

Fluoropolymers Monitoring Technical Group

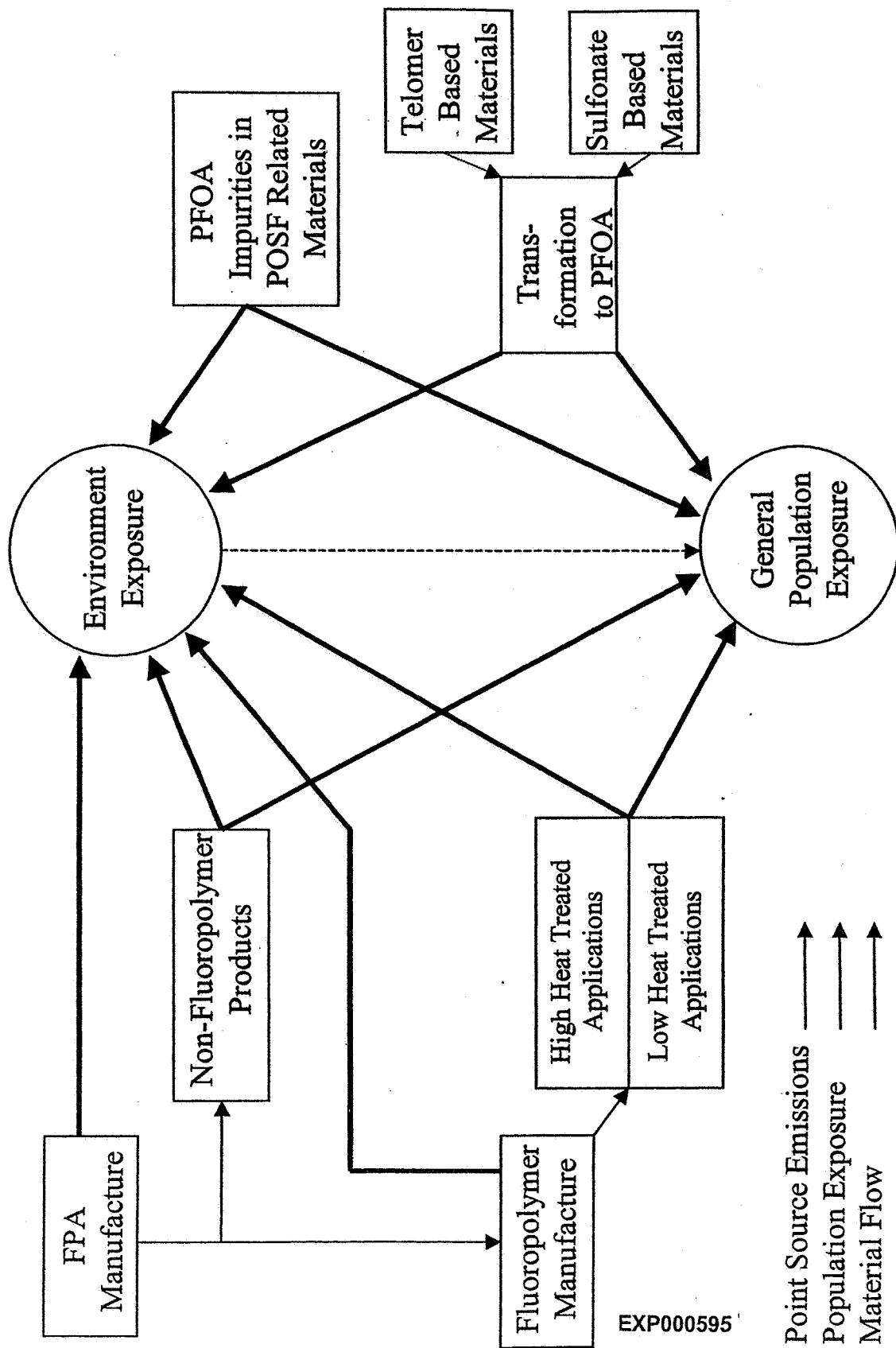
September 18, 2003

EXP000593

Agenda

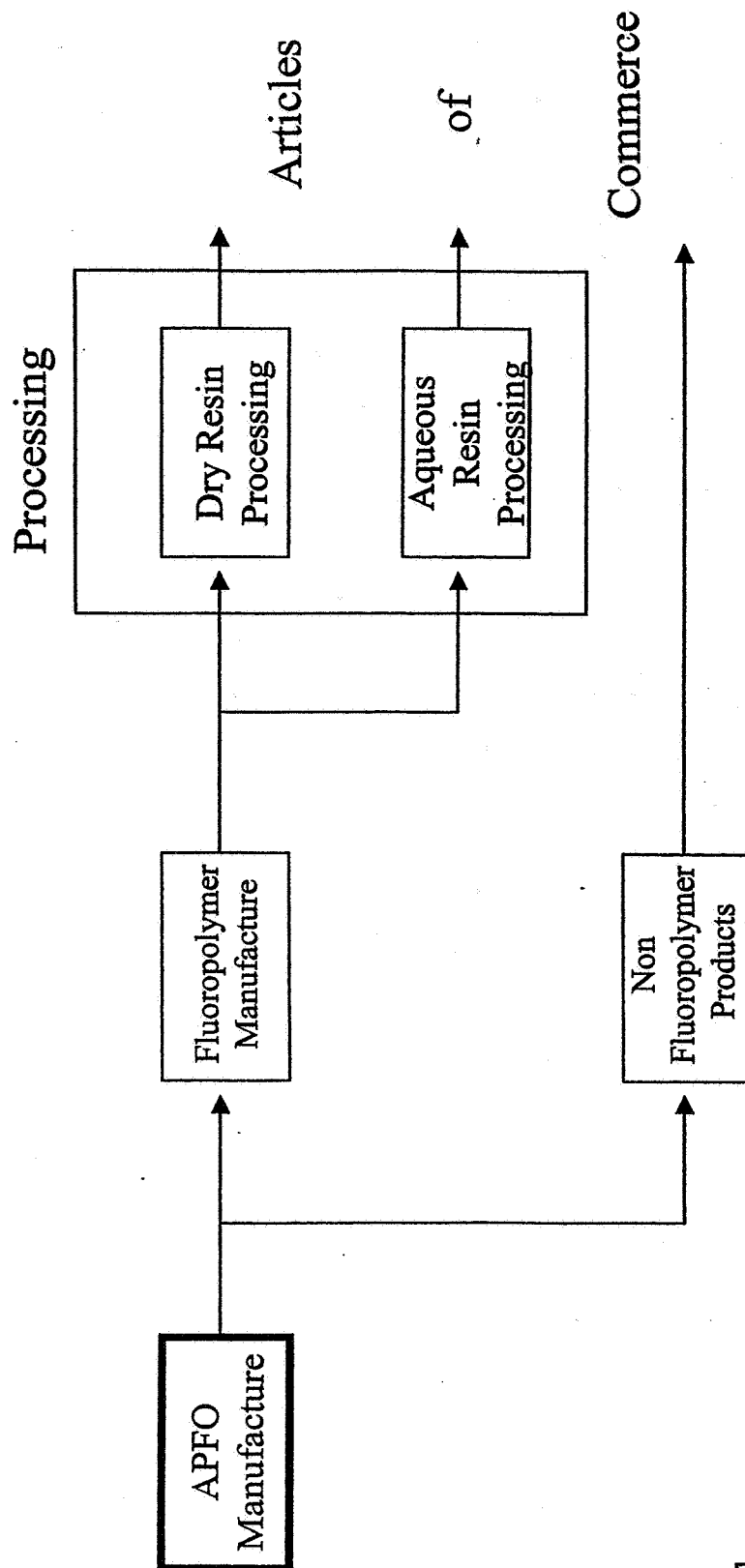
- Program Overview
 - EPA Suggested Priority Change Discussion
- Landfills
- Soil Sampling
- Biota Sampling

