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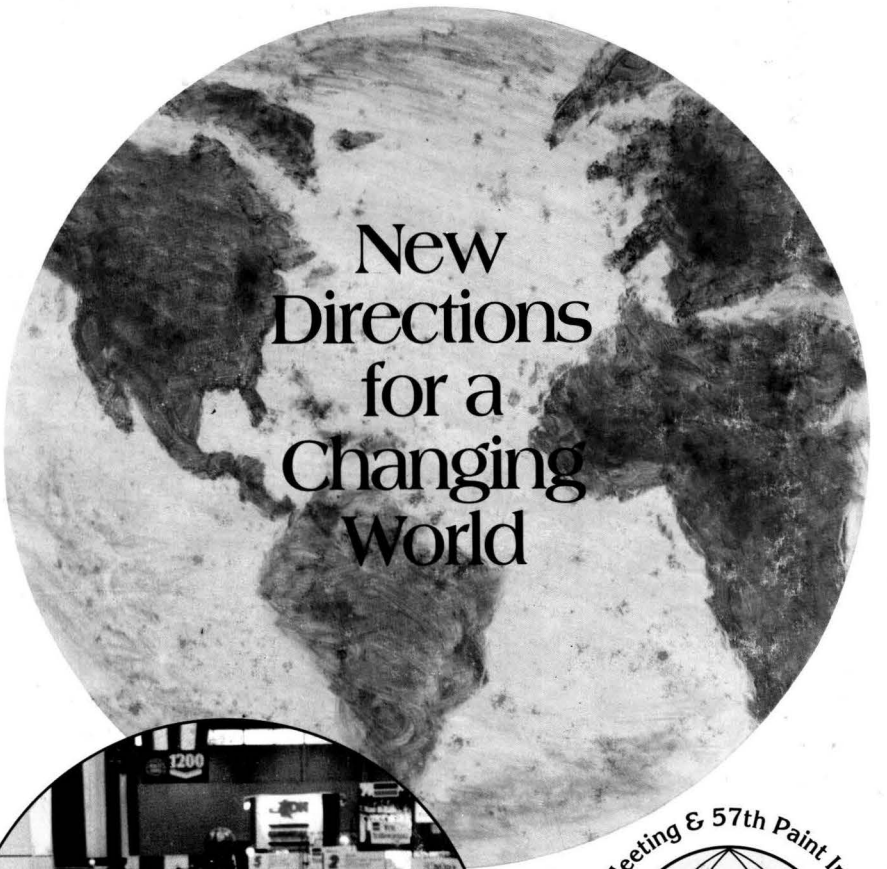
JOURNAL OF COATINGS TECHNOLOGY



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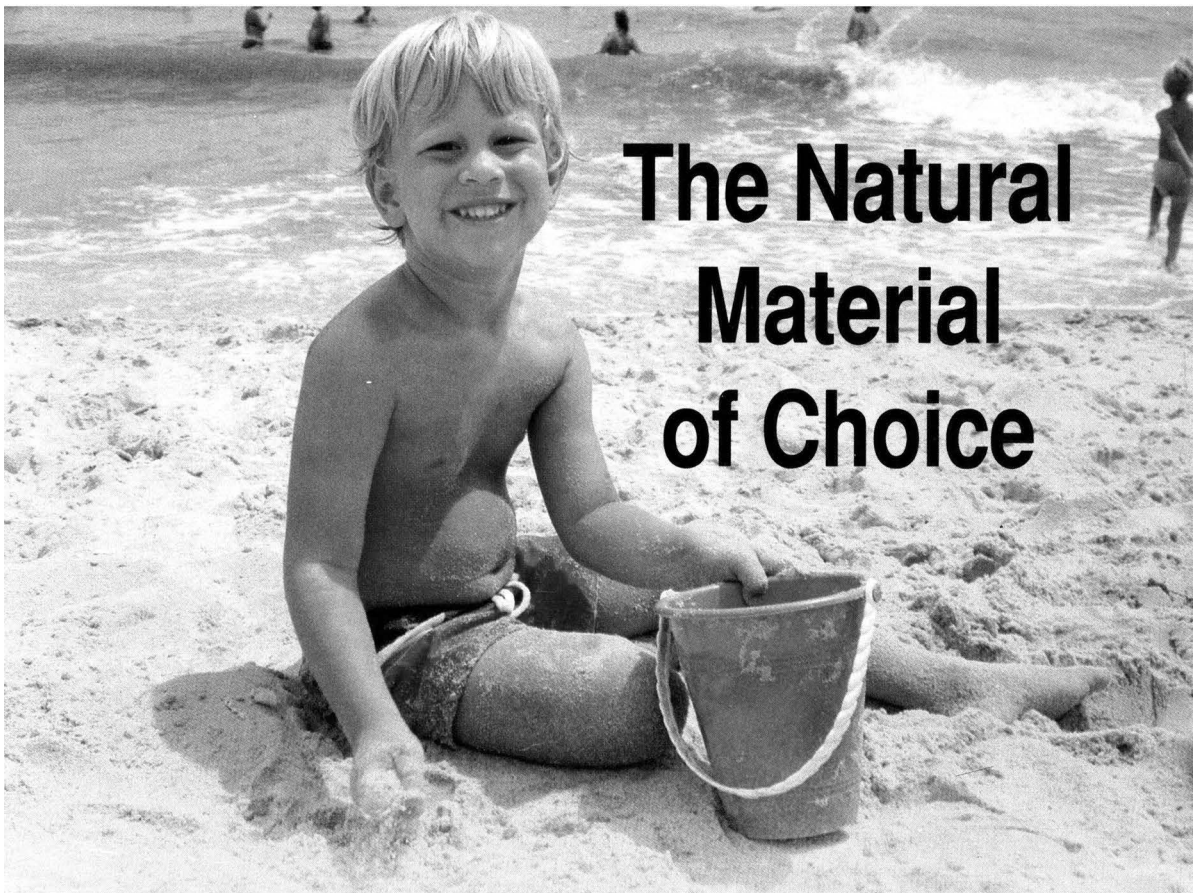

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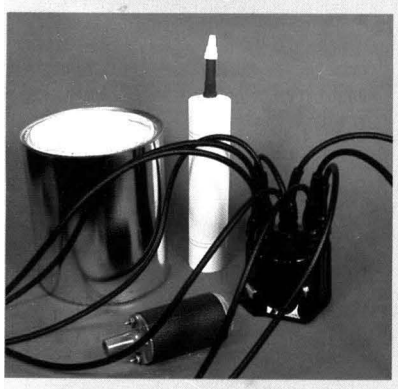

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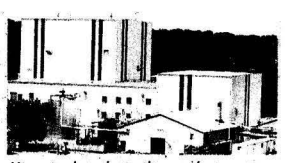

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Comment

Why Did You Join?

In this age of high technology information exchange, we are constantly and continuously exposed to the results of a barrage of studies, surveys, phone polls, etc., all trying to measure the public's response to one issue or another. About all one can gather from the myriad of results is that there is no way to reach consensus when it comes to public opinion.

Thus, we are able to prove correctly what our parents, teachers, and anyone else in authority told us from our earliest memories, that we are all unique individuals!

As such, our needs are all somewhat different and unique. This is true in everything we do, including the reasons why we join an association.

Why did you join FSCT? Was it because of your local Society activity? the influence of a superior or mentor? the information in the JOURNAL OF COATINGS TECHNOLOGY? the Annual Meeting and Paint Industries' Show? or some other reason?

After you determine why you joined, think of what you've done to satisfy the needs. Look around you to see all of the benefits of your involvement in your Society and the FSCT. You'll see the obvious, such as the technical information from the Annual Meeting and Paint Industries' Show or the JCT, the camaraderie of participating in the activities of your Society, and the value you receive with member discounts of technical publications and the like.

But look closer and you'll find the leadership training and experience you'll get by serving as an officer on a committee or in the Society. You'll see the worldwide membership base you are tied into, which is valuable in a variety of ways, and the prestige that comes with membership in a first-class technical organization.

Also, ask your fellow members why they joined. You'll find as many answers as there are members. Your fellow members will probably provide new and unique ways for you to better experience the organization, which is something that benefits everyone in the long run.

Michael G. Bell

Michael G. Bell
Director of Educational Services

Abstracts of Papers in This Issue

(Translations provided by: French—Montreal Society Member Alain Brisson, of Hoechst Canada, Inc. and Spanish—Mexico Society Member Carlos Urbina, of Instituto Mexicano de Tecnicos en Pinturas y Tintas.)

Influence of Imidazoline Content and Water on the Reaction Between Admidoamine and Epoxy Resins—R. F. Brady, Jr. and J.M. Charlesworth

JCT, 65, No. 816, 81 (Jan. 1993)

The reaction of amidoamines with epoxy resins has been studied with fluorescence spectroscopy, Fourier transform infrared spectroscopy (FTIR), and gas chromatography. Films were prepared independently from four amidoamines containing increasing proportions of imidazoline, under dry conditions, and in the presence of water. The intensity of fluorescence increased during curing, and the reaction rate and maximum fluorescence intensity were found to be inversely proportional to the imidazoline content of the amidoamine. FTIR measurements showed that hydrolysis of epoxy and imidazoline rings is slow compared to reaction between the amine and epoxy groups. Fluorescence properties of the cured films were studied as a function of temperature over the range of -8 to 75°C. Two temperature-dependent radiationless processes from the singlet state were observed, with activation energies which depend on the imidazoline content of the amidoamine. Arrhenius plots of fluorescence intensity showed a distinct discontinuity near 32°C which is not affected by imidazoline content. The discontinuity correlates with the dynamic mechanically observed glass transition and is due to increased radiationless thermal deactivation of the singlet excited state, possibly by motion of alkyl chains in the polymer.

Changes in Hiding During Latex Film Formation Part: IV. Effect of Toning and Film Thickness—Cleveland Society for Coatings Technology

JCT, 65, No. 816, 89 (Jan. 1993)

In Part IV of this continuing series, the Cleveland Society for Coatings Technology Technical Committee investigated how titanium dioxide level, toning, and film thickness affect the changes in hiding of a latex flat paint during the first hour of drying. Measurements were made with a computer-interfaced spectrophotometer on paints drawn down over a black substrate. By measuring the reflectance (tristimulus Y) every 15 sec, film brightness, and hence hiding, could be monitored. Results were explained in terms of the three variables of the Kubelka-Munk theory: scattering coefficient (S), absorption coefficient (K), and film

Influence du Contenu en Imidazoline et de l'eau sur la Réaction Entre l'Amidoamine et les Résines Epoxydiques—R.F. Brady, Jr. and J.M. Charlesworth

JCT, 65, No. 816, 81 (Jan. 1993)

La réaction des amidoamines avec les résines époxydiques a été étudiée avec l'aide de la spectroscopie en fluorescence, spectroscopie infra-rouge á transformée de Fourier (FTIR) et la chromotographie gazeuse. Des feuils ont été préparés à partir de quatre amidoamines contenant des proportions grandissantes d'imidazoline, sous des conditions sèches et en présence d'eau. L'intensité de la fluorescence a augmenté durant le durcissement et le taux de la réaction et l'intensité maximum de fluorescence ont été trouvés être inversement proprotionnel au contenu d'imidazoline de l'amidoamine. Des mesures FTIR ont démontré que l'hydrolyse des groupes époxydiques et de l'imidazoline est lent en comparaison avec la réaction entre les groupes amines et époxydiques. Les propriétés de fluorescence des feuils durcis ont été étudiées en fonction de la température pour une gamme allant de -8 à 75°C. Deux procédés sans radiations et dépendant de la température, de l'état de singulet ont été observés, avec des énergies d'activation qui dépendent du contenu en imidazoline de l'amidoamine. Des graphiques de type Arrhenius de l'intensité de fluorescence ont démontré une discontinuité distincte près de 32°C qui n'est pas affecté par le contenu en imidazoline. La discontinuité corrèle avec la phase de transition vitreuse et est due à l'augmentation de la désactivation thermique de l'état excité du singulet, possiblement par la motion des chaînes alkyles du polymère.

Changements de l'Opacité Durant la Formation d'un Feuil de Latex, 4ème Parite: Effet de la Coloration et de l'Epaisseur du Feuil—Cleveland Society for Coatings Technology

JCT, 65, No. 816, 89 (Jan. 1993)

Dans la 4ème partie de cette série, le comité technique de la société de Cleveland a étudié comment le niveau de bioxyde de titane, de colorant et l'épaisseur du feuil affectent les changements d'opacité d'une peinture matte au latex durant la première heure de séchage. Des mesures ont été effectuées avec un spectrophotomètre relié à un ordinateur avec des peintures étalées

Influencia del Contenido de Imidazolina y Agua Sorbe la Reaccion entre la Amidoamine y Resinas Epoxicas—R.F. Brady, Jr. and J.M. Charlesworth

JCT, 65, No. 816, 81 (Jan. 1993)

Se ha estudiado la reacción de las amidoaminas con resinas epóxicas mediante espectroscopia fluorescente, espectroscopia infrarroja con transformada de Fourier (FTIR) y cromatografía de gases. Se prepararon películas independientemente del contenido de amidoamina incrementando las proporciones de imidazolina, bajo condiciones de secado y en presencia de agua. La intensidad de la fluorescencia se incremento durante el curado, y se encontró que la velocidad de reacción y la intensidad máxima de fluorescencia son inversamente proporcionales al contenido de imidazolina en la amidoamina. Las mediciones FTIR mostraron que la hidrolisis de los anillos epoxi e imidazolina es baja comparada con la reacción entre los grupos amino y epoxi. Se estudiaron las propiedades fluorescentes de las películas curadas como una función de la temperatura sobre el range de -8 a 75°C. Se observaron dos procesos dependientes de la radiación de temperatura en el estado simple, con energías de activación que dependen mdel contenido de la imidazolina en la amidoamina. Marcas de Arrhenius en la intensidad de la fluorescencia mostraron una discontinuidad distinta cerca de 32°C donde no se veia afectada por el contenido de imidazolina. La discontinuidad correlacionada con una mecanioidad y dinamicidad en la transición vitra debido a un incremento en el radio de desactivación termal en el estado simple excitado, posiblements por un movimiento en las cadenas alquidálicas en el polímero.

Cambios en el Poder Cubriente Durante la Formacion de la Pelicula de Latex Parte IC: Effecto en el Tono y Espersor de Pelicula—Cleveland Society for Coatings Technology

JCT, 65, No. 816, 89 (Jan. 1993)

En la parte IV de esta serie continua, el Comite Técnico de Cleveland investigó como el nivel de bióxido de titanio, tono y espesor de película afectan a los cambios en el poder cubriente de una pintura base latex mate durante la primera hora de secado. Las medidas se realizaron con una computadora interconectada con un espectrofotómetro en pinturas aplicadas

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thickness (X). From this data, a model has been developed to describe the processes involved.

The Influence of Extender Pigments on the Performance of Ethyl Silicate Zinc-Rich Paints—F.L. Fragata et al.

JCT, 65, No. 816, 103 (Jan. 1993)

Most technical specifications for zinc-rich paints based on ethyl silicate require a minimum content of 75% (by weight) of metallic zinc in the dry film. For the same metallic zinc content, the solids balance can be made using only the binder and zinc dust, or using the binder, zinc dust, and auxiliary pigments. The presence of auxiliary pigments other than zinc dust in the dry film composition of zinc-rich paints is of uncertain origin, especially in regard to its anticorrosive properties. In this work, the effect of extender pigments on the zinc-rich paints' performance is analyzed by electrochemical techniques, salt spray, and field exposure tests. The paints were prepared with 75% and 60%, by weight, metallic zinc in the dry film. For each zinc content three kinds of paint were produced: the first paint with zinc dust and binder, the second paint with zinc dust, binder, and agalmatolite; and the third paint with zinc dust, binder, and barite. All the tests showed that, for the same metallic zinc content in the dry film, the presence of fillers (barite or agalmatolite), within the contents used did not impair the paints anticorrosive properties from the galvanic point of view. On the contrary, in some cases, we observed that the fillers presence improved the paints performance.

sur un subjectile noir. En mesurant la réflectance (tristimulus Y) chaque 15 secondes, l'éclat du feuil, et donc l'opacité a pu être suivi. Les résultats ont été expliqués en fonction des trois variables de la théorie de Kubelka-Munk: le coefficient de dispersion (S), le coefficient d'absorption (K) et l'épaisseur du feuil (X). A partir de ces données, un modèle a été développé afin de décrire les procédés impliqués.

L'influence des Matières de Charge sur la Performance des Peintures Riches en Zinc à Base de Silicate d'Ethyle—F.L. Fragata et al.

JCT, 65, No. 816, 103 (Jan. 1993)

La plupart des spécifications techniques pour des peintures riches en zinc à base de silicate d'éthyle demande un contenu minimum de 75% (en poids) de zinc métallique dans le feuil sec. Pour le même contenu en zinc métallique, la balance des matières solides peut être effectuée en utilisant seulement des poussières du liant et du zinc, ou en utilisant le liant, la poussière de zinc et les pigments auxiliaires. La présence de pigments auxiliaires autres que la poussière de zinc dans la composition du feuil sec des peintures riches en zinc est d'origine incertaine, spécialement par rapport à sec propriétés anticorrosives. Dans ce travail, l'effet des matières de charge sur la performance des peintures riches en zinc est analysé avec l'aide de techniques électrochimiques, brouillard salin et exposition extérieure. Les peintures ont été préparées avec 75% et 60% en poids, de zinc métallique dans le feuil sec. Pour chaque contenu en zinc, trois sortes de peinture ont été produites: la première avec de la poussière de zinc et un liant, la seconde avec de la poussière de zinc, liant et agalmatélites, et la troisième avec de la poussière de zinc, liant et barite. Tous les tests ont démontré que pour le même contenu en zinc métallique dans le feuil sec, la présence de matières de charge (barite ou agalmatélites) à même le contenu utilisé n'a pas affecté les propriétés anticorrosives des peintures au point de vue galvanique. Au contraire, dans certains cas, on a observé que la présence des matières de charge a amélioré la performance des peintures.

sobre un substrato negro. Se pudo monitorear mediciones de la reflectancia (triestimulo Y) cada 15 segundos, brillo de la pelicula y el poder cubriente. Los resultados se explican en términos de tres variables de acuerdo con la teoría de Kubelka-Munk: Coeficiente de dispersión (S), coeficiente de absorción (K) y espesor de la película (X). Para estos datos, se desarrolló un modelo para describir el proceso involucrado.

La Influencia de los Pigmentos Extensores en la Calidad de las Pinturas Base Silicato de Etilo Ricas en Zinc—F.L. Fragata et al.

JCT, 65, No. 816, 103 (Jan. 1993)

Muchas de las especificaciones técnicas para las pinturas ricas en zinc base silicato de etilo requieren un contenido minimo del 75% (en peso) de zinc metálico en la película seca. Para el mismo contenido de zinc metálico, el balance de sólidos se puede hacer mediante el uso de un ligante y polvo de zinc, o utilizando el ligante, polvo de zinc y pigmentos auxiliares. La presencia de pigmentos auxiliares más que el polvo de zinc en la composición de la película seca en pinturas ricas en zinc tiene un origen incierto, especialmente en al deseo de tener propiedades anticorrosivas. En este trabajo, se analiza mediante técnicas electroquímicas, espreado de sal y pruebas de exposición en campo, el efecto de los pigmentos extensores sobre la calidad de las pinturas ricas en zinc. Las pinturas se prepararon con 75% y 60% en peso de zinc metálico en la película seca. Para cada contenido de zinc, se produjeron tres tipos diferentes de pintura: la primera pintura con polvo de zinc y un ligante; la segunda pintura con polvo de zinc, un ligante y agalmatolita y la tercera pintura con polvo de zinc, un ligante y barita. Todas las pruebas mostraron que, para el mismo contenido de zinc metálico en la película seca, la presencia de rellenos (barita o agalmatolita) sin el uso de otros elementos no imparte a las pinturas propiedades anticorrosivas desde el punto de vista galvánico. Por el contrario, el algunos casos, se observó que los rellenos mejoraban la calidad de las pinturas.

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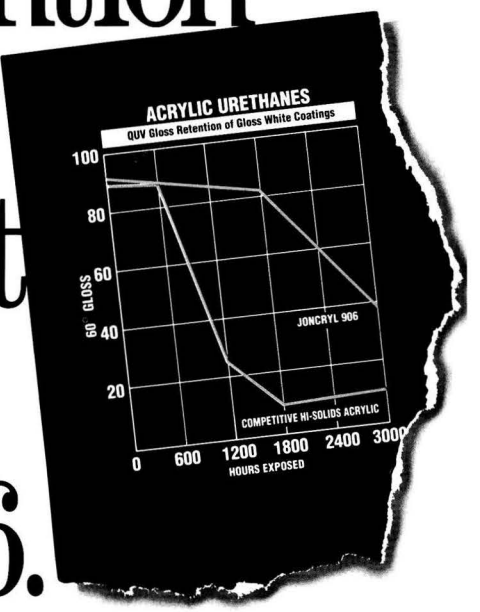

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SC Johnson Polymer

"Introduction to Pigments," by J. Braun, Published by FSCT as 20th Monograph in New *Series on Coatings Technology*

The Federation has expanded its *Series on Coatings Technology* with the addition of "Introduction to Pigments" by Juergen Braun, of Du Pont Chemicals.

In the 36-page publication, the author surveys, explains, compares, and distinguishes the common elements and the important differences between pigment classes and their functions. Done from a consumer's rather than a producer's perspective, the monograph introduces such topics as optics, appearance, and aesthetics. Featured are discussions on light scattering and brightness, and light absorption and color. The performance of pigments and the measurement of performance are explored. Dr. Braun concludes with a discussion on the future outlook for pigments.

The *Federation Series on Coatings Technology* is an important educational resource for the industry. The first monograph, "Film Formation," by Zeno Wicks, Jr., is a 20-page booklet which includes discussions on film formation by solvent evaporation from solutions of thermoplastic polymers, from solutions of thermosetting polymers, and by coalescence of polymer particles.

"Introduction to Polymers and Resins," by Joseph Prane, emphasizes the importance of polymeric materials in the coatings industry. Terminology, classification, types, mechanisms, and structures are presented in the 36-page publication.

In "Radiation Cured Coatings," by J.R. Costanza, A.P. Silveri, and J.A. Vona, emphasis is on the technology, equipment, and commercial applications of radiation curing, as well as material and equipment hazards, storage and handling needs, personnel protection, and toxicity concerns.

"Solvents," by William Ellis, is a 30-page booklet which focuses on solubility parameters, evaporation rates, solvent molecular structures, as well as terpene and oxygenated solvents. Also covered are solvent identification and analysis, and discussions on safety and toxicity.

The fifth monograph, "Coil Coatings" is authored by Joseph Gaske. Emphasis in this 20-page publication is placed on terminology, coating types, problems in application and use and the manufacture and marketing of coil coatings, the processing of precoated coiled metal, and testing.

Dr. Wicks contributed the sixth booklet, "Corrosion Protection by Coatings." Explored in the 24-page monograph are electrochemical corrosion, approaches to formulating corrosion protection coatings, and evaluation and testing procedures.

"Mechanical Properties of Coatings," by Loren W. Hill, introduces the basic concepts involved with the behavior of polymeric materials which help to systematize mechanical property data. Discussion in the 28-page work concentrates on physical property determinations, as well as descriptions of test methods.

The 64-page "Automotive Coatings," authored by Bruce N. McBane, discusses coating systems, original finish undercoats, elements of original finish topcoats, solvents and diluents, and specialty coatings. The author focuses on application techniques, pigmentation, automotive refinishing, and coatings evaluation and quality control.

In "Coating Film Defects," by Percy E. Pierce and Clifford K. Schoff, the causes and cures of common surface appearance problems are described. Also covered in 28 pages are techniques for the characterization of defects, the measurement of surface properties, and general guidelines for the prevention/solution of defects.

The proper choice and use of application equipment is the subject of "Application of Paints and Coatings." In the 52-page booklet, Sidney B. Levinson describes the advantages and limitations involved with the techniques and tools used to coat a product.

"Organic Pigments," a 40-page publication contributed by Peter A. Lewis, indicates the classes of organic pigments that are available in today's marketplace. In addition, the monograph provides insight into the chemistry involved in the manufacture of each pigment type, together with the properties associated with each type as they relate to the use in a coatings application.

"Inorganic Primer Pigments," by Alan Smith, focuses on inorganic pigments as they are utilized in primers for the protection of metallic substrates. The properties, advantages and disadvantages of inhibitive pigments, barrier pigments, film reinforcers, and extenders are also described in this 28-page work.

Information on coatings technology as it is applied to the severe, unique demands of the marine environment is provided in "Marine Coatings," authored by Henry R. Bleile and Stephen Rodgers. This 28-page publication is intended for those who have a need to understand marine coatings, as well as coatings technologists who become involved with the marine industry.

The 14th addition to the Series is "Sealants and Caulks," authored by Joseph Prane. The 28-page publication provides information on applications, definitions associated with caulks and sealants, and discussions of joint design and preparation, and sealant classifications, selection, and specifications.

In 32 pages, "Aerospace and Aircraft Coatings," authored by A.K. Chattopadhyay and M.R. Zentner, offers background information on the types of coatings used by the U.S. aircraft industry and identifies key factors to be considered in formulating these coatings. Additional topics include typical substrates, pretreatments, application and test methods, and future trends.

The 48-page "Introduction to Coatings Technology" by Alan Brandau, provides a general overview of the coatings industry, focusing on such topics as color, pigments, solvents, paint additives, polymers, and basic paint manufacturing. Information on the large spectrum of coatings applications and the chemistry of the many systems that are used to satisfy application demands is given. In addition, the evolution of coatings is reviewed as new technology and governmental regulations direct the industry's course.

"Cationic Radiation Curing," authored by Joseph Koleske, is a 28-page booklet which describes the new technology of cationic cure within the radiation cure arena. The focus is on cationic radiation curing and its chemistry and formulation, application methods, and end uses.

The 18th title offered is "Rheology," contributed by Clifford Schoff. The 44-page booklet focuses on topics such as viscosity, thixotropy, shear rates, dilute polymer solutions, concentrated polymer solutions, dispersed systems, and viscoelasticity. Chapters on viscosity measurement and plotting, the measurement of fluid viscoelasticity, paint processes, viscosity and control, and low pollution coatings are featured.

The most recent addition to the Series is "Powder Coatings," by Josef Jilek. The 36-page monograph examines powder coatings as a viable alternative to conventional liquid coatings. Discussions focus on the manufacture and application, as well as on the raw materials used to produce powder coatings. Summarized are the advantages and limitations in the use of these coatings, and toxicological considerations and hazards.

* * *

List price is $15 for individual copies and $10 if the entire set is purchased. The member cost is $7.50 for individual copies and $5.00 with an order of the full set. Orders may be placed by contacting Meryl Cohen, FSCT, 492 Norristown Rd., Blue Bell, PA 19422-2350.

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Manuscript Entries Invited for 1993 Roon Awards Competition; Cash Prizes to Be Awarded Authors of Winning Papers

Prospective authors are invited to submit manuscript entries in the 1993 Roon Awards competition.

The Awards, sponsored by the Coatings Industry Education Fund (formerly the Paint Research Institute), were established in 1957 by the late Leo Roon, founder of Nuodex Products Co., and are supported by funds provided through the Roon Foundation. They are presented each year to the winning authors at the Annual Meeting of the Federation of Societies for Coatings Technology.

A total of $4,000 in cash prizes will be awarded for the top papers submitted for presentation at the 1993 Annual Meeting, to be held October 27-29, at Georgia World Congress Center, Atlanta, GA.

Papers submitted in the competition must: (1) Describe original work not previously published or presented; (2) Be directly related to the protective coatings industry; (3) Be of such a caliber that they reflect a step forward in real scientific contribution to the coatings industry; and (4) Be accompanied by clearance for publication.

Papers to be considered for the competition are those by individuals associated with the organic coatings industry, including raw material suppliers and educators.

Those wishing to enter the competition must send a letter of intent, along with the title of the proposed paper and a brief abstract (by March 1) to the Chairman of the Roon Awards Committee of the Federation: Louis J. Sharp, Dexter Corp., 1 E. Water St., Waukegan, IL 60085.

1992 Winners of the Roon Awards Competition

FIRST PRIZE—"Influence of Imidazoline Content and Water on the Reaction Between Amidoamine and Epoxy Resins"—Dr. Robert F. Brady, Jr., of Naval Research Laboratory, Washington, D.C., and James M. Charlesworth, of Materials Research Laboratory, Melbourne, Australia.

SECOND PRIZE—"Model Crosslinkers for Polyols. Kinetics of Transetherification of 2-Methoxy Cyclic Ethers"—Makoto Arai and S. Peter Pappas, of North Dakota State University, Fargo, ND.

Principles Governing the Roon Awards

The Awards, sponsored by the Coatings Industry Education Fund, were established in 1957 by the late Leo Roon, founder of Nuodex Products Co. Supported by funds provided through the Roon Foundation, they are for the best technical papers (other than those by a Constituent Society of the Federation) submitted for presentation at a Federation Annual Meeting.

Papers to be considered for the competition will be those by individuals associated with the organic coatings industry, including raw material suppliers and educational institutions.

The principles governing the awards are as follows:

(1) The papers will be of such caliber that they reflect a step forward in real scientific contribution to the coatings industries. The papers shall describe original work which has not been previously published or presented.

(2) Papers must be directly related to the protective coatings industry.

(3) None of the work shall originate from, be guided by, or be any part of, a Coatings Technology Society. These awards shall in no way detract from the cooperative effects of Societies' Technical Committees and their convention papers.

(4) An Awards Committee, appointed by the President of the Federation, will judge the entries.

(5) The Committee is not obligated to award prizes if, in its opinion, none of the submitted papers are of a caliber to be worthy of such recognition.

(6) The submitted papers may be presented at the Annual Meeting with the consent of the President of the Federation and the Chairman of the Program Committee. Although it is the intent of the Roon Awards that winning papers will be presented at the Annual Meeting, papers accepted for presentation and papers awarded prizes are separate and distinct. An invitation from the Program Committee to present his/her paper should not be construed by any author as an indication that the Roon Committee has awarded the paper a prize.

(7) Winning papers will be published in the JOURNAL OF COATINGS TECHNOLOGY, which has prior rights to publication of all submitted papers.

(8) The papers shall be concise and informative discussions of up to approximately 6,000 words. Papers greatly exceeding this length should be divided into more than one paper. Multiple entries in the competition from a single author are accepted. It is requested that manuscripts be prepared in accordance with JCT style, as outlined in the "Guide for Authors." Copies are available from the Federation office in Blue Bell upon request.

(9) A 150 to 200 word abstract shall accompany the paper.

(10) Papers will be rated with emphasis on: (a) Originality(40%); (b) Scientific Importance (20%); (c) Practical Value (20%); and (d) Quality of Composition (20%).

(11) The Awards will be open to anyone involved in study or engaged in work related to the protective coatings industries, including paint, varnish and lacquer manufacturers, raw materials suppliers, research laboratories, and universities. (The Committee, however, will not accept papers which involve raw material sales promotion or are self-serving in regard to exploiting a proprietary product).

(12) The Committee may award any number of prizes, the total of which is not to exceed $4,000.

(13) All papers must be accompanied by company or educational institutional clearance for publication.

(14) Those planning to submit a paper in 1993 must advise the Chairman (Louis J. Sharp, Dexter Corp., 1 E. Water St., Waukegan, IL 60085.) by March 1. He must have 10 publication manuscripts by May 1.

(15) The 1993 Awards and accompanying engraved plaques will be presented during the Annual Meeting in Atlanta, GA.

Louis Ruckgaber Jr. Receives NPCA's '92 Heckel Award; Companies and Local Associations Also Honored

The National Paint and Coatings Association (NPCA), Washington, D.C., has announced that Louis A. Ruckgaber Jr., has been named the recipient of their 1992 George Baugh Heckel Award, the highest honor the NPCA can bestow. The award was presented during the Association's 105th Annual Meeting, on October 19-21, in Chicago, IL.

Mr. Ruckgaber, Vice President, of Egyptian Lacquer Manufacturing Company, Inc., has been a member of NPCA for approximately 30 years. His dedication to the Association includes service on several committees, and most recently, as a member of the NPCA Board of Directors, and Budget and Finance Committees. He has been a member of what is now the Industrial Coatings Committee for 27 years, having served as Committee Vice Chairman for two years, and Chairman for three years. Mr. Ruckgaber also is a longtime member of the Management Information Committee, and a number of other industry groups.

Presenting the 1992 NPCA Heckel Award was Warren O. Manley, of Cook Paint and Varnish Company. Mr. Manley was the Association's 1991 Heckel Award recipient.

In other news, NPCA announced that three companies were recipients of the second annual Pollution Prevention Awards. Honored for their achievements in pollution prevention were: Red Spot Paint and Varnish, Inc., Evansville, IN; Jamestown Paint Company, Jamestown, PA; and Guardsman Products, Inc., Grand Rapids, MI. The awards were presented at the Honors Session during the NPCA's Annual Meeting.

The awards were presented in recognition of innovative efforts to minimize waste during the process of manufacturing paints and coatings.

Red Spot was honored for instituting a major new waste-tracking system and implementing specific waste reduction strategies that, according to company officials, resulted in savings of over a million dollars in its first year.

Jamestown Paint applied the principles of Total Quality Management to improve its waste management and quality control operations. While the company estimated that waste costs had dropped by an amount equal to two percent of sales, they stressed that the biggest dividend has been in personnel development, as employees gained new skills and an increased sense of participation.

A special honorable mention was presented to Guardsman Products for "On Guard," an interactive computer program used to educate employees in waste reduction techniques. The company was cited not only for its initiative in developing the program, but its generosity in making it available to other member companies of NPCA.

Three Outstanding Community Service Awards also were presented during NPCA's Annual Meeting. The Wisconsin (WPCA), Kansas City, (KCPCA) and Puget Sound (PSPCA) Paint and Coatings Associations were presented with 1992 Allen W. Clark Awards for exceptional community service.

The WPCA, winners of the first place prize, completed eight projects during its year-round community-improvement campaign. Paint donations included the continued support of Milwaukee's anti-graffiti work crews, a six-year effort between the city and the Association to fight graffiti vandalism. Other paint donations revived the Bruce Guadalupe School and provided a facelift for the Gingerbread House, a homeless shelter for teenage boys. Additional WPCA projects included participation in the Milwaukee "Big Splash" beautification effort, the YWCA Vel Phillips Day Care Center and transitional housing facility, the Gray's Child Development Center, and renovation of an abandoned 30-room house which now serves as a job training and counseling center.

The second place prize was awarded to the KCPCA for its continuing efforts with paint recycling. The Association coordinated and initiated a Paint Recycling Day in which over 2,000 gallons of unused and unwanted paint was collected during the city's Earth Day celebration. The paint was inspected, blended, packaged, labeled, and donated to community-improvement organizations. The recycled paint was used to repaint a family crisis center, to revive the homes of elderly residents, and to erase graffiti.

The PSPCA was awarded the third place prize for helping provide like-new homes for 21 elderly, low-income homeowners, by donating paint and supplies for Seattle's Christmas in April project. The local paint group refurbished two of the homes.

Miles Inc. to Change Tradename Of Coating Raw Material Product Line

The Coatings business unit of Miles, Inc., Pittsburgh, PA, has announced that the tradename of its line of Mondur® CB aromatic polyisocyanates is being changed to Desmodur® CB. The name change will become effective March 1.

The Miles use of the Desmodur CB tradename will make the product line name consistent with that used throughout the rest of the world by Miles' parent company, Bayer AG, Germany.

The Desmodur CB products available from Miles will continue to be produced at the company's facility in New Martinsville, WV.

Bayer AG has been producing and marketing Desmodur aromatic and aliphatic polyisocyanates, and Miles has manufactured and supplied a variety of Desmodur aromatic and aliphatic polyisocyanates in addition to the Mondur CB aromatic polyisocyanates.

The change from the Mondur CB name to Desmodur CB will include the following products: Mondur CB 75 will become Desmodur CB 75; Mondur CB 601 will become Desmodur CB 601; Mondur CB 72 will become Desmodur CB 72; Mondur CB 60 will become Desmodur 60; and Mondur CB 701 will become Desmodur CB 701.

Lubrizol Corporation to Acquire Langer & Company

The Lubrizol Corporation, Wickliffe, OH, has agreed to acquire Langer & Company, Ritterhude, Germany. The transaction has been reviewed by the German Cartel Office and found to be acceptable. The acquisition is expected to be completed early this month.

Through this acquistion, Lubrizol will obtain a regional infrastructure.

Langer & Company will continue to manufacture and sell its line of Lanco products, and function as a distributor.

