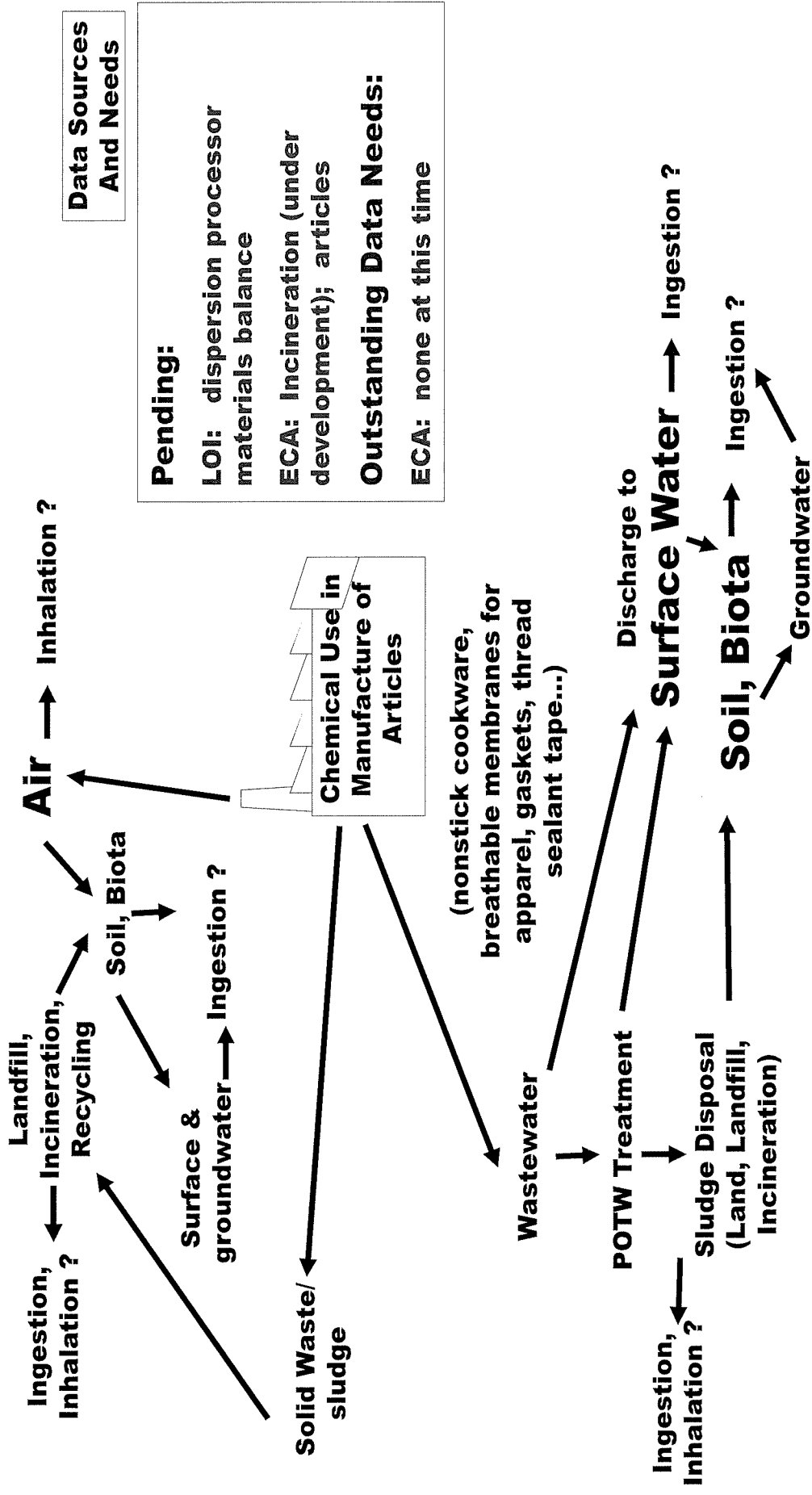
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# Shipping of Fluoropolymers from the Manufacturer to Customers