Possible Sources of Exposure



EXP000595

Fluoropolymer Summary



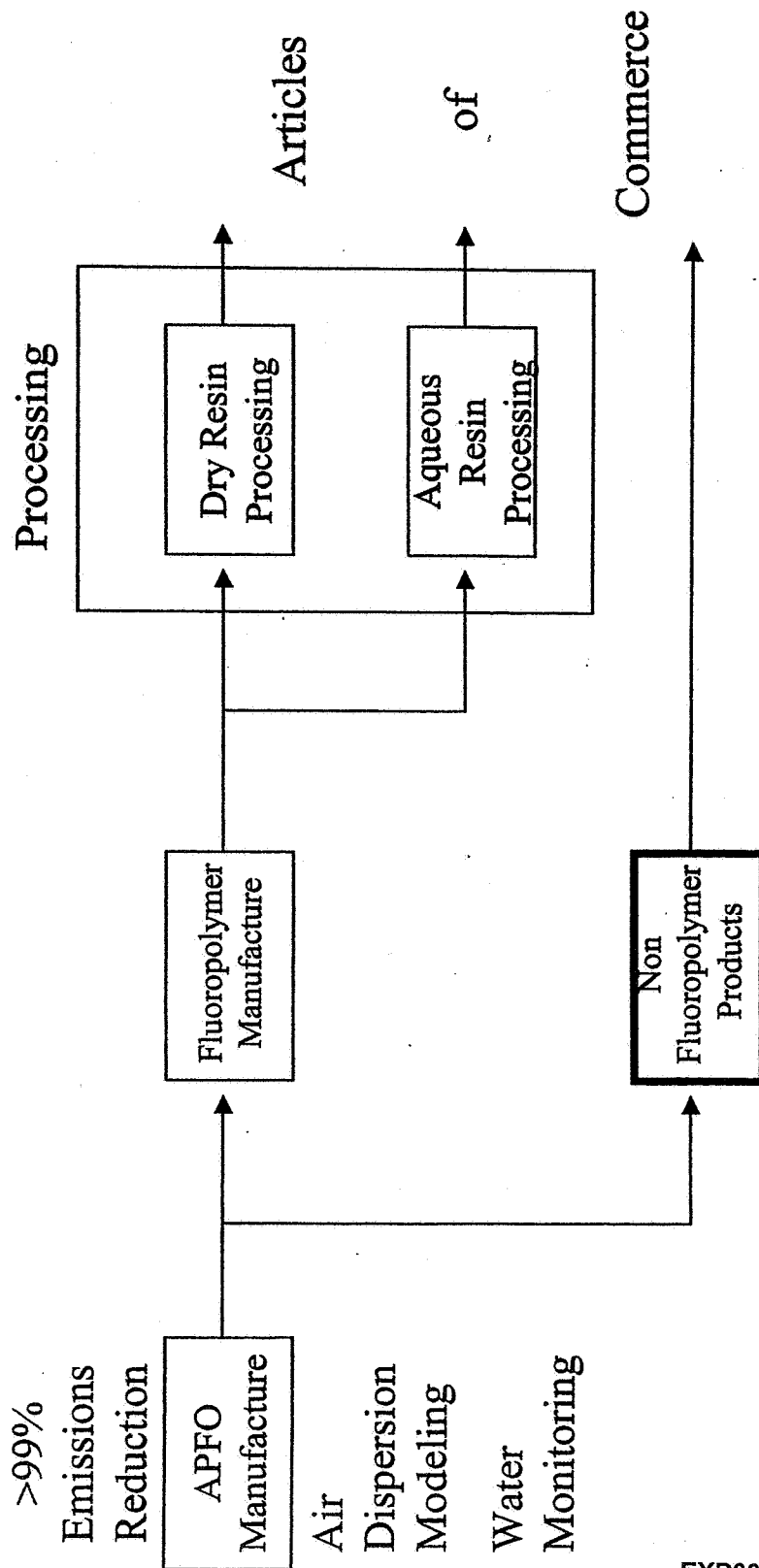
EXP000596

APFO Manufacture

	<u>Program</u>	<u>Timing</u>
• 99% Reduction in emissions as compared to prior manufacture	Plant	In place
• Air dispersion modeling	Design	
• Water monitoring	LOI	Complete
– Prior Manufacturer	LOI/other	Ongoing
– New technology baseline	LOI	Ongoing

