PLAINTIFF'S EXHIBIT

UC-3823

UNION CARBIDE CORPORATION
Engineering, Manufacturing, and Technology Services
Central Engineering

P. O. Box 8361
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BUSINESS CONFIDENTIAL

June 15, 1987

TO: L. E. Calvert
S. W. Clark
G. B. Elder
R. W. Engle
S. S. Murphree

COPY TO: E. M. Bartrug, Jr.
D. J. Dickson
P. D. Franson
G. E. Garrett
T. E. Martin
J. A. Reynolds
J. E. Sanders

FROM: C. C. Neely

SUBJECT: Background Data
Next Task Group Meeting
July 23, 1987

As mentioned in my May 18, 1987 transmittal to you, one of the agenda items for our July 23 meeting will be action plan development for asbestos-containing materials other than gaskets and packing that are used in the C&P work place. The attached listing published by the Alternative Materials Institute will hopefully provide a fairly complete listing by categories of the various products that we must consider in our action plan development. This will supplement the article entitled "Alternatives to Asbestos" that Larry recently submitted to us.

As discussed with some of you, I have arranged to have Karl Schmidt from the Cleveland GRAFOIL™ factory participate in our meeting and lead a discussion of the various GRAFOIL™ gasket products and their limitations. Karl is an Application Representative and should be able to help us factually address questions regarding the trade-offs associated with their various gasket products as a function of service conditions.

By copy of this memorandum, Messrs. Bartrug, Dickson, Garrett and Martin are requested to send a representative or representatives to this meeting to participate in the GRAFOIL™ gasket style trade-off discussions. The action plans that I hope will result from the discussions led by Karl Schmidt are ones relating to the use of GRAFOIL™ gaskets in:

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- pumps and other commonly used machinery items; and
- control systems equipment.

As requested earlier, please transmit meeting agenda items to me by Monday, July 6.

Many thanks.

C. C. Neely

CCN:aa

Attachments

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APPENDIX I

AMI

ALTERNATIVE MATERIALS INSTITUTE

AMERICAN SUPPLIERS OF NON-ASBESTOS PRODUCTS

December 17, 1986

NOTE

The attached list of questions and products was prepared by ICF, the contractor doing EPA's economic analysis related to the asbestos rulemaking. AMI is providing this list as a service to its members, but in doing so, AMI does not suggest that all of the information requested should be shared among the members of the Institute.

Some of ICF's questions relate to product prices, costs, market shares and the like. Although the information is needed by EPA, such data should not be shared among the members for antitrust reasons. We are currently developing mechanisms by which members may provide this information to EPA without sharing it with one another.

AMI018LQP

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December 16, 1986

INFORMATION GAPS IN ICF WORK ON SUBSTITUTES

ASBESTOS PRODUCTS	SUBSTITUTES KNOWN BY ICF	QUESTIONS
Asbestos gasketing and packing	Aramid Flexible graphite Glass Cellulose Blueguard PTFE (100% at value applications market) Carbon Syntheseal (Armstrong) Polybenzamidazole (PBI)	Are ceramic fibers used by packing and gasketing fabricators as a substitute for asbestos? What are the projected market shares of substitutes for asbestos such as PTFE, flexible graphite, cellulose, carbon, glass, aramid, ceramic, PBI, Blueguard, and Syntheseal (Armstrong) in the packing and gasketing market? What are the prices of the substitute products relative to the asbestos gasketing and packing? What company(s) is/are the leader(s) in non-asbestos gasket formulation and technology?
Asbestos drum brake linings	Semi-metallic (steelwool, iron and graphite producer) NAO (non-asbestos organics) - combination of Kevlar®, fiberglass, and/or mineral fiber.	What are the major substitute products and what are their major fibers (and perhaps fillers) for each major application? What share of the OEM does each of the substitutes currently hold? What might be the projected shares of the asbestos-based OEM that could switch to each of these substitute products? What are the specific performance characteristics, service life, safety, and cost (process and materials) issues that justify these projections? How much time will be needed to find acceptable substitutes in the OEM and aftermarket (allowing for development of materials, potential system redesigns, and testing)? What are the prices of the major substitute products relative to the asbestos product?
Brake blocks	Semi-metallics NAO (non-asbestos organic) combination of Kevlar®, fiberglass, and/or mineral fiber	For the four primary uses of brake blocks: trucks and three severe braking categories railroad cars, aircraft (e.g. jets) and off-road vehicles (e.g., logging and mining trucks), please answer all questions asked for drum brake linings.