# Manufacture of Fluoropolymer-Treated Articles



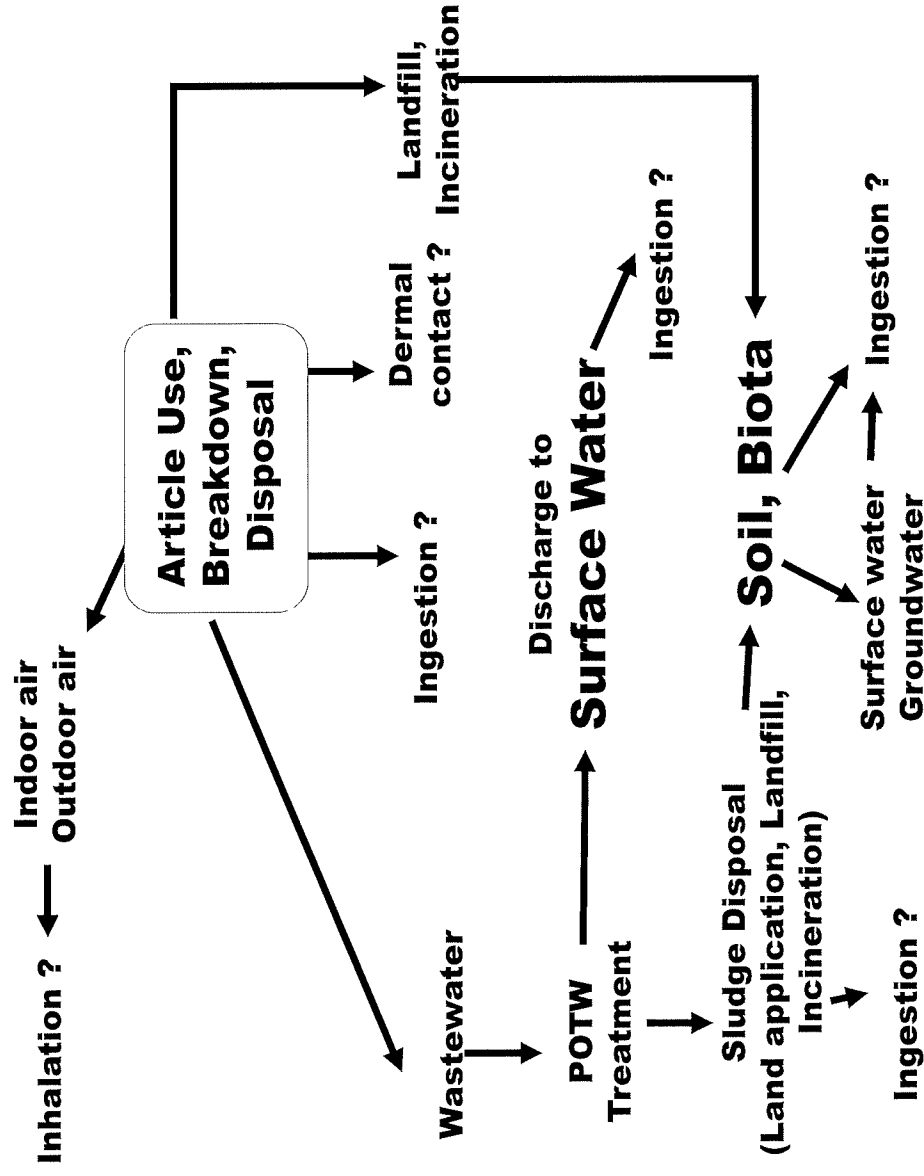
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# Fluoropolymers: Article Use, Breakdown, and Disposal



## Data Sources And Needs

### Pending:

LOI: articles in commerce testing  
ECA: Incineration (under development); aged articles (ECA agreement in principle)