PACIFIC NORTHWEST PAINTMAKING

January 1993

HOW TO "BEAD" THE COMPETITION

There are several excellent "rules of thumb" for making a selection of the proper size and type of mill media for a particular application. These rules are best used to point you in the right direction towards optimizing the performance of the mill, defined here as providing the desired grind in the least amount of time and at the least expense.

In general:

- Grind light colors with larger size beads and darker colors with small sized beads.
- Use the smallest sized bead that will give the desired grind. The smaller the bead, the more work points there are in a given volume.
- Use higher density beads with higher viscosity products.
- Grind a product containing a wide range of particle sizes with, first, a quick pass, and then a slower pass, to achieve the final grind. Or, pass the mill base first through a mill with large beads to knock down the large particles, and then make a pass through a mill with smaller diameter beads for the final grind.
- When altering a coatings formulation, re-optimize the bead type, bead diameter, and grinding time.
- Uniformly sized beads perform more work grinding the product and less work making little beads out of big ones.

One of the major new trends in coatings manufacture is the increased use of zirconium silicate mill media. This ceramic media is almost 60% higher in density than glass and has enabled many companies to increase their mill output substantially.

The advantage of zirconium silicate compared to glass is its ability to disperse products more quickly. When changing to zirconium silicate, consider shortening the milling time or cutting the number of passes. To reduce bead wear, the viscosity of the mill base may need to be increased. Keep the wash-up time to a minimum as a great deal of bead wear occurs when the beads are washed with a low viscosity solvent. If milling results are much improved with zirconium silicate, consider trying an even higher density media such as pure zirconium oxide. You may find that you can make a two-pass product in only one pass by switching to a higher density media.

Some new users of zirconium silicate make the mistake of simply changing to the new bead and make no other changes to their formulations or the mill operation procedures. Disappointment with the results and the amount of bead wear they experience may set in, and the user may revert to the "old way" of milling with the old type of beads. In doing so, they may be missing out on a good opportunity to improve their milling operation. On the other hand, some applications may not need the power of a high density bead. Use a ceramic bead's power where it offers an advantage. Use less costly, lower density beads where it does not.

A common question about any media is, "when is it time to empty the mill and reload it with fresh beads?" The time to change is when the screen begins to clog with worn beads. After cleaning and loading with new beads, keep the mill at its normal fill level by adding more beads of the original size. The mill runs best when it is kept filled to the original level recommended by the manufacturer.

One problem almost always blamed unfairly on beads is that of beads breaking in the mill. Even the weakest silica sand and glass beads have a crush

(Continued on last page)

THE EFFECT OF DISPERSION ON COATING QUALITY. PART II

In the last issue of "Pacific Northwest Paintmaking" (March 1992), we talked about how good pigment dispersion in your paint increases the tinting strength of your expensive organic pigments, reduces rub-up, and improves transparency, clarity, and metallic brightness. This time we will discuss how degree of dispersion affects other characteristics of paint, and will show that a "better," that is, finer, dispersion can significantly improve some properties, while it can worsen others.

Surface Smoothness and the Effect on Appearance

Gloss is determined by the pigment particle size in a coating. Large pigment particles project through the surface causing light to be scattered at every angle. The greater the degree of scattering, the lower the gloss of the coating. Smaller particles mean smoother surfaces, and higher gloss.

Most formulators use "stir-in" silica flatting pigments to lower gloss. These pigments mix in easily with relatively little energy. They do a fine job, but sometimes a problem can occur when a sample of the batch of coating goes to Quality Control (QC), and the report comes back that the gloss is a bit too high. More silica is added and mixed in under the disperser. When QC gets the next sample, with more flatting pigment in the batch, they find that the gloss has actually gone up!

What happened? Simple. As the additional pigment was being dispersed, the original portion was being overground. The individual aggregates were being broken into smaller pieces, and losing their flatting efficiency. Fewer particles disrupted the surface, and the gloss of the coating went up.

Sometimes additives that are not normally considered to be pigments can cause a similar effect. Many coatings, especially industrial finishes, use waxes, polyethylenes, and similar polymers to give slip or resistance to marring, scuffing, or abrasion.

Most of these waxes are used in baking finishes. When the coating is baked, the wax melts and migrates to the surface. When the coating cools, the wax solidifies in round balls, with about half of each ball sticking out of the coating. The size of these balls of wax depends largely on the original particle size of the wax dispersed in the coating.

Large balls of wax will disrupt the smoothness of the surface in the same way large particle size pigments do. This will scatter light and cause loss of gloss, and in clear coatings, loss of transparency.

Gloss and Jetness of Carbon Black Enamels

The gloss and jetness of carbon black pigments is critically dependent on particle size. You can use a high color carbon black that costs over $3.00/lb, but if you don't get a good dispersion, the end result will be no better than if you used a $1.00/lb grade.

An enamel made with a high color black and dispersed with a pebble mill will look milky and dull, and have a definite brown tone. The same formula ground in a steel ball mill will be much glossier and have a richer, jetter color. The extra energy that the steel mill puts into the dispersion helps you come much closer to the ultimate particle size of the pigment, and lets you get everything the pigment has to offer.

Particle Size and Stability

Many additives and special formulating techniques are used to stabilize paints against flocculation and settling. This can often be accomplished just by reducing particle size through improved dispersion.

Reducing particle size increases the total surface area of pigment in the system which, in turn, usually results in higher viscosity. Better dispersion of many organic and some inorganic pigments develops a thixotropic state as well. Higher viscosity and increased thixotropy can greatly improve the stability of a paint.

Flocculation occurs when pigment particles reagglomerate. They are pulled together by Van Der Wall's Forces of Attraction. By definition, the larger the radii of the particles in a system, the greater the attraction. Better dispersion for finer particle size reduces the forces of attraction and also

increases viscosity of the system. Both factors tend to prevent movement of pigments, which in turn prevents flocculation.

The rate of settling of particles in a liquid can be predicted by Stoke's Law as shown below:

Stoke's Law

$$V = \frac{2\,r^2\,(D_1 - D_2)g}{\frac{kn}{gn}}$$

According to Stoke: V=rate of settling; r=radius of pigment; D_1=density of the pigment; D_2=density of the liquid system; g=the force of gravity; k=a constant; and n=the viscosity of the system

Many of the factors in the equation will not change when particle size changes. When you eliminate all the constants, what you have left is:

$$V = \frac{2r^2}{n}$$

Finer particle size means a reduction in the radius of the pigment and an increase in viscosity, both of which mean less settling in your paint.

Effect of Particle Size on Coating Durability

Coatings chemists are continuously evaluating new vehicles and pigments to improve the durability of their products. In some cases, something as simple as particle size of pigments can have a major effect on the results.

We experimented with paints made with a standard grade of TiO_2 in combination with both synthetic red iron oxide and synthetic yellow iron oxide at a ratio of two parts TiO_2 to one part iron oxide. Two samples of each formula were made, one dispersed to an average particle size of 25 microns and the other to six microns.

The paints were first tested for chalking on QUV exposure. After 500 hours, exposure the paints were examined for loss of gloss and loss of color strength as indicated in the following chart.

Effect of Particle Size on QUV Exposure Results

	Yellow Oxide	TiO_2	Red Oxide	TiO_2
	25µ	6µ	25µ	6µ
Gloss (unexposed)	91	94	92	94
Gloss (exposed)	70	52	72	53
Loss of gloss on exposure	21	42	20	41
% Strength lost on exposure	3.5	7.0	4.0	7.0

We confirmed by washing part of the exposed area that the problem was chalking. The washed section had the same gloss and color as the unexposed section. The important point is that in both paints coarse pigment dispersion gives better chalk resistance on QUV exposure. (The iron oxide pigments act as UV adsorbers. The larger particles stick out through the surface of the coating, providing more surface area to adsorb UV energy and thereby providing better chalk resistance.)

When the same coatings were evaluated for water immersion resistance, the results were just the opposite. The larger pigment particles caused a wicking effect that allowed water to penetrate all the way through to the substrate. The coating showed more deterioration, and the steel substrate had more rust.

Conclusion

Today's polymer technology provides coating vehicles that will perform near miracles of protecting and beautifying almost any substrate. In order for you to take advantage of all the potential benefits, you have to pay very close attention to the size of all particulate solids in your coatings.

—Elio Cohen and Michael C. Frantz,
Daniel Products Company

STATIC ELECTRICITY: GROUNDING AND BONDING

There are many examples of electrostatic charge generation and accumulation (static electricity) that are inherent in operations and processes associated with the paint manufacturing industry. Because of the nature of most of the materials processed and the type of operations carried out, flammable atmospheres of solvent vapors, gases, or dust clouds are also likely to be present when the electrostatic discharge occurs. Occurrence of an electrostatic discharge in the presence of a flammable atmosphere can result in a catastrophic explosion or fire.

A definition of static electricity is: an electrical charge generated by friction that is stored until presented with an avenue of discharge.

Some examples of how an electrical charge can be generated during paint production process are:

- transfer of powders through pipes,
- transfer of powders from containers or bags into vessels,
- transfer of liquids through pipelines and hoses,
- transfer of liquids from container to container, and
- mixing or circulation of liquids during manufacturing and packaging.

The generation of an electrical charge, however, can only become a hazard if the generated charge accumulates and has no controlled avenue of discharge. That is why grounding and bonding are so very important in our industry.

Grounding

Grounding is the process of channeling generated static electricity to the earth. Normally, this is achieved with a wire cable connected to a metal pipe or bar buried in the ground. The opposite end is available to attach to any piece of equipment (mixers, dispersers, fixed tanks, etc.) requiring contact to the earth to channel electrostatic current away from it. Mixers and dispersers always generate an electrical charge and should be installed by a licensed electrical contractor in accordance with the National Electrical Code to ensure proper grounding.

Bonding Tanks and Containers

Bonding is a connection between two conductive objects which allows electrostatic current to flow freely between the objects. Bonding is generally done when a connection to the earth for charge dissipation is not possible or practical.

Bonding of portable tanks or mixing vats must be addressed in a paint plant.

If a tank is not firmly and cleanly connected to the grounded mixer or disperser, pouring chemicals into the tank can generate a static buildup and discharge that ignites the solvents. Tanks are not suitably grounded unless they are connected by the use of a static line (bonding) to a properly grounded source. The static line connection points must be scraped clean of buildup or the tank won't be grounded.

An operator should connect their static line to each container before transferring liquids to eliminate the possibility of static discharge. This includes transfer from bucket-to-bucket, drum-to-bucket, drum-to-tank,etc.

Precautions

When a flammable vapor atmosphere is present, precautions against an electrostatically initiated explosion or fire include:

- Properly ground all fixed equipment (including outside storage tanks and charging platforms). If you are unsure of the quality of equipment grounding in your plant, it would be advisable to contact a professional to conduct electrical resistance tests and determine if a potential problem could exist.
- Make sure static bonding lines are attached to each piece of fixed equipment and portable lines are readily available to each employee for bonding containers. Static bonding lines should be constructed with powerful pointed clamps. Clamps and surfaces should be wiped clean to insure a solid bond.
- Use nonsparking (brass/bronze) hand tools and equipment.
- Review the types of containers used for storage of raw materials. Antistatic plastic containers and bag linings may be a possibility, although control of charge generation in powders is very difficult.

(Continued on next page)

UNDERSTANDING THE MSDS

In recent years, regulations introduced have made it mandatory for everybody working with paints or raw materials for the manufacture of paint to read the MSDS in order to understand the potential hazards.

Unfortunately, MSDS were originally designed for use by Industrial Hygienists and others with a very thorough knowledge and understanding of the aspects covered. They certainly are not user friendly for the average employee.

To help you to better understand the information contained in the MSDS in this and future issues, we will be printing definitions of words used in the MSDS—we trust you will find this information useful.

Autoignition Temperature—The minimum temperature at which a substance ignites without application of a flame or spark. Do not heat materials to greater than 80% of this temperature.

Combustible—A term used to classify certain materials that ignite readily, but not as easily as those classified as flammable.

Evaporation Rate—The rate at which a material vaporizes (volatilizes, evaporates) from the liquid or solid state when compared to a known material's vaporization rate. Evaporation rate can be useful in evaluating a material's health and fire hazards. The known material is usually normal butyl acetate (N-BuAc or n-Bu-Ac), with a vaporization rate designated as 1.0. Vaporization rates of other solvents or materials are then classified as: fast evaporating if greater than 3.0; medium evaporating if 0.8-3.0; or slow evaporating if less than 0.8

Flammable Limits (Flammability Limits, Explosive Limits)—The minimum and maximum concentrations of a flammable gas or vapor between which ignition can occur. Concentrations below the lower flammable limit (LFL) are too lean to burn, while concentrations above the upper flammable limit (UFL) are too rich. All concentrations between LFL and UFL are in the flammable range, and special precautions are needed to prevent ignition or explosion.

Flash Point (FP)—Lowest temperature at which a flammable liquid gives off sufficient vapor to form an ignitable mixture with air near its surface or within a vessel. Combustion does not continue, FP is determined by laboratory tests.

Fire Diamond (NFPA Hazard Rating)—Per "NFPA 704" publication. Visual system that provides a general idea of the inherent hazards, and their severity, of materials relating to *fire* prevention, exposure, and control. Preferred reading order, Health, Flammability, Reactivity, Special.

Position B—Flammability (red), susceptibility to burning. 0 = Will not burn. 1 = Will ignite if preheated. 2 = Will ignite if moderately heated. 3 = Will ignite at most ambient conditions. 4 = Burns readily at ambient conditions.

Ignition Temperature—The lowest temperature at which a combustible material ignites in air and continues to burn independently of the heat source.

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(Continued from previous page)

• Avoid free fall and splashing of liquids. When pumping liquids, place the hose as close to the bottom of the tank as possible to avoid static generation.

• Inertion of flammable atmospheres. If practical, blanket the atmosphere in tanks and kettles with nitrogen or carbon dioxide. Note, however, that injecting carbon dioxide (from cylinders) as a blanketing agent is extremely dangerous. The jet of carbon generates a very high electrical charge as it flows through the nozzle of the hose.

• Controlled humidity. Relative humidities in the 60-70% range can increase the amount of water film on nonconducting solids providing conductive routes to dissipate charges.

Static electricity control should an be important part of any plant's training program. It is known as the "silent killer" and should be respected and understood by all paint manufacturing personnel. Frequent training should occur for established employees and no new employee should ever begin working without completing a static electricity training session.

—Thomas W. Higgins,
Carboline Company

A Newsletter
For the Exchange
Of Ideas On Safety
And Manufacturing . . .

HOW TO "BEAD" THE COMPETITION

(Continued from page 1)

strength several hundred times the amount available in a normal operating mill. Usually, the cause of bead breakage is a packed bead bed, improper gap separation, loose mill parts, or other equipment problems. One kind of zirconium silicate grinding media does contain "fragile" beads that will fracture during the first few batches and for this type, a conditioning process is recommended. Another zirconium silicate media does not contain weak beads and no conditioning is needed. Ask the bead supplier if conditioning is required before you run your first batch of product.

Which then is the "best bead?" There is no such thing, because a given mill typically is used for several different formulations. The best bead for one application may not be the best for another. The best bead is the one that accomplishes the dispersion goal as quickly and as cost effectively as possible. By using these "rules," you may be able to make simple changes in bead size and type, benefitting a wide range of products run on your mill. Consider your choice of bead material and size as carefully as you do other raw materials used to produce your coatings and you will be one very big jump ahead of your competition!

—Tom Weiss,
Quackenbush Company

The Pacific Northwest Paintmaking (PNP) is intended for the exchange of ideas on safety and manufacturing. First published and distributed independently by the Manufacturing Committee of the Pacific Northwest Society for Coatings Technology, the newsletter will be published periodically in the JCT. The editors would like your participation. Send your comments, ideas, safety or manufacturing tips, and articles to: PNP Editor, Valerie Braund, General Paint, 950 Raymur Ave., Vancouver, B.C., Canada V6A 3L5.

Regulatory UPDATE

JANUARY 1993

This digest of current regulatory activity pertinent to the coatings industry is published to inform readers of actions which could affect them and their firms, and is designed to provide sufficient data to enable those interested to seek additional information. Material is supplied by National Paint and Coatings Association, Washington, D.C. and edited by members of the FSCT Environmental Affairs Committee.

Legislative Forecast

President-Elect Bill Clinton is expected to push for several policy changes in the initial months of his presidency, with tax and economic growth legislation among the top priorities. But before any tax bills can be considered, the House Ways and Means Committee must fill 13 vacancies on its panel, and the Appropriations Committee needs to fill 19 seats. In fact, because of the large number of new members, several committees will undergo significant changes before any major legislative initiatives can be reported.

Meanwhile, Congress is likely to move quickly on proposals that were vetoed by President Bush during the last session. Those issues could include mandated leave legislation, liberalized voter registration procedures, and possibly campaign finance law changes. Health care is also a high priority for the new Administration, and a bill is expected to be introduced within the first 100 days. However, the issue is controversial and complex, and could take several months to resolve.

According to a recent Gallop poll, less than half of the members of the 103rd Congress ranked environmental issues as important priorities. The poll showed about one-third of the members directly in line with President-Elect Clinton in citing job creation and the economy as the most urgent issues, well above nearly all other national priorities. However, with Vice President-Elect Al Gore's strong advocacy of the environment, it is unlikely certain environmental issues will be left by the wayside. Waste management and Superfund reform will undoubtedly see some activity during the first session of the 103rd Congress, as well as infrastructure legislation that could include water-related provisions. The legislative agenda will not be finalized until both the President and Congress are sworn into office.

Congressional Committee Addresses Reform Proposals

At the request of a special House-Senate Committee created earlier this year, two legislative scholars recently released proposals on how Congress can conduct its business more efficiently. Strengthening party leadership, revising campaign finance law, and changing the committee structure were among the recommendations set forth by Thomas E. Mann of the Brookings Institution and Norman J. Ornstein of the American Enterprise Institute.

The proposals were prepared for the Joint Committee on the Organization of Congress which was established to develop reform recommendations by the end of 1993. The committee is expected to begin hearings in January.

Reportedly, "Congress bashing" over the last couple of years, which has diminished the validity of the legislative body among the general public, was one of the primary reasons for requesting the recommendations from the scholars. In his report, Mr. Mann said, "Congress needs to be more effective but also needs to re-establish its legitimacy in the country as a whole."

The recommendations include:

(1) A 16-member Majority Agenda Committee should be formed to set and help implement legislative priorities.

(2) The next Congress should not wait until January to begin work. Instead, it should start soon after the elections in November. Before the session starts, party leaders should lay out a flexible floor schedule for the session.

(3) The Speaker should be able to declare a committee chair vacant at any point in a session subject to a vote by the respective party caucus.

(4) Committees should be reduced to six, and members should be limited to two committee and four subcommittee assignments. Hearing attendance should be recorded and published.

(5) The minority party should have a right to make a motion to recommit with instructions, and the minority party should have one-third of the investigative staff on committees.

(6) House members should cut their personal full-time staffs from 18 to 15.

Regulatory Notices

During the last year, a number of environmental statutes containing new provisions to restrict the amount of toxic chemicals that industry releases into the environment have been passed or amended. In each case, those new laws or regulatory actions have increased the burden on indust ,, and state and local governments, that relate directly to provisions of the Emergency Planning and Community Right-to-Know Act (EPCRA). The burden is not about to be lessened. In fact, those groups can expect a regulatory increase in the coming year.

New requirements are being developed for storm water management, air emissions control, and mandatory waste

reduction. Most of the blame for the regulatory expansion can be placed on the chemical emissions and release data collected by the Environmental Protection Agency (EPA) for its Toxic Release Inventory (TRI).

The following are some of the key issues facing all those who must comply with reporting requirements under EPCRA.

Issue: Storm Water

EPA imposed more stringent permit requirements to industrial storm water discharges that report TRI data to the agency and states.

Status

EPA issued a final rule on September 3, 1992 for 12 states lacking authority to run the Clean Water program.

Outlook

This rule can be expected to be a model for TRI reporters in all 50 states.

Issue: Clear Air Act

Prevention of accidental toxic chemical releases and emergency response planning are joined together by regulations.

Status

Final rules establishing the list of covered air toxics were expected in November 1992 but has not yet been released. Final guidelines for industry risk management plans due in November 1993.

Outlook

EPA will probably require manufacturers to prepare a chemical process safety plan that includes hazard assessments, prevention programs, and emergency response procedures.

Issue: RCRA Reauthorization

A new bill would amend current laws affecting the management of solid waste by requiring industry to disclose more information about toxic chemical production, use, and release.

Status

No legislation was approved during the last session of Congress.

Outlook

Congress may attempt another shot at reauthorizing RCRA. If so, expect discussion to revolve around the expansion of the TRI list of covered chemicals and facilities.

Issue: Pollution Prevention Act

The law, passed in 1990, requires industry to give a more specific accounting of toxic chemicals prior to treatment and recycling.

Status

EPA should issue final rules and expanded guidelines in 1993.

Outlook

Industry continues to object to having to file TRI reports with no definitions or instructions. Expect dissension throughout the rulemaking process.

EPA, FTC, USOCA Release Environmental Advertising Claims Brochure

A new brochure designed to assist consumers compare products and packaging with regard to their environmental merits has been released by the U.S. EPA in conjunction with the Federal Trade Commission (FTC) and the U.S. Office of Consumer Affairs (USOCA).

The brochure, entitled "Green Advertising Claims," urges consumers to look for environmental claims that contain specific information. If a label has a "less than" claim, it should specify not only "20% less waste," but "20% less packaging than our previous package." Also, a product labeled "recyclable" is only good to a consumer if that specific material is collected for recycling in their community.

The brochure also advises consumers to be aware of overly broad or vague environmental claims such as "environmentally friendly," "environmentally safe," or "eco-safe." While virtually all products have some environmental impact, some products cause less harm than others. The brochure also warns the consumer to carefully check "degradability" and "ozone friendly" claims.

For a free copy of "Green Advertising Claims," contact the RCRA Information Center, U.S. EPA (OS-305), 401 M Street, S.W., Washington, D.C. 20460, (800) 424-9346.

States Proposed Legislation and Regulations

California

CA A. 11 (Eastin) authorizes the Department of General Services, in consultation with the California Integrated Waste Management Board, to establish price preferences, recycled content disclosure, recycled product only bids, and cooperative purchasing arrangements for paper products and for compost glass, oil, plastic, solvents, and paint. The bill was introduced on December 7 and has yet to be referred to a committee.

Illinois

Air Quality—IL H. 4037 (Ryder) amends EPA Act; creates the Clean Air Act Permit Program; requires such sources of pollution to obtain permits from EPA; regulates such pollution in accordance with the Federal Clean Air Act. The House refused to concur in Senate amendments in June. On December 2, the bill was sent to the Conference Committee

Kentucky

Transportation (Regulation)—The Transportation Cabinet of Kentucky has adopted the federal hazardous materials transportation regulation (49 CFR (1978)). The regulation covers labeling, placarding, and manufacturing and testing specifications for packaging and containers. For further information, contact the Transportation Cabinet at (502) 564-4540. (*19 Kentucky Administrative Register 1413*—December 1, 1992.)

Michigan

Storm Water (Regulation)—On November 30, 1992, the Department of Natural Resources (DNR) published regulations implementing its general storm water and storm water-from-construction activities programs. For further information, contact the DNR at (517) 373-1949.

Massachusetts

Lead—MA H. 6179 (Kehoe) makes an appropriation for the fiscal year ending June 30, 1993 to provide for certain other activities and projects; relates to the removal of lead paint by the Needham Housing Authority. The bill was introduced on October 30 and was released from the Joint Committee on Election Laws on November 30.

Notice—A Massachusetts bank is offering a one percent discount on home improvement loans spent on "green repairs and enhancements." "The Green Loan" program, sponsored by Neworld Bank of Boston and Cape Code, is being offered to applicants who finance improvements that reduce energy consumption or remove environmental hazards. Qualifying projects would include the removal of lead-based paint or underground fuel storage tanks.

Minnesota

Hazardous Waste (Regulation)—The Minnesota Pollution Control Agency (PCA) has published a notice of intent to issue a statewide general permit governing storage of liquid substances in aboveground tanks. The permit would incorporate regulations that were promulgated earlier which specify standards for construction, containment, and spill prevention. The three categories of tanks eligible for regulation include (1) tanks with a capacity of over 1,100 gallons; (2) tanks with a capacity of 1,100 gallons or less located beyond 500 feet of a surface water; and (3) tanks with a capacity of 1,100 gallons or less located within 500 feet of a surface water. For further information, contact the Minnesota PCA, Hazardous Waste Division at (612) 296-7202. (*17 Minnesota State Register 1239*—November 16, 1992.)

New Jersey

Waste Reduction/Labeling—NJ A. 2046 (Rooney and Ogden) prohibits the financing, permitting, or construction of new solid waste incinerators or the expansion of existing solid waste incinerators. Requires every county to provide for the reduction of at least 75% of its annual solid waste stream by the beginning of the fourth year following enactment. Prohibits, as of July 1, 1994, any product or packaging from being labeled "recyclable," "recycled," "reuseable," or "compostable" unless certain standards are met. Requires source reduction plans by manufacturers. The bill was introduced on November 23 and is currently in the Assembly Committee on Local Government. An identical bill was introduced in the Senate (S. 1366—Corman) on November 24 and was referred to the Senate Committee on Community Affairs.

Graffiti—NJ S. 1405 (Cowan) requires suspension of driver's license and community service for acts of graffiti. The bill was introduced on December 7 and is currently in the Senate Committee on Law and Public Safety.

Ohio

Lead—OH H. 879 (Miller) requires the abatement of hazardous levels of lead in buildings used for human habitation. Requires health care professionals to report the results of lead poisoning tests performed on Ohio residents to the Director of Health. Prohibits the application of lead-containing materials on buildings. Requires the Public Health Council to establish mandatory lead poisoning screening guidelines. Establishes a lead abatement certification and licensure program within the Department of Health. The bill was referred to the Committee on Health and Retirement on November 17.

OH. H. 888 (Campbell) requires lead abatement in residential structures. Creates a tax credit for such abatement. Provides for licensure or certification of persons performing lead abatement. Creates the Child Lead Poisoning Prevention Advisory Committee. The bill was referred to the House Committee on Health and Retirement on November 17. An identical House bill (H. 383—Drake) was referred to the House Committee on Health and Human Services on November 17.

Texas

Air Quality (Regulation)—On November 27, 1992, the Texas Air Control Board issued final regulations that implement earlier proposed amendments to the state's permit program for new construction and modification. For further information, contact the Air Control Board at (512) 908-1457.

Washington

Water Quality (Emergency Regulation)—Washington's Department of Ecology (DOE) has issued an emergency rule to implement a state permit program applicable to the discharge of waste materials from industrial operations into ground and surface waters. The general permits cover "multiple dischargers within a designated geographical area, in lieu of individual permits being issued to each discharger." For further information, contact the Washington DOE at (206) 459-6000. (*92-21 Washington State Register 013*—November 4, 1992.)

Water Quality (Regulation)—DOE has issued a National Pollutant Discharge Elimination System general permit for storm water discharges associated with industrial activities. The date of issuance was November 18, 1992, and the effective date of the permit is December 18, 1992. To obtain an application [a notice of intent (NOI)], general permit, or fact sheet, contact the DOE, Water Quality Program at (206) 438-7614. (*92-22 Washington State Register 085*—November 18, 1992.)

Fall 1992
Board of Directors Meeting

Thirty-six members and 36 guests attended the Fall Meeting of the Board of Directors of the Federation of Societies for Coatings Technology, on October 20, 1992, in Chicago, IL.

The following were in attendance:

Officers

President ..... William F. Holmes
President-Elect ..... Colin D. Penny
Secretary-Treasurer ..... John A. Lanning

Society Representatives

Baltimore ..... Joseph D. Giusto
Birmingham ..... Gerry J. Gough
C-D-I-C ..... Lloyd J. Reindl
Chicago ..... Richard M. Hille
Cleveland ..... Fred G. Schwab
Dallas ..... Charles Kaplan
Detroit ..... William W. Passeno
Golden Gate ..... Timothy J. Donlin
Houston ..... Arthur McDermott
Kansas City ..... Norman A. Hon
Los Angeles ..... Jan P. Van Zelm
Louisville ..... Louis F. Holzknecht
Mexico ..... Arturo Ita
Montreal ..... Horace S. Philipp
New England ..... Maureen M. Lein
New York ..... Richard J. Himics
Northwestern ..... Larry Brandenburger
Pacific Northwest ..... William E. Shackelford
Philadelphia ..... Wayne A. Kraus
Piedmont ..... Forest Fleming
Pittsburgh ..... William C. Spangenberg
Rocky Mountain ..... John Delmonico
St. Louis ..... Terry Gelhot
Southern ..... Dan Dixon
Toronto ..... Arthur K. Hagopian
Western New York ..... Gerald F. Ivancie

Other Members

Thad T. Broome ..... Southern
Orville E. Brown ..... Louisville
James E. Geiger ..... Southern
Berger G. Justen ..... Southern
J. Dick Mullen ..... Rocky Mountain
Deryk R. Pawsey ..... Pacific Northwest
Kurt F. Weitz ..... Toronto

Guests

Paul Dague, Incoming President, and J. Andrew Doyle, Executive Director, National Paint & Coatings Association.

Norman Thomas, President, National Decorating Products Association.

Max Raaff, President, and Francis Borel, Secretary General, Federation of Associations of Technicians in the Paint, Varnish, Lacquer, and Printing Ink Industries of Continental Europe (FATIPEC).

Jim Hemmings, President-Designate, and Christopher Pacey-Day, General Secretary, Oil and Colour Chemists' Association—UK.

Ted Saultry, Past-President, and Wal Gallagher, Delegate, Surface Coatings Association Australia.

Don MacDonald, President, Oil and Colour Chemists' Association—New Zealand.

Michael Symes, President, Skandinaviska Lackteknikers Forbund (SLF).

Federation Past-Presidents Hiram Ball, John Ballard, Joseph Bauer, Clarke Boyce, Carlos Dorris, William Ellis, Milton Glaser,

Distinguished guests in attendance included Past-Presidents, Committee Chairpersons, Society Officers, and representatives from international coatings organizations

Howard Jerome, Terryl Johnson, James McCormick, William Mirick, John Oates, Eugene Ott, Carroll Scholle, and Joseph Tomecko. (Board Members James Geiger, Deryk Pawsey, and Kurt Weitz are also Past-Presidents of the Federation.)

George R. Pilcher, President, Coatings Industry Education Fund.

Federation Committee Chairpersons Robert Barrett (Society Speakers Awards), Don Boyd (Educational Coordinating), Ronald Brown (A.F. Voss/APJ Awards) and Ted Fuhs (Annual Meeting Host).

Society Officers Martha Colin and Raquel Cortes (Mexico) and Chuck Reitter (St. Louis).

Incoming Society Representative Evans Angelos (Chicago).

Dr. John C. Weaver (Cleveland).

Staff

Michael G. Bell, Director of Educational Services; Victoria Graves, Director of Meetings and Conventions; Patricia D. Viola, Director of Publications; and Robert F. Ziegler, Executive Vice President.

The report of the Spring 1992 Board of Directors Meeting was approved as published in the August 1992 issue of the JOURNAL OF COATINGS TECHNOLOGY.

Reports of the Officers And Staff

PRESIDENT HOLMES

Has it been a good year? Well, I guess. Since the Spring Report, your President has represented you at the Spring Symposium in Boston immediately following the Board Meeting. This was followed the next week by the Joint Paint Industry Coordinating Committee hosted by the Federation in Blue Bell. Our sister organizations, the NDPA, PDCA, and NPCA thought our headquarters quite stunning, and staff did a marvelous job of hosting a reception on-site.

In June, I attended the organizing meeting of the Texas Paint Council, along with Art McDermott of Houston also representing a Constituent Society. In mid-June, Jean and I represented the FSCT at the FATIPEC Congress and Euroformula show in Amsterdam. FATIPEC President Max Raaff presided in a most exemplary manner; the show format and technical talks, while different from our Paint Show, were worthy of study. While in the neighborhood (Europe), we popped in on the Birmingham Society, and attended a called executive committee meeting and spouses' extra meeting that night, where I was the featured speaker (tight budget in the UK, you know). This was followed by a trip to Ironbridge, to which you, the Board, had voted an $8,000 donation to assist in the establishment of the Paint History Museum. The location is truly impressive, and deserving of our support. After all, this is where the Industrial Revolution started to revolve.

Summer doldrums then ensued, with only a couple of meetings of the NPCA/FSCT Joint Advisory Committee to attend. The Executive Committee did meet in an extra session to act on a suggestion for a formalized Strategic Plan for the Federation. The details will be covered in a separate report.

A visit to Chicago for the Host Committee meeting will round out the pre-AM&PS activities for the sitting President.

Everywhere I have visited, the caliber, commitment, and congeniality of the local Society members shines through. This has truly been a rewarding experience for me, if not for the Federation.

WILLIAM F. HOLMES,
PRESIDENT

PRESIDENT-ELECT PENNY

The last six months of my term as President-Elect have been devoted to making preparations for the coming year.

On May 26, I met with Staff in Blue Bell, to review ideas and strategies for our 1992-93 Season and to begin the time-consuming process of selecting committee chairpersons.

In company of several fellow officers, we have met a number of times with our NPCA counterparts to discuss the subject of merger and/or cooperative efforts of the two organizations. As will probably be reported elsewhere, the word "merger" is no longer part of these discussions and we can now seriously consider refining working more efficiently in areas of mutual interest.

On June 12 to 14, June and I were guests of the St. Louis and Kansas City Societies at the Lake of the Ozarks for their annual joint meeting. This proved to be an ideal weekend of work and pleasure and we thoroughly enjoyed the hospitality offered by the Societies.

In September, we meet to put together the final details of what promises to be a most successful 1992 Annual Meeting and Paint Show.

COLIN D. PENNY,
President-Elect

FSCT Executive Vice President Robert F. Ziegler and President William F. Holmes (Dallas)

SECRETARY-TREASURER LANNING

Since the last Board of Directors Meeting, the following functions were attended.

Society Officers Meeting—Boston, May 18, 1992—The format of the meeting with the new Society Officers was modified to include "rotating" round-table discussions. The new format was well received and generated considerable conversation regarding FSCT activities.

JPICC Meeting—Plymouth Meeting, PA, May 26-27, 1992—This meeting, hosted by the FSCT, gave me the opportunity to meet with members of the NDPA, NPCA and PDCA and to understand the mutual problems affecting "sister" organizations.

Joint NPCA/FSCT Industry Advisory Committee—Plymouth Meeting, May 27, 1992 and Chicago, August 14, 1992—Both of these meetings were beneficial in identifying areas where the FSCT and NPCA can mutually assist each other with programs and committees which overlap in function. Realization of cost savings and effectiveness related to the Annual Paint Show were the most significant. Both organizations will concentrate on efforts to benefit and protect our industry.

Strategic Planning Meeting—Chicago, July 14, 1992—Thanks to the foresight of John Oates and the Planning Committee, this meeting was held to further explore ideas on Strategic Planning for the future of the FSCT. Our Staff invited a specialist in the field to discuss the planning process with the Executive Committee. An Ad Hoc Committee was formed to explore a Strategic Plan in more detail on November 21 and 22. Long-range planning for the FSCT will assist in setting goals.

Western Coatings Societies' Meeting—Cambria, CA, July 29 through August 2, 1992—This meeting of the West Coast Societies focused on the activities of Member Societies. The Western Societies are very active in sponsoring coatings technology courses and symposiums. Funding activities for Cal Poly and scholarship programs are top priorities. It was very refreshing to see so many fellow members working together to meet their goals.

Without going into a lot of detail, I can assure the Board that financially, the Federation continues on stable ground. Although it is true that advertising income is down for the JCT, expenses in general are also lower. At this point, the Annual Meeting and Paint Show continues to be strongly supported by our Exhibitors.

JOHN A. LANNING,
Secretary-Treasurer

President-Elect Colin Penny (Baltimore) and Arturo Ita (Mexico)

While the downward trend in advertising continues to be of concern, it does reflect the general situation being experienced by most publications, both trade and mass market.

However, JCT editorial pages continue to feature the best in both technical and practical articles for the industry. The recent PDC survey showed that the membership gave its strong support for and satisfaction with the FSCT's monthly publication.

We sincerely thank Chairman Bob Brady and the Publications Committee and Editorial Review Board for their tireless efforts in strengthening the JCT's technical position.

Yearbook—The Membership Directory, produced entirely in-house in 1992, will be done so again in 1993. We strongly request that all Societies adhere to the November 15 deadline for submission of rosters.

Series Units—In progress is "Introduction to Pigments" by Dr. Juergen H. Braun, of DuPont. It is anticipated that this, the 20th booklet in the series, will be available later this year. Approximately 11 additional manuscripts are in various stages of completion.

Other—Sales of the Infrared Atlas are increasing . . . Discussions with the Chicago Society Technical Committee regarding its project in compiling industry MSDS using CD-ROM technology have been encouraging. A recent demonstration of the system to the FSCT Executive Committee was well-received and will be featured in the Federation's exhibit at the 1992 Paint Show.