EXP000597

Fluoropolymer Summary



EXP000598

LOI

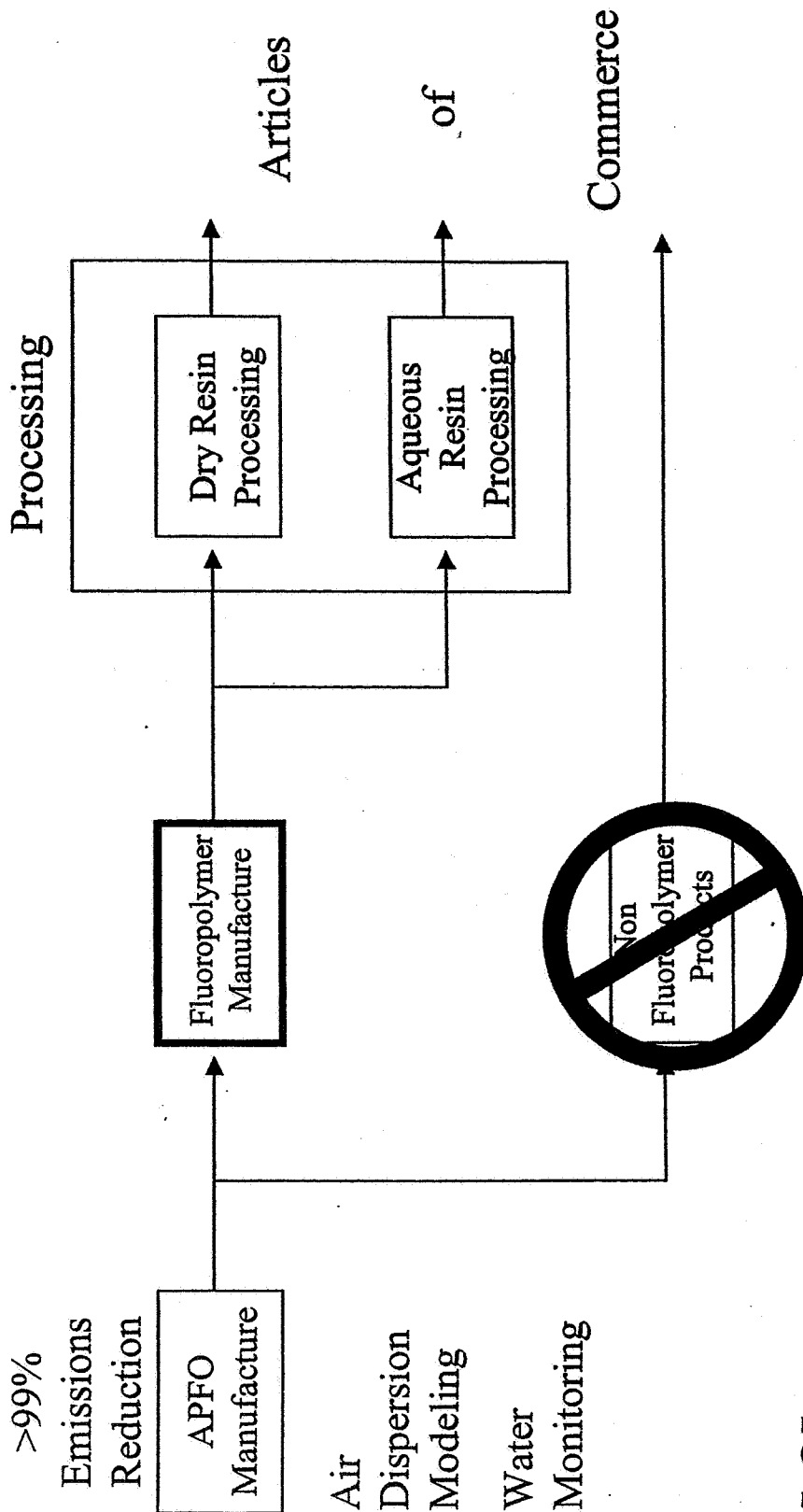
ECA

Non-Fluoropolymer Products

<u>Program</u>	<u>Timing</u>
• Commitment to not sell APFO outside fluoropolymer industry	Ongoing