### Outstanding Data Needs:

ECA: none at this time

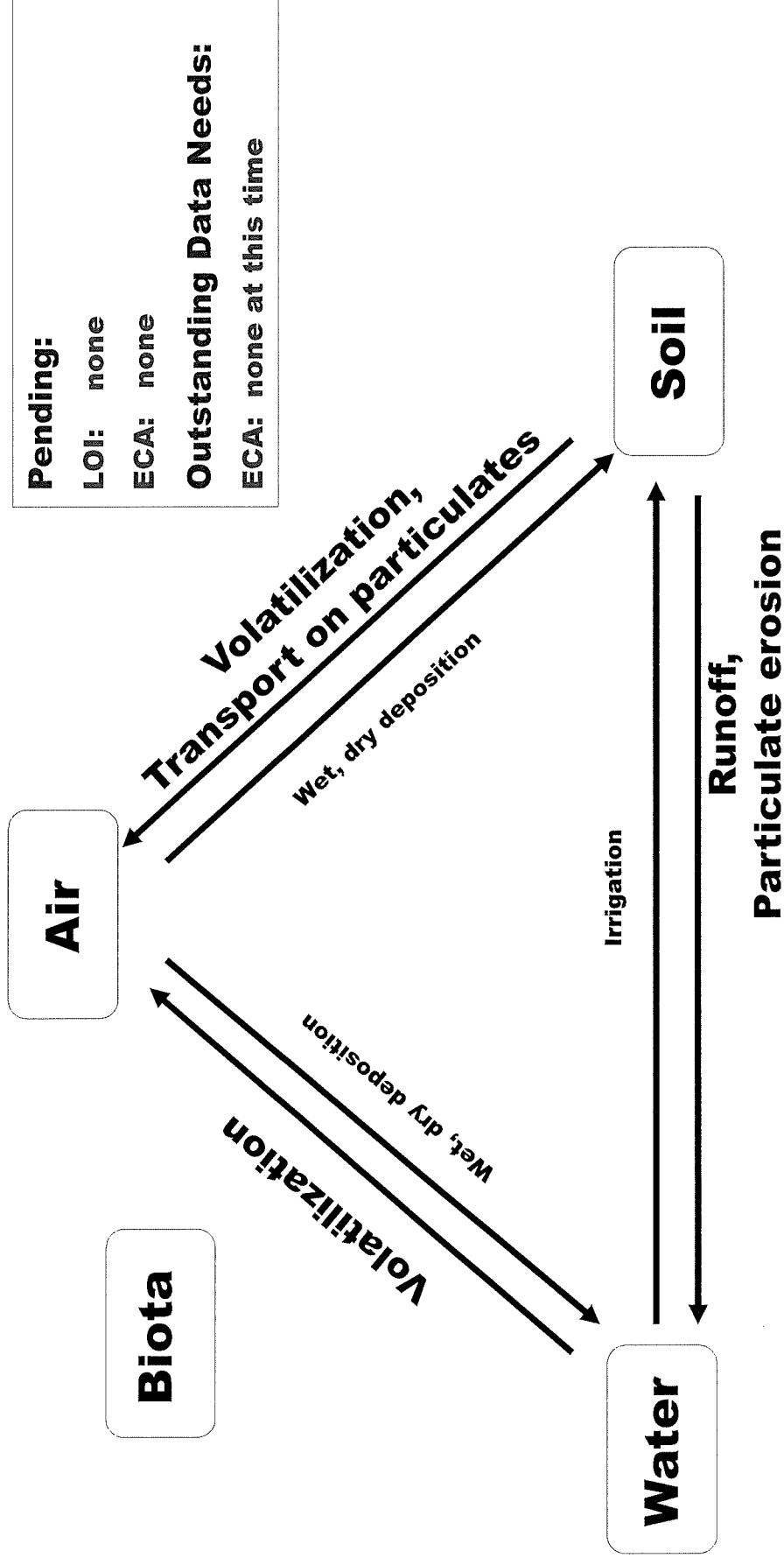
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# Environmental Fate of Fluoropolymers



**Pending:**  
LOI: none  
ECA: none

**Outstanding Data Needs:**  
ECA: none at this time



# Environmental Fate: Water

## Available Data

Little information on the environmental fate of fluoropolymers is available. However, based on the structure of fluoropolymers, information provided on their stability under chemically and environmentally rigorous conditions, and what is known about the behavior of other high molecular weight synthetic organic polymers, fluoropolymer degradation in water is not expected to be a significant source of PFOA.

## Pending/Expected Data via LOI or Proposed ECA

None.

## Additional Data Needed via ECA

None at this time.

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# Environmental Fate: Air

## Available Data

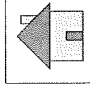
A screening assessment of long-range atmospheric transport using a simple transport and deposition model has been conducted. Results of the evaluation indicate that PFOA can move up to 800 km after being released to the air. This study, while limited, indicates that PFOA may be transported in the atmosphere a significant distance. EPA needs additional information to determine whether air is a significant pathway for fluoropolymers. Air modeling has also been conducted, as described elsewhere in this presentation, but EPA needs additional information on the modeling input and output parameters to evaluate the study. Reference

## Pending/Expected Data via LOI or ECA

None.

