OCT 15 1986

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

P. O. Box 8361
So. Chas., WV 25303

BUSINESS CONFIDENTIAL

September 30, 1986

TO: Mr. J. E. Sanders

COPY TO: Mr. L. C. Calvert
Mr. S. W. Clark
Mr. G. B. Elder
Mr. R. W. Engle

FROM: C. C. Neely

SUBJECT: Final Draft of Recommended C&P Program
Phase-Out Use of Asbestos-Containing Materials in Work Place
Chemicals and Plastic Group

Attached herewith on behalf of the Special Working Group is a copy of the subject document dated 9/29/86. It is a slightly fine-tuned version of the 8/28/86 version which was transmitted to you under my transmittal also dated 8/28/86. The changes that have been made are of a clarifying rather than substantive nature.

At this point, we have not made an effort to obtain broad, formal review of the subject program. However, Larry Calvert has discussed it briefly with the Maintenance APM's and Maintenance Managers. In addition, Stan Clark arranged for its review by the Safety, Health Advisory Committee (SHAC), and your staff has reviewed it. Feedback indicates these groups to be supportive of the concept, but some have expressed concern regarding the January 1, 1989 date specified for the discontinuance of the purchase of asbestos-containing materials, believing it to be optimistic. Some of the concern relates to the following:

1. CED's ability to revise and reissue the V&P Specifications and the Valve Manual in time to support the deadline. The responsible CED specialists have carefully reviewed this matter and believe that reissuance of these Manuals by July 1, 1988 is realistic. This date has not been published, however.

PLAINTIFF'S EXHIBIT
UC-2435



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2. Belief that field testing of new gasket and packing materials will be required. Such testing will not be necessary since the plan at this time is to accommodate most of the substitutions by broadening the use of materials already in use, materials such as reinforced Teflon and GRAFOIL™. This plan has not been broadly disseminated, and we can fully appreciate the reluctance to agree to a purchasing cut-off date for asbestos-containing products without knowing what the substitutes are. We also appreciate that, once this material substitute plan is known, there will be a natural resistance due to the higher first cost of these substitute materials.

3. Some belief that installers will need special training to handle the new gasket and packing materials. For reasons cited in (2), we do not believe this requirement will be significant.

4. Perhaps lack of understanding that the January 1, 1989 date is the cut-off date for the purchase of asbestos-containing materials except as approved by a variance.

5. "Is this really necessary" attitude. The Special Working Group believes that OSHA's recently revised exposure limit of 0.2 fibers per cubic centimeter of air (was previously 2.0 fibers per cubic centimeter) add significant impetus to implement the proposed Recommended Program. According to Terry Hanning's September 5, 1986 memorandum (copy attached), labor union representatives do not believe that controlling the exposure limit to this lower level provides adequate protection.

The above concerns notwithstanding, the Special Working Group decided to submit the subject Recommended Program to you with the January 1, 1989 date included since we believe that, with proper communication with the key plant personnel responsible for its implementation, along with management support, this date is realistic and achievable. We are submitting under separate cover a proposed CED Technology Program which includes request for funds to cover the important communications aspect of the understanding, acceptance and implementation process.

Please let me know how we can be of further assistance regarding this matter.

C. C. Neely

CCN:mr
4319I
Attachment



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8/28/86

D R A F T

RECOMMENDED POLICY

CHEMICAL AND PLASTICS BUSINESS GROUP (C&P)

SUBJECT: USE OF ASBESTOS-CONTAINING MATERIALS[1] IN THE WORK PLACE

PURPOSE/BACKGROUND

The Corporate Charter (1.1) contains the following commitment to employees:

> "To provide working conditions, programs of training and education, and persistent review and appropriate modification of facilities and practices to protect the health and safety of employees."

It also contains a social commitment to conduct business "in accordance with all the applicable national and local laws and regulations."

As a result of available evidence that airborne asbestos in the occupational environment had proven to be carcinogenic in man, all C&P Insulation Standards were revised in 1976 to specify only asbestos-free insulating materials; and new or replacement installations of these materials have subsequently been selected accordingly. Additionally, a Safety/Health Standard designated SH-256 was prepared covering the safe removal and handling (includes disposal) of asbestos-containing insulating material during renovation and demolition. The requirements of this Standard equal or exceed those of current applicable government standards.

OSHA's rule-making efforts relative to asbestos usage in the work place are mired in controversy. Hearings on the latest EPA proposal which includes the phaseout of all asbestos over a ten-year period are now in progress. The proposal states: "EPA is considering banning the manufacture, importation, and processing of asbestos construction products and asbestos clothing soon after the rule's promulgation with the category of asbestos friction products banned about five years later, and other asbestos products banned at a later time." Gaskets and packing that contain asbestos are in the category of "other asbestos products" that would apparently be banned after ten years. No peer company that we are aware of has a target date for removal of existing asbestos-containing insulation, gaskets, or packing; however, one major chemical company has recently discontinued the purchase of asbestos-containing gaskets and packing.