EXECUTIVE VICE PRESIDENT ZIEGLER

FINANCIAL

As of August 31, 1992, Income stood at $2,248,344 and Expense at $1,559,700, with a new positive figure of $688,633 (vs. $327,652 in 1991). This change can be attributed to an increase in sales of publications (*Coatings Technology Series* and *Infrared Spectroscopy Atlas*) and a 17% increase in Paint Show exhibit space. In addition, overall, expenses have declined in the publications accounts due to increased implementation of the desktop publishing system. The financial position of the Federation continues to be strong and it is anticipated that this will carry through to the end of the year. The third quarter financial statement will be forwarded to the Board prior to its meeting on October 20.

PUBLICATIONS

JCT—The Federation's DTP system has been an enormous success which will be enhanced through future additions to its capabilities, not only with regard to the JCT, but also through its use in the many other publications and promotional and informational materials the FSCT produces.

Louis F. Holzknecht (Louisville) and Secretary-Treasurer John A. Lanning (Louisville)

Joseph D. Giusto (Baltimore) and Gerry J. Gough (Birmingham)

Membership

As requested by the Executive Committee, the Membership Services Committee (Brenda Carr, Chair), following its recent survey, made recommendations on revising the by-laws to expedite the election of new members and the processing of applications. These have been reviewed by the Executive Committee and will be forwarded to the By-Laws Committee for consideration.

In conjunction with the committee's efforts, staff has produced several membership promotional brochures which will complement Society recruitment and retention efforts.

Prior to the November update, total membership stands at 7,572 (vs. 7,306 in 1991) as broken down in the following categories: Active—4,667; Associate—2,293; Other (Educator-Student, Retired, Honorary)—612.

Annual Meeting and Paint Show

The FSCT looks forward to its largest Annual Meeting and Paint Industries' Show ever. We thank Program Chairman John Lanning and his committee for developing an excellent technical program keyed to the theme, "New Directions for a Changing World." The two and one-half days of programming, as well as the exhibits, will be held in the North Hall of the McCormick Place Complex, in Chicago.

The Paint Show will feature the exhibits of 295 supplier companies in 94,400 sq. ft. of booth space. Both totals are new records and we sincerely thank the industry for its support for this important event.

James E. Geiger (Southern) and Kurt F. Weitz (Toronto)

Spring Week

We thank the New England Society for hosting the very successful ninth annual FSCT Spring Week meetings, held May 17-20 in Boston. The FSCT Corrosion Committee-sponsored seminar, "Understanding Corrosion Protection," was well-attended, as was the newly-formatted Incoming Society Officers Meeting. We sincerely appreciate the efforts of the committee, the officers, and the Board.

The 10th Annual Spring Week will be held at the South Shore Harbour Hotel near Houston on May 16-19, 1993 with the Board Meeting being held on May 16, Society Officers Meeting on May 17, and the Spring Seminar, sponsored by the Professional Development Committee, on May 18-19.

FSCT/NPCA Cooperative Efforts

Initially reported to the Board at its May 1992 meeting, these cooperative discussions extended in August with a proposal by NPCA to merge with the FSCT. The proposal was declined by the FSCT Executive Committee with a call for renewed efforts on exploring areas of cooperation. NPCA subsequently proposed that the FSCT provide both financial support and membership participation in several NPCA programs, including those relating to its anti-graffiti campaign, State Affairs Councils, and legislative programs in air quality, lead, and the Superfund. The FSCT Executive Committee considered the proposal at its September 10 meeting and its response, which has been forwarded to all Board Members, will be discussed at the October 20 Board Meeting, in Chicago.

Strategic Planning

In order to better evaluate the future direction of the Federation, the Planning Committee recommended that steps be taken to develop a strategic plan. Following considerable discussion, the Executive Committee voted to retain the Lawrence-Leiter Company, a Kansas City-based organization specializing in association management and strategic planning facilitation. President Holmes subsequently formed an Ad Hoc Strategic Planning Committee composed of the following: Don Boyd (Pittsburgh Society), John Oates (New York), George Pilcher (CDIC), Rose Ann Ryntz (Detroit), Patricia Shaw (Golden Gate), and Saul Spindel (New York). The committee will also include the Executive Committee and several staff personnel. The initial meeting of the committee is scheduled to be held November 21-23, in Dallas.

Officer/Staff Visits

Since the last report, visits have been made to following: Joint St. Louis/Kansas City Symposium, the West Coast Societies Board Meeting, and the meeting with the Annual Meeting Host Committee. The Federation also hosted the annual meeting of the Joint Paint Industry Coordinating Committee, which is composed of the FSCT, NPCA, National Decorating Products Association, and the Professional Decorating Contractors of America.

Staff

I wish to thank the members of the Headquarters Staff for their excellent work and support: Michael Bell, Director of Educational Services; Charles Schmidt, Controller; Patricia Viola, Director of Publications; Victoria Graves, Director of Meetings and Conventions; Samuel Amicone, JCT Associate Editor; Kathleen Wikiera, JCT Assistant Editor; Lorraine Ledford, Advertising Services; Audrey Boozer, Subscription Fulfillment; Linda Madden, DTP Operator; Dorothy Kwiatkowski, Mary Sorbello, and Lisa Torrens, Secretaries; Meryl Cohen, Order Dept.; and Marie Wikiera, Receptionist.

I especially want to recognize Tori Graves on being named the "Planner of the Year" by the Philadelphia Chapter of Meeting Planners International and for achieving certification as a Meeting Professional from the Convention Liaison Council. In a very busy year following Mrs. Falvey's retirement, Tori has furthered the excellent tradition set by Rosemary in bringing honor to the Federation among the hotel meetings and convention industry. Congratulations, Tori!

On behalf of the staff, I sincerely thank President Bill Holmes and Jean, President-Elect Colin Penny and June, and Secretary-Treasurer John Lanning and Pat, and the Executive Committee, Board, and Committee Chairmen for their support of Federation activities and good direction throughout the year.

ROBERT F. ZIEGLER,
Executive Vice President

DIRECTOR OF EDUCATIONAL SERVICES BELL

Committee Liaison

EDUCATIONAL COORDINATING COMMITTEE

The Educational Coordinating Committee has met twice since the May 1992 Board of Directors Meeting, on Friday, May 29, in Pittsburgh, PA, with the Educational Chairs of the Constituent Societies, and Wednesday, September 9, in Cleveland, OH.

Major projects of the committee include:

Test Drilling Projects—The committee received funding to investigate two "Test Drilling" projects in 1992—a Monthly Meetings Package for the Constituent Societies and a General Coatings Awareness Package. Unfortunately, the General Coatings Awareness Package was not completed.

The Test Drilling subcommittee is right on target in its development of a proposal of a package to improve the technical programs conducted on the Society level. The subcommittee has surveyed Society Officers, the attendees at the Society Officers Training meeting, and the Chairs of the Constituent Society Educational committees. The subcommittee is now reviewing the input to determine what the Societies need to improve their programs.

A. L. Hendry Award—Four manuscripts were received for this year's contest, up from the two received for the 1991 event. The paper entitled, "A Methodology for Evaluating the Total Performance of Coatings and Coatings Systems," authored by Mark Simakaski, was selected. The committee has submitted recommendations to the Southern Society to enhance the value of the program to the schools of the participants, which hopefully will also improve the response to the award.

Other Activities—The committee plans to begin working on two new "Test Drilling" projects in the coming year and will again be involved in the development of the February issue of JCT, which features the "Guide for Coatings Courses."

TECHNICAL ADVISORY COMMITTEE

The Technical Advisory Committee held its yearly meeting with the Society Technical Committee Chairs on Thursday and Friday, September 24-25, 1992 in Raleigh-Durham, NC. Along with the meeting, tours were held at Reichhold Chemical and the U.S. Environmental Protection Agency Lab in Research Triangle Park, NC. The following activities were reviewed by the committee at the meeting, which is held to provide an overview to the Societies of the activities of the committee and to allow the Society Tech Chairs an opportunity to share ideas on the successes of their committees:

- Joint Coatings/Forest Products Committee, and the Status of the Successful Technical Paper Project
- Collaborative Testing Services Update

Berger G. Justen (Southern) and Thad T. Broome (Southern)

- ASTM/NIBS Update, dealing with Lead Abatement
- Input for the 1993 Meeting with Society Chairs

The committee also heard reports on the status of technical projects from the attending societies, was addressed by Colin Penny, President-Elect of the Federation, and learned the proper techniques of organizing a technical presentation.

MANUFACTURING COMMITTEE

The Manufacturing Committee will be holding a Plant Tour at Dexter Corporation on Tuesday afternoon, October 20, 1992 and a breakfast meeting on Friday morning, October 23, 1992, in conjunction with the Annual Meeting in Chicago. The committee is also sponsoring a symposium as part of the Annual Meeting Technical Program, entitled, "Increasing Employee Involvement: Strategies and Benefits," to be held on Thursday, October 22, 1992. The presentation of the Golden Impeller Award will be made at this time.

Other projects the committee is working on include:

- The Manufacturing Digest
- Evaluation of the Committee Structure
- Methods to Work Closer with Constituent Societies.

1992 ANNUAL MEETING PROGRAM COMMITTEE

The 1992 Annual Meeting Program Committee has assembled a three day technical program with 50 papers. New this year is a Poster Session, scheduled for Thursday, October 22, on the exhibit floor.

Gerald F. Ivancie (Western New York) and J. Dick Mullen (Rocky Mountain)

Don MacDonald, President of the Oil and Colour Chemists' Association—New Zealand

The theme for the 1992 program is "New Directions for a Changing World." The Chairman of the 1992 Committee is John Lanning, of Courtaulds-Porter Paints, in Louisville, KY. John is also the 1992 Secretary-Treasurer of the Federation.

1993 Annual Meeting Program Committee

The 1993 Annual Meeting Program Committee will be meeting on Wednesday, October 21, 1992 at McCormick Place North to begin planning and to determine the theme for next year's event. The Chairman of the Committee is Clifford Schoff, of PPG, in Allison Park, PA.

Miscellaneous

1992 Mattiello Lecture Tape—The taping has been completed for the 1991 Mattiello Lecture, entitled, "Structure/Property Relationships for Thermoset Coatings." The presenter is Dr. Loren Hill, of Monsanto Corp., in Springfield, MA.

The tape has been made available to Constituent Societies and companies on a loan basis, similar to the arrangement with the "Good Tests/Bad Testing" video. Initial response has been good for the videotape.

List of Talks Available—The 1992-93 List of Talks Available has been prepared and sent to all Constituent Societies. The 1992-93 list includes over 110 names of speakers which Societies can select for the monthly meetings. The publication will again be updated and revised in 1993.

Committee Guidelines—This project is still being completed and no deadline has been set for its completion. Initial data has been collected and will be formatted in the form of a question and answer sheet customized for each committee of the Federation.

Roon and A.F. Voss/APJ Awards—The selection of the recipients of both awards will be announced at the Annual Meeting.

Society Visits—No Society visits have been made since the last Board of Directors meeting. However, I did attend the July 14, 1992 meeting of the FSCT Executive Committee concerning Strategic Planning.

Michael G. Bell,
Director of Educational Services

Comments from Guests

Representatives of industry associations attending the meeting presented greetings from their respective groups. Speaking were: Mr. Thomas, of National Decorating Products Association; Mr. Hemmings, of Oil and Colour Chemists' Association—UK; Mr. Saultry, of Surface Coatings Association Australia; Mr. MacDonald, of Oil and Colour Chemists' Association—New Zealand; Mr. Raaff, of FATIPEC (Europe); and Mr. Symes, of SLF (Scandinavia).

Coatings Industry Education Fund

The actions documented in this report were taken by the Trustees of the CIEF at their Monday, May 18, 1992 meeting in Boston. The next Trustees Meeting is scheduled for Thursday, October 22, in Chicago.

The Joseph A. Vasta Memorial Scholarship Fund—The Vasta Scholarship Fund, which has received gifts (as of 6-30-92) of $45,124, is in excellent shape, and already beginning to acquire a degree of recognition normally reserved for older, more established scholarships. The 1992 scholarship was awarded to Kent State University, and will go to the University of Southern Mississippi in 1993. The Trustees voted to disallow future participation of the University of Detroit-Mercy as a future recipient of scholarships given by the Vasta Fund, based upon its current lack of real involvement with the coatings industry. At our upcoming meeting, we will discuss the possibility of expanding the list of schools to which the Vasta scholarships may be awarded, but such decisions must be carefully weighed in light of our objective of establishing the Vasta as the premier scholarship given on behalf of the coatings industry.

Announcement of the "Coatings Industry Honor and Remembrance Fund"—The Trustees announced, in the July issue of JCT, the establishment of the Coatings Industry Honor and Remembrance Fund, which is intended to provide an opportunity for individuals, corporations and coatings organizations to honor those individuals, both living and dead, who have contributed to the advancement of their industry. Gifts, which are tax-deductible to the extent that the law allows, will be recognized annually in the Journal of Coatings Technology, and may be made as a direct gift to the Fund, as a gift in honor of a living person, or as a gift in remembrance of one who

Jim Hemmings, President-Designate, Oil and Colour Chemists' Association—UK

is deceased. It is the present intention of the CIEF Trustees to use the earnings from the principal of this fund for educational assistance in the form of scholarships, grants, and fellowships at colleges and universities with coatings programs. Letters of explanation were sent to the incoming presidents of all Societies, seeking their generous support for this Fund, which would be a really significant means of recognizing outstanding contributions by Society members, both past and present.

Equipment Grant to Cal Poly—The Trustees have given a grant of $7,400 to the Chemistry Department of California Polytechnic State University, at San Luis Obispo, for the purchase of two laboratory dispersers, ancillary equipment, and a sag gauge, to be used in the coatings laboratory. (Prior to approval of payment of these funds, Cal Poly was required to submit competitive equipment bids for CIEF review.) Cal Poly has agreed to give public acknowledgment to CIEF in whatever ways are possible, in accordance with university policy.

Program Funding Research for North Dakota State University—The Trustees extended, with a grant for $8,400, their support for a second year of NDSU's program to develop an "Expert System" for coatings design. It is the hope of the system's creators that it can eventually be offered to industry as a tool for the design of coatings.

Equipment Grant to North Dakota State University—The Trustees authorized a one-time, $5,000 grant to NDSU for the purchase of coatings-related equipment, to be installed in the Department of Polymers and Coatings. This grant requires that NDSU match the CIEF funds on a 1:1 matching basis, i.e., NDSU will provide an additional $5,000 for equipment purchases. Insofar as it is practical to do, the Trustees have requested the CIEF role in equipping the laboratory be publicly acknowledged, preferably with small plaques attached to major pieces of equipment.

Funding for Rocky Mountain Society Received—The Trustees received and considered a request, on behalf of the Rocky Mountain Society, for $1,000 to assist a member in attending the University of Missouri-Rolla. Unfortunately, the Trustees' understanding of CIEF's By-Laws—and requirements for maintenance of its tax exempt status—compelled them to respectfully decline the request.

Educators' Luncheon Scheduled for Chicago—Invitations were sent to representatives of the following nine "coatings" schools, inviting them to a luncheon with CIEF Trustees on Thursday, October 22: Kent State University, University of Missouri-Rolla, Eastern Michigan University, University of Waterloo, North Dakota State University, California Polytechnic State University, University of Massachusetts at Lowell, University of Southern Mississippi, and DePaul University.

At this meeting, a newly proposed set of "Funding Guidelines" will be distributed, and the mutual educational goals of the CIEF and the nine schools can be discussed. As of the September 1 deadline for acceptance, all but Cal Poly had indicated that they would have a representative attend.

Proposed Changes in CIEF By-Laws and Procedures—The Trustees will vote at the October 22 meeting, to approve a variety of pro-forma changes in the By-Laws; these were published in the August issue of JCT. In addition, we will approve a change in the wording under the "Administrator" section of the CIEF Objectives, which are printed in the FSCT Yearbook, to include "Fellowships, scholarships, and grants."

Beginning in calendar 1993, there will no longer be "automatic" appointments of CIEF Trustees from FSCT committees, with the exception of the FSCT Treasurer, who will continue to function as the Secretary-Treasurer of the CIEF. All future Trustees will serve "at large," and will be recommended for three-year terms by the incoming President of the Federation.

GEORGE R. PILCHER,
President

Michael Symes, President, Skandinaviska Lackteknikers Forbund (SLF)

Review of Actions of Executive Committee

(One of the duties of the Board of Directors is to approve or disapprove the actions of the Executive Committee.

The actions of the Executive Committee of July 14, 1992, and September 10, 1992 were included with the minutes mailed previously to the Board Members.)

JULY 14, 1992

That an Ad Hoc Strategic Planning Committee be formed and that Lawrence-Leiter and Company be retained to assist and facilitate the deliberations of the Committee.

(On a motion by Mr. Hon, seconded by Mr. Hagopian, the actions of the Executive Committee for July 14, 1992, were unanimously approved.)

SEPTEMBER 10, 1992

That the following recommendations and responses to the proposal of the National Paint & Coatings Association to provide support for and participate in certain NPCA areas be considered by the Board:

(1) That the amount of support requested is beyond the capacity of the FSCT, and would seriously jeopardize Federation programs as well as its fiscal integrity.

(2) That, in the Federation's opinion, FSCT support should be limited to those programs which deal with the technical nature of coatings, for example, Air Quality, Lead and, to a certain degree, the State Affairs Councils.

(3) That, with a substantial contribution to NPCA's programs, there should be developed some mechanism for accountability on the use of FSCT resources, and that some fair method of representation be given to the FSCT in matters concerning the use of such funding.

(4) That, since the Federation considers the support of certain NPCA programs as being critical to the viability of the industry and, therefore, to the FSCT membership, a grant of $100,000 for 1993 be made to NPCA for use in the following areas: Air Quality, Lead, and State Affairs Councils. It is understood that the FSCT members will be encouraged to participate, at the local levels, in these areas.

Richard J. Himics (New York) and Larry Brandenburger (Northwestern)

(5) That the recommended grant be made on a trial basis, with the consideration of future requests being based on shown effectiveness of FSCT-supported programs and adequate FSCT representation.

That the Golden Gate Society be thanked for its invitation to hold the 1995 FSCT Spring Week in San Francisco, and that the Society consider combining the West Coast Symposium and the FSCT Spring Week that year.

That the exhibit space rental rate for the Paint Industries' Show be increased fifty cents per square foot, effective with the 1993 Paint Show.

That Annual Meeting registration fees be increased, effective in 1993, as follows: Advance—Members from $65 to $75; Non-Members, from $80 to $100; Guest/Spouse from $50 to $60; On-Site—Members-Full Time, from $75 to $90; One-Day, from $55 to $70; and Final Day, $40; Non-Members-Full Time, from $95 to $125; One-Day, from $70 to $90; and Final Day, $50; On-Site—Guest/Spouse, from $60 to $70.

That a donation of $2,000 be made to the National Disaster Relief Fund of the American Red Cross for relief efforts stemming from Hurricane Andrew.

That Dr. Robert F. Brady, Jr. be named Technical Editor of the JOURNAL OF COATINGS TECHNOLOGY for 1993.

Paul Dague, Incoming President of National Paint & Coatings Association (NPCA)

(On a motion by Mr. McDermott, seconded by Mr. Donlin, the actions on September 10, 1992—with the exception of the proposal regarding NPCA cooperation—were unanimously approved.)

OCTOBER 19, 1992

That the Technical Committee continue to investigate alternative programs for collaborative testing.

That the 1993 Committee appropriation budget be set at $76,000.

(On a motion by Mr. Shackelford, seconded by Mr. Passeno, the actions of the Executive Committee for October 19, 1992, were unanimously approved.)

DISCUSSION AND VOTE ON NPCA COOPERATIVE PROPOSAL

Mr. Hille, Co-Chairman of the FSCT/NPCA Joint Industry Advisory Committee, reported on the meetings with NPCA leading to the proposal under consideration by the Board. Addressed by the joint committee were several areas including a survey of industry suppliers, increased cooperation in annual meetings, committee activities, industry public relations, and support of university educational programs through the CIEF.

NPCA, believing that a merger would greatly advance the goals and objectives of both organizations, made such a proposal in August. The Federation Executive Committee rejected the proposal and emphasized its intention to pursue cooperative efforts only.

Subsequently, the NPCA proposed a formal cooperative program, requesting FSCT funding in support of activities perceived to benefit the industry. FSCT made modifications to the proposal and made the above recommendations to the Board for consideration.

Mr. Dague, speaking on behalf of the NPCA, noted the increased pressure on the industry from government legislative and regulatory groups. He indicated that both manufacturers and suppliers required increased representation. In particular, Mr. Dague noted that the NPCA-supported State Paint Councils offered the best opportunity to show a united industry force, and emphasized the need for FSCT involvement.

Mr. Doyle then discussed current NPCA programs saying that it was critical to combine resources to influence environmental regulations affecting the industry. Responding to questions on financial matters, Mr. Doyle relayed that of the $5 million 1993 budget, 23% was slated for state affairs and that 98% of NPCA's income was derived from membership dues, which have been increased 25% over the past several years.

He reviewed current successes shown by NPCA in lead-in-coatings regulations, state paint councils and anti-graffiti campaigns relating to spray paint legislation. NPCA also recently overturned New York City DOT regulations. Mr. Doyle said that NPCA lobbying efforts are directed in educating the regulators and legislators who are involved in setting policy, and not, as generally thought, in supporting the electoral process.

He recognized the importance of Federation support, particularly in the technical areas. He also noted the concerns voiced by FSCT Executive Committee that adequate representation and accountability be developed to ensure that the Federation is kept knowledgeable on where its support is being used.

Following a recess, President Holmes reviewed the proposal and the Executive Committee's recommendations and opened the topic for Board discussion. In general, members expressed their Societies' concern for controls on any financial support and representation on relevant NPCA committees. A poll of members found that six Societies discussed the recommendations with their membership, and all but two Societies considered the recommendations at their Executive Committee meetings.

(Mr. Penny moved to accept the recommendations of the Executive Committee, noting that the question of accountability and representation must be approved by the Executive Committee prior

to any dispersement of financial support. Seconded by Mr. Holzknecht, and approved by the Board of Directors by a vote of 23 for, 10 against, with one abstention.)

Elections

The following slate of candidates to the Board of Directors for the 1992-93 term was presented by the Nominating Committee at the Spring 1992 Meeting. Chairman Weitz, noting that there were no nominations from the floor or by mail ballot, presented the slate for election:

President-Elect—John A. Lanning (Louisville Society), Courtaulds Coatings, Inc., Porter Paint Division (One-year term).

Secretary-Treasurer—Joseph P. Walton (Cleveland Society), Jamestown Paint & Varnish Co. (One-year term).

Executive Committee—Larry Brandenburger (Northwestern Society), The Valspar Corp. (Three-year term).

Board Members-At-Large—Darlene Brezinski (Chicago Society), Consolidated Research (Two-year term); Peter A. Hiscocks (Toronto Society), Ashland Chemicals (Two-year term).

Board of Directors Past-President Member—John C. Ballard (Louisville Society), Burgess Pigment Co. (Two-year term).

(On a motion by Mr. Hagopian, seconded by Mr. Reindl, the slate, as proposed by the Nominating Committee, was unanimously elected by the Board.)

Society Business

BALTIMORE

Mr. Giusto reported that the Society conducted a survey of the Federation regarding future sites for the Annual Meeting, specifically with a recommendation that Las Vegas be considered. Mr. Ziegler advised that he was aware of the survey and its results, which did not show significant interest in Las Vegas and which reflected the results of the industry suppliers survey which ranked the city low in interest among several prospective sites.

HOUSTON

Mr. McDermott invited those present to attend the celebration of the Society's 50th Anniversary on February 6, 1993, in Houston.

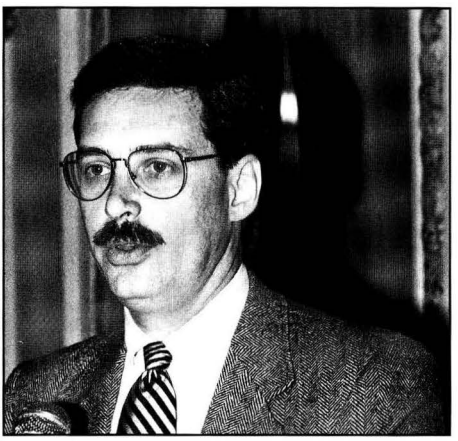
PHILADELPHIA

In recognition of his 50 years of membership in the Federation, FSCT Past-President Eugene Ott was presented with a Fifty-Year Pin and silver engraved pen by President Holmes, who thanked Mr. Ott for his past service.

Committee Reports

ANNUAL MEETING HOST

The following individuals comprise the 1992 Host Committee: *Chairman*—Theodore J. Fuhs, Tru-Test Manufacturing; *Registration Area*—William W. Fotis, Valspar Corporation; *FSCT Hospitality Suite*—Thomas P. Yates, United Coatings; *Information Services*—Natu C. Patel, Ace Hardware Paint Division; *FSCT Exhibit*—Victor M. Willis, Ace Hardware Paint Division; *Program Operations*—Karl E. Schmidt, Premier Coatings; *Spouses Program*—Cynthia K. Fuhs.



J. Andrew Doyle, Executive Director of NPCA

Subcommittee roster worksheets have been distributed to each subcommittee chairman. Subcommittee staffing is nearly complete, but a bulletin has been distributed to Chicago Society members to ask for additional volunteers. The Spouse's Tour was finalized to include the Chicago Art Institute and the Shedd Aquarium. "Goody Bags" and promotional items have been received and will be ready for distribution at the Wine & Cheese Social. The Host Committee identification hats (white fedoras) have been received and should be distributed (along with ID badges) to the committee members by each respective Chairman. Final rosters will be forwarded to Tori Graves in order to have the ID badges prepared.

THEODORE J. FUHS,
Chairman

ANNUAL MEETING PROGRAM

Activities of the 1992 Annual Meeting Program Committee since the May 17 Board of Directors Meetings are as follows:

The Committee's call for papers resulted in submittal of 22 abstracts. From this large group only 15 'finished' papers were submitted for final Committee review, with 12 papers receiving approval for presentation. The authors were advised and updated on presentation requirements.

William Shackelford (Pacific Northwest) and Wayne Kraus (Philadelphia)

For this year's program, 50 papers have been selected for presentation in total. Many Federation Committees have arranged programming focusing on the theme "New Directions for a Changing World."

On Wednesday afternoon, October 21, the Professional Development Committee begins the paper sessions with four papers on Advanced Topics. Three papers on Quality were arranged by Roger Woodhull and five papers on Merging/Emerging Technologies were programmed by Dr. Rose Ryntz. These two sessions are also planned for Wednesday afternoon together with five Society Papers.

On Thursday, the Manufacturing Committee offers three papers on Employee Involvement and the Corrosion Committee has five papers dealing with Formulating Design of Corrosion Coatings Applied Direct-to-Metal. Five Roon Awards Papers will also be presented on Thursday together with five General Coatings topics and five Low VOC topics.

Friday morning the program session wraps up with three Overseas Papers and two papers on Environmental topics.

Without the dedicated assistance of the Program Committee Members, Mike Bell and all the other contributing Committees, this ambitious program would not have been possible. I offer a special thanks to everyone who contributed time and talents. We look forward to a large turnout and hope that everyone benefits from our efforts.

JOHN A. LANNING,
Chairman

EDUCATIONAL

During this report period, the Educational Committee and the Educational Coordinating Committee held a joint meeting in Pittsburgh, PA, on May 29, 1992. In addition to sharing information on our society educational programs, the focus of this meeting was the generation of ideas on how the Federation could aid the Constituent Societies educational efforts. Three areas were chosen for group review:

- Career Opportunities,
- Continuing Education, and
- Public Awareness.

Participants were divided into three groups and asked to identify the important features and possible courses of action to address these topics. Each group chose a different facet of the program area and numerous, excellent ideas were generated. These will serve as input to our next round of test drilling efforts.

Test-Drilling Projects—The centerpiece of the new Educational effort is the idea of "test drilling." Here a focused ad hoc subcommittee composed of volunteers committed to an idea are provided resources to define the scope, deliverables, milestones and sources necessary for the project's successful completion. Once defined, the project can move to completion on its own, with direct funding from the Board.

Richard M. Hille (Chicago) and Lloyd J. Reindl (CDIC)

The first step in generating a successful program is the identification of the opportunity and finding a group of volunteers. We have been using the meetings of the full Educational Committee as a forum for this. After the project area is recognized, priorities are established by the Educational Coordinating Committee. This group nucleates the ad hoc subcommittee and provides seed money for the working group. This group should broaden its nets to find new people and gather as many ideas as possible. At the end of this stage, the group, in consultation with the Coordinating Committee, focuses on the project(s) which have the best chance of success. These will be brought to the Board for funding.

One test drilling project is about midway through this process. An ad hoc subcommittee under the leadership of John Oates has been actively gathering ideas on how to improve monthly Society meetings. This area was initially identified by the full Educational meeting two summers ago. The Constituent Societies were then surveyed to determine how monthly programs were selected. Ideas for improvement, in addition to those generated at the Educational Committee Meeting, were also sought during incoming officer's training this spring. Further input was obtained at this summer's Educational Committee meeting.

We have now collected data and suggestions from a broad spectrum of the Federation. It is now time to narrow our focus on the project(s) which have the greatest potential to help. At the September meeting of the Educational Coordinating Committee, we will be prioritizing projects. A short list will then be circulated to the individual Societies in the form of a survey. Response from this survey will be compiled and form the basis for actions to be proposed for the next fiscal year. Your ideas and support are critical. Please help us to bring this important pilot project to completion.

Additional projects are being considered. We will be proposing additional specific test drilling projects in our upcoming budget. The ideas listed previously are under consideration. This method of establishing programs may necessitate broadening the composition of the Coordinating Committee to include appropriate input from our liaison with colleges and universities (CIEF), interaction with our ongoing efforts to educate our membership (PDC), and help of our more practical committees (Technical Advisory, Manufacturing, etc.). Using the Educational Coordinating Committee as the forum for wide-ranging educational projects and for a clearing house for ideas and interactions concerning FSCT educational efforts is a venture whose time has come.

Hendry Award—The Educational Coordinating Committee has decided to reenergize the Southern Society A.L. Hendry Award. This scholarship of $1000 has, for the last several years, been given for a technical paper of interest to the coatings industry authored by an undergraduate student. The paper has always been more or less formal and has often been published in the JOURNAL OF COATINGS TECHNOLOGY. This committee feels that the purpose of the Hendry Award should be to stimulate student interest in coatings as a career. We would like to encourage broader participation in this award. We feel that making the nature of the paper less formal and by offering a co-award to the laboratory sponsoring the paper will get more entrants. The Southern Society Board has graciously allowed the monies of the Hendry Award to be distributed in this fashion. The Educational Coordinating Committee will be publicizing these changes, both in the rules and in the spirit, of the award. Please encourage undergraduate college and university students and programs in your society's area to participate in the A.L. Hendry Award.

Education—of our membership, of professional technologists entering our industry, and of our communities—is one of the greatest challenges of the Federation. Yet, that is the primary responsibility of the FSCT. All education truly takes place at the local Society level. It is the job of the Federation to make this work easier and more rewarding. Providing the tools for our membership is one of the greatest challenges we face in the FSCT today. Hopefully, the methods and programs developed by the Educational Committee,

Forest Fleming (Piedmont) and William C. Spangenberg (Pittsburgh)

with the backing of the Board of Directors, will help us to meet these challenges.

DONALD W. BOYD,
Chairman

ENVIRONMENTAL AFFAIRS

The Environmental Affairs Committee continues to edit the legislative and regulatory update we receive from the National Paint & Coatings Association each month.

We are presenting a program on "Waste Minimization" at the Annual Meeting.

I have been an observer at the Reg-Neg negotiations with the EPA to formulate a national rule for VOC's for Architectural/ Industrial Maintenance Coatings. The target date for completing the negotiations is March 15, 1993.

SIDNEY J. RUBIN,
Chairman

INTER-SOCIETY COLOR COUNCIL

On June 23-24, 1992 the ISCC and the International Color Association (AIC) sponsored a symposium on computer color formulation. The meeting was held at Princeton University. The FSCT-ISCC chairman was the program chairman. The meeting was over subscribed with more than 250 attendees from 22 countries.

There were speakers from six countries. The papers which had the most relevance to the coatings industry were:

"In Pursuit of Absolute K&S Values for Use in Kubelka's Hyperbolic Equations," by D.S. Andrade, DS Consulting, Inc.; "Innovations in Industrial Colorimentry of Paints," by Dr. Daniel Spitzer, Akzo Coatings; and "Automation of Computer Color Formulation Systems for the Paint Point-of-Purchase Market," by James T. DeGroff, Colortec Associates Inc.

RALPH STANZIOLA,
Chairman

MEMBERSHIP SERVICES

The Membership Committee's activities are as follows:

Report from Spring Week—Committee member Joanne Monique presented the results of the Committee Survey of Constituent Society Membership Chairpersons at the Board of Directors Meeting on Sunday, May 17, 1992 in Boston, MA. Ms. Monique reported:

The results of the survey were very well received. All Societies have the same problems, the largest seems to be declining membership. No one had an answer as to how to increase it.

One unanimous agreement was that head hunters/employment search personnel should not be allowed to join and the By-Laws should be amended to exclude them.

It was noted that dues at the different Societies varied from $28/yr to $125/yr (the latter figures includes dinner at monthly meetings).

The Societies sent renewals out from April-August. Many send second notices or make phone calls to remind people to renew.

Ms. Monique also presented Membership Awards to the following Societies for increasing their membership:

Society Category	Winner
Greater than 300 Members	Detroit (10% increase)
200-300 members	Philadelphia (11% increase)
Less than 200 members	Mexico (38% increase)

Committee Recommendations—Based on the results of the March 1992 Survey of Constituent Society Membership Committee Chairpersons, the Membership Services Committee has proposed the following recommendations to the FSCT Executive Committee regarding revisions to the FSCT By-Laws and Standing Rules relating to the Membership Election Process:

(1) Membership Categories—In order to clarify the membership categories Active and Associate, the committee recommends that the terms "technical" and "sales" be listed in parenthesis next to current categories on the applications.

(2) Length of Election Process—The Committee recommends that only one reading be required prior to election. The Societies would then be given the option to retain the second reading requirement.

(3) Signature Requirements—To streamline the election process, the Committee recommends that the signature of Endorser be eliminated on the membership application. The signature of the Proposer, who is a Voting Member, would still be required for Membership Applications.

(4) Employment Search Personnel—The Committee recommends that a statement be considered to exclude employment search personnel from membership. Further, the Committee suggests that legal counsel be requested due to the sensitive nature of such a statement.

Membership Recruitment—In the areas of membership recruitment six activities are underway:

(1) Staff has designed a brochure directed towards Company CEO's to highlight the benefits the company will receive by approving employee(s) memberships in FSCT Constituent Societies. The brochure has been mailed to NPCA's membership. In addition, each Society Membership Chairman has been sent a copy of the brochure.

(2) Headquarters began mailing a monthly membership leads

William W. Passeno (Detroit) and Timothy J. Donlin (Golden Gate)

summary report in July to ensure the follow-up at the Society level to membership leads received at FSCT Headquarters. The report is sent to each Constituent Society Membership Chairperson and provides a recap of the month's activity.

(3) Headquarters is compiling a database of individuals who have purchased FSCT publications in 1992. Membership information in the form of a condensed version of the current FSCT Benefits of Membership Brochure will be sent to this group.

(4) The Federation's Third Annual Membership Drive will begin in December. The drive is targeted to non-members who attend the 1992 Annual Meeting and Paint Show. Those individuals who file membership applications with the local Society by March 15, 1993 receive a complimentary Federation series unit, "Introduction to Coatings Technology." Headquarters provides each Constituent Society Membership Chairperson with a set of pressure sensitive mailing labels of those non-members attendees with address falling within the respective Society's boundaries.

(5) Headquarters send non-members who attend FSCT Spring Week Seminars and other FSCT Seminars a membership brochure. In addition, Headquarters provides each Society with a set of pressure sensitive labels of non-members in their Society boundaries.

(6) Membership Packets are available to each Constituent Society from Headquarters. The packets contain leaflets describing the services offered by FSCT and are useful at Constituent Society Seminars, Annual Events, Recruitment Night program, etc.

Membership Retention—In the areas of membership retention two activities are noteworthy:

(1) A quantity of "Why Renew" flyers were distributed to each Society in July for mailing with dues renewal invoices.

