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Subject: final draft of Fluoropolymers Appendices A.2 through A.4 as one document

Colleagues,

As requested, attached is a final draft copy of Appendices A.2 through A.4 as one document. Per agreement in the drafting committee, this is not in redline mode.

(See attached file: App A.2 through A.4 Fluoropolymers draft 2-27-04.pdf)

I would like to review and comment on the current Appendix A.1 for fluoropolymers (as well as the current Part II of the fluoropolymers ECA cover document). Among other things, I would like to verify that the changes to the moiety text requested by George, Bill, and I have been made to A.1.

In Table A-3 (was called A-1 in October), I have used George's fluoropolymer name for the second component into the Dry non-melt resin composite and Greg's associated monomers. I would appreciate George and Greg checking this especially.

I look forward to our call on Monday morning.

If you have any questions, please let me know.

Best Regards,

Robert Giraud

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App A.2 through A.4 Fluoropolymers draft 2-27-0

1 **APPENDIX A.2**2 **RATIONALE FOR SELECTING COMPOSITES TO BE TESTED**

3

4 Review of Figure A.2-1 demonstrates that fluoropolymers  
5 industry products can be divided into 3 broad categories as  
6 follows:

7

- 8 • Dry melt resins
- 9 • Dry non-melt resins and gums
- 10 • Aqueous dispersions