EXP000599

Fluoropolymer Summary



EXP000600

LOI

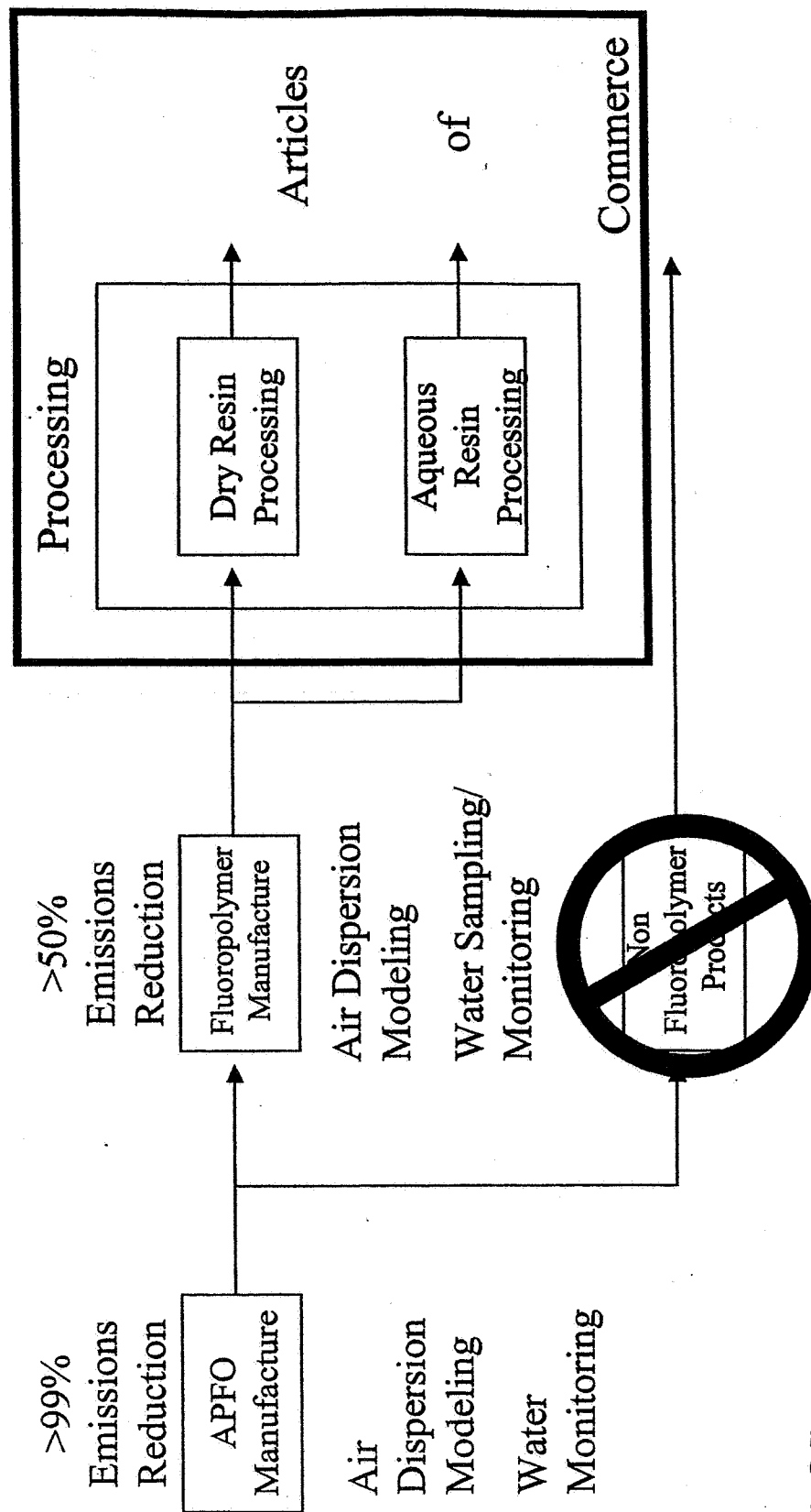
ECA

Fluoropolymer Manufacture

	<u>Program</u>	<u>Timing</u>
• Global Material Balance	pre-LOI	Complete
• 50% Emissions Reduction Commitment	pre-LOI	2006
2002 Status - 48% reduction from the baseline		
• Monitoring/Modeling Commitments		
– Air dispersion modeling	LOI	12/31/03
– Groundwater	LOI/other	Ongoing
– Soil	Other	(Today)
– Landfill	Other	(Today)

EXP000601

Fluoropolymer Summary



EXP000602

LOI

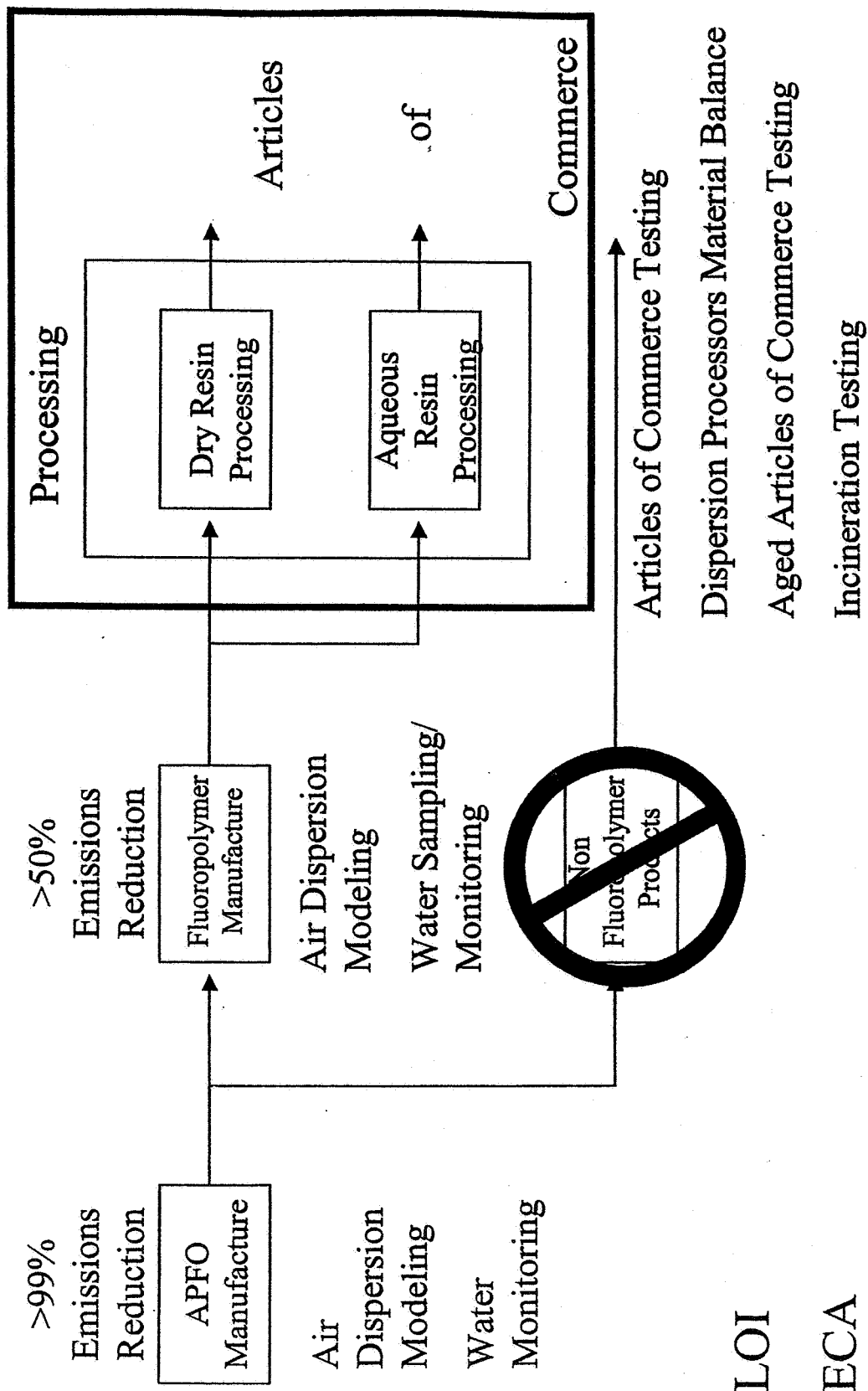
ECA

Processing/Articles of Commerce

	<u>Program</u>	<u>Timing</u>
• Articles of commerce testing		
– “New” Articles of Commerce	LOI	12/31/03
– “Aged” Articles of Commerce	ECA	2004
• Dispersion processors material balance	LOI	12/31/03
• Incineration testing	ECA	6/30/04

EXP000603

Fluoropolymer Summary



EXP000604

EPA Proposal

Delay "Articles of Commerce" testing and goal date and accelerate "Air dispersion modeling" at Fluoropolymer manufacturing sites in order to expedite the process to determine if additional monitoring (and ECA) is needed at these facilities.