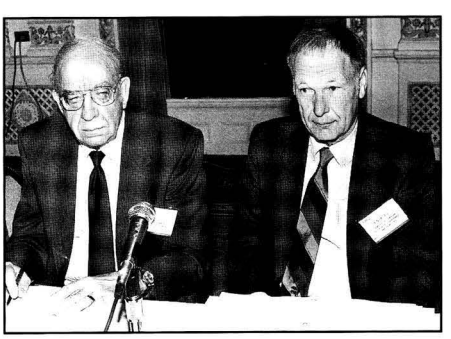
(2) Headquarters plans to send reminder notices to all FSCT members who have not renewed by January 15, 1993. The reminder will inform the member that their JCT subscription and member benefits are about to end. It is hoped that this will assist the renewal effort of each Constituent Society.

BRENDA L. CARR,
Chairman

PROFESSIONAL DEVELOPMENT

The Professional Development Committee submits this report of its 1991-92 activities to the Board:

Quality Management Series—The PDC offerings in Statistical Process Control were broadened in 1992 to include a three-day course entitled "How to Implement Total Quality Management and Secure ISO-9000 Series Certification" and a two-day course titled "Gauge/Measurement Process Assessment and Improvement." These were offered in June in Philadelphia. The seminars were well received by the attendees, who totalled 37. In September, Statistical Process Control, Level I and Level II, are being offered in Atlanta.



Fred G. Schwab (Cleveland) and Charles Kaplan (Dallas)

Early enrollment is substantially above that for the June offerings, and good financial results are projected. Dr. Peter Hunt will be speaking at the Annual Meeting Program Session dealing with Quality, and will make reference to future Federation Quality Management Series seminars, providing built-in publicity. During its August meeting, the Committee considered the problem of poor attendance at several past seminars, and will make specific recommendations to the Executive Committee as part of the 1992-93 budget. Significant changes in course offerings, promotion, publicity, and target audience are under consideration.

PCD Symposium—The Committee will again sponsor "Advanced Topics in Coatings Research" at the 1992 Annual Meeting. Committee members Fred Schwab and Peter Hiscocks have developed the program, which is scheduled for Wednesday, October 21.

Spring Week 1993 Seminar—Dan Dixon, of the PDC, has spearheaded the development of "Influence of Substrates and Application Methods/Techniques on Coatings Performance," the seminar to be presented at Spring Week, 1993, in Houston, TX. The two day event will focus on virtually all substrates of interest to architectural coatings. In addition, two sessions will explore the effects of application tools and methods on the performance of these coatings, incorporating "hands-on" demonstrations by equipment manufacturers. The Joint Coatings/Forest Products Committee will sponsor the sessions dealing with wood and wood composites, and will provide speakers. The Houston area Painting Contractors' Association has expressed strong interest in this program, and has promised their support.

Membership Survey—The second article describing the survey results should be submitted to the JCT within 30 days. Dr. Rose Ryntz is working with Mary Brodie, editing the paper.

Videotape Projects—The Committee recommends that analysis of the use and comments of the two current videotapes: "Good Tests—Bad Testing" and Dr. Loren Hill's 1991 Mattiello Lecture, be made before embarking upon another videotape project at Federation level.

The New York Society is undertaking the creation of one or more educational videos which illustrate the proper performance of some of the standard tests in the industry. Analysis of feedback on this video, once it is available for distribution, will provide additional information on the needs of the Constituent Societies and members, which will be valuable in determining future projects.

New Award Recommendation—Following discussions at the PDC January meeting, a sub-committee was formed to consider the need for a new award, to recognize current and timely contributions of a technical nature (report following). The PDC concurs with the recommendation of the sub-committee that a request be made to the Educational Coordinating Committee to consider the need and feasibility of such an award, and to make a proposal to the Executive Committee as they see fit.

ROGER W. WOODHULL,
Chairman

SUBCOMMITTEE REPORT ON AWARDS

Objective—Create an award recognizing current and timely contributions of an educational or technical nature. This award may include a cash prize, and a spot at the beginning of the Annual Meeting agenda to present a topic of general technical interest. The recognition, especially of a young contributor, should be geared toward the creation of a videotape of this presentation to be used by individual Societies at a monthly meeting program.

Discussion—Several topics were discussed regarding the above objective. These included such items as which committee should best champion this project, how to manage and promote this project, the educational importance of this project to the Constituent Societies and the paint industry, and the like.

Based on these discussions, the PDC subcommittee has the following recommendations:

- It is recommended that the project should be best managed and promoted by the Educational Coordinating Committee.
- It is recommended that the PDC send a member to the next Educational Coordinating Committee meeting to participate in the formation of a test drilling subcommittee to explore the possibility of such a presentation to take place at the Annual Meeting in Atlanta, in 1993.
- It is further recommended that the Educational Coordinating Committee be expanded to include participants from other Federation Committees, such as PDC, TAC, Manufacturing, Environmental, as well as a member of the Annual Meeting Planning Committee and the Mattiello Lecture Committee as it is strongly believed that cross committee action is required to successfully complete this project.

Don Boyd,
Rose Ryntz,
Gail Pollano

PUBLICATIONS COMMITTEE

The Publications Committee met on June 25, 1992 in Arlington, VA. The Editorial Review Board, which customarily meets with this committee in alternate years, was not present this year. The committee discussed the JOURNAL OF COATINGS TECHNOLOGY, the series of monographs on coatings technology, the *Infrared Spectroscopy Atlas for the Coatings Industry*, and the *Paint/Coatings Dictionary*.

The Committee believes that the JCT serves three purposes: It is the principal means of communication between the Federation and its members; it is a record of all important events in the paint and coatings industry; and it is a permanent record of technical advances in the coatings industry. Each of these purposes was discussed in detail. The committee discussed the demographics of the membership and how members' needs are met by the *JCT*. It also discussed standards for submitted papers, review procedures and consistency of reviews, means to conduct reviews smoothly and swiftly, and deadlines for authors to return provisionally approved papers. The committee discussed possible specialized issues on computers in coatings, radiation curing, and powder coatings. The committee also supported efforts to improve the annual index in the December issue.

There are now 19 monographs in the *Federation Series on Coatings Technology*. The twentieth, "Introduction to Pigments," by Dr. Juergen Braun, of DuPont, is in production. The committee considered the suggestion of publishing, as part of the monograph series, booklets containing a collection of "landmark" papers on a particular topic. The first such topic, "Solubility Parameters," is now being studied to determine the feasibility of this concept.

The committee expressed its congratulations to Dr. Darlene Brezinski for the outstanding work of her committee on the fourth edition of the *Infrared Spectroscopy Atlas for the Coatings Industry*, and discussed ways to increase publicity and sales of the *Atlas*.

ROBERT F. BRADY, JR.,
Chairman

TECHNICAL ADVISORY

The Technical Advisory Committee (TAC) met in Arlington, VA, to finalize plans for the joint meeting with the Society Technical Chairs and to discuss the status of Collaborative Testing Services. All TAC members except one were in attendance. Michael Bell from the Federation Staff was also in attendance.

Joint Meeting with Constituent Society Technical Chairs—Plans for this joint meeting and the tentative agenda were finalized. The site that was chosen was Research Triangle Park, Raleigh/Durham. The dates were Thursday, September 24, 1992 and Friday, September 25, 1992.

John Delmonico (Rocky Mountain) and Terry Gelhot (St. Louis)

On Thursday, the agenda includes presentations from the individual Societies on the status of technical projects, a motivational presentation by in-coming FSCT President, Colin Penny, a luncheon presentation by Fred Anwari discussing the successes of the Cleveland Society in developing and presenting technical projects at the Annual Meeting, and a presentation by Carter Johnson of Buying Time Seminars on "Assembling and Presenting a Technical Discussion." The scheduled dinner speaker is James Berry of the Environmental Protection Agency.

On Friday, two facilities will be toured. They are the Reichhold facility in RTP, followed by a tour of the EPA labs.

Collorabora tive Testing Services—The TAC subcommittee began working closely with CTS developing new tests to include in their program. The first additional test that was added was pencil hardness.

The subcommittee suggested that a yearly schedule be set up with CTS involving bi-annual discussions for new test offerings and review of the ongoing tests. In addition, the subcommittee recommended that a corrective action procedure be developed with CTS to inform the TAC and clients of potential problems with test samples or panels.

Before implementation of these recommendations, CTS noted the declining enrollment of Paint and Coatings clients and is now scrutinizing their Paint and Coatings Proficiency Program. Further discussions will take place at a September meeting of the TAC.

Spring Week, 1994—A suggestion was made to have the TAC be the sponsoring committee for Spring Week, 1994. More discussions regarding this suggestion will take place in the future.

New Business—One TAC member, Dr. Victoria Scarborough, resigned her membership due to increasing business responsibilities. Her input was valuable and she will be missed.

The TAC is pleased to announce that Dr. Rose Ryntz has accepted the TAC invitation and will resume membership responsibilities immediately.

GAIL POLLANO,
Chairman

Society Reports

Baltimore

Six monthly meetings featured technical presentations, three of which were hosted by the Educational, Technical, and Manufacturing Committees. The Technical Committee presented the results of a study on people's perception of performance of a VOC compliant coating vs a non-VOC compliant coating. The Educational Committee sponsored a one-half day seminar in conjunction with the regular meeting . . . Merit citations were presented to Gary Morgereth,

of McCormick Paint; Tom Lucas, of Inland Leidy; Jim Smith, of Eastech; and Dick Chodnicki, of Van Horn & Metz . . . A scholarship was presented to James Brady, the child of a member.

Birmingham

Membership now stands at 209, an increase of four percent over last year. Six monthly meetings featured technical presentations and a half-day symposium focused on "The Impact of Environmental Legislation on the Coatings Industry" . . . Technical projects in progress are a paper on "Solids/Density Measurement," a booklet and wallchart detailing correlated solvent data for VOC data, and the National Paint History Museum.

CDIC

Renewed focus on association with Indianapolis-area members . . . "Lew Larson" Educational Grant completed its second year with candidate to attend a session at North Dakota State University . . . Technical programming featured seven presentations at monthly meetings. Educational Committee continued to provide after-dinner speakers who focus on nontechnical topics.

Chicago

Membership totals 668 members, an increase of 20% over the past two years. . . Seven monthly meetings held per year. Two of the seven topics presented were manufacturing-related. Attendance was up 20% at meetings vs previous year . . . With the Chicago Paint & Coatings Association, the Society sponsored the one-day SYMCO program. Attendance of 138 surpassed the predicted goal. . . . Two scholarships of $2000 each were awarded. Scholarship recipients were selected by merit in a blind evaluation of student credentials, by a panel of CSCT members . . . Future goals include driving the interest and participation of members for Society activities. To meet educational needs, a short course in coatings technology is being developed and innovative and quality technical presentations will be sought for monthly meetings. Discussions will be held with Chicago PCA to improve communications and present joint activities, as well as to explore other mechanisms for mutual assistance.

Cleveland

Environmental, formulating, and manufacturing topics presented at monthly meetings . . . Joint meeting held with Cleveland Paint & Coatings Association on "Improving the Return on Your R & D Dollar". . . Society presented two papers at the 1991 Annual Meeting. These tied for first place award for Society papers . . . Paper to be presented at the 1992 Annual Meeting . . . 35th Cleveland Society Technical Conference focused on "Advances in Environmentally Compliant Coatings Technology." . . . Five awards totaling $400 were presented to students having the best coatings-related projects in the Northeast Ohio Science Fair. Society members served as project advisors and judges . . . Presentations made at area high schools on careers in the coatings industry, using the videotape, "The Choice." . . . Society Award of Appreciation given to Past-President Edward Bish.

Dallas

Membership totals 138 . . . Concerned about decreases in meeting attendance, the Society evaluated sites based on locations of each of the members. Based on results, meetings will be held in a different location and it is hoped the move will boost attendance. . . Technical presentations were made at eight monthly meetings. . . Plans are underway for 50th Southwestern Paint Convention, to be held in Dallas, at the Four Seasons Hotel in Los Colinas. The event, keyed to the theme, "Back to the Future," will feature a table top supplier's display room . . . Society recognized University of Southern Mississippi Polymer Science Department's contributions to the paint industry with a $500 grant.

Detroit

Eight monthly meetings, held on variety of technical topics, well attended with an average of 90 attendees. March and May meetings were jointly held with the Detroit PCA . . . Education Night featured presentations by FSCT President Bill Holmes and Executive Vice President Bob Ziegler. Joseph Vasta Scholarships were presented to two students . . . A "Job Corner" was added to Society newsletter to benefit members and member companies . . . $5000 given to University of Detroit Polymer Institute for Technical Committee research project . . . Technical Committee received second prize in A.F. Voss/*American Paint and Coatings Journal* Award competition at 1991 Annual Meeting and Dr. Valerie Gunn received the First Prize in the Society Speakers Award competition . . . Undergrad project at Eastern Michigan University, in cooperation with the Technical Committee, is successfully underway . . . FOCUS seminar theme for 1992 was "Coatings for Plastics—Moulding the Future." Over 100 registrants attended. . . . Society continued participation in Detroit Metropolitan Science Fair.

Golden Gate

Membership figures totaled 283 members . . . 22nd Biennial Western Coatings Symposium to be held at San Francisco Hilton on February 20-22, 1995. Chairmen for most committees have been appointed . . . Technical Committee presented paper at 1991 FSCT Annual Meeting and plans are made to present paper in Chicago at 1992 Annual Meeting . . . Paint Technology course held, with nine students completing course which focused on raw materials, formulation, manufacturing, testing and application . . . Manufacturing conference on "The Forum: Ideas for the Future," hosted 90 people. Morning session focused on environmental and safety regulatory topics and afternoon session dealt with possible solutions to problems associated with these regulations . . . Two $1000 awards made under the Alfred Apfel Scholarship competition and one $1000 Robert E. Minnucciani Scholarship awarded.

Houston

Plans underway for gala celebration of Society's 50th Anniversary in early 1993 . . . Society will host FSCT Spring Week events in May of 1993 . . . Membership totals 161, down slightly from last year . . . Six scholarships awarded . . . David Siller received Second Place prize in Society Speakers competition at 1991 Annual Meeting for his presentation of the Society's first technical paper since 1984 . . . Exciting new format initiated for Southwest Paint Convention . . . Society saddened by death of Loren B. Odell, FAIC. Mr. Odell was a Federation Honorary Member, a 50-Year Member and one of the original organizers of the Houston Society.

Kansas City

Nine meetings held during year, including five technical meetings and a joint meeting with St. Louis Society. The joint meeting featured presentations by faculty from University of Missouri-Rolla, and several students on paint scholarships at the university were in attendance . . . Presentations to the scholarship fund at Rolla were made by the Federation, the St. Louis Society, the Kansas City Coatings Association, and the Society . . . In effort to increase membership, the Society introduced an optional lower cost membership fee which does not include the cost of meals. Members pay only for the meals at the meetings they attend.

Los Angeles

Cal Poly/Western Coatings Society Foundation received additional funding through the second annual memorial golf outing . . . Manufacturing Committee's Speaker Program begun as part of goal to encourage stronger involvement of manufacturing members . . . Paint Technology course graduated 15 students . . . Unemployed

individuals being assisted in finding employment through the LASCT Employment Committee.

Louisville

Society continues to offer courses in surface coatings technology at University of Louisville. Course on "Coatings Uses and Formulations" offered in spring 1991, but "Manufacturing and Application of Coatings" was cancelled as result of low enrollment. . . Society sponsored first River City Waterborne Coatings Technical Conference . . . Educational grant to cover tuition cost for a continuing education course in coatings technology offered. The first recipient, Charles Adams, of United Catalysts, attended course at Kent State University . . . Technical study on "Evaluation of Brookfield Viscosity, Data Collection, and Standardization of Test Methods," put on hold. New goal is to develop a method for identification and quantification of oven fouling with materials such as trichloroethylene and/or triethyl amine.

Mexico

Society held successful one-day seminar on "New Technologies. High Solids, Waterborne and Powder Coatings," with 100 attendees . . . Fifth annual technical symposium held in Monterrey covered topics from manufacturing to safety and ecology and hosted over 75 attendees . . . Six technical presentations given at monthly meetings, with average attendance of 85 . . . Mexico Society Library offers over 635 technical books, six audiovisuals, 72 technical publications subscriptions and 30 videos from technical symposia . . . To celebrate the major contributions to the coatings industry in Mexico made by any member of the Society, a Paint and Ink Technician's Day was instituted . . . Technical Committee has begun one project in regard of HMIS classification for the raw materials currently in use in Mexico . . . Continuing promotion of all FSCT publications.

Montreal

Nine monthly meetings were held, seven of which featured technical presentations . . . Along with Canadian PCA, sponsored a mini-symposium on "Environment: Its Impact on Technology and in the Working Place." Average attendance at meetings was 57 persons, (about 18% of total membership) . . . A 50-Year pin was presented to Society Past-President George Bernard, and six 25-Year pins were awarded . . . The Society meeting location was changed after 25 years . . . An all-Canadian paper, "Coatings for Plastics," which combined the efforts of the Montreal and Toronto Societies and the Vancouver Section of the Pacific Northwest Society was presented at 1991 Annual Meeting . . . A joint project with the Toronto Society on "New Method for the Determination of Oil Absorption of Organic and Inorganic Pigments" was completed . . . A joint project with the Northwestern Society on "Effect of Acid Rain on the Degradation of Coatings" is currently underway with exposures at five different sites . . . A project on "Replacing UV Absorbers with Ultra-Fine TiO_2" has been initiated . . . The Society is in the process of creating a Manufacturing Committee headed by Gerald Paradis, of BASF . . . An introductory course on coatings technology has been scheduled for the fall.

New England

Eight technical/business meetings were held in Massachusetts and Rhode Island in effort to serve geographically dispersed membership . . . This approach generated a participation of between 25 and 30% based on total membership . . .Well-attended joint meeting sponsored with New England PCA . . . Society hosted FSCT Spring Week in May of 1992 . . . Educational Committee supported the Master of Science, Coatings and Adhesives Program at the University of Lowell. The Society, in conjunction with the university, presented a "wish list" to the FSCT Coatings Industry Education Fund, and in return were presented with a grant with which to

Dan Dixon (Southern) and Arthur K. Hagopian (Toronto)

purchase laboratory equipment . . . The Society has discussed the establishment of a basic technician training course to utilize these facilities . . . The Society continued to award scholarships to children of members. In 1992, $2500 was awarded, based on academic achievement and an essay written as part of the application process.

New York

Membership totalled 520 . . . Average attendance at monthly meetings was 129, down slightly from 1990-91 (132). Technical presentations were highlighted at eight monthly meetings . . . Afternoon seminars were held on "Hazardous Waste Classification" and "Computer Generation of MSDS" . . . Educational Committee, in cooperation with the Metropolitan New York PCA presented advanced courses in coatings technology at Fairleigh Dickinson University . . . Scholarships in the amount of $1000 were awarded to current college students: the NYSCT Scholarship Award, and the Melvin M. Gerson Memorial Scholarship, sponsored by Daniel Products Company . . . By-Laws Committee recommended amendments to the By-Laws which were approved by the active membership . . . Jointly sponsored a "Legislative Update," with MNYPCA, featuring speakers from regulatory agencies of New York, New Jersey, and the Federal Government . . . Technical Committee is preparing videotape on standardized paint testing procedures (funded by the FSCT). Additional projects include formation of a symposium coordinating committee for a possible symposium on "Additives and Modifiers for Modern Coatings," and several subcommittees addressing rheological modifiers for high solids coatings, silicone additives for high solids coatings, a color computer usage survey, and defoamers for waterborne systems . . . Members continue to be active in Federation activities on national level, including Steven Bettinger (Manufacturing), Richard J. Himics (Professional Development, CIEF Trustee, Roon Awards, Annual Meeting Program, Planning), John J. Oates (Planning, Educational, George Baugh Heckel Award), Daniel J. Phillips (Bruning Awards, Inter-Society Color Council), Sidney J. Rubin (Environmental Affairs), Jude T. Smith (Joint Coatings/Forest Products), and Saul Spindel (Planning, Joint Coatings/Forest Products and Corrosion).

Pacific Northwest

Membership total of 256 represents a six percent decrease caused primarily by a loss of Active Membership in the Seattle section. . . . Scholarship program continued with a $1000 scholarship being awarded by the Puget Sound Section and two $500 scholarships being awarded by both the Portland and Vancouver B.C. sections. The Pacific Northwest has made an additional commitment to support the California Polytech Paint School by donating 20% of any surplus from the spring symposium. For 1992, contribution was slightly over $2000 . . . Vancouver section has continued the paint short course at Kwantlen College, with 16 students attending . . .

Portland Section is arranging seminars that precede some of the monthly meetings . . . Vancouver Section is following the planning of a paint recycling facility to be sited in Laidlaw, B.C. The Puget Sound Section has met with Puget Sound Pollution Control Agency to assist in defining manufacturing processes for minimal volatiles and particulate losses. Portland continues the practice of having an additional environmental speaker at monthly meetings . . . Spring Symposium and Annual Meeting held at Benson Hotel in Portland. Nine papers were presented at technical program and Honorary Society memberships awarded to Carlton Huntington and Paul Payne. William Shackelford was awarded the James A. Leider Award for outstanding service. . . . Plans are underway for 1993 Symposium to be held April 29-May 1 in Bellevue, WA.

Philadelphia

Eight technical presentations featured at monthly meetings. Monthly Technical Committee meetings highlighted by technical talks . . . Technical Seminar on "Latex and Rheology Interactions between Latex and Associative Thickeners" attracted attendance of 130 . . . Course on "Introduction to Coatings Chemistry" partially sponsored by Society was attended by 20 individuals . . . Paper was presented at the 1991 Annual Meeting on "Suitability of ASTM Test Method for High Solids VOC Determination" . . . Liberty Bell Award was presented to Lawrence Kelly, of Eastech Chemical, Inc. The Ben Franklin Award, intended to honor the elder statesmen in the Society who continue to contribute to the group, was presented for the first time. The recipient was Robert C. Sonntag, of Superior Varnish & Drier Co.

Piedmont

Membership recruitment is strong focus and 32 new members joined the Society in the past year. The Society was recognized by the City of Greensboro, NC and Guilford County for successful paint recycling efforts . . . To promote Society and increase membership interest, Society joined with Piedmont PCA to donate toys and gifts to underprivileged children through local Toys for Tots program . . . Two $1000 scholarships were awarded to chemistry majors who have a career interest in the coatings industry . . . Income from newsletter being used to support Technical Committee activities . . . Mini trade show planned for March 1993 to allow suppliers to display products to the local coatings industry . . . Historical Committee completed publication on the History of the Piedmont Society. Copies are available . . . 25-Year pins were given to Gerry Currier, Barry York, Cecil Wilson, and Jim Frazier . . . A Recognition Award was given to Jim Husted for his years of service as Society Representative.

Pittsburgh

Attendance at monthly meetings increased as result of "Special Events" nights and "Dedicated Honored Company" nights. This was in addition to regular technical presentation . . . Technical talks are divided between research, product development, formulating practice, manufacturing practices, and professional development. . . Symposium on environmental impact entitled "Environmental Responsible 90s" to be held on April 18, 1993.

Rocky Mountain

Emphasis is on increasing membership and in supporting a paint short course.

St. Louis

Toured General Motors Assembly Plant in Westville, MO . . . Scholarship awards presented to Matt Burst of Carboline; Kim Goodman, of Columbian Chemicals; and Leonard Wright, of P.D. George. Technical presentation on "Flash Rust Testing and Inhibitor Evaluation Through a New Spectrophotometric Technique" awarded third place at 1991 Annual Meeting. . . Held joint meeting with St. Louis PCA . . . Highlights of monthly meeting were Education Night, Manufacturing Night, and Past Presidents' Night . . . Awards were presented to Dr. Fred Weber, Howard Jerome, Dr. Herman Lanson, and G.O. Stephenson for contribution to the Society and the St. Louis area coatings industry . . . Participated in joint meeting with Kansas City Society.

Southern

Society continues to support the Polymer Science Department at the University of Southern Mississippi . . . The annual meeting in Orlando, FL, provided the opportunity for the Society to donate proceeds to a Polymer Science Department Chair, the first in coatings history . . . Memphis Section has donated $500 to the school, the Gulf Coast Section sponsored an outstanding senior in coatings at the school and gave awards to two winners, and the Atlanta Section has started a scholarship program . . . One-day seminar program continued by each section . . . Society continues to sponsor the A.L. Hendry Award given for the best student-authored paper on topic of coatings technology . . . Annual Meeting planned for Nashville, TN on April 21-23.

Toronto

Membership of 470 is slightly lower (5%) than last year, but represents a high retention level . . . Clarke Boyce named Honorary Member of the Society . . . Educational Committee reorganized the coatings course at George Brown College in Toronto. Participants who successfully complete the course will be issued a certificate in Coatings Technology. . . Closer relationships being developed with both the University of Waterloo and the University of Toronto. . . . Technical Committee paper on "New Method of Determining the Vehicle Demand of Organic Pigments" will be presented at 1992 Annual Meeting. Other projects include mildewcides in emulsion paint and their effect on paint films; and a study of heat aging and weathering behavior of basic coil coating polyester . . . A new program being developed to secure participation of manufacturing segment of the Society . . . Annual Symposium on "Color Technology and Environment in the 1990s" was held with 100 registrants . . . Attendance at monthly meeting is less than anticipated and will be a priority with incoming Executive Committee.

Western New York

Approximately one-third of membership attends monthly meeting, due in part to Reichhold Chemicals' leaving the Buffalo area . . . Five technical meetings held in various locations and a joint meeting was held with Buffalo Paint & Coatings Association . . . Three $300 scholarships were made, together with participation of Buffalo PCA . . . The Society, in an attempt to keep membership active , has plans for the upcoming year to embark on a "coordinated schedule of monthly meetings" with the Buffalo PCA.

The next meeting of the FSCT Board of Directors will be on May 16, 1993, at the South Shore Harbour Resort and Conference Center, League City, (Houston), TX

In Memoriam

We report with deep regret the passing of the following members during the past year.

Birmingham

Kenneth G. Cook—Retired (Arthur Holden & Sons)
Society Past-President
Ray Howl—Newtown Industrial Paints Ltd.
Peter Walker—Retired
Past-President
David Yates—Retired
Society Past-President

CDIC

Carl Opp—Retired (C.L. Zimmerman Co.)
Society Past-President
Elwood (Woody) Pease—Retired (Paint American Co., Warehouse Paint Centers)

Cleveland

Jack McNally—Retired (McNally & Weber)

Detroit

Dr. John Graham—Eastern Michigan University
PRI Member
Don Hayes—BASF
Fred Weed—BASF
Society Past-President

Houston

Robert Busch—Monarch Paint Co.
James A. Downs—Spartan Color Corp.
Loren B. Odell—Retired (Napko Corp.)
Federation Honorary Member
50-Year Member
Society Past-President
Walter Pope—Cook Paint
Society Past-President
Joseph E. Rench—Yorktown Associates, Inc.

Golden Gate

Dexter Tight—Retired (W.P. Fuller and Company)

Philadelphia

Adolf C. Elm—Retired (New Jersey Zinc Co.)
Federation Honorary Member
Ralph B. Frazier—Retired (Van Horn, Metz & Co. Inc.)
Society Past-President

Los Angeles

Geneva H. Wells—H.M. Royal of California, Inc.
Clyde Smith—Consultant
Federation Past-President
Society Honorary Member
Society Past-President
50-Year Member

Louisville

Joseph V. Lococo—Reynolds Metals Co.
25-Year Member
Society Past-President

New York

Temple C. Patton—Retired (Baker Castor Oil Co.)

Pittsburgh

John Armstrong—Consultant

St. Louis

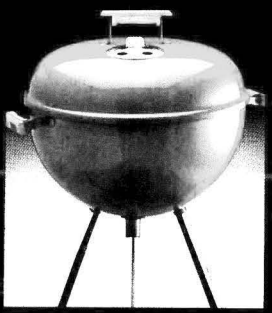
George Claytor—Retired (Walsh & Associates)
Donald E. Leever—Retired (Reichhold Chemicals Inc.)
Larry Meyer—Sterling Lacquer Manufacturing
Carl E. Peterson—P.D. George Co.
Albert Zanardi—C.L. Smith Co.
Society Past-President

Southern

Thomas A. Lane—ITW Philadelphia Resins
Vern Webb—Retired (McCullough & Benton)

Western New York

Amos T. Montayne—Retired (Pratt & Lambert)
Federation Past-President
Society Past-President
Society Honorary Member



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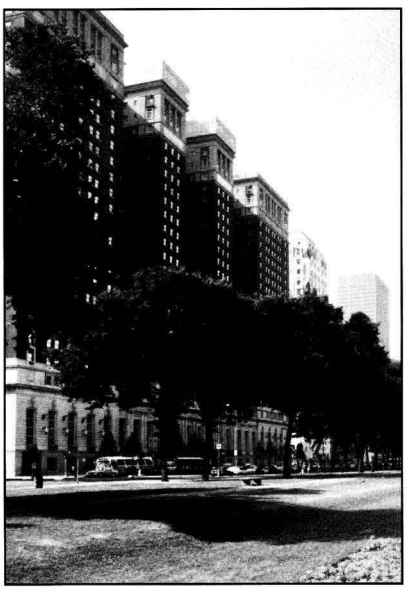
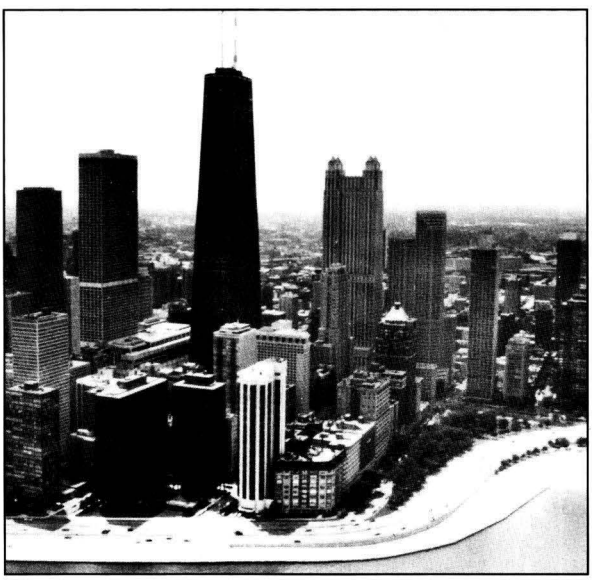




Chicago

October 21 • 22 • 23, 1992

McCormick Place North

FSCT Annual Meeting & Paint Show Wrap-Up

FSCT Annual Meeting & Paint Industries' Show Attracts Over 8,400 Registrants to the "Windy City"

On Sunday, October 18, at 12:00 noon, the main floor of Chicago's McCormick Place North was desolate, except for the carpenters who were marking and laying out the show floor, and the decorators who either were hanging aisle signs or installing carpet. Meanwhile, the teamsters were awaiting directions to begin delivery of the freight.

In 70 hours time, they, along with the electricians, plumbers, and riggers, had to transform a cold, bare McCormick Place North into the biggest and best Paint Show ever held.

By Wednesday, the opening day of the event, the workers had accomplished their task. McCormick Place North was fully carpeted and decorated, exhibitors' booths were standing, and the crowd, from both the U.S. and other countries, was beginning to assemble in front of the entrance units to the 57th Paint Industries' Show. They had come to Chicago to visit the largest coatings-related exhibition in the world.

The Federation of Societies for Coatings Technology's 70th Annual Meeting and 57th Paint Industries' Show had returned to the "Windy City" for a three-day engagement, on October 21-23. The 1992 event was attended by a total of 8,404 registrants, the third largest attendance ever (8,693 attended the AM&PS in Washington, D.C., in 1990 and 8,414 registrants in Chicago, in 1988).

A total of 784 registrants from countries outside North America attended this 1992 AM&PS, including 188 from Mexico and 168 from Japan. Among the international attendees were these officers of other coatings organizations: FATIPEC—Francis Borel, Secretary-General, and Max Raaff, President; JSCM—Dr. Isao Kumano, Vice President; OCCA-NZ—Don MacDonald, President; OCCA-UK—Christopher Pacey-Day, General Secretary, and Jim Hemmings, President-Designate; SLF—Michael Symes, President; and SCAA—Ted Saultry and Wal Gallagher, Delegates.

The theme of the 1992 Annual Meeting Program was "New Directions for a Changing World," which focused on the need to change existing business strategies in formulating products, responding to regulatory and safety demands, and prudent management of resources.

In addition to the 50 technical presentations, attendees were treated to the largest Paint Show to date. A total of 295 supplier companies to the coatings manufacturing industry presented and discussed their newest products and services in over 94,000 sq. ft. of exhibit space. This 1992 AM&PS also featured a Poster Session as part of its programming.

The Opening Session included the E.W. Fasig Keynote Address which was delivered by Jack Anderson. Mr. Anderson, one of the most widely-read syndicated columnists in the world, set the meeting tone by entertaining and educating a standing room only crowd with his insights and inside stories surrounding life on Capitol Hill.

A quality management series update was presented by Dr. Peter Hunt, President of Productivity Management Consultants, in Clearwater, FL. Dr. Hunt gave an overview of the FSCT Quality Management Series.

Concurrent technical sessions offered a wide variety of papers on a cross-section of coatings topics. The "new directions" which were addressed in the presentations included adopting merging and emerging technologies to drive innovation, developing environmentally friendly products and processes, and embracing total quality systems to effectively compete in a global market. The sessions were well attended, and featured question-and-answer segments following the presentations, as well as one-on-one discussions with the speakers after the sessions.

The highlight of the technical program was the Joseph J. Mattiello Memorial Lecture, delivered by Dr. John L. Gardon, Vice President of Research and Development for Akzo Coatings, Inc., in Detroit, MI. Dr. Gardon spoke on "Polyurethane Polyols: Ester-Bond-Free Resins for High Solids Coatings."

The Poster Session, featuring non-commercial work in new ideas and techniques in coatings research, was a new feature to the 1992 programming.

The FSCT's Annual Business Meeting featured the induction of Colin D. Penny, of Kapsulkote, Inc., who

1993 Annual Meeting & Paint Show To Be Held October 27-29, in Atlanta, GA

The 71st Annual Meeting and 58th Paint Industries' Show of the Federation of Societies for Coatings Technology is scheduled for October 27-29 at Georgia World Congress Center, in Atlanta, GA.

Chairman of the Annual Meeting Program Committee is Clifford Schoff, of PPG Industries, Inc., Pittsburgh, PA.

Members of the Southern Society, under the direction of Chairman Jeff Shubert, of Shubert Paints, Inc., Tucker, GA, will serve on the Host Committee.

For exhibit or attendance information, contact FSCT Headquarters, 492 Norristown Road, Blue Bell, Pennsylvania 19422, (215) 940-0777, FAX: (215) 940-0292.

succeeded William F. Holmes, of National Pigments & Chemicals, Inc., as FSCT President. Mr. Penny announced the following members of his 1992-93 Executive Committee: President-Elect John A. Lanning, of Porter Paints Div. of Courtaulds Coatings, Inc.; Secretary-Treasurer Joseph P. Walton, of Jamestown Paint Company; Larry Brandenburger, of The Valspar Corporation; Joseph D. Giusto, of Lenmar, Inc.; Mr. Holmes; and Jan P. Van Zelm, of BYK-Chemie USA.

Also announced were the 1992-93 FSCT Board of Directors, and the new Committee Chairmen.

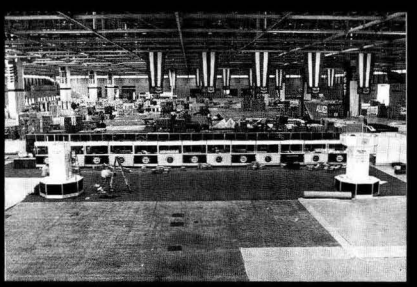
However, by-and-large, the biggest attraction was the Paint Show itself which had exhibits featuring a wide variety of raw materials, production equipment, containers and filling equipment, laboratory apparatus, and testing devices for the paint and coatings producer. The exhibit hall aisle traffic was heaviest on opening day, and maintained a steady flow throughout the remainder of the Paint Show. Thanks to the unusually wide 10-foot aisles which provided the free flow of traffic, registrants moved about the Show with relative ease. Attendees had the opportunity to meet with key personnel from the top technical and sales staffs to discuss the latest developments in products and services.

The 1992 AM&PS concluded with the Awards Luncheon. Featured were the presentations of the A.L. Hendry, Roon Foundation, and C. Homer Flynn Paint Show Awards. Former Mayor of Chicago Jane Byrne was the guest speaker. She spoke about her days in office and the community service projects she sponsored. Also, the Southern Society for Coatings Technology Distinguished Professorship in Polymer Science was presented to Dr. Shelby F. Thames, of the University of Southern Mississippi. A special presentation was made by the American Red Cross to the FSCT for their generosity in aiding the disaster relief victims of Hurricanes Andrew and Iniki, in South Florida, Louisiana, and Kauai, Hawaii.