## Additional Data Needed via ECA and Rationale

No additional data on the environmental fate of PFOA in air is needed at this time.



# Environmental Fate: Soil

## Available Data

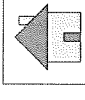
Little information on the environmental fate of PFOA in soil is available. Adsorption studies in soil are available, but the studies are limited and do not sufficiently address the complex soil media. The Agency believes that soil may be an important pathway for human exposure to PFOA, and is requesting additional surface soil monitoring data to better understand this pathway and the relevant sources of soil contamination. References

## Pending/Expected Data via LOI or Proposed ECA

None.

## Additional Data Needed via ECA and Rationale

No additional information on the environmental fate of PFOA in soil is needed at this time, however, surface soil testing is needed in order to understand whether soil is a significant pathway for exposure to PFOA.



# References:

## Soil and Sediment

- Dekleva, Lynn (2003) “Adsorption/Desorption of Ammonium Perfluorooctanoate to Soil (OECD 106)” Study conducted at E.I. du Pont de Nemours and Company site in Newark, DE, Report number EMSER 17-03.**
- Welsh, Stephen (1978) “Adsorption of FC 95 and FC 143 on soil.” Report 1, Project 9970612633, February 27, 1978. (AR226-0488)**
- U.S. EPA, Soil Screening Guidance: Users Guide. EPA Publication 9355.4-23, July 1996.**
- U.S. EPA, Fate, Transport and Transformation Test Guidelines, OPPTS 835.1220 Sediment and Soil Adsorption/Desorption Isotherm. EPA 712-C-96-048, April 1996.**
- Organization for Economic Cooperation and Development (OECD) (2003). Adsorption/desorption of ammonium perfluorooctanoate to soil. OECD 106 test guideline. EMSE study number T0111/14107, report number 17-03.**



# Manufacture of Fluoropolymers: General Information and Specific Information at the Parkersburg, WV Facility

## Available Data

Fluoropolymer Manufacturers Group (FMG) members include Asahi Glass Fluoropolymers, Daikin, DuPont, and Dyneon. Fluoropolymers are manufactured by DuPont at the Washington Works facility in Parkersburg, WV, and by Daikin at the Decatur, AL facility. DuPont is the only U.S. manufacturer of APFO which is used to make fluoropolymers. References

Information on the basic physical/chemical properties of the fluoropolymers, the manufacturing process, facilities, locations, uses/applications of fluoropolymers, CAS #, chemical names, synthetic sequences, and production/import volumes. (LOI Commitment) Much of this information is CBI, however, FMG has provided detailed, non-CBI information on fluoropolymer use categories, and some companies have provided non-CBI plant location References

EPA also has some materials balance information for one facility. EPA also has annual release data for the Parkersburg, WV facility which provides information on the amount of PFOA released, the compartments to which the materials are released. This provides an understanding of potential pathways at manufacturing facilities. References

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# Manufacture of Fluoropolymers at the Parkersburg, WV Facility (continued)

## Available Data (continued)

Results from several DuPont-sponsored studies of the Washington Works facility and surrounding area are also available. In summary, ppb levels of PFOA were detected in a variable pattern within a 2 mile radius of the facility in groundwater. High levels (ppm) were detected in soil associated with waste disposal. On-site soil samples in other areas not associated with waste disposal were in the 10-50 ppb range. Only two off-site soil samples were analyzed; these detected levels of 110 and 170 ppb in the Little Hocking well field, approximately 1 mile off-site.

In surface water, low to sub- ppb levels were found downstream of the facility. PFOA was not detected upstream of the outfall. Local public water supplies were also tested, and low ppb to sub-ppb levels were detected. Air modeling using ISCST3 has also been conducted, and DuPont believes the results can be used to predict where to conduct groundwater monitoring. EPA has looked at the results and other available information and disagrees. DuPont believes that air deposition followed by rapid migration through the soil to groundwater is the major route of the contamination. EPA needs additional data on this pathway to determine whether this theory is supportable. [References](#)



# **Manufacture of Fluoropolymers at the Parkersburg, WV Facility (continued)**

## **Pending/Expected Data via LOI or Proposed ECA**

Additional data (location of monitoring wells and soil samples, and input and output files for air modeling) has been requested to enable EPA to better understand the modeling and monitoring and DuPont's interpretation of the data.