11

12 These three broad categories can in turn be divided into  
13 four representative classes as follows:

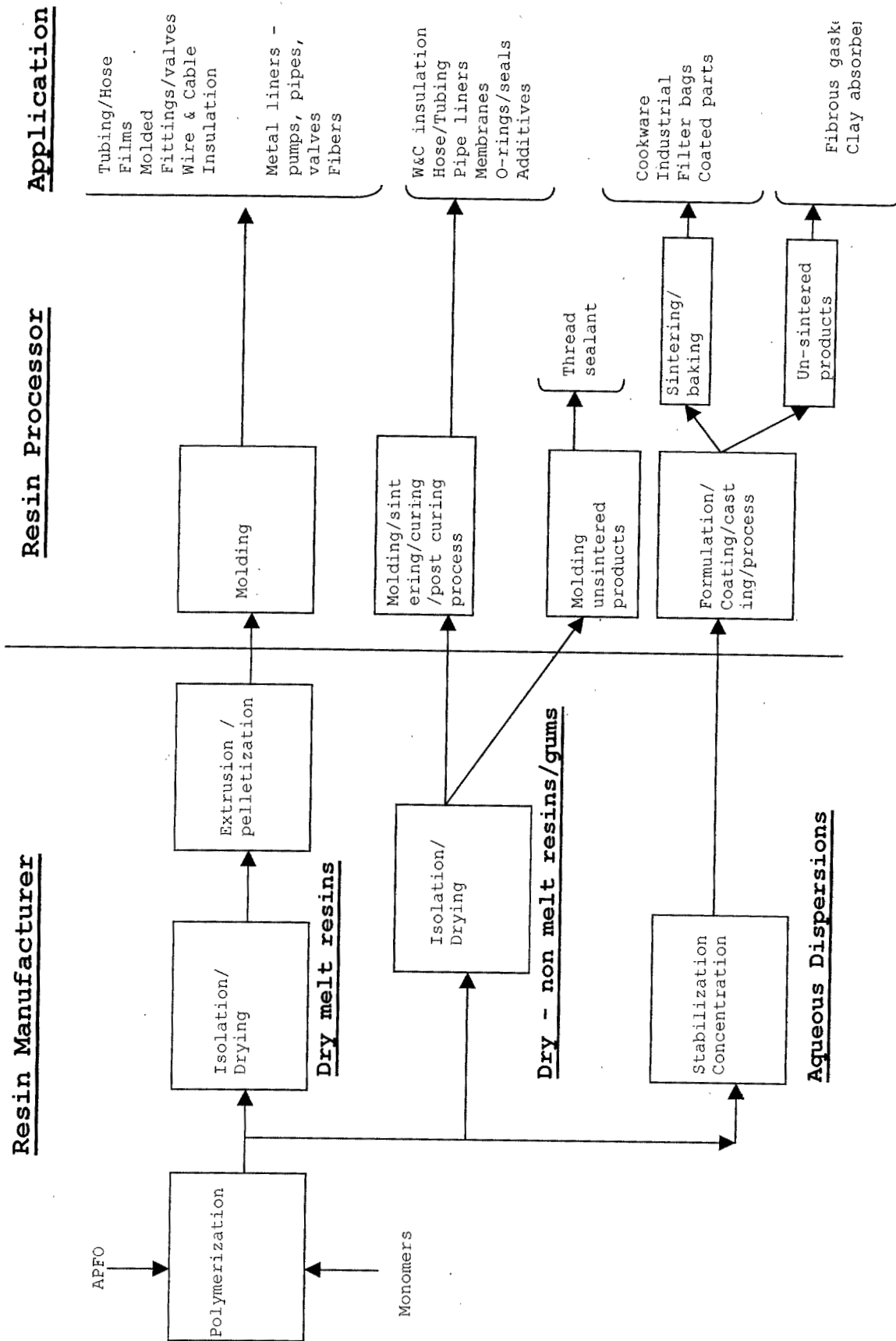
14

- 15 • Dry melt resins
  - 16 1. FEP, PFA, THV, ETFE, HTE
- 17
- 18 • Dry non-melt resins and gums
  - 19 2. Dry non-melt resins
  - 20 3. Fluoroelastomers (dry non-melt gums)
- 21
- 22 • Aqueous dispersions
  - 23 4. PTFE, FEP, PFA, THV

24

25 Composite samples of each of these four representative  
26 classes were selected as the test substance for this  
27 testing program in order to represent the entire range of  
28 fluoropolymers involved.

Figure A.2-1. Fluoropolymer Industry Overview



1 **APPENDIX A.3**2 **COMPOSITION OF COMPOSITES TO BE TESTED**

3  
4 The four composite test substances for this test program  
5 are presented below in Table A.3-1 with the fluoropolymer  
6 types, CAS numbers, and associated monomers for these  
7 fluoropolymers. Each fluoropolymer used in each relevant  
8 test substance composite will have been made using APFO.  
9

10 **Table A.3-1. Test Substance Composites by Type**

Test Substance	Fluoropolymer Type	CAS Number	Associated Monomers
Composite 1 - Dry non-melt resin	PTFE	9002-84-0	TFE
	Modified PTFE	26655-00-5	TFE, PPVE
Composite 2 - Dry melt resins	FEP	25067-11-2	TFE, HFP
	PFA	26655-00-5	TFE, PPVE
		31784-04-0	TFE, PEVE
	THV	25190-89-0	TFE, HFP, VDF
	ETFE	68258-85-5	TFE, E
HTE	35560-16-8	TFE, HFP, E	
Composite 3 - Fluoroelastomers	Fluoroelastomer Copolymers	9011-17-0	VDF, HFP
	Fluoroelastomer Terpolymers	25190-89-0	TFE, HFP, VDF
	Base resistant elastomers	54675-89-7,	TFE, VDF, P
		27029-05-6	TFE, P
	Perfluoroelastomers	26425-79-6	TFE, PMVE
	CTFE elastomers	9010-75-7	CTFE, VDF
Low temperature elastomers	CBI	TFE, VDF	
Composite 4 - Aqueous Dispersions	PTFE	9002-84-0	TFE
	FEP	25067-11-2	TFE, HFP
	PFA	26655-00-5	TFE, PPVE
		31784-04-0	TFE, PEVE
THV	25190-89-0	TFE, HFP, VDF	

11  
12 Confidential business information (CBI) regarding the  
13 chemical identity of Low temperature elastomers has been  
14 submitted to EPA under separate cover.

1 **APPENDIX A.4**2 **PREPARATION OF COMPOSITES TO BE TESTED**3  
4 4.1 Approach

5  
6 A composite mixture of representative fluoropolymers, as  
7 solids, will be prepared for each of the four test  
8 substance composites.