Impact

	<u>Program</u>	<u>Timing</u>
• Articles of commerce testing		2/28/04
– "New" Articles of Commerce	LOI	12/31/03
• Monitoring/Modeling		
Commitments		
– Air dispersion modeling	LOI	10/31/03
		12/31/03

ECA Technical Subgroup Monitoring

Landfill Monitoring and Exposure Summary

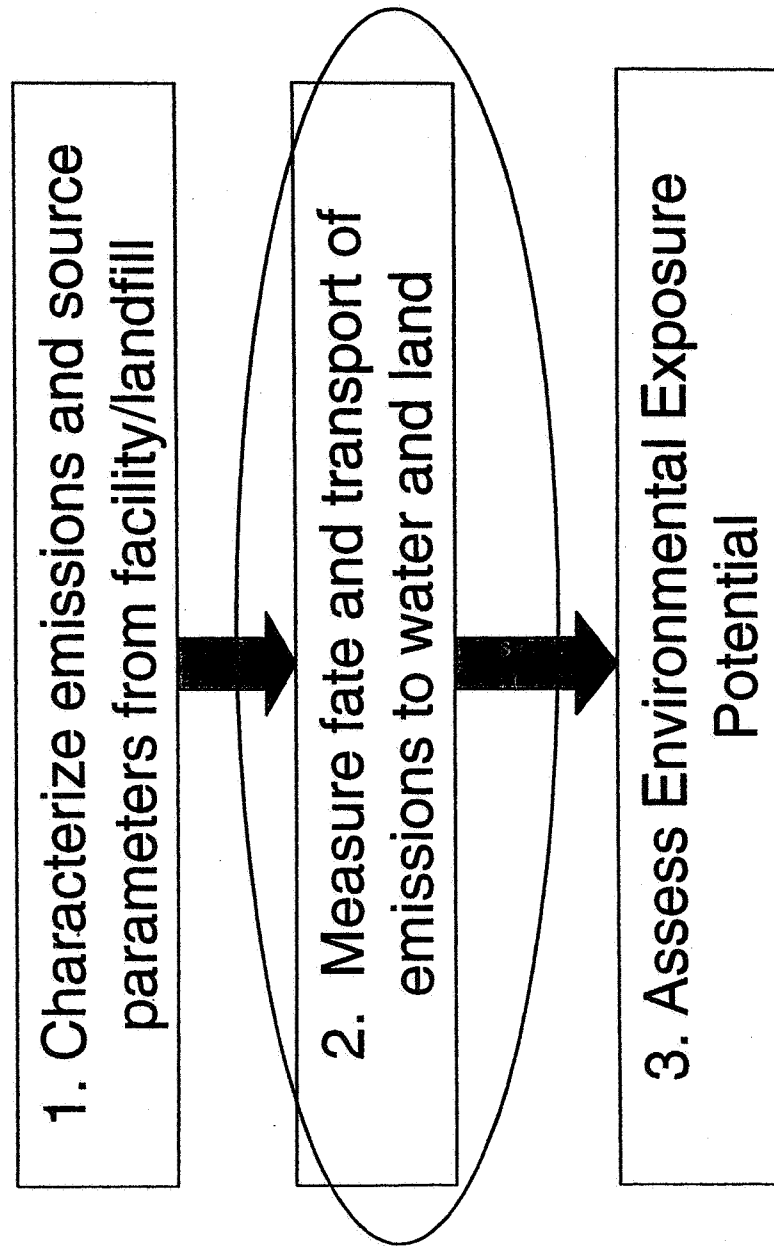
EXP000606

Goal for Today

- Understand the contribution of landfills to PFOA levels in the environment

EXP000607

Environmental Assessment From Manufacturing Facilities/Landfills

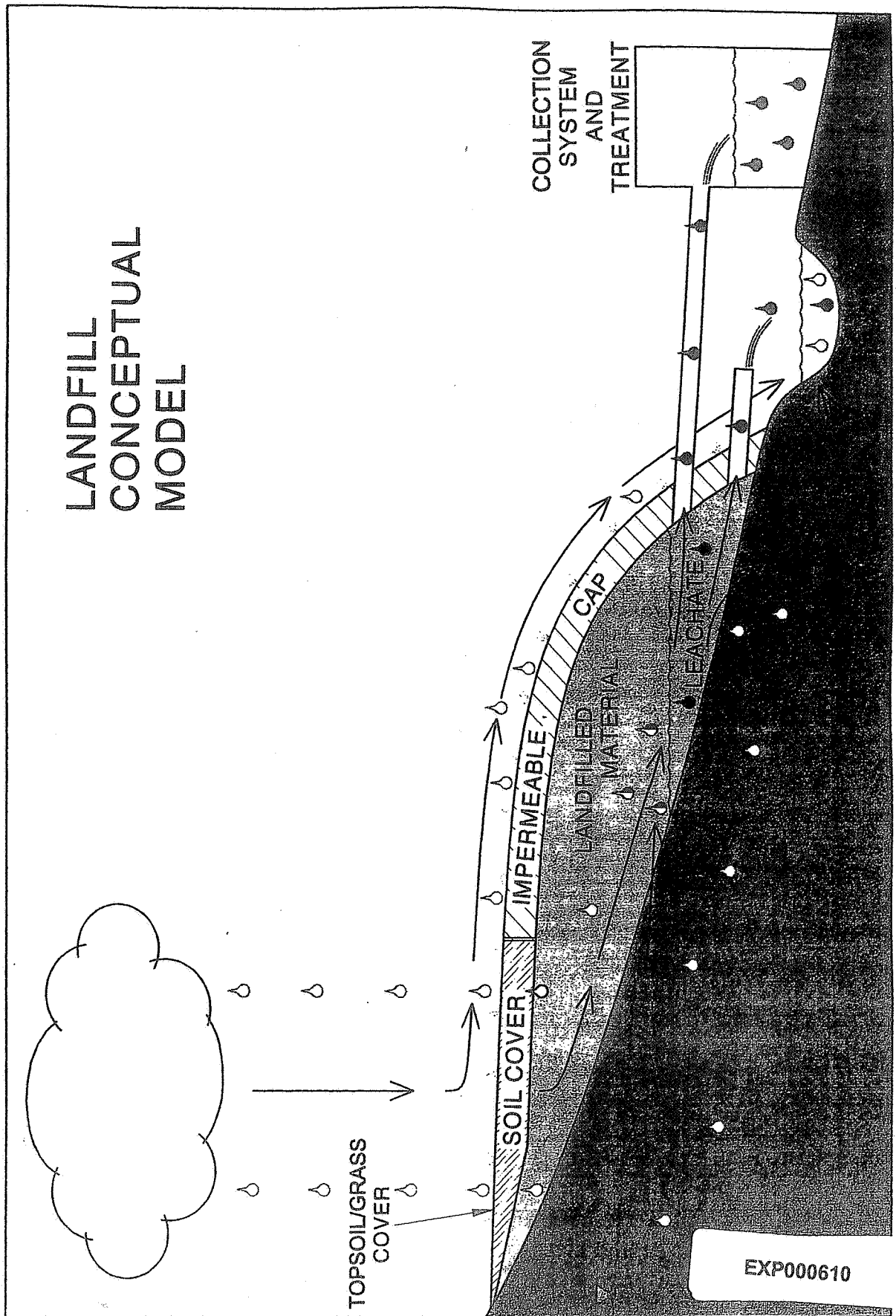


EXP000608

Landfills Are Regulated And Well Managed

- Industrial landfills are subject to State solid waste management requirements:
 - Most have engineered containment and cover systems (i.e., daily and permanent)
 - Extensive/frequent surface water and groundwater monitoring
 - Discharges are NPDES permitted

Typical Industrial Landfill Conceptual Model



Typical Landfill Monitoring

- Surface Water Monitoring
 - Ponds
 - Outfalls
 - Stormwater
 - Streams
- Groundwater Monitoring
 - Program dictated by hydrogeologic complexity
 - Quarterly or semi-annual
- Leachate Monitoring

What we have learned from monitoring at landfills.....

EXP000612

Landfills On-site Summary

Item	Site 1	Site 2	Site 3
Landfill Type	Engg Cap	Active	Soil Cover
Site Wells	15	13	9
Sampling Events	Over 20	10	8
On-site PFOA Range (ppb)	0.058-30,500	NQ-22.8	NQ-65.9
On-site PFOA Mean (ppb)	2763	2.87	17.7
GW-SW Flow (gpy)	525,600	6,664,900	2,482,000
PFOA Flux (lbs/yr)	4.03	8.65	1.01

EXP000613

Flux Calculation