The success of the 1992 AM&PS is directly attributable to the attendees, program participants, exhibiting firms and their personnel, and all who gave of their time and talents. Special thanks are passed on to the members of the Chicago Society who, under the leadership and direction of Host Committee Chairman Ted Fuhs, of Tru-Test Manufacturing Company, made sure that the event was a most successful one.

For a full two-and-one-half days, the paint industry was at its best in terms of product promotion and technical programming. However, at the conclusion of the Awards Luncheon on Friday, the AM&PS was officially concluded. Exhibit booths were being dismantled, meeting rooms were being cleared, and, with anticipation, arrangements were being made for the 1993 event.

Interest for this year's Paint Show at the Georgia World Congress Center, in Atlanta, GA, on October 27-29, has already been heavy. Exhibitors are contracting for space at a record-setting pace, with most requesting additional square footage for their booths. Potential new exhibitors are also inquiring about exhibiting at the Show in Atlanta. From all indications, the 1993 Paint Show has all the makings for another successful event.



Annual Meeting & Paint Industries' Show Awards Presented in Chicago, IL

Distinguished Service Award

This award was presented to William F. Holmes, of the Dallas Society, in grateful recognition of his valuable contributions to the progress of the Federation while serving as President of the Federation in 1991-92.

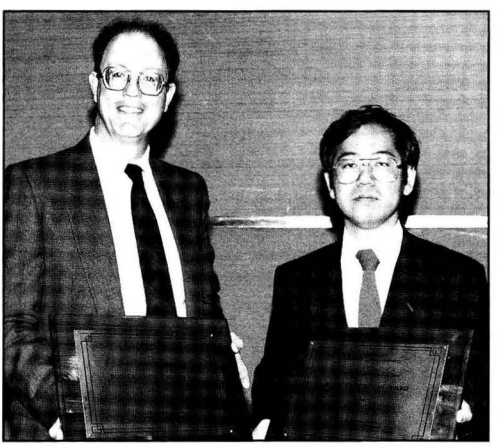
FSCT President-Elect Colin D. Penny (right) presents President William F. Holmes with the Distinguished Service Award

Roon Foundation Awards

These cash awards and plaques, established by the late Leo Roon, and administered by the Coatings Industry Education Fund, are for the best technical papers entered in the competition and submitted for presentation at the Federation's Annual Meeting by individuals associated with the organic coatings industry.

First Prize ($2,200)—"Influence of Imidazoline Content and Water on the Reaction Between Amidoamine and Epoxy Resins"—Dr. Robert F. Brady, Jr., Naval Research Laboratory, Washington, D.C., and John M. Charlesworth, of Materials Research Laboratory, Melbourne, Australia.

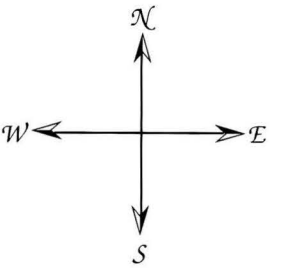
Second Prize ($1,400)—"Model Crosslinkers for Polyols. Kinetics of



Robert F. Brady (left), of Naval Research Laboratory (First Prize), and Makoto Arai, of North Dakota State University (Second Prize), are the recipients of the 1992 Roon Foundation Awards

The winner of the A. L. Hendry Award is Mark Simakaski, of Drexel University (left). Accepting the award with Mr. Simakaski is coauthor Charles Hegedus, of Naval Air Development Center

Gus Voss (left) presents the 1992 A.F. Voss/*American Paint & Coatings Journal* awards to representatives of the winning Societies: First Place—Freidun Anwari (Cleveland); Second Place—Horace Philipp and Art Hagopian (Montreal and Toronto) accepting for Walter Fibiger; and Third Place—Sandra Dickinson (Los Angeles) accepting for Mark Georgantas



"New Directions for a Changing World"

Transetherification of 2-Methoxy Cyclic Ethers"—Makoto Arai and S. Peter Pappas, of North Dakota State University, Fargo, ND.

Alfred L. Hendry Award

Sponsored by a grant from the Southern Society of the Federation, this award of $1,000 is for the best undergraduate student paper submitted for competition. The 1992 competition was won by Mark Simakaski, of Drexel University, for the paper "Methodology for Evaluating the Total Performance of Coatings and Coatings Systems."

Society Secretary Awards

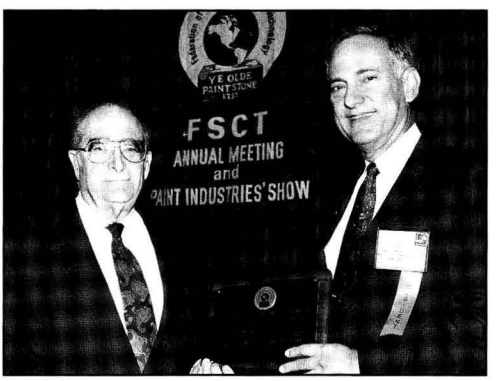
These awards are made to the Secretaries of Constituent Societies of the Federation who furnish to the JOURNAL OF COATINGS TECHNOLOGY the most interesting reports of Society meetings and discussions following the presentation of papers at those meetings.

FIRST PRIZE ($250)—J. Brian O'Conner (McWhorter Inc.), Secretary of the Philadelphia Society.

SECOND PRIZE ($100)—Philip C. Bremenstuhl (Ashland Chemical, Inc.), Secretary of the Los Angeles Society.

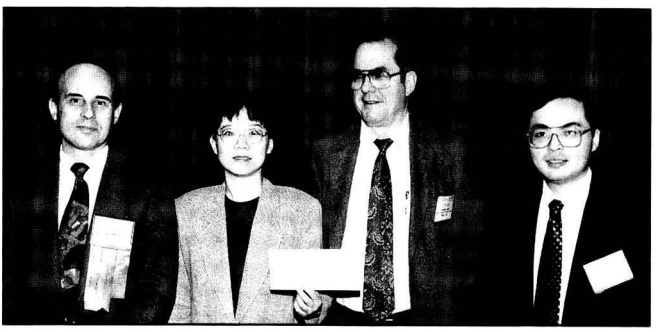
Society Speaker Awards

These awards are presented to individual members for the Societies who present Society Papers at the



Mattiello Memorial Lecturer John Gardon receives the Distinguished Scientific Achievement certificate from President Holmes for Dr. Gardon's presentation entitled "Polyurethane Polyols: Ester-Bond-Free Resins for High-Solids Coatings"

1992 Society Secretaries Awards are presented to: First Place—J. Brian O'Connor (Philadelphia); and Second Place—Jan P. Van Zelm (Los Angeles) accepting for Philip C. Bremenstuhl



Program Committe Chairman John A. Lanning (left) presents the Poster Session Awards to: First Prize—Zeying Ma and J. Edward Glass; and Second Prize—Zhigiang A. He. Missing from photo, Third Prize winner J.O. Stoffer and Younhee Kim

Annual Meeting in the best form and manner.

FIRST PRIZE ($250)—Michael Van De Mark (University of Missouri-Rolla), St. Louis Society.

SECOND PRIZE ($100)—Mark Georgantas (Byk-Gardner Instruments), Los Angeles Society.

A.F. Voss/*American Paint & Coatings Journal* Awards

These awards are cash prizes presented by the *American Paint & Coatings Journal* for the most constructive papers by Constituent Societies of the Federation in connection with the research, development, manufacture, or application of the industry's products, or of the raw materials entering into their fabrication.

FIRST PRIZE ($450)—"Changes in Hiding During Latex Film Formation. Part V. Effect of Opaque Polymer"—Cleveland Society (Freidun Anwari).

SECOND PRIZE ($350)—"A New Method of Determining the Vehicle Demand of Organic Pigments"—Toronto and Montreal Societies (Walter Fibiger).

THIRD PRIZE ($200)—"Color Standards: Wet, Dry or Spectrophotometric"—Los Angeles Society (Mark Georgantas).

Poster Session Winners

A Poster Session, designed to provide a noncommercial arena for new ideas, new techniques, preliminary results, work that is significant but not ready for full publication, results or ideas that do not fit normal publication criteria, etc., was introduced at this year's Annual Meeting.

FIRST PRIZE ($300)—"Adsorption of Associative Thickeners on PMMA Latices"—Zeying Ma and J. Edward Glass, North Dakota State University, Fargo, ND.

SECOND PRIZE ($200)—"Environmentally Friendly Functionalized Cholorinated Rubber Coatings"—Shelby F. Thames, Zhigiang A. He, and Laroy H. Edwards, University of Southern Mississippi, Hattiesburg, MS.

THIRD PRIZE ($100)—"Ultrasonically Initiated Free Radical Catalyzed Copolymerization: Poly(Styrene co Maleic Anhydride)"—James O. Stoffer and Younhee Kim, University of Missouri-Rolla, Rolla, MO.

Golden Impeller Award

This annual award, offered by Morehouse Industries, Inc., for outstanding achievement in dispersion technology, was presented at the Annual Meeting to Leo Dombrowski, of Gibraltar Chemical, S. Holland, IL.

Society Speaker Awards Chairman Robert McD. Barrett (left) presents awards to: First Place—Michael Van De Mark (St. Louis Society); and Second Place—Sandra Dickinson (Los Angeles Society) accepting for Mark Georgantas

Leo Dombrowski (right) accepts the Morehouse Golden Impeller Award for outstanding achievement in dispersion technology, from Jim Swartwout, Morehouse Industries, Inc.

Meeting of Members of the International Coordinating Committee Held During Annual Meeting and Paint Show, October 22

A luncheon meeting for visiting members of the International Committee to Coordinate Activities of Technical Groups in the Coatings Industry (ICCATCI) is sponsored each year by the Federation of Societies for Coatings Technology (FSCT) at its Annual Meeting.

ICCATCI is composed of: FSCT; Federation of Associations of Technicians in the Paint, Varnish, Lacquer, and Printing Ink Industries of Continental Europe (FATIPEC); Oil and Colour Chemists' Association—United Kingdom (OCCA); Oil and Colour Chemists' Association—New Zealand (OCCA-NZ); Surface Coating Association Australia (SCAA); Japan Society of Colour Materials (JSCM); and Federation of Scandinavian Paint and Varnish Technicians (SLF).

Present at the meeting held on October 22, 1992, during the FSCT Annual Meeting and Paint Show in Chicago, and pictured above, were:

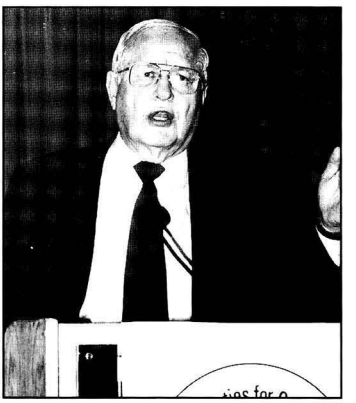
Seated (left to right): President Don MacDonald (OCCA-NZ); President-Designate Jim Hemmings (OCCA); President Max Raaff (FATIPEC); President William Holmes (FSCT); Vice President Isao Kumano (JSCM); Ted Saultry (Delegate, SCAA); and President Mike Symes (SLF).

Standing: General Secretary Christopher Pacey-Day (OCCA); Secretary-General Francis Borel (ICCATCI); IUPAC Delegate Gerry Gough (FSCT); Past-President Deryk Pawsey (FSCT); Past-President Kurt Weitz (FSCT); Past-President Carlos Dorris (FSCT); Past-President John Ballard (FSCT); President-Elect Colin Penny (FSCT); and Executive Vice President Robert Ziegler (FSCT).

The next meeting of the ICCATCI will be held during the SLF Congress, in Copenhagen, Denmark, September 1993.

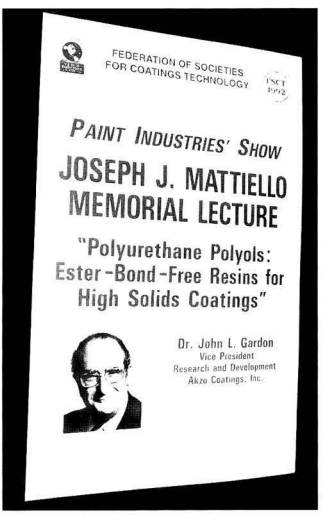
Annual Meeting Program Sessions

A standing-room-only crowd was present at the Opening Session as President Holmes detailed Federation activities



The Keynote Address was presented by Journalist and Political Correspondent, Jack Anderson

Joseph Walton (right) introduced paticipants of the Manufacturing Seminar on "Increasing Employee Involvement: Strategies and Benefits"—one of the many sessions sponsored by FSCT Committees



The Federation's prestigious Joseph J. Mattiello Lecture was a highlight of the technical programming

The Opening Session of the Annual Meeting featured the introduction of distinguished guests from allied organizations, as well as Federation Officers

FSCT Officers
Past and Present

Federation Officers for 1992-93 are (left to right): President Colin D. Penny, President-Elect John A. Lanning, and Secretary-Treasurer Joseph P. Walton

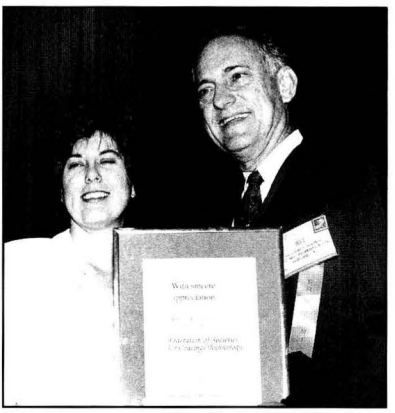
The FSCT's Business Meeting, on Friday, October 23, featured the induction of Colin D. Penny as the 71st President of the Federation of Societies for Coatings Technology. John A. Lanning assumed the office of President-Elect, and Joseph P. Walton became Secretary-Treasurer.

In addition to Messrs. Penny, Lanning, and Walton, the Federation's Executive Committee will consist of Larry Brandenburger, Joseph D. Giusto, William F. Holmes, and Jan P. Van Zelm.

The Fall Board of Directors Meeting of the Federation was held on Tuesday, October 20, in the Chicago Hilton Hotel. This meeting features reports from FSCT Officers, Staff, and Committee Chairmen and discussions of Federation concerns and activities.

Federation Past-Presidents in attendance at the Board Meeting included (pictured below, seated left to right): A. Clarke Boyce (1982-83); William H. Ellis (1980-81); Howard Jerome (1981-82); Hiram P. Ball (1951-52); Carroll M. Scholle (1965-66); Eugene H. Ott (1960-61); and Joseph W. Tomecko (1957-58). Standing: Deryk R. Pawsey (1987-88); Terryl F. Johnson (1983-84); James E. Geiger (1988-89); William Mirick (1985-86); Joseph A. Bauer (1984-85); Kurt F. Weitz (1990-91); Carlos E. Dorris (1986-87); James A. McCormick (1978-79); John J. Oates (1977-78); and John C. Ballard (1989-90)

Annual Luncheon



President Holmes receives Certificate of Appreciation from Pamela Sebern, Director of Office Volunteer Resources, of the Red Cross for the Federation's generosity in aiding the disaster relief efforts of Hurricanes Andrew and Iniki

A well-recognized political figure, both in Chicago and the U.S., Jane Byrne addressed the attendees at the Annual Luncheon

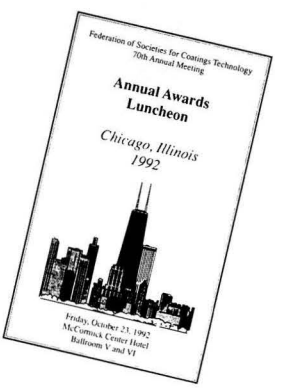
Atlas Electric Devices Honored for 50 Years in Paint Industries' Show

Atlas Electric Devices Co., Chicago, IL, was recognized for having participated as an exhibitor for 50 years in the Paint Industries' Show sponsored by the Federation.

A plaque commemorating the occasion was presented to Atlas by the Federation.

Atlas joins seven other exhibiting companies participating for 50 or more years in the Show. Other 50-year exhibitors include: Ashland Chemical Co (52); Cargill, Inc. (51); Columbian Chemicals Co. (56); Hüls America, Inc. (55); Reichhold Chemical, Inc. (54); Rohm and Haas Co. (56); and Union Carbide Corp. (56).

Paint Show General Manager Bob Ziegler (left) presents Robert Lattie, of Atlas Electric Devices, with a plaque commemorating Atlas' 50th year as an exhibitor in the Paint Industries' Show



Dr. Shelby F. Thames Is Named Southern Society's Distinguished Professorship in Polymer Science

The Southern Society for Coatings Technology has funded the endowment for a Distinguished Professorship in the Department of Polymer Science at the University of Southern Mississippi (USM), Hattiesburg, MS. This is first such endowment provided by the coatings industry.

Named to this distinguished professorship is Dr. Shelby F. Thames. He is a native of Mississippi and received both Bachelors and Masters Degrees from USM. After earning the Doctorate in Chemistry from the University of Tennessee, Dr. Thames returned to his alma mater and has remained there for 29 years.

From the rank of Assistant Professor of Chemistry, he rose quickly to tenured full professor. Dr. Thames recognized that the branch of chemistry dealing with polymers would not have the support and nurturing needed to acquire national and international status if it remained a part of the university's very traditional and very fine Chemistry Department, so he convinced USM to create the Department of Polymer Science. He served as the first chair of that department.

From that first administrative appointment, Dr. Thames moved on to become Dean of the College of Science, later changed to the College of Science and Technology. He was then named Vice President for Administration and Regional Campuses, then later Executive Vice President.

Dr. Aubrey K. Lucas (right), President of USM, congratulates Dr. Thames on his Distinguished Professorship in USM's Department of Polymer Science

Throughout his administrative career, Dr. Thames has been a model scholar/administrator. In addition to long hours of administrative responsibilities, he always taught and carried on an active research program. Then one day he set some priorities for his life. He decided that discovering and transmitting knowledge were the most important functions in a university, and to that end he wanted to devote his full energies. Dr. Thames left administration and returned full time to the faculty.

It was through his leadership that USM acquired funding, planned, and built a $20 million state-of-the-art Polymer Science Research Facility.

(Contributed by Dr. Aubrey K. Lucas)

Standing (left to right): Lew Larson, Carl Engelhardt, Lowell Wood, Herb Hillman, and Clifford Schwahn. Seated: Marian Larson, Ruth Engelhardt, and Libby Hillman

FSCT 50-Year Members

Left to right: Joseph Tomecko, John Weaver, Ruth Kraft, Gerald Kraft, and Milton Glaser

Receptions and Spouses' Program

"Women in Coatings" Sixth Annual Reception

Winners of the 1992 Women in Coatings Awards

Standing (left to right): Management Award—Rose Ryntz, Ford Motor Co., Dearborn, MI; Industry Support Award—Patricia Stull, Pacific Coast Chemicals, Berkeley, CA; Leadership Award—Lenora J. Marshall, The Glidden/ICI Co., Atlanta, GA; and Award Committee Chairman Eve De La Vega-Irvine. Seated: Sales & Marketing Award—Connie Tobin, Cargill, Inc., Oil Seed Processing Div., Minneapolis, MN; Research & Development Award—Connie Corbalis, CIBA-GEIGY Corp., Ardsley, NY; and Communications Award — Marilyn Lindquist, Devoe Coatings Co., Louisville, KY

Exhibitor's Reception

International Visitors Reception

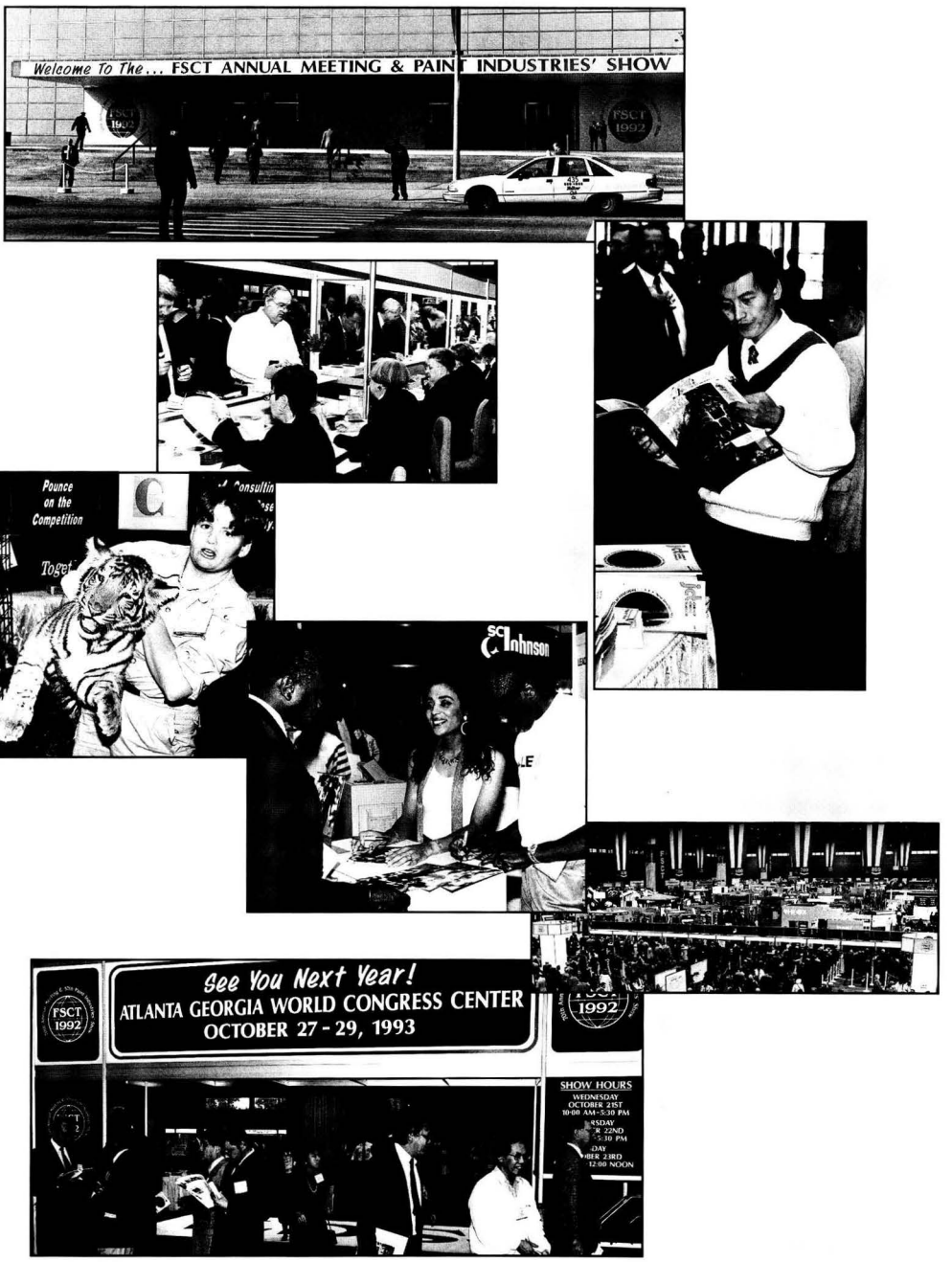
Spouses' Activities

A SINCERE THANK YOU

The following companies are recognized for their generous contributions to the FSCT Spouses' Activities:

ANGUS Chemical Co.
Cabot Corp.
Cargill Resins Products
Dow Corning Corp.
Du Pont Co.
Eastman Chemical Co.
E-M Industries, Inc.
Exxon Chemical Co.
ICI Americas, Inc.
S.C. Johnson & Son, Inc.
KRONOS, Inc.
PPG Silicas
SCM Chemicals
Sun Chemical Corp.
Systech Environmental Corp.
Troy Corp.
Union Carbide Solvents & Intermediates

Paint Show . . . Here and There



Nine Exhibitors Win Awards At 1992 Paint Industries' Show

Aztec Catalyst Co.; Brookfield Engineering Laboratories, Inc.; Bulk Lift International, Inc.; Degussa Corp.; Hockmeyer Equipment Corp.; ITT/Marlow Pump; The Lubrizol Corp.; University of Missouri-Rolla; and Sloss Industries Corp. were recipients of the C. Homer Flynn Paint Show Awards at the 1992 Paint Industries' Show, McCormick Place North, Chicago, IL, on October 21-23.

These awards are presented for outstanding exhibits in the Show on the basis of technical excellence, educational value, attractiveness, and novelty. The awards are divided into four categories: Raw Material Suppliers (single, double, 3-5, and 6-plus booths); Production Equipment Manufacturers (single, double, and 3-plus booths); Service Industries; and Laboratory and Testing Equipment Manufacturers.

The prizes (engraved plaques) were awarded as follows:

RAW MATERIAL SUPPLIERS:

Single-Booth Exhibit—Sloss Industries Corp., Birmingham, AL (One year in Show).

Double-Booth Exhibit—Aztec Catalyst Co., Houston, TX (Eight years).

Three-to-Five Booth Exhibit—Degussa Corp., Dublin, OH (25 years).

Six-or-More-Booth Exhibit—The Lubrizol Corp., Wickliffe, OH (Eight years).

PRODUCTION EQUIPMENT MANUFACTURERS:

Single-Booth Exhibit—Bulk Lift International, Inc., Carpentersville, IL (Seven years).

Double-Booth Exhibit—ITT/Marlow Pump, Cincinnati, OH (Four years).

Three-or-More-Booth Exhibit—Hockmeyer Equipment Corp., Harrison, NJ (43 years).

SERVICE INDUSTRIES: University of Missouri-Rolla, Rolla, MO.

LABORATORY AND TESTING EQUIPMENT MANUFACTURERS: Brookfield Engineering Laboratories, Inc., Stoughton, MA (23 years).

Winners of the 1992 C. Homer Flynn Awards for Outstanding Exhibits

Representing the winning companies are (standing, left to right): Keith Grgurich (ITT Marlow Pump); Bob Kral (Hockmeyer Equipment Corp.); Bruce Walker (Brookfield Engineering Laboratories); and Mike Offenburger (Bulk Lift International, Inc.). Seated: Lyle Kinsler (Sloss Industries Corp.); Dan Petticord and Nick Motto (Aztec Catalyst Co.); Jim Stephanadis (The Lubrizol Corp.); and Joseph Offenburger (Bulk Lift). Not pictured are representatives from Degussa Corp. and University of Missouri-Rolla

RAW MATERIALS SUPPLIERS

Sloss Industries Corp., Birmingham, AL

Aztec Catalyst Co., Houston, TX

Winners

Degussa Corp., Dublin, OH

The Lubrizol Corp., Wickliffe, OH

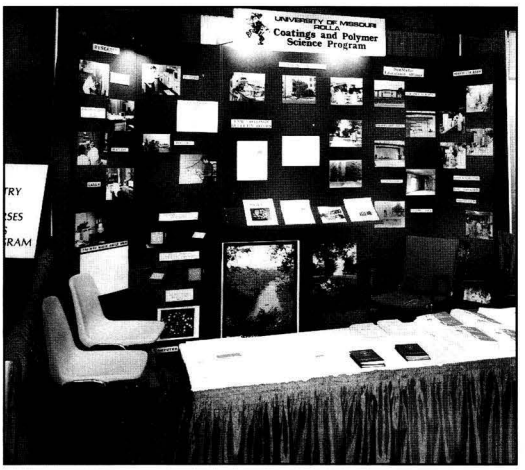
PRODUCTION EQUIPMENT MANUFACTURERS

Bulk Lift International, Inc., Carpentersville, IL

ITT/Marlow Pump, Cincinnati, OH

Hockmeyer Equipment Corp., Harrison, NJ

SERVICE INDUSTRIES



University of Missouri-Rolla, Rolla, MO

EQUIPMENT MANUFACTURERS

Brookfield Engineering Laboratories, Stoughton, MA

1992 Paint Industries' Show Exhibits

The 1992 Paint Industries' Show of the Federation of Societies for Coatings Technology was held at McCormick Place North, Chicago, Illinois on October 21-23. The 295 exhibitors took part in the largest ever Paint Show (over 94,000 square feet).

As a continuing service to JCT readers, we present (in the following pages) a description of the products and services which highlighted the booths of the exhibitor companies. These are reprinted as published in the Federation's "Paint Show Program," which was given to all registrants at the convention.

ACETO CORP.
One Hollow Lane
Lake Success, NY 11042

Offered is a wide range of chemicals for the coatings industry. These include zinc oxide, organotin compounds, anti-skinning agents, electrostatic spray-paint additives, UV photoinitiators, aziridine-based chemicals, and titanium dioxide.

Circle No. 1 on Reader Service Card

ADVANCED COATING TECHNOLOGIES
273 Industrial Dr.
Hillsdale, MI 49242

Accredited independent testing services are described, new blank powder coating line for test programs and panel preparation. Test panels of various shapes, metal and plastic, are displayed.

Circle No. 2 on Reader Service Card

ADVANCED SOFTWARE DESIGNS
P.O. Box 647
Chesterfield, MO 63006

ASD gives demonstrations of the SNAP Version 3.00 Manufacturing Control System, which features user-defined properties, multi-language support, ANSI standard MSDSs and labels, on-line help and documentation. SNAP is the fully-integrated solution for all of your formula management, regulatory compliance, production, and accounting needs.

Circle No. 3 on Reader Service Card

AGGLO RECOVERY INC.
34 Leading Rd.
Toronto, Ont. M9V 3S9 Canada

Circle No. 4 on Reader Service Card

AIR PRODUCTS & CHEMICALS, INC.
7201 Hamilton Blvd.
Allentown, PA 18195-1501

Featured are emulsions for low VOC coatings and Flexthane™ polymers—urethane acrylic hybrids for water-based wood, metal and plastic coatings, as well as Surfynol® surfactants, defoamers and pigment grind aids for water-based airless spray coatings. Also promoted are our Pacific Anchor epoxy curing agents.

Circle No. 5 on Reader Service Card

AKZO CHEMICALS
300 S. Riverside Plaza
Chicago, IL 60606

Akzo Chemicals features their line of organic peroxide and azo initiators for coatings and resins.

Circle No. 6 on Reader Service Card

AKZO RESINS
P.O. Box 37320
Louisville, KY

Akzo Resins features its entire line of coatings resins with particular emphasis on high-solids, water-reducible, and polyester/acrylic polyols. A comprehensive new product brochure is introduced.

Circle No. 7 on Reader Service Card

ALAR ENGINEERING CORP.
9651 W. 196th St.
Mokena, IL 60448

Alar Engineering Corp., manufacturer of water pollution control equipment, is exhibiting the Auto-Vac filter for dewatering water-based paint sludges as well as wastewater sludges from over 50 other industrial applications.

Circle No. 8 on Reader Service Card

ALCAN-TOYO AMERICA, INC.
1717 N. Naper Blvd., Suite 201
Naperville, IL 60563

Alcan-Toyo America places the spotlight on its line of nonleafing aluminum pastes including its specialty Alglo pigments. In addition, the display features new additions to the company's powder coating line, which was launched in 1990.

Circle No. 9 on Reader Service Card

ALCOA INDUSTRIAL CHEMICALS
4701 Alcoa Rd.
Bauxite, AR 72011

Alcoa's Industrial Chemicals Division is promoting its new spacer/extender series of SpaceRite® aluminas for application with various coating systems: paints, inks, powder, UV, clears, and high solids. Product, performance, application and cost savings information is presented.

Circle No. 10 on Reader Service Card

ALLIED-SIGNAL INC.
A-C Performance Additives
101 Columbia Rd.
Morristown, NJ 07962-2332

ACqua™ waterborne dispersions for protective film applications, ACtol™ resin modifiers for improved coating flexibility and impact resistance, A-C rheology additives to improve sag and settling properties, and A-C coating additives to improve mar and abrasion resistance are highlighted.

Circle No. 11 on Reader Service Card

ALLIED-SIGNAL INC.
Specialty Oximes
101 Columbia Rd.
Morristown, NJ 07962-2332

Allied-Signal provides the most advanced oxime chemistry to help develop coating technology for lower temperature cure. Specialty oximes as blocking agents in powder and liquid urethane coatings enhance the ability to coat temperature sensitive materials as diverse as plastics, specialty metals, wood and textiles.

Circle No. 12 on Reader Service Card

ALT-CHEM INTERNATIONAL
9 Orangetown Center, Suite 390
Orangeburg, NY 10962

The company is introducing a line of nontoxic pearl essence pigments and is highlighting their line of nontoxic, biodegradable cleaning and degreasing chemicals and cleaning systems.

Circle No. 13 on Reader Service Card

AMBROSE CO.
20325 71st Ave., NE, Suite #D
Arlington, WA 98223

Featured is Ambrose's Model 1911, fully automatic one gallon paint filler, new one gallon electronic filler, five gallon volumetric filler, drum filler and pail denester.

Circle No. 14 on Reader Service Card

AMERICAN CHEMICAL SOCIETY—C&E NEWS
1155 16th St., NW
Washington, DC 20036

The American Chemical Society, a leading chemical and science publisher since 1879, is exhibiting a selection of publications including *Chemical & Engineering News; Chemcyclopedia; Chemistry of Materials; Today's Chemist at Work; Macromolecules; Organometallics* and *Langmuir*—a journal devoted to surface and colloid chemistry. Books, software programs, and A/V courses are also featured.

Circle No. 15 on Reader Service Card

AMERICAN CHEMICAL SOCIETY—INDUSTRY RELATIONS
1155 16th St., NW
Washington, DC 20036

American Chemical Society Industry Relations features a 16-page booklet entitled *Partners for Growth: Industry and the American Chemical Society*. The purpose of this brochure is to heighten awareness of ACS programs, products,

and services that allow industry professionals to "do their jobs better."

Circle No. 16 on Reader Service Card

AMERICAN CYANAMID CO.
1 Cyanamid Plaza
Wayne, NJ 07470

American Cyanamid's exhibit promotes the company's advanced products for the coatings industry, including our crosslinking agents, CYMEL® and Bettle®, high performance CYAGARD® coating additives, Powderlink 1174 resin, and crosslinkable monomers. Also featured are Cythane 3160®, an aliphatic polyisocyanate, and TMXDI® and TMI®, both aliphatic isocyanates.

® Registered Trademarks of American Cyanamid.

Circle No. 17 on Reader Service Card

AMERICAN FELT & FILTER CO.
311 First St.
Newburgh, NY 12550

American Felt & Filter Co. the original patent holder in bag filter systems displays their line of bags as well as their vessel systems. American is pleased to introduce a new line of non-ASME code vessels with all of the original's patented features. Technical help is present for your systems assistance.

Circle No. 18 on Reader Service Card

AMERICAN IRON & STEEL INSTITUTE
1101 17th St., N.W., Suite 1300
Washington, DC 20036

The American Iron and Steel Institute's committee of tin mill products producers highlights the benefits of packaging paint and coatings-related materials in steel containers for durability, safety, fire protection and recyclability.

Circle No. 19 on Reader Service Card

AMERICAN PAINT & COATINGS JOURNAL CO.
2911 Washington Ave.
St. Louis, MO 63103

Free copies of the *American Paint & Coatings Journal*–an industry resource publication, and the APJ Convention Daily–the only daily source for industry news at the Paint Show will be available for distribution.

Circle No. 20 on Reader Service Card

AMOCO CHEMICAL CO.
200 E. Randolph Dr., MC 4106
Chicago, IL 60601-7125

Amoco Chemical supplies a variety of chemical intermediates to the coatings industry, including isophthalic acid, trimellitic anhydride, terephthalic acid, maleic anhydride and styrene. Technical literature includes starting point formulations and covers coatings for high solids, waterborne, powder, coil and plastics.

Circle No. 21 on Reader Service Card

ANGUS CHEMICAL CO.
1500 E. Lake Cook Rd.
Buffalo Grove, IL 60089

In addition to our full line of quality additives for coatings, ANGUS introduces ZOLDINE® MS-52 Moisture Scavenger for use in coatings, sealants and elastomers. ZOLDINE MS-52 is a fast-reacting, low viscosity additive which safely eliminates moisture from urethane systems without adversely affecting film properties.

Circle No. 22 on Reader Service Card

ANKER LABELERS USA INC.
705 Live Oak St., Suite E
Tarpon Springs, FL 34689

Anker debuts the new Variant KD II Pail Labeler. Features include higher speed—up to 23 PPM—effortless adjustment of the label magazine, and the capacity to label 2, 2.5, 3, 3.5 and 5 gallon pails.

Circle No. 23 on Reader Service Card

AQUALON COMPANY
1313 N. Market St.
Wilmington, DE 19899

The proven performance of AQUALON products for paints and coatings is highlighted. NATROSOL®, NATROSOL B, NATROSOL PLUS, and NATROSOL FPS™ water-soluble polymers for paint thickening, along with Hercules® Nitrocellulose, EG™ Nitrocellulose, and AQUALON® pentaerythritol for industrial coatings are featured.

Circle No. 24 on Reader Service Card

ARCO CHEMICAL CO.
3801 West Chester Pike
Newtown Square, PA 19073

The firm features its complete line of high performance, low toxicity solvents including Arcosolv® propylene glycol-based solvents n-methyl pyrrolidone (NMP), gamma butyrolactone (GBL), Arconate™ propylene, and other specialty chemicals for the paint and coatings industry. The Arcocomp Solvent Selector, a computer program to aid in reformulation, is demonstrated.

