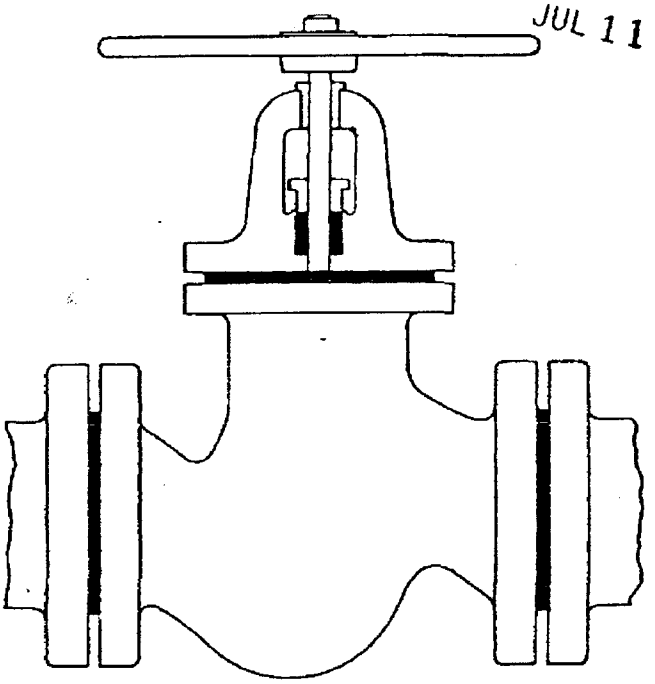
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PLAINTIFF'S EXHIBIT
UC-4046



ASBESTOS SUBSTITUTE GASKET & PACKING MATERIALS SEMINAR

Inter-Continental Hotel
Houston, Texas
August 6 & 7, 1986

sponsored by

VALVE MANUFACTURERS ASSOCIATION OF AMERICA

Suite 701
1050 Seventeenth Street, NW
Washington, DC 20036
(202) 331-8108

Papers presented and made available to the VMA will be distributed at the meeting.

TUESDAY, AUGUST 5, 1986
6:00–8:00 p.m.
Registration
Ballroom Foyer

WEDNESDAY, AUGUST 6, 1986
7:30 a.m.
Registration
Ballroom Foyer

9:00 a.m.
Welcome Remarks, **Sam Shields**, V.P. Engineering, Atwood & Morrill, Salem, Massachusetts, and Chairman, VMA Technical Committee

9:05 a.m.
VMA's Concerns
Malcolm O'Hagan, VMA President

9:15 a.m.
Session I: "Legal/Political Update of Asbestos Issues"
Moderator: **Malcolm O'Hagan**, VMA President
Ballroom

Speakers:



Mitchell J. Cole, Vice President and Principal, *Tillinghast, Nelson & Warren, Inc.*, New York, New York, will address the pros and cons of legislation and the impact of that legislation on the insurance and reinsurance environment, particularly with regard to product liability. He will review asbestosis exclusion clauses in insurance coverages, and the options which are available.



David Dull, Deputy Director, Chemical Control Division, *Environmental Protection Agency*, Washington, D.C., will discuss the EPA's proposed regulation to eliminate asbestos use in the U.S. over a 10 year period.



Bob Pigg, Executive Director, *Asbestos Information Association*, Arlington, Virginia, will review, from the industry's perspective, the EPA's proposal to ban and phase out the use of asbestos. His presentation will also include a review of new OSHA workplace regulations.

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10:00 a.m.
Break

10:30 a.m.
Session II: "High Temperature Asbestos-Free Packing Material Recommendations"
Moderators: **Donn W. Duffey,** V.P., Engineering & Research, Flow Control Division, Rockwell International, Pittsburgh, Pennsylvania, and **Don Monroe,** V.P., Engineering, Stockham Valves & Fittings, Inc., Birmingham, Alabama.

Speakers:



G.R. McKillop, Product Manager, Packing Sales Division, *John Crane-Houdaille, Inc.*, Morton Grove, Illinois, will report on the best packing material for use in valve applications where the service temperature exceeds 400°F. Special emphasis will be made with regard to the many new high temperature packings, and the limitations of these packings will be segregated for comparative tensile strengths, compression, fluid resistance and temperature limit of the base materials as well as combinations of the various products. Actual applications of these materials will be shown for utilities, refineries, and other industries. It is hoped that fire tests (API 607) will have been completed at the time of the seminar so the results may be presented also. Mr. McKillop's presentation will not only cover packing materials, but will also develop guidelines covering installation, inhibitors, finishes and live loading.