EXP000614

Groundwater Investigation Steering Team (GIST)

EXP000615

GIST Offsite Summary-3 Landfills

Item	Site1	Site 2	Site 3
GIST Offsite Sample	1-mile	1-mile	2-mile
# Off-site Samples	30	53	109
Offsite PFOA Range (ppb)	ND-0.636	ND-0.974	ND-14.3
Offsite PFOA Mean (ppb)	0.04	0.185	1.46

Landfills-Overall Impressions

- Landfills are regulated by state permits
- Permits require:
 - Engineering controls
 - Monitoring plans
- Our experience demonstrates:
 - Engineering controls are effective for PFOA
 - The monitoring conducted indicates minimal PFOA contribution to the environment

Actions

- The other Fluoropolymer LOI signatories will compare the DuPont data with their industrial landfill data in order to develop an understanding of the contribution of other landfills to PFOA environmental loadings

EXP000618

ECA Technical Subgroup Monitoring

Soil Sampling Summary

EXP000619

Goal for Today

- Understand the significance of soil sampling in characterizing the overall manufacturing contribution to PFOA levels in the environment

CATT Defined Soil Ingestion Risk Based Concentration

- 240 mg APFO/kg soil or 240,000 ug/kg
- Based on typical child/adult exposure through ingestion scenario

Soil Exposure Scenario

- Exposure assessments for soil typically consider the topmost 1 to 2 feet of the soil column where accidental ingestion may occur.
- Exposure to deeper soils is typically only relevant in an industrial/construction setting. In that case, engineering controls and health and safety measures prevent direct exposure.