Incineration Analysis – ECA Proposal is being drafted; anticipate results roughly 18 months from start of the test, based on similar studies.

## **Additional Data Needed via ECA and Rationale**

At manufacturing facilities, monitoring of air, surface soil, and biota are needed. Off-site from these facilities, monitoring of concentrations in air, surface water, groundwater (background), wastewater treatment and sludges, and biota are needed. Very little off-site data are available to the Agency, and thus, the extent of the contribution of these point sources to the general population exposures is largely unknown.

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# **Manufacture of Fluoropolymers at the Parkersburg, WV Facility (continued)**

## **Additional Data Needed via ECA and Rationale, continued**

These data are needed to better understand the pathway from air transport and deposition onto soil followed by migration to groundwater. This would enable EPA to determine the potential for these point sources to impact the general population.

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# **References: General Fluoropolymer and Parkersburg, WV Site**

**APFO Users Letter of Intent, “Voluntary Actions to Evaluate and Control Emissions of Ammonium Perfluorooctanoate (APFO). The Society of the Plastics Industry, to Stephen L. Johnson, Assistant Administrator, OPPTS, EPA, March 14, 2003.**

**DuPont de Nemours and Company. Voluntary Use and Exposure Information Profile for Ammonium Perfluorooctanoate (APFO). Undated. AR226-0599.**

**3M Company (2003) Letter from Michael Santoro and George Millet to Document Control Officer, OPPT, EPA on the subject of P-Chem Properties for fluoropolymers.**

**Kudo, Naomi, Naoki Bandai, Yoichi Kawashima, “Determination of perfluorocarboxylic acids by gas-liquid chromatography in rat tissues.” Toxicity Letters, 99 (1998) 183-190.**

**Sottani, Christina, and Claudio Minoia, “Quantitative determination of perfluorooctanoic acid ammonium salt in human serum by high-performance liquid chromatography with atmospheric pressure chemical ionization tandem mass spectrometry” Rapid Communications in Mass Spectrometry 16 (2002) 650-654.**



# **References: Parkersburg, WV Site (continued)**

**Flaherty, John, and Karen Risha, Method of Analysis for the Determination of Ammonium Perfluorooctanoate (APFO) in Water Revision 1, Exygen Research, State College, PA. January, 2003.**

**Corporate Remediation Group (An Alliance between DuPont and URS Diamond), Sampling Investigation Results Little Hocking Water Association Well Field; Washington County, Ohio, Project number 748218983762.00010, April, 2003. (AR226-1416).**

**Corporate Remediation Group (An Alliance between DuPont and URS Diamond), Groundwater Investigation Quality Assurance Project Plan For Washington Works Plant, Project number D6WW7423.01, January, 2002.**

**DuPont Fluoroproducts, Ammonium Perfluorooctanoate (C-8) Groundwater Investigation Steering Team Report, Consent Order No. GW-2001-019, August, 2003.**

**Corporate Remediation Group (An Alliance between DuPont and URS Diamond), C-8 Data Summary Report; Consent Order GWR-2001-019, DuPont Washington Works Facility and Local Letart And Dry Run Landfills; Project number 742318983635, February, 2003. (AR226-1415)**



# References: Parkersburg, WV Site (continued)

Corporate Remediation Group (An Alliance between DuPont and URS Diamond), C-8 Data Summary Report; Consent Order GWR-2001-019, DuPont Washington Works Facility and Local Letart And Dry Run Landfills; Project number 742318983635, February, 2003. (AR226-1415)

DuPont (2003) Letter from Andrew Hartten to David Watkins, West Virginia Department of Environmental Protection on the subject of: 2Q03 Public Water Supply Results, West Virginia and Ohio DuPont Washington Works, Washington, WV, June 25, 2003. (AR226-1417)

Sprenger, Mark, and Michael Horne, Draft Report, Dry Run Creek; Washington, Wood County, West Virginia, Environmental Response Team Center, Office of Emergency & Remedial Response, November, 1997. (AR226-1474)

DuPont Fluoroproducts, Ammonium Perfluorooctanoate (C-8) Groundwater Investigation Steering Team Report, Consent Order No. GW-2001-019, August, 2003.

Corporate Remediation Group (An Alliance between DuPont and URS Diamond), Site Screening Level Assessments for PFOA and the Relevance of Soil Sampling, Project number 18983753.00034, October 20, 2003.