Peter S. Petrunich, Manager, Customer Technical Service, *Union Carbide Corporation*, Electronics Division, Cleveland, Ohio, will outline the material differences between flexible graphite and a typical braided asbestos packing. Mr. Petrunich will show the chemical, physical, and functional property differences that give flexible graphite a superior sealability over a wider temperature and pressure range. Laminate, ribbon, and die-molded ribbon forms will be reviewed with the use of braided end-rings. The influence of stuffing box design, including stem surface finishes, will be addressed, as well as die-molded ring density and dimensional tolerances. Corrosion and oxidation inhibitors will also be discussed, and typical installational procedures will be reviewed. In-service experience in specific fluids such as steam, hydrocarbons, and general chemical service will be overviewed, as well as the impact of live loading and die-molded ring geometry on flexible graphite packing performance.



Richard E. White, Director of Research and Development, *Garlock, Inc.*, Industrial Packing, Palmyra, New York, will explain how valve sealing product design and evolution is reacting to end-user needs through innovative material selection and strategic material placement. To support this engineering effort, a new generation of test equipment to suitably screen materials and processing techniques, thereby establishing application limits, is required. Value-added benefits of non-asbestos products will be discussed, along with techniques to evaluate application limits. Insight as viewed by the supplier will be covered to relate test data to field response. Being aware of the continuous non-asbestos fluid sealing product evolution will be a strategic tool in effective valve design.

12:15 p.m.
VMA Host Luncheon
(Room to be designated)

2:00 p.m.
Session III: "Test Data Relative to Gasket Material Performance"
Moderator: **David Moser,** President, Durabla Manufacturing Company, Lionville, Pennsylvania.

Speakers:



Samuel F. Thomas, Vice President, *Flexitallic Gasket Co., Inc.*, Bellmawr, New Jersey, will show how the development of methods to characterize gasket and joint performance and development of higher performance and lower total cost materials makes it possible for both equipment manufacturers and end-users to reduce costs and improve both safety and reliability. The development of gasket materials and composites suitable for service in the temperature range of 500°F to 1500°F at typical process plant pressures will be reviewed, in addition to characterization and testing of gasket performance for these services and their impact on vessel and equipment design.



Peter Petrunich, Manager, Customer Technical Service, *Union Carbide Corporation*, Carbon Products Division, Cleveland, Ohio, will share his thoughts on how the use of flexible graphite has brought a new culture to non-metallic, as well as metallic, gasketing. Material differences between flexible graphite and asbestos-based elastomeric compositions will be described. Chemical, physical, and functional property differences which lead to flexible graphite's improved sealability over a wider range of temperature and pressure conditions will be shown. Compositing of flexible graphite, primarily via metal inserts, will be reviewed. Mr. Petrunich will make mechanical and sealability, as well as handling and fabrication comparisons, between composite gasket materials and high quality asbestos-based products. A discussion will be held on the implication of the functional test results on "m" and "y" gasket design factors and flange surface finish. A value comparison between flexible graphite and asbestos gasketing based on functional differences will be shown. In-service experience with flexible graphite in specific fluids, including steam, hydrocarbon, and inorganic chemicals will be overviewed, in addition to the influence of oxidizing conditions on flexible graphite gaskets.



David Lingard, Manager, Applications Engineering, Gasketing Products, *Garlock, Inc.*, Palmyra, New York, will review the various methods by which PTFE gaskets, such as extruded and slided coil, molded and sliced cylinders, molded sheet, skived sheet, and PTFE envelopes can be manufactured. He will also discuss the physical properties of virgin and repro PTFE, unfilled versus filled, with a variety of different fillers. A comparison of the serviceability of PTFE versus various other non-metallic gasketing materials will be made.



Jack Harris, Vice President, *Durabla Manufacturing Company,* Lionville, Pennsylvania, will present technical composition and performance data on compressed non-asbestos gasket material with comparisons to compressed asbestos and other gasket materials.



Roger Davis, Group Manager, *W.L. Gore & Associates,* Elkton, Maryland, will compare the characteristics of full density PTFE and expanded PTFE, and explore the sealing applications opened by this expanded construction.



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4:00 p.m.
BREAK

4:15 p.m.
Session IV: "User Awareness of Asbestos Substitute Materials—Impartial Survey by the Trade Press"
Moderator: **Joe Wright,** V.P. Technical Marketing, Jamesbury Corporation, Worcester, Massachusetts.