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ASBESTOS PRODUCTS	SUBSTITUTES KNOWN BY ICF	QUESTIONS
	Full metallic (steel wool, iron, other metal)	In addition: Are there any other federal regulatory requirements constraining the development of acceptable substitutes in the OEM or aftermarket?
Friction materials (industrial/commercial machinery, excluding on or off-road vehicles)	NAO's (molded or woven) (combination of Kevlar^{R}, fiberglass, and/or mineral fiber)	Please answer all the questions asked for drum brake linings. In addition: Are there any other federal regulatory requirements constraining the development of acceptable substitutes in the OEM (or aftermarket)?
Clutch Facings (manual transmissions)	NAO's (molded or woven) (combination of Kevlar^{R}, fiberglass and/or mineral fiber)	Please answer all the questions asked for drum brake linings and for friction materials. In addition: Mercedes-Benz and Saab-Scania stated in their comments that they now use asbestos-free clutch facings in their OEM vehicles; what are these substitute products (major fibers and perhaps fillers)? Is it true that safety and performance considerations for clutch facings are less than a problem for vehicle and heavy machinery brake linings, and thus the testing time for substitute clutch facings may be shorter and simpler?
Disk brake pads (Light and medium vehicle)	Semi-metallic	What is the purchase cost of the semi-metallic substitute product relative to the cost of the asbestos product?
Disk brake pads (Heavy vehicles)	Semi-metallic	What is the purchase cost of the semi-metallic substitute product relative to the cost of the asbestos product?
Rollboard	Fiberfrax Paper (550 & 570) Kaowool Rollboard Ceramic paper	Is anyone producing or importing asbestos rollboard?

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ASBESTOS PRODUCTS	SUBSTITUTES KNOWN BY ICF	QUESTIONS
Millboard	Mineral boards Ceramic boards	Who are the importers and/or producers of asbestos millboard?
Pipeline Wrap	Mineral felt Urethane foam Fiberglas felt	What are the projected market shares for the three substitutes - mineral felt, fiberglass felt, and urethane foam? What is the useful life for each substitute and the asbestos felt?
Roofing Felt	Fiberglas felt Organic felt Single-ply membrane	What are the projected market shares for the three substitutes - fiberglass felt, organic felt and single ply membrane?
Flooring Felt	Fiberglas Pulpex^{R} Clay Duracon^{R} Bontex 148 ^{R}	Is anyone producing or importing asbestos flooring felt?
Vinyl asbestos floor tile	Pulpex ^{R} Santoweb^{R} Microfibers^{R} Fiberglass Polyester	Is anyone producing or importing vinyl asbestos floor tile?
Missile Liner	Kevlar^{R} fiber Ceramic fiber	What is the useful life of the following missile liners - rubber and asbestos rubber and Kevlar^{R}, ceramic and rubber?
Sealant-Tape	For building applications: Ductmate For automobile windshields: Urethane	Who produces structural urethane used to seal automobile windshields? How much does structural sealant tape cost (per linear foot preferably)? Are there other substitutes?
Asbestos textiles	Fiberglass Ceramic/Refractory silica Carbon/graphite Aramids	Are there other fibers that can be used in replacement products for asbestos textiles other than fiberglass, ceramic/refractory silica, carbon/graphite, aramid, and PBI?