A cost analysis of pipe-size gaskets shows that GRAFOIL®, probably the most expensive of the acceptable gasket substitute materials, is, in fact, cost effective when only the cost of mandatory work practices associated with the use of asbestos (e.g. wetting for removal or airborne fiber

[1] "Asbestos-containing materials" include but are not limited to insulation, gaskets, packing, welding blankets, and building materials.



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exposure monitoring during removal, placing in labeled plastic bags after removal, landfill disposal, and record keeping) is considered. The same conclusion is drawn relative to valve packing when the additional considerations of improved service life and sealability are included.

Consistent with the aforementioned commitments and the economic use of materials, C&P has concluded that positive actions relative to asbestos-containing materials(1) should be taken.

POLICY

Except as otherwise provided by applicable law, Chemicals and Plastics Business Group will:

Continue to phase out the use of asbestos-containing materials:

- Asbestos-containing insulation shall be replaced with asbestos-free materials as required to maintain structural and functional integrity.
- No asbestos-containing materials shall be purchased after January 1, 1989.
- C&P approved practices shall be employed for the identification, removal, modification, and/or disposal of asbestos-containing materials.
- Evaluation of asbestos substitute materials shall include consideration of health effects as well as suitability for intended service and cost.
- A variance approval procedure shall be employed to cover consideration of uncommon circumstances. Approval must always include endorsement of C&P HS&EA management.

SCOPE

This recommended policy applies to all C&P operated/hosted facilities. Other components of the Corporation will be apprised of its content.

DELEGATION

The assignment of duties and authority to carry out the policy defined herein is delegated as follows:

To Central Engineering Department

- Develop and maintain engineering standards covering:
  - Identification of asbestos-containing materials;



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- Removal, modification and/or disposal of asbestos-containing materials; and

- Use of asbestos-substitute materials.

To Site Management

- Implement policies and practices for the identification, removal, modification, and disposal of asbestos-containing materials.

- Use of CED Standards covering asbestos substitute materials and the communication of service experience with these materials.

To Manufacturing Services

- Monitor use of asbestos-substitute materials and the communication of service experience with these materials.

To C&P HS&EA

- Audit compliance with governmental regulations and CED-developed standards relating to asbestos-containing materials and, where applicable, their substitutes.

C. C. Neely
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GRAFOIL®
Flexible Graphite

A Union Carbide Corporation Trademark Product

GRAFOIL® SEMINAR OUTLINE

1. Solving your packing and gasketing problems.
2. Understanding Asbestos packings or gaskets.
3. The search for an asbestos replacement.
4. Current non-asbestos offerings.
5. Characteristics of Graphite.
6. How GRAFOIL® is processed from chrystalline graphite.
7. Characteristics of GRAFOIL® vs. Graphite
8. Chemical resistance of GRAFOIL®.
9. Fire testing and fire safety with GRAFOIL®.
10. Corrosion protection with GRAFOIL®.
11. Oxidation of GRAFOIL® --- Misconceptions????
12. Valves --- Packing Installation procedures and features.
13. Flanges --- Gasketing Installation procedures and features.
14. Gaskets --- GRAFOIL® laminate offering and SWG filler.
15. Product Offerings: Packings, gaskets, ribbons, and tapes.

The seminar includes demonstrations which assist the participant in his/her understanding of the product and lasts about 90 minutes.

NOTE***

Since several of the demonstrations require the use of an open flame, your management is requested to provide a conference room in which these demonstrations may be conducted without violating the safety regulations of your company.

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GRAFOIL®
Brand Flexible Graphite

Newsletter
Number

PG 008 178

Your Seal of Assurance

SUBJECT: Special Gasketing Techniques With GRAFOIL® Flexible Graphite

INTRODUCTION

GRAFOIL® flexible graphite is a resilient form of graphite which has excellent properties as a gasketing material. By itself, GRAFOIL® flexible graphite seals about as readily as rubber. It is also fabricated into metal core laminates or into spiral wound gaskets, and significantly improves their characteristics. In general, GRAFOIL® gaskets will seal the maximum pressure specified on properly designed, correctly manufactured and suitable maintained equipment.

While being flexible and resilient, GRAFOIL® flexible graphite is still all graphite. It has no resins, binders or filler materials or other additives that might detract from the chemical inertness and temperature resistance of pure graphite. GRAFOIL® gaskets will not cold flow, become brittle, or vulcanize to gasketing surfaces in service. The unique chemical and physical properties of GRAFOIL® flexible graphite combine to make it a nearly universal gasketing material especially suitable to high temperature and cryogenic service and/or corrosive environments.