# **References: Parkersburg, WV Site (continued)**

**Corporate Remediation Group (An Alliance between DuPont and The W-C Diamond Group), RCRA Facility Investigation Report; DuPont Washington Works; Washington, West Virginia; USEPA Permit Number WVD04-587-5291, Project number 0D6W7205, June 30, 1999.**

**Corporate Remediation Group (An Alliance between DuPont and URS Diamond), Compilation of Historical C-8 Data; DuPont Washington Works; Main Plant and Landfills; Project number D6WW7423, January, 2002.**

**DuPont (2003) Letter from David Rurak to Document Control Officer, OPPT, EPA on the subject of: Follow-up to September 15, 2003 Submission of DuPont Progress Report on Environmental Assessments Pursuant to the APFO Users LOI dated March 14, 2003: Air Dispersion Modeling Reports, October 20, 2003.**

**Corporate Remediation Group (An Alliance between DuPont and URS Diamond), DuPont Telomer Manufacturing Sites: Environmental Assessment of PFOA Levels in Air and Water, Project number 50850118983843.00003, September, 2003.**

**Corporate Remediation Group (An Alliance between DuPont and URS Diamond), C-8 Data Summary Report; Consent Order GWR-2001-019, DuPont Washington Works Facility and Local Letart And Dry Run Landfills; Project number 742318983635, February, 2003. (AR226-1415)**

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# References: Parkersburg, WV Site (continued)

Society of the Plastics Industry (SPI) (2003). Detecting and Quantifying Low Levels of Fluoropolymer Polymerization Aids: A Guidance Document. Fluoropolymer Manufacturers Group, Technical Working Group, Analytical Working Group. Washington, DC. SPI Catalog No. BZ-102.

Drobny, J.G. (2001). Technology of Fluoropolymers. Boca Raton, FL: CRC Press. 172 pp.

Schiers, J. (Ed.) (1997). Modern Fluoropolymers: High Performance Polymers for Diverse Applications. Chichester: Wiley & Sons. 637 pp.

Taylor PH, Dellinger B, and Lee CC (1990). Development of a thermal stability based ranking of hazardous organic compound incinerability. Environ Sci Technol 24:316-328.

Napoli, M., Fraccaro C, Scipioni A, and Armelli R (1984). Thermal decomposition of pefluoroalkanesurfonyl fluorides: The pyrolysis of perfluoro-n-octane-1-sulfonyl fluoride. Journal of Fluorine Chemistry, 24: 377-385.

Tsang W, Burgess DR, and Babushok V (1998). On the incinerability of highly fluorinated organic compounds. Combustion Science and Technology 139:385-402.





# Manufacture of Fluoropolymers at the Decatur, AL Facility

## Available Data

Several studies of PFOA contamination in the vicinity of the Decatur facility. PFOA has been detected in wastewater, surface water, sediment, and fish tissue near the facility outfall and in areas downstream; some fish collected upstream of the outfall had measurable PFOA concentrations as well. In groundwater, PFOA was detected at ppm levels near the facility, including some upgradient wells. Contaminant plumes have been detected at the facility and at a nearby landfill. References

A limited amount of air modeling data have been generated for the Decatur facility, but the data have not undergone a rigorous analysis and EPA needs additional information in order to better understand the results. References

## Pending/Expected Data via LOI or Proposed ECA

Ongoing monitoring at the facility is being conducted and the Agency expects to receive this data when it becomes available.

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# **Manufacture of Fluoropolymers at the Decatur, AL Facility (continued)**

## **Additional Data Needed via ECA and Rationale**

**Manufacturing facilities and off-site from these facilities: concentrations in air, surface water, groundwater, wastewater, landfill leachate, soil, sludges, and biota. Very little off-site data are available to the Agency, and thus, the extent of the contribution of these point sources to the general population exposures is largely unknown.**

**These data are needed to better understand the pathway from air transport and deposition onto soil followed by migration to groundwater. This would enable EPA to determine the potential for these point sources to impact the general population.**

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# **References: Fluoropolymer Manufacture Decatur, AL Site**

**Entrix, Inc. A Survey of Selected Fluorochemicals in the Decatur Alabama Area 2002 Sampling, prepared for 3M, St. Paul, Minnesota, July, 2003.**