9  
10 The polymer samples will be first quality product polymer,  
11 substantially free of inorganic constituents. Each sample  
12 will be from a representative grade for each applicable  
13 fluoropolymer type from each applicable company.

14  
15 A hypothetical example for Composite Z in Table A.4-1 below  
16 shows how the composites will be assembled. In this  
17 example with 4 types across 4 companies, there are 11 x's.  
18 Hence, composite Z would be made up of 11 equal proportions  
19 of the materials indicated with an x.

20  
21 **Table A.4-1. Example for Compositing Across Companies & Types**

Test Substance	Fluoropolymer Type	Company A	Company B	Company C	Company D
Composite Z	Type 1		x	x	x
	Type 2	x	x	x	x
	Type 3			x	
	Type 4	x	x	x	

22  
23 4.2 Preparation

24  
25 Representative samples of each component from each  
26 applicable company for each composite will be sent to the  
27 compositing facility(ies) in packaging customarily used for  
28 product sample packaging or in polyethylene, polypropylene,  
29 or glass containers.

30  
31 Each composite will be prepared under conditions designed  
32 to prevent cross-contamination and designed to assure  
33 solids temperatures less than or equal to 60 °C.

34  
35 Following preparation of each composite, the composite will be  
36 placed in a polyethylene, polypropylene, or glass container.

37  
38 4.2.1 Composite 1

39  
40 Dry non-melt resins are available in powder form. Equal

1 weights of the powder form of each of the two types of  
2 components (following the approach in the example for  
3 Composite Z in Section 4.1 above) will be mixed together in  
4 dry form to yield Composite 21.

#### 5 6 4.2.2 Composite 2

7  
8 FEP, PFA, THV, ETFE, and HTE dry melt resins are available  
9 in powder form. Equal weights of the powder form of each  
10 component (following the approach in the example for  
11 Composite Z in Section 4.1 above) will be mixed together in  
12 dry form to yield Composite 2.

#### 13 14 4.2.3 Composite 3

15  
16 Fluoroelastomers are available in slab, lump, or sheet  
17 form. Composite 3 will be prepared following one of the  
18 following approaches:

19  
20 a) Equal weights of each component (following the approach  
21 in example for Composite Z in Section 4.1) will be mixed  
22 on a rubber mill to produce a homogenous slab of preset  
23 thickness to yield Composite 3.

24  
25 Or

26  
27 b) Each component of Composite 3 will be cryogenically  
28 cooled (to make the elastomers brittle) and size-reduced  
29 (e.g., ground) to produce powder. Equal weights of the  
30 powder form of each component (following the approach in  
31 the example for Composite Z in Section 4.1) will be mixed  
32 together in dry form to yield Composite 3.

#### 33 34 4.2.4 Composite 4

35  
36 Aqueous dispersions of PTFE, FEP, PFA, and THV are  
37 available as dispersions containing 20 to 60% fluoropolymer  
38 solids by weight. Composite 4 will be prepared following  
39 one of the following approaches:

40  
41 a) Equal weights (on a dry solids basis) of each component  
42 in aqueous dispersion form (following the approach in  
43 example for Composite Z in Section 4.1) will be mixed  
44 together in liquid form. Solids will be separated from  
45 the resulting liquid composite to yield low water content  
46 (i.e., drip free) fine solids.

1

2

Or

3

4

b) Solids will be separated from liquid for each component of Composite 4 to yield low water content (i.e., drip free) fine solids for each component. Equal weights of the solids form of each component (following the approach in the example for Composite Z in Section 4.1) will be mixed together to yield Composite 4.

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#### 4.3 Verification

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In order to assure that composite samples in this testing program have been made up of clearly identified materials, the preparation of the composites will include formal Chain of Custody procedures. A chain of custody form will be included with each component material going into the composite to show the identity of the component material and each transfer of custody from its point of origination to preparation of the composite.

22

23

24

Once prepared, each composite will be accompanied by a new chain of custody until it reaches the incineration testing facility.

25

26

27

28

For documentation, the facility preparing a given composite will generate a report to be submitted to EPA with the final report for Phase II incineration testing.