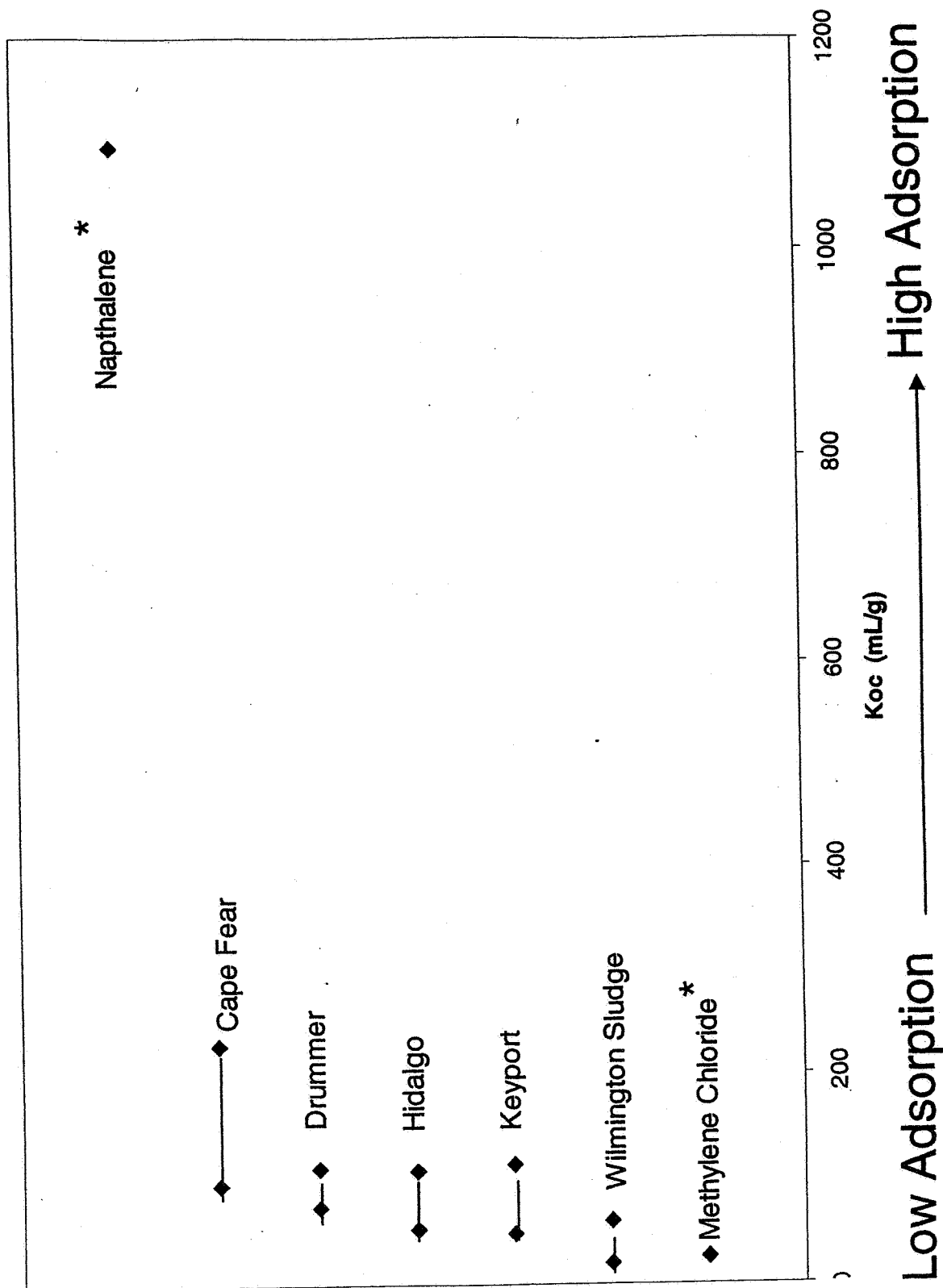
APME PFOA

Adsorption/Desorption Study

- Key Results:
 - Most soil types with low to medium organic carbon content displayed very low adsorption capacity.
 - A high organic content soil/sludge also displayed low “Adsorption Coefficient as a function of organic content” or “Koc”.
 - Water effectively desorbs PFOA
- Conclusion:
 - PFOA has low affinity for adsorption onto soils

EXP000623

PFOA Koc versus Other Chemicals*



EXP000624

Other Soil Sampling Observations

- Fine grained soils (i.e., clays and silts) can support higher PFOA “wet weight” concentrations due to entrapped pore water
- Soils below the water table less likely to adsorb PFOA
- Weather conditions (i.e., wet or dry) at the time of sampling will affect results

Soil Sampling Summary

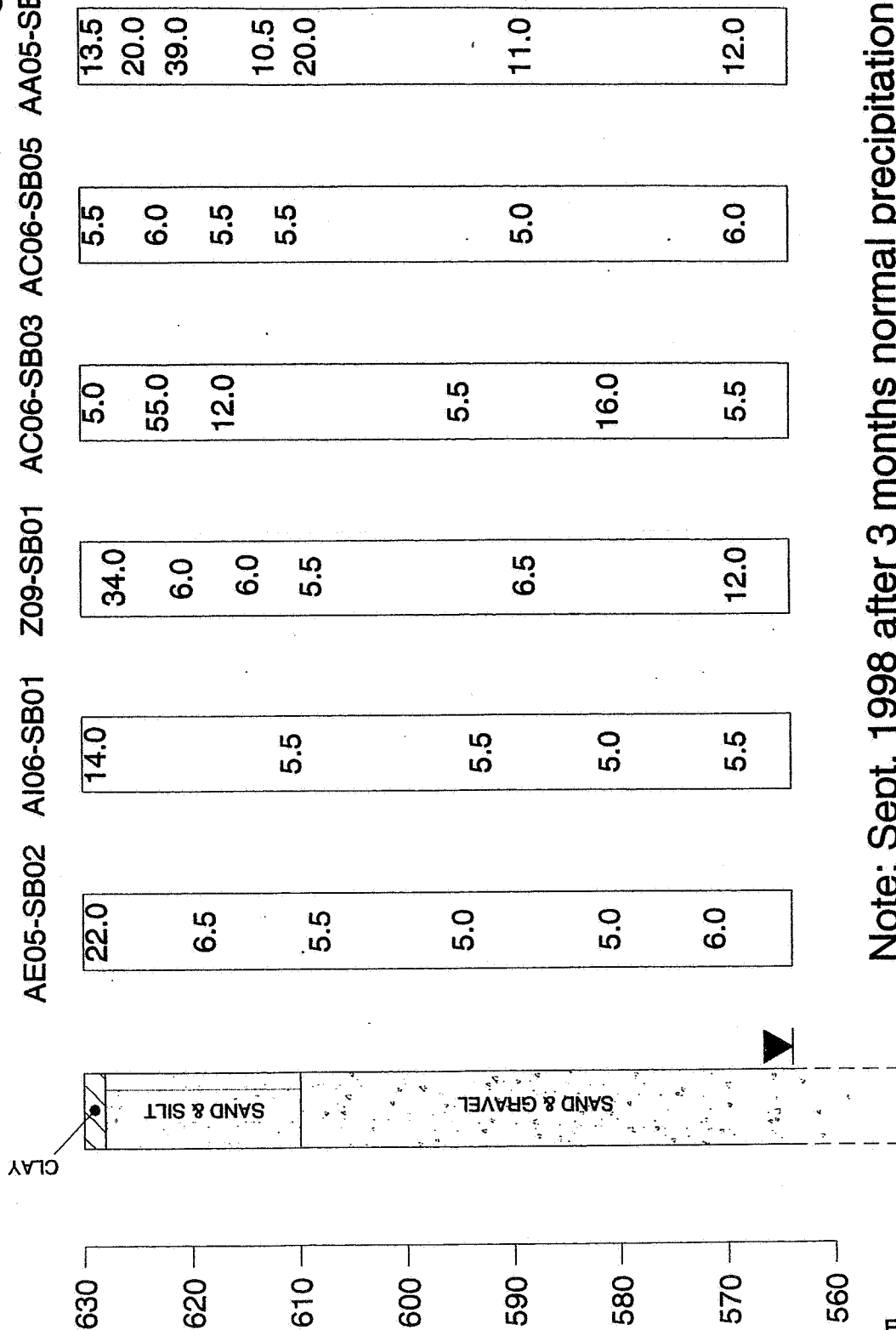
Two key sampling events:

- In 1998 approximately 247 soil samples were collected at a fluoropolymer facility:
 - Objective:
 - Develop concentration versus depth profiles
 - Random locations throughout site
 - At Solid Waste Management Unit (wastewater pond)
- August 2002 at an off-site location (20 samples)

Random Site Locations (PFOA in ug/kg)