**3M Company (2003) Letter from Michael Santoro to Document Control Officer, OPPT, EPA on the subject of: Submission of Monitoring Data Pursuant to the 3M LOI dated March 13, 2003 and APFO Users LOI dated March 14, 2003, August 1, 2003.**

**Alabama Department of Environmental Management, National Pollutant Discharge Elimination System Permit, Daikin America, Inc. (AL0064351) no date.**

**DuPont (2003) Letter from David Rurak to Document Control Officer, OPPT, EPA on the subject of: Follow-up to September 15, 2003 Submission of DuPont Progress Report on Environmental Assessments Pursuant to the APFO Users LOI dated March 14, 2003: Air Dispersion Modeling Reports, October 20, 2003.**

**Daikin (2003) Letter from Randy Roussel to Document Control Officer, OPPT, EPA on the subject of: Progress Report on Monitoring Efforts at Daikin America, Inc. Decatur Facility, September 15, 2003.**

**3M Environmental Laboratory, Environmental Monitoring - Multi-City Study; Water, Sludge, Sediment, POTW Effluent and Landfill Leachate Samples. June 25, 2001.**

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# Shipping From Fluoropolymer Manufacturer to Customers

## Available Data

EPA has no information on what types of containers are used, and how the shipping containers are handled.

## Pending/Expected Data via LOI or Proposed ECA

The Dispersion Processor Materials Balance Study, with a targeted completion date of 2Q 2004, should provide some information on amount of container waste for dispersions.

## Additional Data Needed via ECA

None at this time.



# **Fluoropolymers: Article Manufacturing**

## **Available Data**

There are two broad uses of fluoropolymers: a) solid polymer which is ultimately molded to form articles, and b) fluoropolymer dispersed in a liquid matrix, with PFOA used to stabilize the emulsion. The dispersions are applied onto the article and the article is heated to drive off PFOA and to impart favorable properties.

### **References**

## **Pending/Expected Data via LOI or Proposed ECA**

**Dispersion Materials Balance Study** will assess the potential for APFO environmental releases during dispersion processing. The target date for completion of the study is 2Q 2004.

## **Additional Data Needed via ECA**

**Monitoring on-site and off-site of concentrations in air, soil, surface water, groundwater, wastewater treatment and sludges, and biota is needed to enable the Agency to determine whether these facilities are significant sources of PFOA.**

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# Fluoropolymers: Article Use/Breakdown/Disposal

## Available Data

EPA has information on the thermal breakdown of PFOA. The study authors burned fluoropolymers and detected PFOA. However, thermal degradation data were not included in this study. EPA also has basic information on fluoropolymers, including information on solvents and their impact on fluoropolymer materials.

## References

## Pending/Expected Data via LOI or Proposed ECA

FMG has committed under its LOI to test high and low heat consumer and industrial articles of commerce using FDA Guidance for Industry (April 2002), using water and other extraction solvents as appropriate, using LC/MS/MS analysis and the Exygen method. In addition, a proposed ECA is under discussion and there is an agreement in principle. The proposed ECA will address testing membranes for apparel, household cookware, plenum cable and thread sealant tape using a solvent that is identified by a solvent comparison test, in a mass balance method and a method proposed by FMG to determine the potential for generation of PFOA and characterization of release of PFOA from articles.



# **Fluoropolymers: Article Use/Breakdown/Disposal (continued)**

## **Additional Data Needed via ECA and Rationale**

**Thermal degradation data are needed. This testing may be incorporated into the article testing proposed, but EPA needs additional information to determine whether the testing will be adequate.**

**This testing would determine the level at which fluoropolymers may thermally degrade in routine use and reasonably foreseeable misuse of articles.**



# **References:**

## **Article Use/Breakdown/Disposal**

**Ellis, David, Jonathan Martin, Derek Muir, and Scott Mabury, “The use of <sup>19</sup>F NMR and mass spectrometry for the elucidation of novel fluorinated acids and atmospheric fluoroacid precursors evolved in the thermolysis of fluoropolymers” The Analyst 128 (2003) 756-764.**

**Dionex Corp. (2000). Accelerated solvent extraction (ASE) of additives from polymer materials. Application Note 331.**

**American Society for Testing and Materials (ASTM). Standard guide for small-scale emission chamber determinations from indoor materials/products. ASTM D-5116-97. Available at [www.astm.org](http://www.astm.org).**

