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Thanks for

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UNION CARBIDE CORPORATION

Asbestos Substitutes

P. O. Box 8361

Engineering, Manufacturing, and Technology Services

So. Chas., WV 25303

Central Engineering

BUSINESS CONFIDENTIAL

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JUL 1 1987

W. B. FETHKE

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

QC C.R. Hoff - 514/82
J.M. Claverton - 500/R1
J.F. Dodd - 514
R.C. Hazelton - 380
R.D. Hoover - Mobile
E.M. Midgett - 507
J. Kennedy - Savannah
S.E. Galbreath - Amerchol, Edison
Mike Psaila - CPI
Ken Dalrymple - Bound Brook
J.E. Rikula - 323
W.D. Bredbury - 514/2000

JUN 18 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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JUN 16 1987

S. W. CLARK

A04320

UCC 010459

Memo

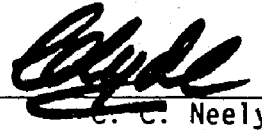
- 2 -

June 15, 1987

- 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

4917I

AU4321

UCC 010460



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

A04322

INFORMATION GAPS IN ICF WORK ON SUBSTITUTES

ASBESTOS PRODUCTS

Asbestos gasketing and packing

Asbestos
gasketing
packing

SUBSTITUTES KNOWN BY ICF

Aramid
Flexible graphite
Glass
Cellulose
Blueguard
PTFE (100% at value applications market)
Carbon *graphite fiber*
Synthesseal (Armstrong)
Polybenzamidazole (PBI)
Mica

QUESTIONS

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 Synthesseal (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^R, 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^R, 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.

A04323

ASBESTOS PRODUCTS

SUBSTITUTES KNOWN BY ICF

QUESTIONS

Friction materials
(Industrial/commercial
machinery, excluding
on or off-road
vehicles)

Full metallic (steel wool,
iron, other metal)

In addition:
Are there any other federal regulatory requirements
constraining the development of acceptable substi-
tutes in the OEM or aftermarket?

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 substi-
tutes 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 considera-
tions 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?

AU4324

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)
Kao wool Rollboard
Ceramic paper

Is anyone producing or importing asbestos rollboard?

<u>ASBESTOS PRODUCTS</u>	<u>SUBSTITUTES KNOWN BY ICF</u>	<u>QUESTIONS</u>
<u>Millboard</u>	Mineral boards Ceramic boards	Who are the importers and/or producers of asbestos millboard?
<u>Pipeline Wrap</u>	Mineral felt Urethane foam Fiberglass 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?
<u>Roofing Felt</u>	Fiberglass felt Organic felt Single-ply membrane	What are the projected market shares for the three substitutes - fiberglass felt, organic felt and single ply membrane?
<u>Flooring Felt</u>	Fiberglass Pulpex ^R Clay Duracon ^R Bontex 148 R	Is anyone producing or importing asbestos flooring felt?
<u>Vinyl asbestos floor tile</u>	Pulpex ^R Santoweb ^R Microfibers ^R Fiberglass Polyester	Is anyone producing or importing vinyl asbestos floor tile?
<u>Missile Liner</u>	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?
<u>Sealant-Tape</u>	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?
<u>Asbestos textiles</u>	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?

AU4325

ASBESTOS PRODUCTS

SUBSTITUTES KNOWN BY ICF

Polybenzimidazole (PBI)

QUESTIONS

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 concrete 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 substitute 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¢

AU4320

ASBESTOS PRODUCTS

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) Latticecrete EP cement board (Laticrete; Bethany, CT) Durock (US Gypsum) Wonderboard (Modular; Hamilton, OH) Benelex 402 (Masonite; Laurel, MS)
Fiberglass reinforced polyester (GPO) (Glastic; Cleveland, OH)
Glass reinforced cement (GRC) or Sterling Board
Zircar Refractory Sheet (Zircar, Florida, NY)
For laboratory table tops:
Epoxy resin
Impregnated sandstone
Colorlith II
Laminated plastic

What are the major substitutes for building/construction applications? high temperature 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?

high temp. & electrical

A04327

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?

QUESTIONS

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

A04328