Circle No. 25 on Reader Service Card

A.R. ARENA PRODUCTS, INC.
2101 Mt. Read Blvd.
Rochester, NY 14615

First-of-a-kind all-plastic, collapsible Intermediate Bulk Containers (IBCs) for shipping liquids and bulk solids are displayed. The Arena 330 Shipper—330 gallon returnable, collapsible, bag-in-box container—substantially reduces solid waste while reducing packaging, shipping and handling costs.

Circle No. 26 on Reader Service Card

ASHLAND CHEMICAL, INC.
P.O. Box 2219
Columbus, OH 43216

Featured: complete range of formulation ingredients and additives—virtually everything needed to make paint, including coalescents, dispersants, monomers, pigments, pigment dispersions, plasticizers, preservatives, resins, silicones, solvents, surfactants, thickeners and other additives—specialties from most of the key industry suppliers. All of this is backed by extensive services, from technical guidance in reformulation to full chemical waste management services, and health, safety, and technical programs.

Circle No. 27 on Reader Service Card

ATLAS ELECTRIC DEVICES CO.
4114 N. Ravenswood Ave.
Chicago, IL 60613

Altas unveils a new xenon Weather-Ometer®. Real time, accelerated and high irradiance test capabilities are explained. The Atlas Cyclic Corrosion Chamber introduces a new direction in corrosion testing. Demonstrations are given on the UVCON UV/Condensation Weathering Device. The new Fire Science Products group discusses the recent developments with fire hazard testing.

Circle No. 28 on Reader Service Card

AZTEC CATALYST CO.
One Northwind Plaza
7600 W. Tidwell, Suite 500
Houston, TX 77040

AZTEC® high purity initiators including alkyl peroxyesters, diacyl peroxides, dialkyl peroxide perexyketals, alkyl hydroperoxides, blends and custom formulations are featured.

Circle No. 29 on Reader Service Card

B&P ENVIRONMENTAL RESOURCES, INC.
128 Bauer Dr.
Oakland, NJ 07436

B&P is a full service environmental waste management corporation and certified laboratory offering a wide range of services. B&P acts as an agent for permitted

treatment facilities capable of properly handling most types of regulated and nonregulated wastes through treatment, incineration, fuel blending and/or secure chemical landfill.

Circle No. 30 on Reader Service Card

B.A.G. CORP.
11510 Data Dr.
Dallas, TX 75218

Flexible intermediate bulk containers (FIBC), known as Super Sack containers, come in a variety of sizes and designs to fit a customer's specific requirements. Featured is a new design of WETSACK container for handling liquids.

Circle No. 31 on Reader Service Card

BASF CORP.
100 Cherry Hill Rd.
Parsippany, NJ 07054

BASF displays their full line of dyes and pigments for all types of paints, an extensive line of solvents, dispersions, latexes, diols and chain extenders, radiation-curable products, catalysts and curatives, surfactants, stabilizers, emulsifiers, dispersants, defoamers, plasticizers and urethane chemicals.

Circle No. 32 on Reader Service Card

T.J. BELL, INC./ERICHSEN INSTRUMENTS INC.
1340 Home Ave.
Akron, OH 44310

Displaying a variety of test equipment for the coatings industry. Highlighting glossmeters, cupping test machine, and the automated ERICHSEN Cyclical Corrosion Test Chamber. Meeting and exceeding Asian, European and U.S. test standards. Offering solutions to current and future test needs with practical adaptations and additions to test equipment to meet your special requirements.

Circle No. 33 on Reader Service Card

BLACKMER PUMP
1809 CENTURY AVE., SW
Grand Rapids, MI 49509

Blackmer exhibits their full line of rotary-vane pumps specially designed for handling abrasive fluids, nonlubricating solvents and heavy pastes or resins. Their new line of seal-less pumps are featured along with cutaway and working units. Models are available in stainless steel or iron construction, with flowrates from 2 to 600 gpm.

Circle No. 34 on Reader Service Card

BOHLIN INSTRUMENTS, INC.
2540 Rt. 130, Suite 113
Cranbury, NJ 08512

Meet the industry experts on viscosity and rheology to find out how Bohlin's expertise with paints, coatings, inks and adhesives can solve your rheological problems. See Bohlin's Controlled Stress Rheometer and Visco 88 Viscometer to learn what rheological data can mean to you in terms of end product performance.

Circle No. 35 on Reader Service Card

BROOKFIELD ENGINEERING LABORATORIES, INC.
240 Cushing St.
Stoughton, MA 02072

Brookfield is introducing a new series of Calculating Laboratory Viscometers which have temperature monitoring, increased viscosity range and computer compatibility. Typical applications include the measurement of paints and coatings for quality control and research. Also featured is the In-Process Portable Viscometer, Model TT220 for measuring and controlling viscosity.

Circle No. 36 on Reader Service Card

BROOKHAVEN INSTRUMENTS CORP.
750 Blue Point Rd.
Holtsville, NY 11742

Brookhaven Instruments Corporation, manufacturer of quality particle sizing and zeta potential instruments, features their new ZetaPlus, zeta potential and particle size analyser and the BI-DCP, high resolution disc centrifuge.

Circle No. 37 on Reader Service Card

BUCKMAN LABORATORIES, INC.
1256 N. McLean Blvd.
Memphis, TN 38108

Buckman Laboratories is emphasising their line of microbiocides. Two new bactericides, Busan 1104 and Busan 1130 and a new fungicide, Busan 1118, are introduced. Busan 1130 is of special interest since it is not a formaldehyde donor.

Circle No. 38 on Reader Service Card

BUHLER INC.
1100 Xenium Ln.
Minneapolis, MN 55441

Buhler exhibits its full range of highly efficient dispersion equipment for liquid and paste inks such as Submill (new), Horizontal Bead Mill and Three Roll Mill. For the first time Buhler also presents their FT-NIR Universal Spectrometer to identify substances in a matter of seconds.

Circle No. 39 on Reader Service Card

BULK LIFT INTERNATIONAL, INC.
231 W. Main St., Suite 305
Carpentersville, IL 60110

Bulk Lift International displays its new OHMEGA bag. The Bulk Lift OHMEGA bag is manufactured from specialized fabric which minimizes static charge during the filling and discharging cycles. It requires no grounding. Additives in the material effectively reduce the charge.

Circle No. 40 on Reader Service Card

BURGESS PIGMENT CO.
Beck Blvd.
Sandersville, GA 31082

Demonstrations with emphasis on Eggshell and Satin formulations are keyed to significant savings while improving quality. Products featured include: OPTIWHITE, OPTIWHITE P, OPTIWHITE MX, and BURGESS No. 98. Disciplines also include interiors and exteriors with both alkyd and latex vehicles.

Circle No. 41 on Reader Service Card

BYK-CHEMIE USA
524 S. Cherry St.
Wallingford, CT 06492-7651

Highlighted is BYK® 346 to improve substrate wetting and Byketol® WS to eliminate water and solvent popping in water-based formulations. The new polymeric wetting agents Disperbyk® 110, 164 and 170 are also featured as is the new solvent-free catalyst BYK® 468. Advantages of defoamers BYK® 024 and 025 in aqueous systems are shown.

Circle No. 42 on Reader Service Card

BYK-GARDNER, INC.
2435 Linden Lane
Silver Spring, MD 20910

BYK-Gardner, Inc., manufacturer of color, appearance and physical test equipment, features their new orange peel meter, wave-scan, for objectively evaluating surface structures. In addition, a comprehensive line of color, appearance, physical test and dispersion equipment is displayed.

Circle No. 43 on Reader Service Card

CABOT CORP.
CAB-O-SIL & Special Blacks Div.
P.O. Box 188, Route 36 W.
Tuscola, IL 61953-0188

Featured are CAB-O-SIL® TS-610, TS-530, and TS-720 treated fumed silicas for rheology control, improved water and corrosion characteristics, flow control in powder coatings and numerous other benefits in coatings. Also exhibited are MONARCH®, REGAL®, BLACK PEARL® and ELFTEX® carbon blacks, versatile performance products for coatings applications.

Circle No. 44 on Reader Service Card

CAFRAMO LTD.
Box 70, Airport Rd.
Wiarton, Ont. N0H 2TO Canada

A full line of HIGH-TORQUE lab stirrers is featured. Unique variable speed mechanical transmission amplifies the power of the motor. Brushless (sparkless) motors designed for continuous use.

Circle No. 45 on Reader Service Card

CALGON CORP.
P.O. Box 1346
Pittsburgh, PA 15230

To meet the demand for environmentally safe products, Calgon features its biocide line. On hand are technical experts to help with your specific biocide needs.

Circle No. 46 on Reader Service Card

CAPPELLE INCORPORATED
39 Secor Rd.
Scarsdale, NY 10583

Cappelle introduces two new opaque organic pigments for stoving paints. Acetanil Yellow 7415C (PY 74)—high opacity and color strength—is presented, as well as the Capoxyt Transparent Iron Oxyde Red and Yellow range.

Circle No. 47 on Reader Service Card

THE CARBORUNDUM CO.
Fibers Div.
345 Third St.
Niagara Falls, NY 14302

On display, Fiberfrax® HS-70, HS-70C and HS-95C. These structural thixotropes provide reinforcement, improved wear resistance and improved corrosion resistance in addition to being cost effective thixotropes. They have been successful in high performance thick build coatings, structural adhesives and related applications.

Circle No. 48 on Reader Service Card

CARDOLITE CORP.
500 Doremus Ave.
Newark, NJ 07105

Featured are phenalkamine curing agents, reactive diluents, and flexibilizers for high performance epoxy coating. Several low viscosity materials for VOC compliant coatings are available.

Circle No. 49 on Reader Service Card

CARGILL, INC.
2301 Crosby Rd.
Wayzata, MN 55391

New high-solids, water-reducible, UV-curable, powder and acrylic resins are presented. Formulation techniques and performance data are available. In addition, Cargill's highly experienced team of chemists and application specialists are available for discussion and questions. Zero VOC is our mutual goal.

Circle No. 50 on Reader Service Card

CARRI-MED AMERICAS, INC.
9885 Rockside Rd., Suite 140
Valley View, OH 44125

The Carri-Med CSL Controlled Stress Rheometer operates in oscillatory, creep, and flow modes; helps predict sag, leveling, splattering, running, settling, and dispersion characteristics of coatings; viscosity measurements, gel formations; versatile rheometer.

Circle No. 51 on Reader Service Card

CARROLL SCIENTIFIC, INC.
5401 S. Dansher Rd.
Countryside, IL 60525

Carroll Scientific is exhibiting their Fluotron™ water-based dispersion line. These virgin DuPont Teflon® dispersions are incorporated into water-based paint and coatings to impact abrasion resistance and surface lubricity.

Circle No. 52 on Reader Service Card

CB MILLS DIV.
Chicago Boiler Co.
1225 Busch Pkwy.
Buffalo Grove, IL 60089

CB Mills displays the latest in milling equipment including a sealed "Red Head" vertical mill, multihead lab mill for side by side testing, and a new high efficiency Dyno-Mill. The "Red Head" solvent recovery still and tank washing equipment are also shown.

Circle No. 53 on Reader Service Card

CCP POLYMERS
217 Freeman Dr.
Port Washington, WI 53074

CCP Polymers Division is a full line supplier of resins and additives to the coatings industry. Items highlighted in this year's booth include Hydrosol acrylic emulsions, multifunctional resins and P-Cure ® peroxide curable resins.

Circle No. 54 on Reader Service Card

CELITE CORP.
137 W. Central Ave.
Lompoc, CA 93436

Learn how our efficient CELITE® flatting agents and extender pigments can help improve your formulation's performance and cost.

Circle No. 55 on Reader Service Card

CHEMICAL MARKETING REPORTER
Schnell Publishing
80 Broad St.
New York, NY 10004-2203

Copies of "Coatings '92," an industry special report on solvent replacement, powder coatings and additives are being distributed. Sales representatives are also available to discuss *Chemical Business*, CB *Red Book of Chemical Services*, OPD *Chemical Buyers Directory* as well as *Chemical Marketing Reporter*.

Circle No. 56 on Reader Service Card

CHEMICAL WEEK
888 Seventh Ave.
New York, NY 10106

Circle No. 57 on Reader Service Card

CIBA-GEIGY CORP.
Additives Div.
7 Skyline Dr.
Hawthorne, NY 10532

CIBA-GEIGY Corp. features a broad spectrum of additives and resins for coatings. The Polymers Div. features high technology resins for liquid and powder coatings and hardeners for high performance, low VOC coatings. The Additives Div. features hindered amine light stabilizers and UV absorbers that help formulators meet regulatory requirements. They are also featuring Tinuvin® 123, a novel light stabilizer based on hindered aminoether technology.

Circle No. 58 on Reader Service Card

COATINGS MAGAZINE
86 Wilson St.
Oakville, Ont. L6K 3G5 Canada

Show issues of *Coatings Magazine*, Canada's magazine serving the coatings industry, are distributed.

Circle No. 59 on Reader Service Card

COLOR AND APPEARANCE TECHNOLOGY, INC.
29 Emmons Dr., Bldg. G-2
Princeton, NJ 08540

Color Quality Control Systems—featuring new Pass/Fail logic with automatic determination of tolerances, and portable spectrophotometer. Total Color Control Systems—featuring easy-to-use, comprehensive formulation, correction, and QC software. Multi-angle Spectrophotomer—featuring measurements from eight different angles.

Circle No. 60 on Reader Service Card

COLOR CORP. OF AMERICA
1215 Nelson Blvd.
Rockford, IL 61104

Sales and technical persons are available to discuss Color Corporation's products. These include: OptiColor high performance industrial colorants, Ethylene Glycol Free Universal colorants, Tint-Eze aqueous dispersions, Customatic Universal colorants, ExacTint alkyd dispersions and T-75 alkyd colorants.

Circle No. 61 on Reader Service Card

COLORGEN, INC.
One Federal St.
Billerica, MA 01821

Colorgen exhibits the DCM 1100 Computer Color Matching System that incorporates their own dual beam spectrophotometer, an IBM compatible computer, and software for color formulation and analysis, quality control, and color matching. Their system provides solutions to quality control and color formulation problems in laboratory and manufacturing environments and is used in the paint, ink, textile, and plastics industries.

Circle No. 62 on Reader Service Card

COLORTEC ASSOCIATES, INC.
74 Main St.
Lebanon, NJ 08833

Colortec presents Version 7 of ColorSoft® Color Matching and Batch Correction software. ColorSoft® V7 has been specifically improved to help solve difficult paint shading problems, in-plant; in small batching stations and in custom tinting. It is designed to drive color matching instruments from many manufacturers; demonstrations with the advanced Milton Roy ColorMate™ spectrophotometer are done live.

Circle No. 63 on Reader Service Card

COLUMBIAN CHEMICALS CO.
1600 Parkwood Circle, Suite 400
Atlanta, GA 30339

Columbian Chemicals features its Raven carbon blacks for color application, highlighting Raven 5000 Ultra II for automotive coatings. The Mapico Division exhibits its full line of synthetic iron oxides.

Circle No. 64 on Reader Service Card

COMPLIANCE SERVICES, INC.
826 N. Lewis Rd.
Royersford, PA 19468

Compliance Services, Inc., an environmental management company, is committed to keeping our clients competitive in their marketplace by integrating their environmental requirements with today's high technology through our Waste Management, Transportation, Remediation and Consulting Groups.

Circle No. 65 on Reader Service Card

CONSOLIDATED RESEARCH, INC.
200 E. Evergreen
Mt. Prospect, IL 60056

CRI offers coatings and polymer consulting to the consumer, industrial and high tech markets for solving formulation, application, production problems and cost reduction. Also provided are FDA compliance, expert witness experience, comprehensive technical/marketing reports on focused markets, and analytical services. Our fifty plus associates represent the finest talent in the industry and assure clients leading edge capability.

Circle No. 66 on Reader Service Card

COOKSON PIGMENTS, INC.
256 Vanderpool St.
Newark, NJ 07114

Cookson Pigments displays an unusual array of newly released organic red and blue pigments in combination with various special effects pigments.

Circle No. 67 on Reader Service Card

COULTER CORP.
601 Coulter Way
Hialeah, FL 33010

Featured is the LS-Series, laser diffraction particle size analyzer with hazardous fluids module, the zeta potential analyzer Delsa 440 for multi-angle simultaneous light scatter measurement, and the submicron particle size analyzer, N4MD, for rapid pass/fail QC tests.

Circle No. 68 on Reader Service Card

CPI PURCHASING MAGAZINE
275 Washington St.
Newton, MA 02158

CPI Purchasing magazine is a monthly publication which reaches 40,000 qualified buyers and managers with purchasing responsibility in the chemical and process industries. *CPI Purchasing* is the only magazine written and edited for buyers in the chemical and process industries.

Circle No. 69 on Reader Service Card

CPS CHEMICAL CO., INC.
P.O. Box 162
Old Bridge, NJ 08857

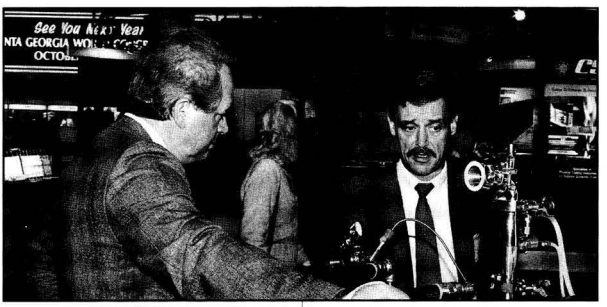
CPS Chemical Company, Inc., manufactures and distributes functional monomers and other specialty organic chemicals from two U.S. plants for the coatings industry.

Circle No. 70 on Reader Service Card

CR MINERALS CORP.
14142 Denver West Pkwy., Suite 250
Golden, CO 80401

CR Minerals introduces DiaFil—an amorphous diatomite flatting pigment. Photos, data sheets, and sales literature are on display to describe this new approach to eliminating the crystalline silica problem.

Circle No. 71 on Reader Service Card



CRAY VALLEY PRODUCTS, INC.
468 Thomas Jones Way
Exton, PA 19314

Cray Valley is exhibiting three product groups including families of micronized waxes and rheological additives. The introduction of a flexible two pack acrylic resin system will complement their existing line of specialty resins.

Circle No. 72 on Reader Service Card

CROSFIELD CO.
101 Ingalls Ave.
Joliet, IL 60435

Crosfield Company is proud to announce the opening of their state of the art manufacturing facilities in Joliet, Illinois. The plant manufactures Crosfield's line of silica flatting agents which are specifically designed for use in the surface coatings industry. The Gasil HP line of high performance flatting agents is also featured.

Circle No. 73 on Reader Service Card

CUNO INC
400 Research Pkwy.
Meriden, CT 06450

Cuno manufactures a complete line of disposable and cleanable filters, filter pack systems, and housings. Cuno's depth-type filters provide excellent classification characteristics.

Circle No. 74 on Reader Service Card

D/L LABORATORIES
116 E. 16th St.
New York, NY 10003

Representatives of D/L Laboratories, a fully accredited consulting and testing organization serving the coating and sealant industries for over 50 years, are available to discuss the cost benefits of using our services, either in place of your existing technical service staff or as an adjunct to your technical staff. Services include QPL testing, formulation, VOC determinations, market surveys and legal assistance.

Circle No. 75 on Reader Service Card

DANIEL PRODUCTS CO., INC.
400 Claremont Ave.
Jersey City, NJ 07304

New for '92...Tint-Ayd® Transparent Red and Yellow Oxide Dispersions for tinting most low VOC solvent-thinned and water-thinned hgh performance coatings; and Slip-Ayd® SL 700 and SL 800 micronized blends of FDA cleared waxes for slip and resistance to marring, abrasion and blocking.

Circle No. 76 on Reader Service Card

DANTCO MIXERS CORP.
9 Oak St.
Paterson, NJ 07501

Dantco Mixers Corp. designs and manufacturers mixers, agitators, dispersers, blenders, homogenizers and pressure vacuum vessels. This equipment is available from 1/4 HP, for laboratory use, up to 200 HP, for production use. Dantco also designs and fabricates blades, impellers, disk valves, crushers (can, pails, drums), and float air switches for level controls.

Circle No. 77 on Reader Service Card

DATACOLOR INTERNATIONAL
5 Princess Rd.
Lawrenceville, NJ 08648

Datacolor International features its new hand-held MicroFlash® spectrophotometer to complement its full line of equipment and systems for total color management. Other systems include: the FORMULA ONE® dispensing system for computer automated blending of color formulas in production; the model 2018 advanced computer color control system; and the CHROMA QC system for color QC.

Circle No. 78 on Reader Service Card

DAY-GLO COLOR CORP.
4515 St. Clair Ave.
Cleveland, OH 44103

Day-Glo Color Corp. is the world's largest manufacturer of fluorescent color for the paint, graphic arts (inks and coatings), and plastics industries. Recent research breakthroughs unveil several new technologies.

Circle No. 79 on Reader Service Card

DEFELSKO CORP.
802 Proctor Ave.
Ogdensburg, NY 13669

DeFelsko features its full line of leading coating thickness gages. On display are the new electronic PosiTector 5000 and 6000 Series which measure the thickness

of coatings on ferrous or nonferrous metals accurately and quickly, and the PosiTest and unique PosiPen gages used to measure nonmagnetic coatings on steel.

Circle No. 80 on Reader Service Card

DEGUSSA CORP.
425 Metro Place North, Suite 450
Dublin, OH 43017

Degussa's exhibit features numerous high-performance products which include AEROSIL fumed silicas, flatting agents OK412, OK500 and TS100, carbon blacks FW200 and Printex XE2. Construction of their hydrophobic fumed silica AEROSIL R972 plant in Waterford, NY is also highlighted.

Circle No. 81 on Reader Service Card

UNIVERSITY OF DETROIT MERCY
P.O. Box 19900
Detroit, MI 48221

Coatings and polymers educational and research activities at the University of Detroit Mercy are displayed. Research activities are concentrated on coatings—structural and automotive (waterborne, powder, UV-curable, moisture curing, conductive coatings and coatings for plastics and elastomers), sealants and adhesives.

Circle No. 82 on Reader Service Card

DEVREE CO./AUTOMATED FILLING SPECIALISTS
P.O. Box 709
Milford, MI 48381

Automated Filling Specialists, distributor for the DeVree Company of Belgium, exhibits the Automatic Filling Machine, Type V.230 for five U.S. gallon metal or plastic pails.

Circle No. 83 on Reader Service Card

DISTIL-KLEEN, INC.
22 Hudson Pl.
Hoboken, NJ 07030-5512

Featured are the Robus tank washing system, to wash contaminated mixing tanks, the LED water treatment system, to treat contaminated water, and the M2ON solvent recovery system, to reclaim contaminated solvents.

Circle No. 84 on Reader Service Card

DOMINION COLOUR CORP.
1800 Ironstone Manor, Unit #2
Pickering, Ont. L1W 3J9 Canada

DCC exhibits organic pigments including new products for coatings applications, as well as inorganic pigments featuring silica encapsulated chrome yellows and moly oranges; supported by the extensive range of regular, predarkened and sulphur dioxide resistant types. For anticorrosion primer paints, DCC is offering Oncor®, zinc phosphate and a range of specialty anticorrosive pigments.

Circle No. 85 on Reader Service Card

THE DOW CHEMICAL CO.
2040 Dow Center
Midland, MI 48674

Representatives discuss the company's product stewardship programs and a new regulatory information service. Featured products from the Coatings Group include: D.E.R.® liquid and solid epoxy resins, D.E.H® epoxy hardeners, and new monomers. The Chemicals & Performance Products Group features its DOWANOL® glycol ether products. Representatives from the North American Latex Group are available.

Circle No. 86 on Reader Service Card

DOW CORNING CORP.
P.O. Box 0994
Midland, MI 48686-0994

Dow Corning exhibits high performance silicone resins, including a new line of water-based products and silicone additives for paints, inks, coatings and adhesives.

Circle No. 87 on Reader Service Card

DRAISWERKE, INC.
3 Pearl Ct.
Allendale, NJ 07401

The newly developed Drais DCP perl mill with double cyclinder rotor/stator system is featured. The Drais horizontal "TEX" perl mill and Drais PML-H/V laboratory perl mill are also highlighted.

Circle No. 88 on Reader Service Card

DREW INDUSTRIAL DIV.
One Drew Plaza
Boonton, NJ 07005

Drew's exhibit focuses on new biocides and dispersants, as well as high-gloss and high-performance defoamers.

Circle No. 89 on Reader Service Card

DRY BRANCH KAOLIN CO.
Route #1, Box 468-D
Dry Branch, GA 31020

Dry Branch Kaolin Company presents over 90 years of clay experience and knowledge, resulting in a complete line of Hegman, delaminated, fine particle, and calcined clays for the paint industry, produced under the highest production standards, including statistical process and quality controls.

Circle No. 90 on Reader Service Card

DSA CONSULTING, INC.
P.O. Box 1121
Mission, KS 66222

DSA Consulting, Inc. exhibits and demonstrates The Desk Top Laboratory. This system of computer programs gives the user the ability to start and complete a formula beginning with color, hide, gloss and extender additions, dispersion, bulk for cost and stoichimetry, followed by viscosity calculation.

Circle No. 91 on Reader Service Card

DU PONT CO.
1007 Market St., N2526
Wilmington, DE 19898

Du Pont Coatings Resource Network combines high quality products, services, and resources. It is a resource for acrylic resins, solvents, titanium dioxide, many additives for special coating properties, and specialty products, as well as services for solving environmental, technological, business operation, and engineering problems.

Circle No. 92 on Reader Service Card

EAGLE-PICHER MINERALS, INC.
1755 E. Plumb Ln., Suite 155
Reno, NV 89502

Celatom for the paint industry, an essentially pure, inert silica which does not react with any pigments or vehicles used in most organic coatings, is featured. Celatom's fresh water diatoms have a unique microscopic void structure with thicker walls for higher bulk/strength.

Circle No. 93 on Reader Service Card

EAGLE ZINC CO.
30 Rockefeller Plaza
New York, NY 10112

Eagle Zinc Co. manufactures American process zinc oxide at the former Eagle-Picher Co. plant in Hillsboro, IL. For improved stability, durability and color retention, use our American Process grades 414W, 417W, and 427W. Meadowbrook Co., our sister plant, manufactures zinc dust to your exact specifications and packaging requirements.

Circle No. 94 on Reader Service Card

EASTERN MICHIGAN UNIVERSITY
Emissions Eval. Ctr., 201 Sill Hall
Ypsilanti, MI 48197

Information is available for the academic programs (BS and MS Polymer and Coatings Technology); National Science Foundation Coating Center; Emissions Center; and Coating Research Institute for Industrial Contract Research.

Circle No. 95 on Reader Service Card

EASTMAN CHEMICAL CO.
1133 Ave. of the Americas
New York, NY 10036

For waterborne technology, new water-dispersible cellulose esters rheology control resins and chlorinated polyolefin plastics-adhesion promoting resins are featured along with Ektasolve EP coupling solvent and Texanol coalescing aid. For high-solid technology acetoacetyl containing AAEM and TBAA are highlighted along with two new polyester resin intermediates HPHP and BEPD. The performance of Eastone FSE fountain solution solvent is also presented.

Circle No. 96 on Reader Service Card

EBONEX CORP.
2380 S. Wabash
Melvindale, MI 48122

A display of products manufactured by use of bone black pigments is highlighted. Bone Black as a filter for removing heavy metals from water is introduced.

Circle No. 97 on Reader Service Card

ECC INTERNATIONAL
5775 Peachtree-Dunwoody Rd., Suite 200G
Atlanta, GA 30342

ECC International features its full line of calcium carbonate filler and extender pig-

ments. Industry standards such as Atomite, Snowflake White and Duramite are featured alongside Micro-White 25 Drikalite and No. 1 White.

Circle No. 98 on Reader Service Card

EIGER MACHINERY, INC.
1258 Allanson Rd.
Mundelein, IL 60060

Eiger presents a complete line of laboratory and production horizontal bead mills at the 1992 Paint Show. Included is the patented "MINI" mill, excellent for R&D. Production mills range in size from 5 to 250 liter chamber capacity.

Circle No. 99 on Reader Service Card

ELEKTRO-PHYSIK USA, INC.
778 W. Algonquin Rd.
Arlington Heights, IL 60005

On display is our comprehensive line of portable, nondestructive coating thickness testing gauges. Gauges on display are the Mikrotest Series, the Minitest 500 and 4000 Series and, featured, the new Mikrotest V-Digital and Minitest 100 and 200.

Circle No. 100 on Reader Service Card

ELF ATOCHEM
Three Parkway
Philadelphia, PA 19102

Highlighted are t-Amyl peroxides, a new family of initiators which allow the production of acrylic resins with low molecular weight, narrow molecular weight distribution and low viscosity at high solids levels. Also featured are products from the Functional Polymers and Industrial Specialties Groups, and Polymer Additives Systems.

Circle No. 101 on Reader Service Card

ELMAR WORLDWIDE
200 Gould Ave., P.O. Box 245
Buffalo, NY 14043-0245

The Elmar Model RPE-507 GI, seven station gallon rotary piston filler, filling latex paints at speeds to 80 gallons/min. is shown. With Elmar's 6" side mounted piston and individual piston stroke adjustment (IPSA) feature, accuracy can be guaranteed at ± 1/4 fl. oz. (± 7 cc).

Circle No. 102 on Reader Service Card

EM INDUSTRIES, INC.
5 Skyline Dr.
Hawthorne, NY 10532

EM Industries, Inc., Pigment Division, and their associates are the largest manufacturer of synthetic pearlescent pigments worldwide. Sold under the tradename of Afflair® Lustre Pigments in the U.S. and Canada, they are easily incorporated into plastics and coatings. They add an aura of opulence and a visually exciting iridescent lustre to finished quality products.

Circle No. 103 on Reader Service Card

EMCO CHEMICAL DISTRIBUTORS INC.
2100 Commonwealth Ave.
N. Chicago, IL 60064

Emco Chemical Distributors Inc. display consists of the various types of equipment used in the blending and packaging of various chemicals, solvents and chemical specialty products at their plant.

Circle No. 104 on Reader Service Card

ENGELHARD CORP.
101 Wood Ave.
Iselin, NJ 08830

HARSHAW™ organic and inorganic color pigments and TiO_2 extenders and thickening agents: METEOR® and METEOR PLUS™ mixed metal oxide pigments, organic pigments, low soluble cadmium pigments AURACRYL™ and AURASPERSE® color dispersions, SATINTONE® and ASP® kaolin-based TiO_2 extended pigments, and ATTAGEL® specialty thickeners are featured.

Circle No. 105 on Reader Service Card

EOG ENVIRONMENTAL, INC.
5611 West Hemlock St.
Milwaukee, WI 53223

Full-service for waste recycling/disposal, including identification, packaging, labels, manifests, transportation and recycling/disposal, are featured. Facility located in Milwaukee.

Circle No. 106 on Reader Service Card

EPWORTH MFG. CO., INC.
1400 Kalamazoo St.
South Haven, MI 49090

Featured is the very latest technology in media dispersion mills, including a new, closed, continuous process small media mill. Batch process mills are also on display, as well as a complete selection of large and small grinding media. Samples of all types of grinding media are available.

Circle No. 107 on Reader Service Card

ETNA PRODUCTS, INC.
Specialty Chemical Div.
16824 Park Circle Dr.
Chagrin Falls, OH 44023

Featured are oil-free, high-solid polyester resins for VOC compliant industrial coatings. We offer new product information on high solids/low viscosity vehicle systems to meet current environmental regulations. Personnel are on hand to review our commercial and custom resins, and toll manufacturing capabilities.

Circle No. 108 on Reader Service Card

EXXON CHEMICAL CO.
P.O. Box 3272
Houston, TX 77253

This new exhibit features compliant products and initiatives available to the coatings industry to help comply with current emissions regulations. Available is a free, confidential demonstration of the CO-ACT™ computer service offered by Exxon Chemical.

Circle No. 109 on Reader Service Card

FAWCETT CO., INC.
3863 Congress Pkwy.
Richfield, OH 44286

On display is our complete line of air and electric driven mixing equipment. Also shown is our Reddy System Mixer for protable paint mixing tanks.

Circle No. 110 on Reader Service Card

FCF-BOWERS INC.
487 Lorne Ave.
Stratford, Ont., N5A 6T1 Canada

Products exhibited include: Bowers patented oribital shaft processor, drum mixers, dispersers, stainless steel tote tanks with air agitators, and a jacketed stainless steel reactor with mixer.

Circle No. 111 on Reader Service Card

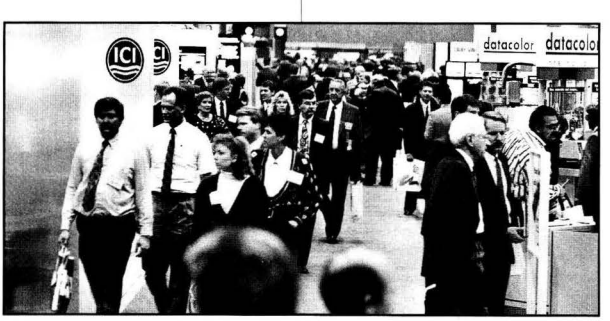
FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY
492 Norristown Rd.
Blue Bell, PA 19422

Featured is the new ***Infrared Spectroscopy Atlas for the Coatings Industry***. A display of Federation publications and educational and training aids including the FSCT Series on Coatings Technology, the JOURNAL OF COATINGS TECHNOLOGY, the *Paint/Coatings Dictionary*, and the FSCT slide/tape training programs is highlighted. Information on upcoming Federation sponsored seminars is available. The 1993 Paint Industries' Show floor plan is on display and applications for exhibit space are available. The 1993 Show is in Atlanta, GA.

Circle No. 112 on Reader Service Card

FILTER SPECIALISTS, INC.
P.O. Box 735
Michigan City, IN 46360

Liquid filtration products are featured, including pressure vessels for cartridge



and bag filtration, polypropylene microfiber cartridges, and felt and mesh filtration bags.

Circle No. 113 on Reader Service Card

FISCHER TECHNOLOGY, INC.
750 Marshall Phelps Rd.
Windsor, CT 06095

Fischer is exhibiting instruments to measure paint thickness, as well as specialized instrumentation to measure Micro Hardness under ultra low load.

Circle No. 114 on Reader Service Card

FLUID MANAGEMENT LTD. PARTNERSHIP
605 S. Wheeling Rd.
Wheeling, IL 60090

Fluid Management displays a variety of mixing and dispensing equipment. This includes the Miller Accutinter 3000 and 4000 as well as the Harbil 5G, the Miller Gyromixer for one and five gallon containers.

Circle No. 115 on Reader Service Card

FMC CORP.
1735 Market St.
Philadelphia, PA 19103

Lattice™ colloidal microcrystalline cellulose, a suspension aid, is stable over a broad range of pH temperatures. It works synergistically with other thickeners to produce improved, cost-effective formulations. It reduces syneresis, improves sag resistance and brushability, and minimizes roller splatter.

Circle No. 116 on Reader Service Card

FMJ INTERNATIONAL PUBLICATIONS
Queensway House, 2, Queensway, Redhill
Surrey RH1 1QS England

Publications and exhibitions for the international paint and coatings industry. Paint & Ink International, targeting South East Asia, the Middle East and Latin America. *Polymers Paint Colour Journal*, a leading European title. Information is available on forthcoming "Resins and Pigments" exhibitions in Europe and the "Asia Pacific Coatings Show" to be held in Singapore, May 1993.

Circle No. 117 on Reader Service Card

H.B. FULLER CO.
3530 N. Lexington Ave.
St. Paul, MN 55126

Featured is our new high-solids acrylic for exterior paint, and new high scrub vinyl acrylic. Other vinyl-acrylics, styrene-acrylics, and all-acrylic latexes for paints, floor and deck coatings, and wood stain coatings are shown.

Circle No. 118 on Reader Service Card

PAUL N. GARDNER CO., INC.
602 Northeast First St.
Pompano Beach, FL 33060

Watch the unbelievable electronic rocker automatically start, stop, and record hardness readings (bring in some panels for test). Also, receive your free, new, smaller size viscosity cup equivalent chart.

Circle No. 119 on Reader Service Card

GAYLORD CHEMICAL CORP.
P.O. Box 1209
Slidell, LA 70459-1209

Looking for a safer, more powerful solvent for your coatings or strippers? The unique properties of Gaylord Chemicals dimethyl sulfide (DMSO) may help you to develop new formulations to replace those that don't satisfy your current needs. To replace methylene chloride, DMF, NMP or other solvents, stop by our booth.