CATT = 240,000 ug/kg

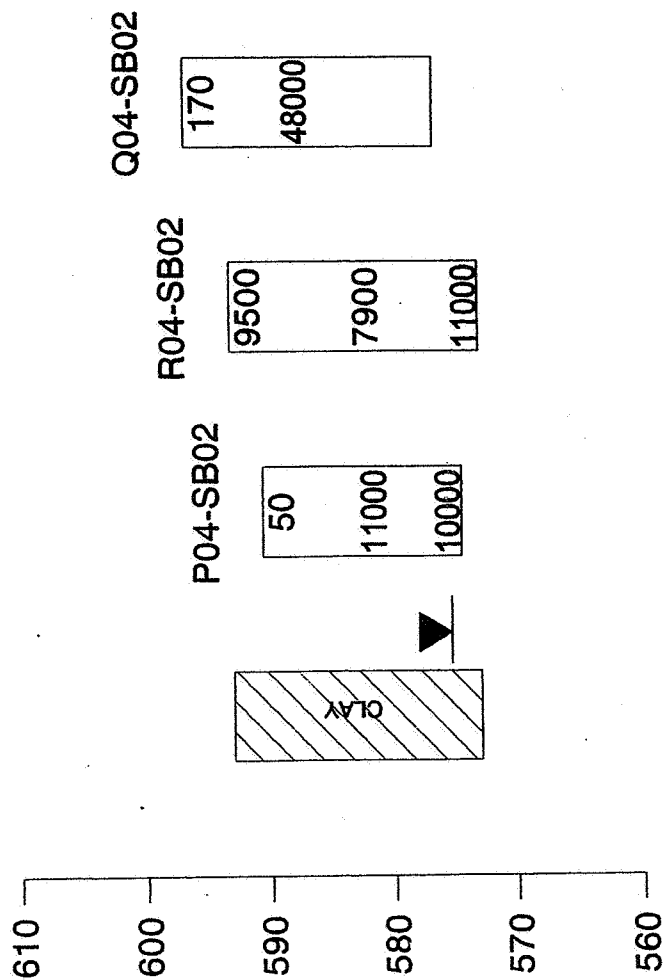
AE05-SB02 AI06-SB01 Z09-SB01 AC06-SB03 AC06-SB05 AA05-SB01



Note: Sept. 1998 after 3 months normal precipitation

Solid Waste Management Unit (PFOA in ug/kg)

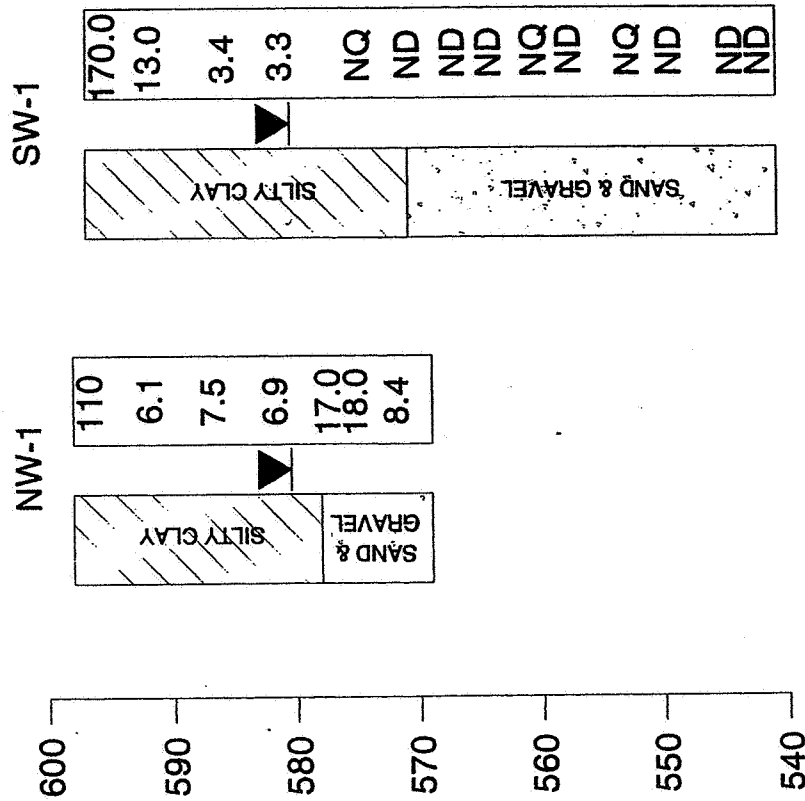
CATT = 240,000 ug/kg



Note: Former waste management pond constructed with bentonite clay liner

Off-site Location-August 2002 (PFOA in ug/kg)

CATT = 240,000 ug/kg



Note: Collected after 6 weeks of below normal precipitation

Conclusions

- Adsorption/Desorption data suggests APFO will not adsorb to soils
- Sample data verifies that APFO does not build up in soils

APME PFOA

Adsorption/Desorption Study

- **Key Results:**
 - Most soil types with low to medium organic carbon content displayed very low Adsorption Coefficients (Kd). Range: 0.41-8.86 mL/g
 - A high organic content soil/sludge also displayed relatively low Kd (12.6-36.8 mL/g)
 - Water effectively desorbs PFOA
- **Conclusion:**
 - PFOA has low affinity for adsorption onto soils

Kd Chart

EXP000632

Soil Sampling Summary

- In 1998 approximately 247 soil samples were collected at a fluoropolymer facility:
 - PFOA Results Surface 0-2 ft Depth:
 - Site-wide: Mean 31.3 ug/kg (40 samples)
 - Waste Pond/Clay Liner: Mean 2,842 ug/kg (4 samples)
 - PFOA Results-Site Soil Boring Profile:
 - 0-2 ft. 13.5 ug/kg Clay/Silty Clay
 - 4-6 ft. 20.0 ug/kg Clay/Silty Clay
 - 8-10 ft. 39.0 ug/kg Clay/Silty Clay
 - 16-18 ft. 10.5 ug/kg Clay/Silty Clay
 - 20-22 ft. 20.0 ug/kg Clay/Silty Clay
 - 40-42 ft. 11.0 ug/kg Sand
 - 60-62 ft. 12.0 ug/kg Sand & Gravel
 - -*Mean PFOA across site not including waste pond: 40.16 ug/kg (226 samples)

CATT = 240,000 ug/kg