Speakers:
Robert Schwieger, Editor, *Power*
John Moore, Sr. Editor, *The Oil Daily*
Al Gaines, Sr Editor, *Chemical Processing*
Lester Kane, Technical Editor, *Hydrocarbon Processing*
Matthew Coleman, Editor, *Southern Pulp & Paper*


Schwieger


Moore


Gaines


Kane


Coleman

5:00 p.m.
ADJOURNMENT

5:30 p.m.
VMA Host Meet & Greet Reception—Gasket & Packing Supplier Exhibits
Foyer Area of Ballroom

THURSDAY, AUGUST 7, 1986

7:00 a.m.
Registration

8:00 a.m.
Welcome to Second Day's Session
Samuel Shields, V.P., Engineering, Atwood & Morrill Co., Inc., Salem, Massachusetts, and Chairman, VMA Technical Committee.
Ballroom

8:05 a.m.
Session V: "Industry Users' Technical Data Relating to Gasket Packing Materials Performance—Companies' Material Use Policies"
Moderators: **Bob Koester,** Chief Engineer, The Wm. Powell Co., Cincinnati, Ohio, and **Peter Bolger,** Chief Engineer, Dresser IVD, Alexandria, Louisiana.

Speakers:



Russell Nordstrom, Mgr. Heat Transfer & Pressure Equipment, Eng. & Project Mgmt., *Shell Oil Co.*, Houston, Texas, will discuss the Ad Hoc Task Force on Alternative Gasket and Packing Materials that was established by the American Petroleum Institute in August of 1985. He will focus on the results of the Ad Hoc Task Group and the forward program established by the American Petroleum Institute.



Earl Bake, Research Manager, Flow Control Division, *Rockwell International Corporation*, Pittsburgh, Pennsylvania, will report on a test program that was conducted to evaluate asbestos-free valve stem packing materials proposed for high temperature service. Packing gland bolt loads, stem frictional loads, and packing compression were measured. Tests were performed with room temperature water at pressures to 6250 psig and with steam at pressures to 2200 psig. Valve stem diameters from 1.0 to 4.0 inches, and strokes from 1.68 to 20 inches were included in the testing and live loading of the packing was evaluated. Effectiveness of several corrosion inhibitors was tested, and leakage of hydrocarbons through the packing materials was measured. Several successful packing material combinations will be identifed.



Gerard Jomand, Engineering Mgr., *Masoneilan/Dresser*, Conde, France, will report on Masoneilan's comprehensive study into the theory and practice of spiral wound gasket use. The study was prompted by the sophisticated gasket joint designs required to fulfill the increasing demands of design codes and specifications, specifically those of the International Atomic Energy Agency in Europe. In initiating the study, it quickly became apparent that the available technical literature was insufficient to either specify or to justify joint designs. The focus, therefore, was to research the specific phenomena involved in the mechanism of gasket compression and to determine the pertinent parameters essential to obtaining and maintaining a desired joint tightness. This was achieved by concentrating the study on the analysis of gasket loading and unloading to establish the thresholds of joint tightness and gasket leakage. For practical reasons, the study was limited to the types of joints found within Masoneilan's valves. The program studied the main vendors in Europe through analysis of their technical literature and extensive pressure and temperature testing of gasket joints in the Masoneilan laboratories. The results of this study lead to a spiral wound gasket specification that takes into account the operating conditions and joint design.



Rudy MacDonald, Piping Component Specialist, *Exxon Co. U.S.A.*, Baton Rouge, Louisiana, will address the need to find a product that is as good as or better than asbestos in the areas of service reliability, integrity in a fire, and wide range of service applications. The superiority of graphite packing will be discussed, in addition to future trends and expectations for gaskets based on current data.



Rex Engle, Sr. Piping Engineer, *Union Carbide Corporation*, S. Charleston, West Virginia, will discuss Union Carbide's plans to remain using asbestos as long as it is available to the marketplace and feasible to use in its petrochemical plants. If a void forms, it will be filled with expanded use of Teflon™ and GRAFOIL™, a flexible graphite. The GRAFOIL™ product is extremely attractive due to its compatability with solvents and its wide temperature working range.



Frank Highland, Senior Engineer, Station Nuclear Engineering Dept., *Commonwealth Edison Co.*, Chicago, Illinois, will relate details about the Davis-Besse Station (Toledo Edison) transient event on June 9, 1985, where two MOV's failed to perform as desired. Since this incident, the NRC has expressed much concern regarding MOV operability. Although it is debatable to what extent nuclear

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power plant MOV failure history represents a credible safety risk, more reliable MOV functionality is an obviously worthwhile objective on its economic and radiation exposure reduction merits alone. There are two concepts being pursued on how to best accomplish this. Essentially, one involves developing means to accommodate time dependent physical changes in a given MOV (packing changes being the most significant) capable of challenging operability, and the other involves developing means to make such changes predictable, such that their influence on operability can be readily brought under control. Mr. Highland's opinion, based on the significance of packing changes, is that the latter is the more practical and economical approach. His presentation will seek to provide an action plan and some useful background information for making this strategy into a practical reality with respect to packing. Progress made thus far that fits logically into the plan will be discussed, as well as further steps needed that can be performed efficiently through the combined efforts of nuclear utilities, valve manufacturers, and packing manufacturers.