Circle No. 120 on Reader Service Card

THE BF GOODRICH CO.
Specialty Polymers & Chemicals Div.
9911 Brecksville Rd.
Cleveland, OH 44141-3247

BFGoodrich features its extensive line of Carboset specialty waterborne polymers for industrial coatings, graphic arts and adhesives. Coatings polymers are presented for metal, plastic and wood and temporary strippable and peelable coatings. Carboflow specialty coatings additives are also featured.

Circle No. 121 on Reader Service Card

GOODYEAR TIRE & RUBBER CO.
Chemical Div.
1485 E. Archwood Ave.
Akron, OH 44316

Goodyear is displaying its Pliolite water reducible resins: Pliolite WRD, 7103, 7104 and 7217. It is exhibiting examples of how its products have found low VOC utility; which includes a top coat paint for the Golden Gate Bridge. Other successes where VOC levels were important to the manufacturer are also shown.

Circle No. 122 on Reader Service Card

W.R. GRACE & CO.
Davison Chemical Div.
P.O. Box 2117
Baltimore, MD 21203-2117

W.R. Grace introduces their new SYLOID® 7000 flatting agent for wood finishes. The exceptional clarity and excellent suspension of SYLOID® 7000 makes it the perfect solution for both waterborne and solvent based coatings. Also featured is SYLOID® LV-6 flatting agent for high solids industrial coatings.

Circle No. 123 on Reader Service Card

GUERTIN BROS. COATINGS AND SEALANTS
50 Panet Rd.
Winnipeg, Man. R2J OR9 Canada

Featured are Super-Shield® II patented high-solid, isocyanate-free, two-component, acrylic polyurethane resins for environmentally friendlier coatings.

Circle No. 124 on Reader Service Card

HAAKE, INC.
53 W. Century Rd.
Paramus, NJ 07652

HAAKE dispays the Sofraser in-line process control instrument and the new RS100 controlled stress rheometer.

Circle No. 125 on Reader Service Card

HALOX PIGMENTS
2340 165th St.
Hammond, IN 46320

HALOX Pigments features new "XTAIN" products for tannin stain inhibition. They also feature their new, "heavy-metal free" HALOX CW-491 corrosion inhibitor. The latest formulating guidelines for using HALOX SZP-391 in high performance protective coating systems are also available.

Circle No. 126 on Reader Service Card

HARCROS PIGMENTS INC.
11 Executive Dr.
Fairview Heights, IL 62208

Harcros Pigments manufactures a broad line of synthetic and natural pigments and extenders. High quality iron oxides, chromium oxides, barium sulfate extenders and carbon black, all engineered to meet the demanding performance requirements of the coatings industry are featured.

Circle No. 127 on Reader Service Card

R.E. HART LABS, INC.
1641 Langley Ave.
Irving, CA 92714

Circle No. 128 on Reader Service Card

HARRIS ENVIRONMENTAL, INC.
7001 Chatham Center Dr., Suite 2200
Savannah, GA 31405

A new cost efficient (patented) Intermediate Bulk Container (IBC) for the shipping and storage of liquid and flowable material has been developed by Harris Environmental, Inc. The Titan 330 is made of a new, space age, composite material, which eliminates virtually all problems associated with drums and other IBCs.

Circle No. 129 on Reader Service Card

HENKEL CORP.
300 Brookside Ave.
Ambler, PA 19002

The Coatings and Inks Division of Henkel Corp. exhibits reactive resins and additives for waterborne coatings, high solids coatings, radiation cured systems, and powder coatings. The products featured include defoamers, mildewcides, rheology modifiers, epoxy curing agents, corrosion inhibitors, polyamide and acrylic resins.

Circle No. 130 on Reader Service Card

HERAEUS DSET LABORATORIES, INC.
45601 N. 47th Ave.
Phoenix, AZ 85027-7042

Heraeus DSET Laboratories exhibits a full range of services and equipment for evaluating the weatherability of paints and coatings.

Circle No. 131 on Reader Service Card

HEUCOTECH LTD.
99 Newbold Rd.
Fairless Hills, PA 19030

Heucotech Ltd. is highlighting Aquis II, a glycol free, high solids line of pigment dispersions; Ecopaque, a lead chromate alternative; Heucophos, a nontoxic anti-

corrosive for the replacement of zinc and strontium chromate in coil, aircraft and conventional coatings; and Heucodur, a mixed metal oxide line.

Circle No. 132 on Reader Service Card

HILTON DAVIS CO.
2235 Langdon Farm Rd.
Cincinnati, OH 45237

Hilton Davis makes available information concerning all its color dispersions for the paint and coatings industry. Sales, technical, and management personnel are available.

Circle No. 133 on Reader Service Card

HITOX CORP. OF AMERICA
P.O. Box 2544
Corpus Christi, TX 78403

The Hitox Corp. of America features HITOX buff titanium dioxide and HITOX 5, a sub-micron buff TiO_2. HITOX is an economical, functional alternative to white TiO_2. HITOX 5 is a sub-micron grade recommended for coatings which require optimum opacity and gloss. OSO iron oxides and BARTEX barium sulfate are also exhibited.

Circle No. 134 on Reader Service Card

HOCKMEYER EQUIPMENT CORP.
610 Worthington Ave.
Harrison, NJ 07029

Hockmeyer introduces the Hockmeyer HSD Mill providing an extremely effective high intensity milling alternative for the finest of grind requirements. Also presented is our full range of equipment including multiple shaft mixers, CMX-100 Automated Tote/Tank Washer, rotostators and dry powder blending units.

Circle No. 135 on Reader Service Card

HOECHST CELANESE CORP.
Pigments Div.
500 Washington St.
Coventry, RI 02816

Hoechst Celanese, the world's largest supplier of color pigments for coatings, has a new booth highlighting their many products and services. Technical specialists are on-hand to help with color pigment questions and to provide information on several new products.

Circle No. 136 on Reader Service Card

HOECHST CELANESE CORP.
Waxes & Lubricants Group
Route 202-206, P.O. Box 2500
Somerville, NJ 08876-1258

The complete line of Ceridust® micronized waxes used to maximize performance properties of powder, water-based, and standard coatings is exhibited. The highly water-dispersible Ceridust® VP3719 and companion emulsion concentrates, ideal for use in waterborne coatings and stains are featured.

Circle No. 137 on Reader Service Card

HORIBA INSTRUMENTS, INC.
17671 Armstrong Ave.
Irvine, CA 92714

Horiba displays a line of products for particle size measurement. These include CAPAs for centrifugal photosedimentation analyses and LAs for laser scattering particle size analysis. The VM-100 true density measuring instrument is shown.

Circle No. 138 on Reader Service Card

J.M. HUBER CORP.
One Huber Rd.
Macon, GA 31298

J.M. Huber Corp. is represented by its Clay Division, Chemicals Division, and Calcium Carbonate Division. Huber's broad line of pigments for the paint and coatings industry is presented by experts in applications and technical service.

Circle No. 139 on Reader Service Card

HÜLS AMERICA INC.
2 Centennial Ave.
Piscataway, NJ 08855

Hüls America Inc. features trade sales and industrial color systems, high solids colorant dispersions, aliphatic isocyanates (IPDI/TMDI), aliphatic epoxy hardeners (IPD/TMD), powder coating crosslinkers, and a comprehensive line of additives, including driers, fungicides, preservatives, thickening agents and defoamers. Also shown are a high purity line of silanes, silicates and silicones, polyamide 12 for powder coatings, and vinyl esters.

Circle No. 140 on Reader Service Card

HUNTERLAB
11491 Sunset Hills Rd.
Reston, VA 22090

HunterLab features MatchMaker® color formulation software developed for professional colorists and available on all of HunterLab's spectrophotometers. For gloss and DOI, HunterLab presents ProGloss™ and DORIGON® II, the newest members in their family of portable instruments.

Circle No. 141 on Reader Service Card

ICI AMERICAS INC.
Concord Pike & New Murphy Rd.
Wilmington, DE 19897

ICI Americas Inc. features products from ICI Biocides, in particular, PROXEL® GXL, an effective, nonformaldehyde preservative formulated for use in water-based paint formulations, ICI Colors' Solsperse® hyperdispersants, nitrocellulose and pigments; and the ICI family of quality nonionic surfactants used in resin emulsification, wetting agents and dispersants applications.

Circle No. 142 on Reader Service Card

ICI RESINS U.S.
730 Main St.
Wilmington, MA 01887

The ICI Resins U.S. exhibit demonstrates new developments in the company's full line of waterborne acrylic and urethane polymers, copolymers, vinyl-acrylic terpolymers and other special-purpose and solventborne polymers for the industry and architectural coatings markets.

Circle No. 143 on Reader Service Card

IDEAL MFG. & SALES CORP.
1118 O'Neill Ave.
Madison, WI 53704

Modular filling, placing and closing systems are on display. These units are available for semi and fully automatic operation. Fillers for 1/4 pints to drums. Placers and closers for 1/4 pints to pails. Filling by volume, weight and other methods.

Circle No. 144 on Reader Service Card

INDUSTRIAL FINISHING MAGAZINE
191 S. Gary Ave.
Carol Stream, IL 60188

The October issue of *Industrial Finishing*, the magazine for coatings manufacturing and application, is distributed free to attendees. Subscription qualification forms are available. Business and editorial staff members are present.

Circle No. 145 on Reader Service Card

INTERFIBE CORP.
6001 Cochran Rd., #A-202
Solon, OH 44139

Interfibe cellulose fiber is a lightweight, high bulk filler. Characterized by exceptional viscosity-building and reinforcing qualities, Interfibe is ideal for products as diverse as asphalt and latex-based coatings, butyl, silicone and oil-based sealants, as well as epoxy adhesives, urethane foams and many others.

Circle No. 146 on Reader Service Card

INTERNATIONAL COMPLIANCE CENTRE
2150 Liberty Dr., Unit 6
Niagara Falls, NY 14304

Regulatory products to comply with CFR Title 49, HM-181, TDG, and ICAO/IATA regulations are featured. Products and services include UN performance packaging, UPS packaging, training seminars, training aids, placard, labels and publications.

Circle No. 147 on Reader Service Card

INTERNATIONAL RESOURCES, INC.
8945 Guilford Rd., Suite 100
Columbia, MD 21046

The firm features organotin compounds from Sankyo Organic Chemicals. Emphasis is on catalysts for electrodeposition, chlorinated rubber paints, automotive topcoats, and silicone coating systems. Featured are pentaerythritol, dipentaerythritol, SANKO HCA, Lithopone, THN, acrylamide, and dicyandiamide.

Circle No. 148 on Reader Service Card

INTERNATIONAL SPECIALTY PRODUCTS
1361 Alps Rd.
Wayne, NJ 07470

ISP's RAPI-CURE® line of nonacrylate reactive diluents for UV/EB cured coatings, inks and adhesives is featured. ISP's environmentally sensible alternatives can replace many dangerous solvents, including CFCs, 1,1,1-trichloroethylene, methylene chloride and acetone. ISP engineered products: Nonflammable and noncarcinogenic.

Circle No. 149 on Reader Service Card

ISP FILTERS INC.
4436 Malone Rd.
Memphis, TN 38118

A full line of liquid filtration bags and vessels is exhibited, including the new Accurate 1 and Y finished bags for high efficiency/fiber free filtration in conjunction with the Sentinel Ring.

Circle No. 150 on Reader Service Card

ITT A-C PUMP/MARLOW
1150 Tennessee Ave.
Cincinnati, OH 45229

ITT A-C Pump and ITT Marlow offer a complete line of centrifugal and air-operated diaphragm pumps for the paint industry.

Circle No. 151 on Reader Service Card

S.C. JOHNSON POLYMER
1525 Howe St.
Racine, WI 53403-5011

SC Johnson Polymer displays a wide range of Joncryl acrylic polymers for coatings applications. Included in the display are waterborne high gloss paints, wood coatings, and maintenance coatings and high performance coatings based on high solids acrylic polyols and acrylic powder coatings.

Circle No. 152 on Reader Service Card

JOURNAL OF COATINGS TECHNOLOGY
492 Norristown Rd.
Blue Bell, PA 19422

The JOURNAL OF COATINGS TECHNOLOGY, official publication of the Federation of Societies for Coatings Technology, is a monthly technical magazine which has been published since 1922. Recognized world-wide as a leading industry publication, its editorial pages carry the bylines of outstanding authorities in the fields of coatings and color. ***JCT*** readers *are* the coatings industry. They are the chemists, chemical engineers, technologists, research and development, technical sales, and supervisory production personnel engaged in the formulation, testing, and manufacture of paints, varnishes, lacquers and related materials.

Circle No. 153 on Reader Service Card

K-T FELDSPAR CORP.
Highway 226 North
Spruce Pine, NC 28777

K-T Feldspar Corporation is a manufacturer of feldspar filler extenders for the paint and coatings industries. The company is a producer of a range of products which are sold under the trade name of MINSPAR. This exhibit features information on MINSPAR 3, 4, and 25 as well as MINSPAR 7, our newest product introduced in 1992.

Circle No. 154 on Reader Service Card

KEMIRA, INC.
P.O. Box 368
Savannah, GA 31402

Kemira, Inc. presents the diversity of the Unitane® line of titanium dioxide pigments for the paint and coatings industry.

Circle No. 155 on Reader Service Card

KENRICH PETROCHEMICALS, INC.
140 E. 22nd St.
Bayonne, NJ 07002-0032

Ken-React® titanate, zirconate and aluminate coupling agents for improved dispersion, adhesion and anti-corrosion performance in solvent and waterborne coatings are exhibited. Kenplast® G and Kenplast® ES-2, nonreactive and reactive diluents are also featured.

Circle No. 156 on Reader Service Card

KENT STATE UNIVERSITY
Chemistry Dept., P.O. Box 5190
Kent, OH 44242

Highlights of the coatings program within the chemistry department are featured; including published research, coatings continuing education program, cooperative education and the analytical instrumentation facility.

Circle No. 157 on Reader Service Card

KING INDUSTRIES, INC.
Science Rd.
Norwalk, CT 06852

King Industries' new exhibit features technical information on specialty additives used in the formulation of high solids, waterborne and powder coatings. These include NACURE® and K-CURE® catalysts, K-FLEX® polyester and polyurethane polyols, NACORR® inhibitors, K-SPERSE® dispersants and DISLON® rheological additives.

Circle No. 158 on Reader Service Card

KRAFT CHEMICAL CO.
1975 N. Hawthorne Ave.
Melrose Park, IL 60160

Kraft Chemical is sponsoring the Message Center at this year's Show. If you need to reach a show registrant, schedule a location to meet someone, or find a place to relax away from the show crowd, the Message Center and lounge is available to you.

Circle No. 159 on Reader Service Card

KROMACHEM INC.
1200 Grove St.
Irvington, NJ 07111

Kromachem Inc. displays a range of products for UV-curing inks and coatings: Photoinitiators such as ITX and PI liquids, FLORSTAB UV—unique in-can stabilizers that do not inhibit the cure speed, and a range of other UV-additives to help the formulator.

Circle No. 160 on Reader Service Card

KRONOS, INC.
3000 N. Sam Houston Pkwy., E.
Houston, TX 77206

KRONOS, Inc. is highlighting several new chloride process pigment grades including KRONOS® 2310, zirconia-treated, which provides high gloss, haze-free finishes with very high gloss retention and chalking resistance, and KRONOS 2102, a zirconia-treated low oil absorption, rutile pigment that offers very good gloss, gloss retention and chalking resistance.

Circle No. 161 on Reader Service Card

KTA-TATOR, INC.
115 Technology Dr.
Pittsburgh, PA 15275

KTA-Tator, Inc. features coatings consulting and testing services, including coatings failure analysis, laboratory testing, inspection, training, and lead paint removal engineering services. Coatings inspection instrumentation and the KTA Envirotest, a cyclical weathering apparatus, are displayed.

Circle No. 162 on Reader Service Card

LAWTER INTERNATIONAL, INC.
990 Skokie Blvd.
Northbrook, IL 60062

Featured are fluorescent pigments, dispersions and toll dispersing, as well as dry waxes such as PTFE and Poly. Specialty resins including ketone, phenolic, rosin, and hydrocarbon resins are also highlighted.

Circle No. 163 on Reader Service Card

LEEDS & NORTHRUP
351 Sumneytown Pike
North Wales, PA 19454

Leeds & Northrup's MICROTRAC Div. demonstrates new MICROTRAC 9200-Series particle analyzers. This unique modular system measures a range from 0.005 to 700 μm. Its Full-Range Analyzer (FRA) measures from 0.1 to 700 μm in a single measurement, and its Ultrafine Particle Analyzer (UPA) measures from 0.005 to 3 μm.

Circle No. 164 on Reader Service Card

LESAC CORP.
416 Scott St.
Michigan City, IN 46360

Circle No. 165 on Reader Service Card

LIGHTNIN
221 Rochester St.
Avon, NY 14444

Circle No. 166 on Reader Service Card

LIQUID CONTROLS CORP.
4 Wacker Park
North Chicago, IL 60064

Liquid Controls manufactures a full line of positive displacement flow meters from 1/2 to 1,000 gpm for batch processing and custody transfer metering applications. Available with electronic registration in pounds or volume and read out of rate and temperature.

Circle No. 167 on Reader Service Card

THE LUBRIZOL CORP.
29400 Lakeland Blvd.
Wickliffe, OH 44092

Ircogel rheology control additives, Ircosperse pigment dispersants, and phosphates acid ester adhesion promoters are featured. The introduction of the new Ircosperse dispersants from Lubrizol will be made.

Circle No. 168 on Reader Service Card

LUZENAC AMERICA
8985 E. Nichols
Englewood, CO 80112

Luzenac America, the world's largest talc supplier, presents a complete line of talc

and chlorite for the paint industry. Our products, with familiar names like Beaverwhite 325 and Mistron Monomix, are produced under the highest standards including statistical and quality controls.

Circle No. 169 on Reader Service Card

3M
3M Center, Bldg. 223-6S-04
St. Paul, MN 55144-1000

Fluorad™ coating additives, featuring a range of wetting agents, flow control agents and fluorochemical surfactants, are highlighted. They are designed for high-solids and 100% epoxy systems. Technical sales personnel are on hand.

Circle No. 170 on Reader Service Card

M & M INDUSTRIES, INC.
316 Corporate Place
Chattanooga, TN 37419

Life Latch containers are featured. They are available from half gallon through six gallon sizes, are U.N. approved and D.O.T. 35 approved, child resistant, and they require no tools.

Circle No. 171 on Reader Service Card

MACBETH
Div. of Kollmorgen Corp.
405 Little Britain Rd.
Newburgh, NY 12551-0230

A broad range of equipment for color control is featured, including the Optiview color quality control system. Optimatch computer color formulation systems, the new portable ColorCheck 545 spectrophotometer, and the Judge Color Matching Portable Light Booth are also highlighted.

Circle No. 172 on Reader Service Card

MAGNESIUM ELEKTRON, INC.
500 Point Breeze Rd.
Flemington, NJ 08822

MEI presents fine zirconium chemicals for the coating and ink industries. Featured are the crosslinking capabilities of zirconium chemicals in solvent formulations, with emphasis on their improvement in heat and water resistance to water-based systems. A new series of white conductive powders for coating colors and formulations is introduced.

Circle No. 173 on Reader Service Card

MALVERN INSTRUMENTS, INC.
10 Southville Rd.
Southborough, MA 01772

Particle characterization equipment to measure particle size ranges of .001-2000 microns and particle counters equipped to count particles in both liquid and air applications are featured. Also highlighted are instruments suited for particle charges, zeta potential, and surface area analysis.

Circle No. 174 on Reader Service Card

MALVERN MINERALS CO.
P.O. Box 1238
Hot Springs, AR 71902-1238

NOVACITE® (finely divided microform of quartz) and NOVAKUP® (surface modified NOVACITE®) are offered for use in high solids and low VOC coatings applications. Personnel are on hand to discuss other surface modified products offered. NOVACITE® has one of the lowest oil absorptions in the industry and offers many physical improvements that can only be found with a hard filler such as quartz.

Circle No. 175 on Reader Service CArd

McWHORTER, INC.
400 E. Cottage Place
Carpentersville, IL 60110

McWhorter's 1992 FSCT Paint Industries Show booth features products from each of our low VOC product lines: high solids, emulsions and water reducibles for high performance in industrial maintenance and trade sales.

Circle No. 176 on Reader Service Card

THE MEARL CORP.
41 E. 42nd St.
New York, NY 10017

The Mearl Corp. displays its Mearlin® and Mearlite® pearlescent and iridescent luster pigments, both exterior and regular grades. New grades of particular interest to automotive paint manufacturers are also shown.

Circle No. 177 on Reader Service Card

MICHELMAN, INC.
9080 Shell Rd.
Cincinnati, OH 45236

Presented are water-based additive products. Highlighted is the Ultrabead® line of additives which provide water beading and water resistance. Also presented are a variety of carnauba, paraffin, microcrystalline, polyethylene and other wax emulsions which can enhance slip, antiblock, mar resistance, release, etc.

Circle No. 178 on Reader Service Card

MICRO MOTION
7070 Winchester Circle
Boulder, CO 80301

Featured are Corioliss mass flow and density meters, measuring latex, solvents, oils, pigments, resins, and slurries throughout the coatings industry, unaffected by temperature and viscosity.

Circle No. 179 on Reader Service Card

MICRO POWDERS, INC.
580 White Plains Rd.
Tarrytown, NY 10591

Micro Powders, Inc. is exhibiting its full line of unique micronized waxes for the paint and coatings industry. Several new grades are being introduced including SYNFLUO fluorinated wax additives, specifically designed for optimum lubricity and gloss retention in lacquers and coatings. New AQU-ABEAD and MICROSPERSION specialized wax dispersions and emulsions are also presented.

Circle No. 180 on Reader Service Card

MICROFLUIDICS CORP.
90 Oak St.,P.O. Box 9101
Newton, MA 02164-9101

Microfluidics manufactures a range of processing equipment suitable for processing emulsions, dispersions and deagglomerations and introduces the M-210EH Electric Hydraulic Pilot Plant Microfluidizer®. This machine generates liquid pressures up to 30,000 psi, flow rates to 90 gallons per hour.

Circle No. 181 on Reader Service Card

MICROMERITICS INSTRUMENT CORP.
One Micromeritics Dr.
Norcross, GA 30093-1877

Micromeritics exhibits automatic and manual analytical instruments which measure the physical characteristics of powders and solids. These instruments include: particle size analyzers, surface area analyzers, pore volume analyzers, pore size analyzers, and density analyzers (pycnometers).

Circle No. 182 on Reader Service Card

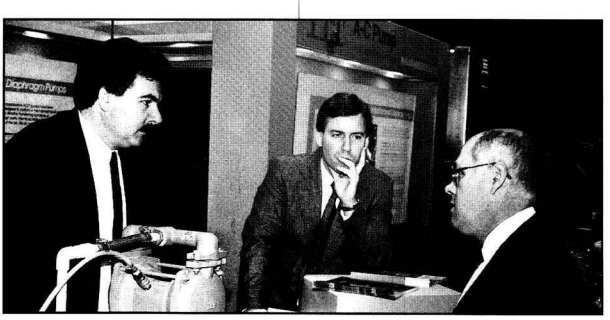
MID-STATES ENG. & MFG.
400 Main St.
Milton, IA 52570

Bulk liquid and dry storage containers with capacities from 178 to 644 gallons for liquids and 10 to 150 cubic feet for powders, are featured. Mild steel with dot 56 or 57 available.

Circle No. 183 on Reader Service Card

MILES INC.
Mobay Rd.
Pittsburgh, PA 15205-9741

"Miles. Leading the Race to Zero VOC." This is the theme of the company's ex-



hibit, which highlights Miles' polyurethane and other coating raw materials which are used to formulate low-VOC, high-performance coatings for the transportation, maintenance, construction, architectural, furniture and industrial finishing markets.

Circle No. 184 on Reader Service CArd

MILLIPORE CORP.
80 Ashby Rd.
Bedford, MA 01730

Millipore exhibits paint monitors and sampling kits for "dirt-in-paint" checks. Monitors are available to handle a wide range of solvent and aqueous based paints. Portable sampling kits can perform "dirt-in-paint" tests at coatings manufacturing sites and on paint lines. Polygard filters for paint filtration are also shown.

Circle No. 185 on Reader Service Card

MILTON CAN CO., INC.
580 Division St.
Elizabeth, NJ 07201

Displayed is a complete product line of our new welded side seam, 100% lead free, cans. These cans are available in a range of sizes from gallons to 1/2 pints triple tight. Also available and on display with a welded side seam are one gallon F, five gallon square and 211 diameter cans.

Circle No. 186 on Reader Service Card

MINERAL PIGMENTS CORP.
12116 Conway Rd.
Beltsville, MD 20705

Emphasis is on nontoxic corrosion inhibiting pigments, including the new PHOSGUARD line. Featured, as new items, is a line of mixed metal oxides for camouflage and heat resistant applications in addition to transparent iron oxide pigments for stains and automotive finishes. Literature on these and MPC's range of iron oxide pigments may be obtained.

Circle No. 187 on Reader Service Card

MiniFIBERS, INC.
2923 Boones Creek Rd.
Johnson City, TN 37615

The company displays its wide variety of SHORT STUFF® polyethylene and polypropylene fibers, together with technical literature and suggested starting formulations. Also featured are display panels utilizing these unique fibers in different end products.

Circle No. 188 on Reader Service Card

MINOLTA CORP.
101 Williams Dr.
Ramsey, NJ 07446

Minolta features color measuring equipment, including the CM-2002 spectrophotometer, CR-300 series colorimeters and color control software.

Circle No. 189 on Reader Service Card

MISSISSIPPI LIME CO.
7 Alby St.
Alton, IL 62002

Mississippi Lime Co. features information on their dry and slurry Precipitated Calcium Carbonate (PCC) products. PCCs are excellent, low cost TiO_2 extenders, as well as cost effective calcined clay substitutes.

Circle No. 190 on Reader Service Card

UNIVERSITY OF MISSOURI—ROLLA
Chemistry Dept., 142 Schrenk Hall
Rolla, MO 65401

Featured are research, academic, and short course programs. The new DemMaTec Educational Alliance, a coatings demonstration facility cosponsored by the State of Missouri that will aid industry in technology development, assessment and implementation, is highlighted.

Circle No. 191 on Reader Service Card

MODERN PAINT & COATINGS
6255 Barfield Rd.
Atlanta, GA 30328

Copies of the October issue are being distributed at our booth. *Paint Red Book*, the only directory in the paint and coatings field, is on display, as is *Adhesives Age Directory* and *Rubber Red Book*.

Circle No. 192 on Reader Service Card

MOREHOUSE-COWLES, INC.
1600 W. Commonwealth Ave.
Fullerton, CA 92633

We are displaying our new line of laboratory dissolvers and media mills, the Molteni Planimax, and various new dispersing attachments.

Circle No. 193 on Reader Service CArd

MORTON INTERNATIONAL, INC./
UNIVERSAL COLOR DISPERSIONS
100 N. Riverside Plaza
Chicago, IL 60606

Universal Color Dispersions features its five dispersion lines that are compatible with many solvent-free, high-solids and water-based systems, and its capability to do custom grinds. Construction Coatings and Sealants features its complete line of LP liquid polysulfide polymers.

Circle No. 194 on Reader Service Card

MOUNTAIN MINERALS CO. LTD.
714 5th Ave., S., P.O. Box 700
Lethbridge, Alb. T1J 3Z6 Can.

Mountain Minerals exhibits its line of naturally white barium sulfate (barytes) for filler and extender applications, highlighting the high purity (99%) fine material Sparwite W-5 HB as an economical substitute for bleached barytes. White silica sand for nonskid coatings is also presented.

Circle No. 195 on Reader Service Card

MYERS ENGINEERING
8376 Salt Lake Ave.
Bell, CA 90805

Circle No. 196 on Reader Service Card

NACAN PRODUCTS LTD.
60 West Dr.
Brampton, Ont. L6T 4W7 Canada

Nacan features VINAMUL 3692, a unique, proven polymer technology designed for formulating zero VOC environmentally friendly paints. VINAMUL 3692 has been highly successful in Europe, leading the development of the zero VOC paint evolution. VINAMUL 3692 provides superior scrub resistance, excellent gloss formation diversity over a wide PVC range, and film formation at 5°C.

Circle No. 197 on Reader Service Card

NATIONAL CHEMICAL CO.
600 W. 52nd St.
Chicago, IL 60609

Featured are catalysts—acid and blocked acid types (p-TSA, DDBSA, Mixed acids); anti-corrosive pigments—including Strontium Phosphate (lead-free, chrome-free); and wax compounds—for inks and coatings.

Circle No. 198 on Reader Service Card

NETZSCH INCORPORATED
119 Pickering Way
Exton, PA 19341

Netzsch features their new Zeta System, the latest in milling technology for the 90's. Also featured at the Netzsch Incorporated booth are the Molinex and John milling systems.

Circle No. 199 on Reader Service Card

NEUPAK, INC.
11935 PORTLAND AVE.
Burnsville, MN 55337

Featured is a four head, one gallon filling by net weight measurement filling machine. This unique machine (patent applied for) is capable of filling and flush cleaning simultaneously. Also on display is a 55 gallon drum and 5 gallon pail filling systems.

Circle No. 200 on Reader Service CArd

NEW WAY PACKAGING MACHINERY, INC.
210 Blettner Ave.
Hanover, PA 17331

New Way exhibits its model SA labeler with automatic controls. The SA series labeler is a basic machine which can be equipped with electronic accessories for higher production rates.

Circle No. 201 on Reader Service Card

NICOLET INSTRUMENT CORP.
5225 Verona Rd.
Madison, WI 53711

Exhibiting: Infrared (FT-IR) spectrometers for the identification and analysis of paints and coatings; and a demonstration of the combined analysis package, including the FSCT Infrared Spectroscopy Atlas and Nicolet's Digital Chicago Paint Library.

Circle No. 202 on Reader Service Card

NIPPON SHOKUBAI CO., LTD.
101 E. 52nd St.
New York, NY 10022

Nippon Shokubai introduces a variety of high-performance polymers, including Polyment™ (waterborne acrylamine), Epomin™ (polyethyleneimine), Acryset™ UW (weather-resistant acrylic polymer), and Epocros™ (oxazoline emulsion).

Circle No. 203 on Reader Service Card

NORMAN INTERNATIONAL
Hazardous Materials & Packaging Div.
2050 E. 15th St.
Los Angeles, CA 90021

Hazardous material UN4G certified packaging systems for the shipping of all group II and III hazardous materials are featured. All Norman's UN4G combination packages are in full compliance with the current UN shipping regulations.

Circle No. 204 on Reader Service Card

NORTH DAKOTA STATE UNIVERSITY
1301 12th Ave., N.
Dunbar Hall 54
Fargo, ND 58105

The polymer and coatings education and research programs at the B.S., M.S., and Ph.D. levels at NDSU are featured. Information is available on these programs as well as the 1993 short courses in coatings science and related topics.

Circle No. 205 on Reader Service Card

NYCO MINERALS, INC.
124 Mountain View Dr.
Willsboro, NY 12996

Featured are 10 WOLLASTOKUP® pigments, designed to provide blister and corrosion resistance. Included in the pigment package, it ensures optimal performance over a much larger range of PVC/CPVC. A broad range of wollastonite products for use in trade sales, powder coatings, and roof coatings are highlighted along with FLAKEGLAS® which provides barrier protection in tank linings.

Circle No. 206 on Reader Service Card

OBRON ATLANTIC CORP.
830 E. Erie St.
Painesville, OH 44077

Featured are metallic pigments for brilliant special effects in automotive, maintenance and aerosol coatings. Highlighted is Europe's most advanced range of water-stabilized aluminum pigments, manufactured to ISO-DIN 9001 standards.

Circle No. 207 on Reader Service Card

OHIO POLYCHEMICAL CO.
1920 Leonard Ave.
Columbus, OH 43219

Ohio Polychemical displays environmentally friendly high-solids compliant resins, in addition to a complete assortment of V.T., urethane, and other traditional vehicles.

Circle No. 208 on Reader Service Card

OLIN CHEMICALS
120 Long Ridge Rd.
Stamford, CT 06904-1355

Olin Performance Chemicals' Specialty Chemicals Division—Biocides, offers Zinc OMADINE®, a fungicide, algicide and bactericide for marine and architectural coatings, adhesives, sealants, and elastomers. The Performance Urethanes Division features TDI and LUXATE™ aliphatic diisocyanates including IPDI, HDI trimer, HDI biuret, and H_{12} MDI.

Circle No. 209 on Reader Service Card

OPTICOLOR
101 North Point Dr.
Nebo, NC 28761

Opticolor is exhibiting three high resolution color quality control systems: A four-beam, hand-held with MetallicQCs software, a GONIO spectrometer features automatic selection of up to 484 discrete geometry, and a fully automatic noncontact process color sensor.

Circle No. 210 on Reader Service Card

ORTECH INTERNATIONAL
2395 Speakman Dr.
Mississauga, Ont. L5K 1B3 Can.

ORTECH International is an independent technical consulting and contract R&D organization. Business and technical viewpoints can be applied simultaneously to clients' needs in areas including process and product development, materials selection, formulation, evaluation and specification testing.

Circle No. 211 on Reader Service Card

PACIFIC MICRO SOFTWARE ENGINEERING
1500 Pacific Coast Hwy., Suite E
Seal Beach, CA 90740

Demonstrated are the latest features of BatchMaster Version 3, PC-software for paint manufacturers. It includes solutions for inventory, production, costing, formulating, MSDS, labeling, accounting, and is fully integrated with the Platinum Series accounting software.

Circle No. 212 on Reader Service Card

PAINT & COATINGS INDUSTRY MAGAZINE
755 W. Big Beaver Rd., Suite 1000
Troy, MI 48084

Decision makers in the $12 billion paint/coatings industry rely on PCI for new products/services information. Another element of our success—marked by the largest circulation and most ad pages in the industry—is readership by professionals in the adhesives/sealants and printing inks markets.

Circle No. 213 on Reader Service Card

PEN KEM, INC.
341 Adams St.
Bedford Hills, NY 10507

Pen Kem introduces the System 8000 particle size analyzer, which measures the true size distribution of concentrated slurries. Also on exhibit are the Model 501 Lazer Zee meter and the Vilastic-3 viscoelasticity analyzer.

Circle No. 214 on Reader Service Card

PENINSULA POLYMERS
1350 Steel Ave., SW
Grand Rapids, MI 49507

Peninsula Polymers features new high-solids and water-reducible resin for trade sales and industrial paints. Peninsula Polymers is a young resin manufacturing company with creative ideas to help the paint chemist.

Circle No. 215 on Reader Service Card

PERELANDRA SYSTEMS, INC.
18-3 E. Dundee Rd., Suite 100
Barington, IL 60010

CLaM will be running on an IBM RS/6000 multi user RISC architecture computer. CLaM helps improve productivity throughout your company. Laboratory, MSDS (automatically created), quality control, SPCC, formula processing and labeling make up the base system. Inventory, costing, sales analysis, production, order entry and financials are add-on modules.

Circle No. 216 on Reader Service Card

PERKIN-ELMER CORP.
761 Main Ave.
Norwalk, CT 06859

UV/visible and fluorescence spectrophotometers, thermal mechanical and thermal gravimetric analyzers, high-temperature DTA and elemental analyzers, FTIR and FTIR microscopy spectrophotometers and laboratory computers are featured.

Circle No. 217 on Reader Service CArd

PFIZER MINERALS
640 N. 13th St.
Easton, PA 18042

Pfizer Minerals manufactures a complete line of calcium carbonate and talc products for use in paint formulations. Information on our ground and precipitated mineral additives is presented with particular emphasis on talc for gloss and sheen control and precipitated calcium carbonate for TiO_2 extension.

Circle No. 218 on Reader Service Card

PHILIPS CONTAINER CO.
14200 Darley Ave.
Cleveland, OH 44110

The company features its extruding, recycling, and packaging services.

Circle No. 219 on Reader Service Card

PHYSICA USA, INC.
400 Randal Way, B-207
Spring, TX 77388-8908

PHYSICA viscometers and rheometers for measuring the viscous and elastic properties of solvents, paints, pigments, inks and resins are featured. Laboratory and process instruments cover wide ranges of flow and temperature conditions.

Circle No. 220 on Reader Service Card

PICO CHEMICAL CORP.
7319 Duvan Dr.
Tinley Park, IL 60477

Specialized Workhorse chemicals to remove a wide variety of general industrial, high tech and synthetic coatings from interiors of portable and stationary production mixing tanks, reactors, storage and shipping tanks, are featured.

Circle No. 221 on Reader Service Card

PLASTICAN, INC.
196 Industrial Rd.
Leominster, MA 01453

Plastican, Inc. manufactures a full line of high density polyethylene open head pails

ranging in size from 5 pound tubs to 6½ gallon capacity. DOT and U.N. certified containers are offered. Manufacturing plants are located in Leominster, MA; Dallas, TX; and Macon, GA.