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ASBESTOS PRODUCTS	SUBSTITUTES KNOWN BY ICF	QUESTIONS
	Polybenzimidazole (PBI)	What is the projected market share for each substitute fiber in the asbestos textile replacement market? What is the density of each fiber relative to asbestos? How much (by weight and/or volume) of each substitute fiber is used relative to asbestos? What are the costs ($/lb is preferable) of the finished substitute products relative to asbestos for major packing and gasket applications (e.g. 1/2 inch rope, 1/8 inch cloth).
Asbestos-cement pipe	PVC Ductile Iron Reinforced Concrete Prestressed Concrete (pretensioned)	What are the average prices for PVC, ductile iron, prestressed concrete, and reinforced concete pipe? How do these prices compare with the cost of A/C pipe (e.g. 2x's, 3.5x's)? Has pretensioned pipe largely replaced prestressed concrete pipe? Would PVC be the major substitute in the 0-150 psi, 4"-12" diameter pressure pipe market and the 0'-16', 4"-24" diameter non-pressure market? Would ductile iron be the major substitute in the 150 psi, 4"-12" diameter f, the less than or equal to 150 psi, 12"-24" diameter pressure pipe market and the greater than or equal to 16' deep, 4"-24" diameter non-pressure market? Would prestressed concrete (or pretensioned) pipe be the major subatitute in the greater than 24" diameter pressure pipe-market? Would reinforced concrete pipe be the major substitute in the greater than 24" diameter non pressure pipe market? Do these projected market shares for A/C pipe replacement market appear correct?

	by linear foot	by weight
PVC	72%	40.5%
Ductile Iron	23.7%	37%
Prestressed concrete	4%	22%
Reinforced concrete	less than .5%	.5%

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ASBESTOS PRODUCTS	SUBSTITUTES KNOWN BY ICF	QUESTIONS
Corrugated asbestos-cement sheet	Fiberglass reinforced plastic (FRP) PVC Aluminum Galvanized steel Glass reinforced cement sheet	What are the major substitutes other than FRP, PVC, aluminum and galvanized steel? Is glass reinforced cement sheet? What are the projected shares of the replacement market each substitute will take? What corrugated sheets can be used in waterway or bulkhead construction?
Flat asbestos-cement sheet	Transite II, Flexboard II, Marinite (Manville) Minerit (Sanspray; Santa Clara, CA) Eterboard, EFlex (Etermit; Reading, PA) Ultraboard (Weyerhaeuser; Tacoma, WA) Latticrete EP cement board (Laticrete; Bethany, CT) Durock (US Gypsum) Wonderboard (Moduars; Hamilton, OH)	What are the major substitutes for building/construction applications? high temperature applications? electrical applications? Are all the products mentioned to the left potential substitutes? What is the projected market share of the A/C sheet replacement market for each substitute? What are the installation costs for each substitute relative to those for flat A/C sheet? What is the useful life of each substitute relative to the life of A/C sheet?
electrical	Benelex 402 (Masonite; Laurel, MS)	
electrical	Fiberglass reinforced polyester (GPO) (Glastic; Cleveland, OH) Glass reinforced cement (GRC) or Sterling Board	
high temp. & electrical	Zircar Refractory Sheet (Zircar, Florida, NY)	
	For laboratory table tops: Epoxy resin Impregnated sandstone Colorlith II Laminated plastic	
Roof Coatings & Cements	Cellulose Fibers Polyethylene Fibers Clay, Talc	What percentage of the roof coatings or cement market is asbestos-free? Are there other substitutes being used?

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ASBESTOS PRODUCTS	SUBSTITUTES KNOWN BY ICF	QUESTIONS
Non-Roofing (specialty) Adhesives, Sealants Coatings	Polyolefins Aramid Cellulose Fumed Silica Clay, Talc, Limestone	What other substitute fibers & fillers are being used in specialty formulations? What are the differences between silica fibers, fumed silica, and sodium silicates?

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