**3M Corp. (2003). Letter from Michael Santoro and George Millet to Document Control Officer, OPPT, EPA on the subject of physical/chemical properties of fluoropolymers.**

**APFO Users (2003). APFO Users Letter of Intent, “Voluntary actions to evaluate and control emissions of Ammonium Perfluorooctanoate (APFO).” Submitted with a cover letter from Don Duncan, The Society of the Plastics Industry, to Stephen L. Johnson, Assistant Administrator, OPPTS, EPA. March 14, 2003.**





# Fluoropolymers: Biota

## Available Data

EPA has reviewed biota data in wildlife from Japan and Korea, in a limited study of alfalfa collected from the site of a 3M facility which encountered analytical problems, and from a market basket study also conducted by 3M. The market basket study included food purchased in Mobile, AL; Columbus, GA; Decatur, AL; Pensacola, FL; Cleveland, TN; and Port St. Lucie, FL. For each city, six samples of each of the following types of food were sampled: green beans, apples, pork, chicken, eggs, milk, bread, hot dogs, fish, and ground beef. This yielded 36 total samples for each food type. Purchase times and food origins were uncertain for all samples. PFOA was not detected in chicken, pork, eggs, hot dogs, or fish. PFOS (but not PFOA) was detected in milk. PFOA was detected in one green bean sample, two apple samples, one bread sample, and two ground beef samples. This is a useful study, but the number of samples collected was very small compared to other studies (e.g., Pesticide Data Program) which are used to provide reliable results about the nation's food supply. References

## Pending/Expected Data via LOI or Proposed ECA

None

## Additional Data Needed via ECA and Rationale

EPA is consulting our internal experts to evaluate these studies and will then prepare an Agency review of the data, including whether additional data are needed via an ECA and rationale.



# References: Biota

**Sanderson, Hans, Timothy Boudreau, Scott Mabury, Keith Solomon, “Impact of perfluorooctanoic acid on the zooplankton community in indoor microcosms.” Aquatic Toxicology, 63 (2003) 227-234.**

**Kannan, Kurunthachalam, Jae-Won Choi, Naomasa Iseki, Kurunthachalam Senthilkumar, Dong Kim, Shigeki Masunaga, and John Giesy, “Concentrations of perfluorinated acids in livers of birds from Japan and Korea,” Chemosphere 49 (2002) 225-231.**

**Ohya, Takeshi, Naomi Kudo, Erika Suzuki, Yoichi Kawashima, “Determination of perfluorinated carboxylic acids in biological samples by high-performance liquid chromatography” Journal of Chromatography 720 (1998) 1-7.**

**Giesy, John P. and Kurunthachalam Kannan, “Global Distribution of Perfluorooctane Sulfonate in Wildlife” Environmental Science & Technology, 35 (2001) 1339-1342.**

**U.S. Department of Agriculture. Pesticide Data Program. Annual Summary Calendar Year 2001. February 2003.**



## **References: Biota (continued)**

**Kannan, Kurunthachalam, J. Christian Franson, William W. Bowerman, Kris J. Hansen, Paul D. Jones, and John P. Giesy, “Perfluorooctane Sulfonate in Fish-Eating Water Birds Including Bald Eagles and Albatrosses” Environmental Science & Technology, 35 (2001) 3065-3070.**

**Kannan, Kurunthachalam, Jaana Koistinen, Kimberlee Beckmen, Thomas Evans, Jay F. Gorzelany, Kris J. Hansen, Paul D. Jones, Eero Helle, Madeleine Nymann, and John P. Giesy, “Accumulation of Perfluorooctane Sulfonate in Marine Mammals” Environmental Science & Technology, 35 (2001) 1593-1598.**

**3M Environmental Technology and Safety Services, Alfalfa Summary, Centre Analytical Laboratories, Inc., State College, PA, no date.**

**3M Environmental Technology and Safety Services, Analysis of PFOS and PFOA From Various food Matrices Using HPLC Electrospray/Mass Spectrometry, Centre Analytical Laboratories, Inc., State College, PA, June 21, 2001.**



# **References:**

## **Air**

**Franklin, James, Screening Assessment of the Potential for Long-Range Atmospheric Transport of perfluorooctanoic acid, Solvay Research & Technology, March 24, 2002.**

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# **References: Manufactured Articles**

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