10:00 a.m.
BREAK

10:15 a.m.
Session VI: "Update On Independent Gasket & Packing Materials' Testing/Research Activities"
Moderators: **Guy Jolly,** Chief Engineer, Valve and Fitting Division, Henry Vogt Machine Co., Louisville, Kentucky, and
James Reed, Dir. Product Engineering, Masoneilan/Dresser, Avon, Massachusetts.
Speakers will discuss their personal involvement with gasket and packing materials research.

Speakers:


Issid

Nicolas Issid, Section Head, Process and Mechanical Engineering Branch, and **John Aiken,** Senior Research and Development Technologist, *Atomic Energy of Canada Ltd.*, Montreal, Quebec, Canada, will report on the results of AECL's work on valve packings and static seals that was initiated as a result of intolerable leakage from packings and gaskets in the prototype CANDU reactors that started up in the 1960's. These experimental programs investigated the effects on leakage and valve stem friction of surface finishes, gland dimensions, fluid pressure and temperature, gland pressure, and packing materials. This work showed that differences in materials and gland pressure played the dominant roles in seal integrity and led to the use of spring loads (live loading) for maintaining gland pressures in most packed valves used in CANDU reactors. This improvement relegated valve stem leakage and packing maintenance to insignificant levels by the early '70s and most experimentation was ended by 1977, although there was still potential for improvement by the use of better materials. Valve packing work has revived in recent years through AECL's participation in EPRI sponsored tests on flexible graphite and in-house testing of asbestos based substitutes for the now discontinued John Crane 1871.


Aiken



Boyd Brooks, Project Director, *Electric Power Research Institute,* Palo Alto, California, will relate how leakage of process media from valve stem packing systems causes a significant loss of plant availability and results in major maintenance activity in U.S. nuclear power plants. He will report on a two-phase project, initiated by the Electric Power Research Institute in 1984, that has identified two methods for reducing this leakage. The two methods are the use of die-formed graphite packing in place of the currently used asbestos packing and the application of live loading methods to maintain continual force on the valve stem packing. In the first phase of the work several new packing configurations, in addition to the conventional square packing, were evaluated for subsequent full-scale testing. Guidelines for the design and implementation of live-loading devices were developed and the regulatory and procedural aspects of this retrofit were identified. The second phase of the work includes full scale laboratory testing of selected packing and gland loading configurations at BWR and PWR conditions, the conducting of in-plant demonstrations, and the technology transfer and commercialization of the corrective actions.



James Payne, President, *JPAC Inc.*, Long Valley, New Jersey, will address two important issues: How are gasket performance and design factors to be measured and established for new materials and styles, and what standardized methods are developed to assist users and valve designers with screening and qualification. While bolted flanged joint design is a fairly straight forward application of the ASME Boiler and Pressure Vessel Code rules, the need to prove and improve the code gasket design factors has been the subject of an ongoing industry-sponsored research program directed by the Pressure Vessel Research Committee (PVRC). Much progress has been made with the ambient temperature programs and an elevated temperature effort is now well underway. A goal of the PVRC is to provide industry with gasket performance data that is suitable for reduction to more meaningful, experimentally supported Code gasket factors. A related goal is to define ASTM type test methods enabling manufacturers to define gasket performance in a widely accepted and standard manner. The availability of many new gasket materials and styles whose properties are different than those of asbestos products has made these goals all the more important. How tightness based gasket design factors proposed for ASME Code use are extracted from gasket performance data, and how that data is gotten from proposed standard test procedures will be reviewed in an overview of the PVRC's ambient and elevated gasket testing activities. Another industry supported program directed at the development of elevated temperature qualification methods for sheet products will also be discussed briefly.

12:00 Noon
Summary and Closing Remarks, **Sam Shields,** V.P., Engineering, Atwood & Morrill Co., Inc., Salem, Massachusetts, and Chairman, VMA Technical Committee.

12:10 p.m.
VMA Host Luncheon
(Room to be designated)

2:00 p.m.
ADJOURNMENT





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