GENERAL POINTS TO REMEMBER WHEN GASKETING WITH GRAFOIL® FLEXIBLE GRAPHITE

1.) The flange surfaces must be clean, free of nicks, scratches, burrs, metal fillings, scale or other foreign matter.
2.) Use a proper bolt tightening sequence to ensure a uniform load is applied to the joint (see Figure VI). The use of a torque wrench is advantageous to ensure that a uniform tensile stress is applied to each bolt.
3.) GRAFOIL® Grade GHE 316 Stainless Steel Tang Metal Inserted gaskets (Catalog Section G-8817 and G-8819) should not be used between any metal surfaces that are softer than the stainless steel (i.e. aluminum, brass, bronze), or between glass or ceramic surfaces. When GRAFOIL® Grade GHE gaskets are used, the metal tangs must be compressed such that the GRAFOIL® begins to seal. Due to the minimum seating stress recommended for these gaskets (i.e. 2500 psi), the metal tangs can make small indentations in the softer metal of the flange face. The tangs can also create stress concentration points on glass or ceramic surfaces.
4.) GRAFOIL® flexible graphite gaskets must be loaded with a net compressive unit load as shown in the Unit Load vs. Leak Pressure Curve, Figure I, and in GRAFOIL® Catalog Sections G-8816 and G-8817.
5.) The initial thickness of the GRAFOIL® gasket must be such that when it is compressed between two mating surfaces, the GRAFOIL® is strained sufficiently at all points in the joint to seal the maximum service pressure. If the flange surfaces are scratched, serrated, or warped, the initial gasket thickness must be large enough to completely fill and compensate for their effects when the joint is made and the gasket is compressed.

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6.) The flatness of the flange surfaces is essential to good gasketing practice as is the proper gasket unit load. If gasketed surfaces are perfectly flat under operating conditions, the average unit load is also the minimum unit load. If, for any reason the gasketed surfaces are not flat while in service, the gasket unit load can be less at some point or points than the amount required to seal operating or test pressures.

In general, if when the flange faces are brought together (i.e. just touching and under no bolt load), a 0.001" feeler gauge can not be inserted anywhere around the circumference of the joint, then a 1|64 inch (0.015") thick GRAFOIL® gasket can always be used. If this criteria can not be met, then the thicker GRAFOIL® gasket will be required.

IMPORTANT POINTS CONCERNING FLANGE SURFACE FINISH AND "STANDARD" SERRATIONS

Under equivalent compressive unit loads, GRAFOIL® gaskets will seal where surface finishes range from 5 RMS (root mean square) to 125 RMS. Within that range any RMS finish will seal as well as any other.

Flanges ordered with "standard serrations" or a "standard finish" usually have finished surfaces machined in accordance with MSS Standard Practice SP-6 (1) which allows for considerable latitude in finish. The SP-6 Standard refers to AARH finishes or arithmetic average roughness. AARH values are different from RMS valves for any given surface. RMS measurements can be made with stylus tracer instruments, whereas, AARH can not. AARH finishes are evaluated only by "sight and touch" comparisons with standard specimens.

The standard serrations may be concentric or spiral. If concentric, there may be up to 32 serrations per inch, and the depth of the serration may range from 0.005" to 0.015". The serration cross-section can range from a radiused "u" cut to a "v" cut.

Flange surfaces having the maximum serrations per inch at maximum depth can leave a "saw tooth" surface with little or no flat areas between the serrations. GRAFOIL® flexible graphite gaskets are not recommended for use with this type of flange finish.

Spiral serrations can range from 20 to 50 per inch in number and from 0.001" to 0.006" in depth. Again, the maximum number of serrations to maximum groove depth can produce a sharp, "saw tooth" surface. However, in contrast with concentric serrations, a spiral serration can form a continuous leak path if the gasket material does not deform and seal all the way to the bottom of the groove. Consequently, the greater the depth of the spiral serration, the greater the required thickness of the GRAFOIL® gasket in order to seal. The required thickness can be calculated in a manner similar to that shown in Case 3.

While serrations, in general, do not help GRAFOIL® gaskets to seal, GRAFOIL® gaskets with their unique physical properties will seal serrations more dependably than most other materials. If a flanged joint is being designed with the intent of using GRAFOIL® flexible graphite gaskets, it is recommended that the serrations and surface finish be dimensioned in detail, rather than left to the broad limits permitted by Standard Practice SP-6.

(1) Developed and approved by the Manufacturer's Standardization Society of the Valve and fittings Industry, 420 Lexington Avenue, New York, New York 10017.



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