Circle No. 222 on Reader Service Card

POLAR MINERALS
5060 N. Royal Atlanta Dr., Suite 12
Tucker, GA 30084

Polar Minerals features white calcium carbonates which are semi-rounded, extremely soft, pure and free from detectable levels of crystalline silica. High brightness talcs shown are tremolite and silica free, and are easy to disperse to maintain hegman grind. Barites featured are high in purity, low in iron and heavy metals and are available in a variety of particle sizes.

Circle No. 223 on Reader Service Card

POLLUTION CONTROL INDUSTRIES, INC.
4343 Kennedy Ave.
E. Chicago, IN 46312

P.C.I. is a fully permitted PART B T.S.D.F. with bulk, drummed liquid and solid capabilities for secondary fuels. Aerosol can destruction unit and a new lab pack operation on site. Full-service remediation, transportation and in-house analytical services.

Circle No. 224 on Reader Service Card

POLY-RESYN, INC.
534 Stevens Ct.
Dundee, IL 60118-1822

Featured is a complete line of rheological additives for solvent-based coatings. Highlighted are two new additions to our product line: Pourable SUSPENO #201-MS in mineral spirits to improve brushability in low VOC coatings as well as conventional systems and pourable SUSPENO #201-X moisture free, anti-settling, anti-sag agent.

Circle No. 225 on Reader Service Card

PPG INDUSTRIES
Silica Products
One PPG Place
Pittsburgh, PA 15272

PPG Industries, Chemicals Group, exhibits our Lo-Vel® brand of flatting agents and Hi-Sil® brand of thixotropes, which are precipitated silicas designed for use in a variety of coatings, adhesives and sealants. Lo-Vel HSF is a low viscosity flatting agent for low VOC coatings. Hi-Sil T-700 is a state-of-the-art precipitated silica which is the most efficient thixotrope available.

Circle No. 226 on Reader Service Card

PPG INDUSTRIES, INC.
Specialty Chemicals
3938 Porett Dr.
Gurnee, IL 60031

PPG Industries performance additives for the coatings market are highlighted as are their performance additives: reactive silicones, reactive diluents, dispersants, defoamers, antistats and surface active monomers.

Circle No. 227 on Reader Service Card

THE PQ CORP.
P.O. Box 840
Valley Forge, PA 19482

PQ Corporation and its subsidiary, Potters Industries, Inc., offer solid and hollow microspheres of glass, ceramic and plastic compositions for use as density reducing and rheological modifiers for paints and coatings. Small particle sizes are highlighted and special surface coatings are featured for conductive and corrosion resistance applications.

Circle No. 228 on Reader Service Card

PREMIER MILL CORP.
1 Birchmont Dr.
Reading, PA 19606-3298

Premier is a leader in the custom design and manufacture of wet milling, blending and dispersion equipment and systems. Featured is our new high flow recirculation mill. Premier's engineering group (PSE) has the ability to completely design a fully automated turn-key system to meet your specific processing requirements.

Circle No. 229 on Reader Service Card

PROGRESSIVE RECOVERY, INC.
700 Industrial Dr.
Dupo, IL 62239

Featured for the paint industry: WC Wash System—clean "mixing tanks"; Series SCR distillation; and PRI-Vac drying system to maximize solvent recovery.

Circle No. 230 on Reader Service Card

PURITY ZINC METALS CO. LTD.
290 Arvin Ave.
Stoney Creek, Ont. L8E 2M1 Can.

Purity Zinc Metals Co. Ltd. provides information on the company's various grades of ultra pure zinc dusts, which offer the ultimate performance in zinc rich coatings systems.

Circle No. 231 on Reader Service Card

PYOSA, S.A. de C.V.
Ave. Industrias No. 1200 Pte.
Monterrey, N.L. 64000 Mexico

Featured are organic and inorganic pigments including: phthalocyanine blues and greens, organic reds and yellows, chrome yellows, moly orange and lead chromate substitutes.

Circle No. 232 on Reader Service Card

Q-PANEL CO.
26200 First St.
Cleveland, OH 44122

The QUV Solar Eye Accelerated Weathering Tester recreates the damage caused by sunlight, rain and dew. The Solar Eye is a precision irradiance control system for the QUV Accelerated Weathering Tester. With it, the user chooses the level of light output. Also exhibited is the new Q-Fog® cyclic corrosion chamber.

Circle No. 233 on Reader Service Card

QUACKENBUSH CO.
500 E. Main St.
Lake Zurich, IL 60047

Quackenbush Co. features their complete line of glass, ceramic, and metallic mill beads, several models of UNIQUAX brand portable pump-filters, Crane Deming air diaphragm pumps, Viking pumps, and PBM ball valves. Also shown is QBZ-64 zirconium silicate media.

Circle No. 234 on Reader Service Card

QUANTACHROME CORP.
5 Aerial Way, P.O. Box 9011
Syosset, NY 11791

Powder characterization instrumentation is featured. For surface area pore size—the new NOVA 1000, for particle size—the Microscan II, and for solid density—the Ultrapycnometer 1000.

Circle No. 235 on Reader Service Card

RAABE CORP.
N. 92 W. 14701 Anthony Ave.
Menomonee Falls, WI 53051

Raabe Corporation is exhibiting its custom color matching and aerosol filling capabilities. Raabe highlights its exact matching touch-up paint (California compliant) available in aerosol, bulk, or brush-in-cap bottles.

Circle No. 236 on Reader Service Card

RADTECH INTERNATIONAL NORTH AMERICA
60 Revere Dr., Suite 500
Northbrook, IL 60062

RadTech is an association dedicated to promoting the use and development of UV/EB technology. RadTech serves as an industry forum, addressing the educa-

tional needs of users and suppliers of UV/EB equipment and materials. Association publications are displayed.

Circle No. 237 on Reader Service Card

RANBAR TECHNOLOGY INC.
1114 Wm. Flinn Hwy.
Glenshaw, PA 15116

Ranbar is a custom manufacturer of coating resins. The product line includes: conventional alkyds, polyesters, epoxy esters, water-reducible alkyds/polyesters, and high-solids resins. We specialize in custom specifications and proprietary toll product production.

Circle No. 238 on Reader Service Card

REICHHOLD CHEMICALS, INC.
P.O. Box 13852
Research Triangle Pk., NC 27709

Reichhold has remained a leader in industrial, architectural, and specialty coating polymers and resins for 65 years. Our product lines meet the industry's most demanding application and performance requirements. Our exhibit focus is VOC-compliant technology—high solids, waterborne, and powder.

Circle No. 239 on Reader Service Card

RHEOX, INC.
P.O. Box 700
Hightstown, NJ 08520

RHEOX, Inc. is introducing several new products, including RHEOLATE® 2000 rheological additive for use in waterborne systems, BENAQUA® 6000 rheological additive for conventional latex paints, and a new, low-cost effective BENTONE® additive for low to medium polarity systems.

Circle No. 240 on Reader Service Card

RHONE-POULENC, INC.
CN 7500, Prospect Plains Rd.
Cranbury, NJ 08512

Graphics and literature summarize the range of specialty chemicals offered by Rhone-Poulenc: Tolonate® polyisocyanate resins, wet adhesion monomers, dispersants, defoamers, wetting agents, thixotropes, adhesion promoters, water repellents, crosslinkers, and epoxy, acrylic, and other thermoset resin products.

Circle No. 241 on Reader Service Card

ROHM AND HAAS CO.
Independence Mall West
Philadelphia, PA 19105

Rohm and Haas exhibits their wide range of binders, rheology modifiers, opaque polymers, dispersants, and mildewcides for high performance paints and coatings. New offerings for architectural coatings are Rhoplex SF-012 and Rovace SF-091 binders for interior paints that can be formulated without any solvents.

Circle No. 242 on Reader Service Card

ROSEDALE PRODUCTS, INC.
3730 W. Liberty Rd.
Ann Arbor, MI 48103

The Rosedale booth features bag filter housings, basket strainers, cartridge filter housings, duplex systems, automatic backwashing systems, vibrating filters, cleanable metal cartridges, and high efficiency filter bags.

Circle No. 243 on Reader Service Card

CHARLES ROSS & SON CO.
710 Old Willets Path
Hauppauge, NY 11788

Established in 1840, Charles Ross & Son manufactures a broad range of mixing and dispersion equipment. High speed/high shear mixer emulsifiers and the UltraMax horizontal bead mills are displayed. The unique PowerMix planetary disperser is featured.

Circle No. 244 on Reader Service Card

RUSSELL FINEX INC.
156 W. Sandford Blvd.
Mt. Vernon, NY 10550

Russell Finex Inc. is exhibiting three machines. Featured is the new Liquid/Solid Separator as well as the Russell In-Line Strainer and the Russell Super Finex High Speed Strainer.

Circle No. 245 on Reader Service Card

SAFETY-1 MARKETING, INC.
842 State Rd.
Princeton, NJ 08540

Safety-1 Marketing features literature and visual aids dealing with their flame retardant chemicals and coatings.

Circle No. 246 on Reader Service Card

SANDOZ CHEMICALS CORP.
4000 Monroe Rd.
Charlotte, NC 28205

Featured is the new SANDOVOC range of dyes for water-based and low VOC inks, coatings and adhesives. Included are additives and pigments for water-based applications. Also shown is the range of nonmetallized dyes recommended as replacement for the metal complex solvent dyes normally used in transparent foil lacquers.

Circle No. 247 on Reader Service Card

SANNCOR INDUSTRIES, INC.
300 Whitney St.
Leominster, MA 01453-3209

Sanncor Industries, Inc. exhibits a variety of new products in their waterborne urethane product line. These include high solids waterborne urethanes, aromatic waterborne products for wood flooring applications, and stain resistant waterborne polymers for various flexible and rigid coatings. Urethane coated floors are available for examination in addition to other products using our urethanes.

Circle No. 248 on Reader Service Card

SARTOMER CO., INC.
468 Thomas Jones Way
Exton, PA 19341

A leader in specialty chemical manufacturing for environmentally safe UV/EB curing, Sartomer offers the world's broadest line of monomers, listing over 250 types. They also offer oligomers and photoinitiators.

Circle No. 249 on Reader Service Card

SCHENECTADY CHEMICALS CANADA
319 Comstock Rd.
Scarborough, Ont. M1L 2H3 Can.

A supplier of specialty resins for over 35 years, we offer a quality range of alkyds, epoxy esters, polyesters, urethanes and phenolics, ranging from broad application architectural to specialized industry applications. The Coatings group is located in Toronto, Ont., Canada, and Schenectady, NY.

Circle No. 250 on Reader Service Card

SCHOLD MACHINE CORP.
10590 Oak St., NE
St. Petersburg, FL 33716

Featured are 50 liter high-speed horizontal media mills 75 hp, media mill shaft and seal arrangement cutaways, turbo rotor stator post mounted disperser #VRS 20 hp, and a fully automatic post mounted tank washer.

Circle No. 251 on Reader Service Card

SCM CHEMICALS
7 St. Paul St., Suite 1010
Baltimore, MD 21202

SCM Chemicals is the second largest TiO_2 producer in North America, the third largest in the world. A powerful combination of high-quality people, systems, and technology has made SCM Chemicals the preferred supplier of the highest quality TiO_2. SCM Chemicals' TiONA® pigments are widely praised for superior whitening, brightening, and opacifying properties and have a reputation for excellent dispersion and product consistency in a multitude of coatings.

Circle No. 252 on Reader Service Card

SCOTT-BADER
1592 Georgetown
Hudson, OH 44236

Scott Bader features ECOBINDER, a very low VOC latex which requires no coalescer, POLIDENE, a vinylidene chloride copolymer latex for stable corrosion resistant primers, TEXICOTE powder coatings resins, and TEXIGEL for acrylic roof coatings.

Circle No. 253 on Reader Service Card

SEMI-BULK SYSTEMS, INC.
1812 Walton Rd.
St. Louis, MO 63114

The Air-Pallet® system for completely closed, dust-free powder handling is featured. Display includes Air-Pallet® container, Air-Cone® fluidized hopper for free-flowing discharge, ejector-mixer for powder slurrying, components and hardware for other types of discharge.

Circle No. 254 on Reader Service Card

SERAC, INC.
300 Westgate Dr.
Carol Stream, IL 60188

Serac, Inc. displays fill by weight technol-

ogy on semi automatic and automatic systems.

Circle No. 255 on Reader Service Card

SHAMROCK TECHNOLOGIES, INC.
Foot of Pacific St.
Newark, NJ 07114

Shamrock provides a wide range of stir-in powder products, primarily utilizing polyethylene and PTFE, in grinds to suit your application needs. Products are designed to provide wear, mar, and abrasion resistance, as well as a textured appearance and other properties, to your coatings. New products are on display at our booth.

Circle No. 256 on Reader Service Card

SHELL CHEMICAL CO.
910 Louisiana St.
Houston, TX 77002

The Shell Chemical Company exhibit features EPON® resins, EPONOL® resins, CARDURA® resins, KRATON® elastomers and Shell solvents. New information on resin and elastomer products is featured for use in coating formulations.

Circle No. 257 on Reader Service Card

SHERWIN-WILLIAMS CHEMICALS
1700 W. 4th St.
Coffeyville, KS 67337

Nontoxic, corrosion inhibiting, MOLY-WHITE® pigments are featured. New literature and panel displays demonstrating the cost effective performance of molybdate pigments are exhibited. Sales and technical personnel are available to discuss new developments and applications and our cyclic corrosion testing services.

Circle No. 258 on Reader Service Card

SHIMADZU SCIENTIFIC INSTRUMENTS
7102 Riverwood Dr.
Columbia, MD 21046

Physical measurement products include the UV-1201 compact spectrophotometer with application program packs; the DSC-50 differential scanning calorimeter with extensive thermal analysis software and data system; the AEG and AEL analytical and semi-micro balances as well as the EB series of internal calibration weight top-loader balances.

Circle No. 259 on Reader Service Card

SILBERLINE MANUFACTURING CO., INC.
Lincoln Dr.
Tamaqua, PA 18252

Look for our dazzling displays featuring Silberline's SPARKLE SILVER® Premier [SSP] aluminum paste grades. Stop by and discuss what's new for all types of protective and VOC compliant coatings.

Circle No. 260 on Reader Service Card

SINO-AMERICAN METALS AND MINERALS S.F., INC.
5801 Christie Ave., Suite 575
Emeryville, CA 94608-1933

We feature lead-free WHITE CLOUD® SAFE YELLOW® pigments—Organic Hansa shell encapsulating an inert core of opacifying Lithopone. Suitable for high-solids, VOC-compliant trade, industrial and traffic coatings. Comparison information provided on computer-optimized formulations for solvent, waterborne and UV/EB cured systems, tested and photometrically characterized to demonstrate cost savings and technical performance advantages obtainable.

Circle No. 261 on Reader Service Card

SLOSS INDUSTRIES CORP.
4200 F.L. Shuttlesworth Dr.
Birmingham, AL 35207

The nation's largest mineral fiber plant produced PMF® Fiber, a filler/reinforcer for use in a variety of markets including paint and coatings, friction, papers and gaskets, caulks, sealants and adhesives, plastics and phenolics, is featured. PMF® Fiber, a replacement for asbestos, is a vitreous-calcium alumino silicate fiber.

Circle No. 262 on Reader Service Card

SOUTH FLORIDA TEST SERVICE, INC.
17301 Okeechobee Rd.
Miami, FL 33015

The firm introduces the Desert Site expansion which has greatly increased their wide range of materials testing services. Examples of SUN10 outdoor accelerated tests are illustrated and actual test samples displayed. Results of a ground breaking study into "High Irradiance" weathering tests are announced and exhibited.

Circle No. 263 on Reader Service Card

SOUTHERN CLAY PRODUCTS, INC.
1212 Church St.
Gonzales, TX 78629

Southern Clay Products' rheological line of CLAYTONE®, FLOWTONE®, LAPONITE®, and AQUAMONT™ products provide superior performance for cost effective use of rheological modifiers and suspension agents, with the advantage of one source of consistent supply.

Circle No. 264 on Reader Service Card

UNIVERSITY OF SOUTHERN MISSISSIPPI
Department of Polymer Science
Southern Station Box 10076
Hattiesburg, MS 39406-0076

The USM exhibit highlights the recent activities of the Department of Polymer Science; information concerning the 1993 Waterborne and Higher-Solids Coatings Symposium is available, as well as information about B.S., M.S., and Ph.D. degree programs in Polymer Science.

Circle No. 265 on Reader Service Card

SPARTAN COLOR CORP.
5803 Northdale
Houston, TX 77087

For small batch manufacture and tinting, the widely-compatible Spartacryl-PM industrial color concentrates in PM acetate are featured. They are excellent for both volumetric and digital weight dispersing systems. Also shown are masstone and the level displays of the broad palette of colors available in the Spartacryl-PM Color.

Circle No. 266 on Reader Service Card

STARTEX CHEMICAL INC.
#5 Hackberry Lane
Cut & Shoot, TX 77303

A full line of chemicals and solvents for the paint and coatings industries is featured. Private labels and special blending are available. A complete line of after market automotive acrylic lacquer thinner, acrylic enamel reducers and antifreeze is also highlighted.

Circle No. 267 on Reader Service Card

STEEL STRUCTURES PAINTING COUNCIL
4400 Fifth Ave.
Pittsburgh, PA 15213-2683

Publications, standards, video, and training programs are highlighted. Featured subjects include accelerated testing and coating performance, lead paint abatement and removal, performance standards in low VOC coatings, protective coating for concrete.

Circle No. 268 on Reader Service Card

SUB-TROPICAL TESTING SERVICE
8290 S.W. 120th St.
Miami, FL 33156

Sub-Tropical Testing Service exhibits a variety of equipment and test procedures used in the analysis of paint film degradation. Staff is on hand to explain all facets of natural and accelerated weathering in addition to any questions you have on how to initiate a new and comprehensive test program.

Circle No. 269 on Reader Service Card

SUN CHEMICAL CORP.
411 Sun Ave.
Cincinnati, OH 45232

Sun Chemical features a complete display of technical literature describing almost every aspect of the colored organic pigments manufactured and marketed worldwide by the United States' largest manufacturer of organic pigments. Also featured is a display in keeping with previous years' practices: a rare Tucker automobile in 1988, a custom finished 1974 Corvette in 1989; an Indy 500 race car in 1990; and a 1927 Model T in 1991.

Circle No. 270 on Reader Service Card

SUNKYONG INDUSTRIES
140-A New Dutch Ln.
Fairfield, NJ 07004

The company features saturated copolyester resins for coatings, paints, inks, and hot-melt adhesives; polyurethane resins for coatings, inks and binders; and biocides.

Circle No. 271 on Reader Serfice Card

SYSTECH ENVIRONMENTAL CORP.
245 N. Valley Rd.
Xenia, OH 45385-9354

Systech Environmental converts waste into fuel for powering cement kilns through the proven technology of co-processing. The waste fuel replaces nonrenewable fossil fuels normally burned in the company's network of kilns, such as coal and other natural resources. The en-

ergy from these fuels is then used to produce cement.

Circle No. 272 on Reader Service Card

TABER INDUSTRIES
455 Bryant St.
N. Tonawanda, NY 14120

Taber abrasers facilitate precision accelerated wear testing on all types of paints and coatings, flooring material, decorative laminates and other architectural materials in accordance with various national and international specifications.

Circle No. 273 on Reader Service Card

TAYCA CORP.
c/o C.I. SPECIALTY CHEMICALS INC.
30500 Northwestern Hwy., #400
Farmington Hills, MI 48334

Tayca features their "K-White" line of nontoxic, corrosion inhibiting pigments for use in a variety of paint systems.

Circle No. 274 on Reader Service Card

TEGO CHEMIE SERVICE USA
914 E. Randolph Rd.
Hopewell, VA 23860

Defoamers, slip and wetting agents as well as state-of-the-art dispersants for aqueous and solvent containing paints and printing inks are featured by Tego Chemie Service USA. Silicone and silicone-polyester resins, which are used as heat and weather resistant paint binders for industrial paints of high quality, are also highlighted.

Circle No. 275 on Reader Service Card

TEXACO CHEMICAL CO.
3040 Post Oak Blvd.
Houston, TX 77056

Performance chemical products and the TEXSOLVE™ solvents are represented. A solvent selector computer program and polyurea spray elastomer video is featured as well as JEFFAMINE polyetheramines and TEXACAR carbonates for high solids and water reducible coatings.

Circle No. 276 on Reader Service Card

THIELE ENGINEERING CO.
7225 Bush Lake Rd.
Minneapolis, MN 55439-2024

Liquid fillers, both volumetric and weight, are featured.

Circle No. 277 on Reader Service Card

TIOXIDE INC.
9999 Cavendish Blvd., #100
St. Laurent, Que. H4M 2X5 Canada

Tioxide now offers a wide choice of chloride and sulfate process TiO_2 grades. They are the first TiO_2 producer to obtain the accreditation for both chloride and sulphate processes—ISO 9002. Featured is Tiosorb, a complete line of ultrafine TiO_2. Tioxide will add to its world capacity this year upon completion of its Malaysia plant, and information is available on its Becancour construction.

Circle No. 278 on Reader Service Card

TROY CORP.
72 Eagle Rock Ave.
E. Hanover, NJ 07936-0366

The exhibit features Troy's advanced performance materials for emerging environmentally-sensitive coatings technologies. Performance fungicides; bactericides; a variety of surfactants, dispersants, hydrophobic agents, and rheology modifiers, including Troy Unifilm 100 HSB, are featured.

Circle No. 279 on Reader Service Card

21ST CENTURY CONTAINERS, LTD.
5300 Westpark Dr.
Atlanta, GA 30336

The ATLAS container,displayed in a variety of applications and arrays, is featured. Demonstrations and audio/visuals illustrate the versatility of our extraordinary 360 gallon container, including some of the more common applications and uses.

Circle No. 280 on Reader Service Card

U.S. BORAX & CHEMICAL CORP.
136 Summit Ave.
Montvale, NJ 07645

U.S. Borax introduces a new anticorrosive pigment, BOROGARD®ZB, a unique form of zinc borate which has proven performance in a variety of coating systems. BOROGARD®ZB is chromate-free and can be used in both organic and aqueous systems. BOROGARD®ZB is also an effective fungicide.

Circle No. 281 on Reader Service Card

U.S. SILICA CO.
P.O. Box 187
Berkeley Springs, WV 25411

U.S. Silica & U.S. Borax will jointly exhibit in a new booth. U.S. Silica's Specialty Products Group features the SIL-CO-SIL® and MIN-U-SIL® lines of ground and fine ground silicas; SNOW•TEX® calcined kaolin and more.

Circle No. 282 on Reader Service Card

UNIMIN SPECIALTY MINERALS INC.
258 Elm St.
New Canaan, CT 06840

Unimin Specialty Minerals Inc. features its line of micronized and microcrystalline silica fillers, mica, nepheline syenite, and feldspar materials. Featured brandnames: IMSIL®, SILVER BOND™, TAMSIL®, MINEX™, and UNISPAR™.

Circle No. 283 on Reader Service CArd

UNION CARBIDE CHEMICALS AND PLASTICS CO., INC.
39 Old Ridgebury Rd.
Danbury, CT 06817-0001

Exhibit features expanded line of UCAR® solvents and solution vinyl resins for high-performance coatings; CYRACURE® resins for UV-cure coatings; UCAR® acrylics and latexes for trade paints and industrial finishes; CELLOSIZE® and UCAR® POLYPHOBE® thickeners; and coatings additives.

Circle No. 284 on Reader Service Card

UNION PROCESS INC.
1925 Akron-Peninsula Rd.
Akron, OH 44313

Attritor fine grinding and dispersing equipment is featured. Three systems are available for slurry grinding—batch, continuous and recirculation. Batch and continuous dry grinding mills are available. All attritors are jacketed for temperature control. Sizes available from research to full-scale production.

Circle No. 285 on Reader Service Card

UNITED CATALYSTS INC.
1227 S. 12th St.
Louisville, KY 40210

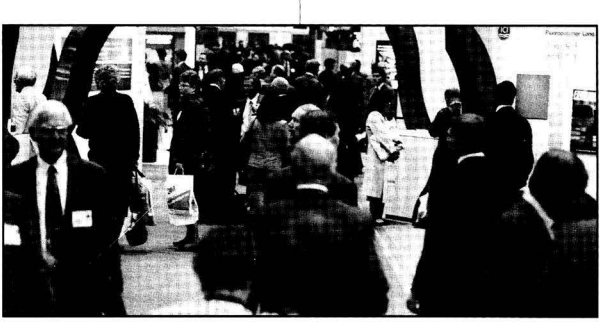
In addition to our full line of rheological additives for the coatings industry, we are promoting our maximum performance organoclays. Our "MP" products are the most efficient organoclays available in the world today allowing, in most cases, reduced usage levels.

Circle No. 286 on Reader Service Card

UNITED MINERAL & CHEMICAL CORP.
1100 Valley Brook Ave.
Lyndhurst, NJ 07071

Pigments are the theme of this booth. Highlights include a display of the U.C.F. fluorescent pigment lines offered by UMC, along with examples of their end use in paints, inks, and coatings.

Circle No. 287 on Reader Service Card



UNITED STATES TESTING CO., INC.
1415 Park Ave.
Hoboken, NJ 07030

United States Testing Co. offers a wide variety of services. We have literature and discuss our testing procedures, including performance testing, chemical analysis, consulting, physical property measurements and specification requirements.

Circle No. 288 on Reader Service Card

VAN WATERS & ROGERS INC.
6100 Carillon Point
Kirkland, WA 98124-1325

Van Waters & Rogers Inc. features a broad and growing array of coatings commodities and specialties, 100+ local stock points and a host of blue chip suppliers. Information concerning ChemCare, a specialized service for disposal of hazardous waste is also available.

Circle No. 289 on Reader Service Card

R.T. VANDERBILT CO., INC.
30 Winfield St.
Norwalk, CT 06855

Major emphasis at the booth is on developments with NYTAL, IT, ACTIV 8 and updated studies on VANCORR corrosion inhibitors. The booth is staffed by technical specialists to answer questions regarding the entire product line.

Circle No. 290 on Reader Service Card

VAUDREUIL STORAGE INC.
166 Aime-Vincent
Vaudreuil, Que. J7V 5V5 Canada

The company handles public warehousing, specializing in chemical and coating products.

Circle No. 291 on Reader Service Card

VELSICOL CHEMICAL CORP.
10400 W. Higgins Rd., Suite 600
Rosemont, IL 60018

Velsicol features several high performance products that will help you meet environmental regulations, including: Benzoflex® 352 for powder coatings; Benzophenone, a UV photoinitiator, Velate™ 262 coalescing aid, benzoic acid and sucrose benzoate.

Circle No. 292 on Reader Service Card

VERSA-MATIC TOOL, INC.
6017 Enterprise Dr.
Export, PA 15632

Shown are versatile, air-operated, diaphragm pumps, excellent for pumping highly viscous, shear sensitive latex, ink and abrasive pigments. Available in exclusive Thermo-Matic ™ thermoplastic elastomers.

Circle No. 293 on Reader Service Card

VORTI-SIV DIV., M M INDUSTRIES, INC.
36135 Salem Grange Rd.
Salem, OH 44460

Vorti-Siv displays several models of its line of gyratory sieving and straining equipment. Models include a model RBF-15 (15" screen diameter) media reclamation sieve along with new lab/small batch models RBF-10 (10" screen diameter) and RBF-12 (12" screen diameter).

Circle No. 294 on Reader Service Card

WACKER SILICONES CORP.
3301 Sutton Rd.
Adrian, MI 49221-9397

Featured is Wacker's expanding line of VOC compliant, high temperature resins. Also on display is its full line of paint raw materials including intermediates, ethyl silicates and paint additives. Wacker Chemicals (USA) is represented with hydrophobic and hydrophylic fumed silica.

Circle No. 295 on Reader Service Card

WASHTECH SYSTEMS, INC.
3003 E. Chestnut Expwy.
Springfield, MO 65802

Introduced is a new portable tank testing system for DOT recertification and industrial tank washing systems.

Circle No. 296 on Reader Service Card

WARREN RUPP, INC.
A Unit of IDEX
800 N. Main St.
Mansfield, OH 44901

Warren Rupp, Inc., a unit of IDEX, demonstrates and displays SandPiper® air-operated pumps.

Circle No. 297 on Reader Service Card

WHALLON MACHINERY, INC.
205 N. Chicago St., P.O. Box 429
Royal Center, IN 46978-0429

Whallon Machinery, Inc. exhibits video presentations of the Whallon brite can, pail and case palletizing equipment. Company representatives are available for consultation and/or questions.

Circle No. 298 on Reader Service Card

WILDEN PUMP AND ENGINEERING CO.
22069 Van Buren St.
Colton, CA 92324

On display is Wilden's complete line of air-operated, double-diaphragm, positive displacement pumps. The pumps handle up to 90% solids to over 250 foot heads in permanent, submerged and self-priming operations. The shear sensitivity and wide range of construction options make your tough pumping jobs simple.

Circle No. 299 on Reader Service Card

WITCO CORP.
520 Madison Ave.
New York, NY 10022

Witco features Witcobond® aqueous polyurethane dispersions and SACI® 8000 series corrosion-inhibitive raw materials for protective coatings; surfactants and metallic stearates for paint formulations; oleochemical specialty additives for resins and coatings; and Esperox® peroxyacetates for acrylic alloy coatings.

Circle No. 300 on Reader Service Card

X-RITE, INC.
3100 44th St., S.W.
Grandville, MI 49418

X-Rite features two new products, a portable sphere spectrophotometer (SP 68) and paint formulation software (PaintMaster).

Circle No. 301 on Reader Service Card

ZEELAN INDUSTRIES, INC.
141 E. Fourth St., #220
St. Paul, MN 55101-1620

Zeelan's exhibit demonstrates the use of two types of ceramic microspheres (fine particle size, high strength ZEEOSPHERES® and larger particle size, low density Z • LIGHT SPHERES®) to increase solids, control gloss, improve flow and enhance abrasion, chemical, corrosion and burnish resistance in a variety of coating systems.

Circle No. 302 on Reader Service Card

THIS PAPER WAS AWARDED FIRST PRIZE
IN THE 1992 ROON AWARDS COMPETITION

Influence of Imidazoline Content and Water On the Reaction between Amidoamine and Epoxy Resins

Robert F. Brady Jr.
Naval Research Laboratory*

John M. Charlesworth
Defence Science and Technology Organization†

The reaction of amidoamines with epoxy resins has been studied with fluorescence spectroscopy, Fourier transform infrared spectroscopy (FTIR), and gas chromatography. Films were prepared independently from four amidoamines containing increasing proportions of imidazoline, under dry conditions, and in the presence of water. The intensity of fluorescence increased during curing, and the reaction rate and maximum fluorescence intensity were found to be inversely proportional to the imidazoline content of the amidoamine. FTIR measurements showed that hydrolysis of epoxy and imidazoline rings is slow compared to reaction between the amine and epoxy groups. Fluorescence properties of the cured films were studied as a function of temperature over the range −8 to 75°C. Two temperature-dependent radiationless processes from the singlet state were observed, with activation energies which depend on the imidazoline content of the amidoamine. Arrhenius plots of fluorescence intensity showed a distinct discontinuity near 32°C which is not affected by imidazoline content. The discontinuity correlates with the dynamic mechanically observed glass transition and is due to increased radiationless thermal deactivation of the singlet excited state, possibly by motion of alkyl chains in the polymer.

INTRODUCTION

Polyamide-cured epoxy coatings are widely used to preserve steel in industrial and marine environments.[1,2] Mixtures of polyamide and amidoamine resins are used as curing agents, and impart excellent chemical and water resistance to the coating. In addition, these curing agents are effective surfactants which displace water and wet steel substrates easily,[1] making the coatings especially valuable on moist and poorly prepared substrates.

Polyamide and amidoamine resins are similar materials made by the condensation reaction of carboxylic acids and polyalkylene polyamines (the simplest of which is ethylene diamine). Polyamides are made from dimer acids (isomerized and dimerized fatty acids), and amidoamines are produced from tall oil fatty acids (a mixture of unsaturated fatty acids derived from pine). When dehydration conditions are prolonged beyond formation of the amide bond, intramolecular reaction takes place between the amide carbonyl group and an amine, a second mole of water is eliminated, and an imidazoline ring is formed, as

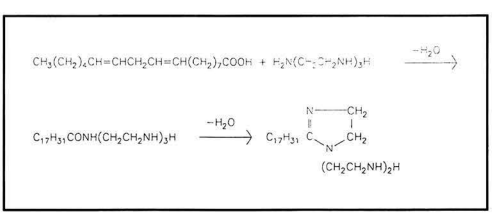


Figure 1—Amidoamines are produced by the reaction of monobasic fatty acids with polyamines. This example shows the reaction of linoleic acid with triethylene tetramine

Presented at the 70th Annual Meeting of the Federation of Societies for Coatings Technology, on October 21-23, 1992, in Chicago, IL.

*Materials Chemistry Branch, 4555 Overlook Ave., S.W., Washington, D.C. 20375.
†Materials Research Laboratory, P.O. Box 50, Ascot Vale, Victoria 3032, Australia.

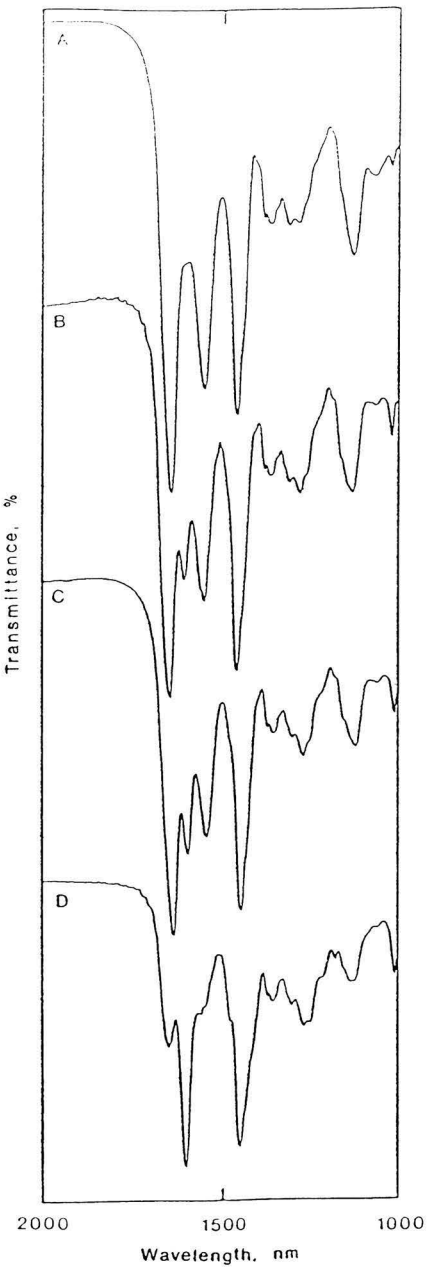


Figure 2—FTIR absorption spectra of amidoamines A-D between 2000 and 1000 cm^{-1}

shown in *Figure* 1. Reactive amine groups are converted to inert imidazoline rings by the second dehydration. Increasing the proportion of imidazoline rings lowers the amine equivalent weight and viscosity and increases the miscibility with an epoxy resin. Because formation of the imidazoline ring can be reversible, the rings are said to scavenge water from the substrate and open to reform amine groups which then react with epoxy groups.

The effects of small amounts of water on the rates of reaction of polyamides with epoxy resins, and on the structure of the resins formed, have not previously been reported. In this paper, we use the intrinsic fluorescence of amidoamine resins as a probe of their reactions with an epoxy resin. Four related amidoamine resins, containing different amounts of imidazoline rings, are used and the reactions are performed under wet and dry conditions. This technique provides new information on the effect of water on rates of film formation and on the properties of the resulting coating films. The data so obtained have important implications for the formulation and application of polyamide-epoxy primers intended for use in damp conditions.

Fluorescence spectroscopy is a particularly useful technique for following the reaction of thermosetting systems and is regarded as a sensitive method for investigating the reactivity and molecular dynamics of polymers in general.[3,4] To date, at least four fluorescence techniques have been applied to the nondestructive monitoring of the curing process. These are: (1) production and detection of new fluorescent species[5–9]; (2) excimer formation[10,11]; (3) polarization of fluorescence[12]; and (4) enhancement of the fluorescence of fluorophores dispersed or bound within the matrix.[13] A recent review provides a summary of progress in these areas.[14]

EXPERIMENTAL

Materials

The liquid epoxy resin used in this work was the diglycidyl ether of bisphenol A, a commercial product (Shell Chemical Company, Houston, TX) having a number-average molecular weight of 376 and an epoxide equivalent weight of 188. The resin includes about 12% of higher oligomers which contain hydroxyl groups.[15] The amidoamines were commercial products (Pacific Anchor Chemical Corporation, Los Angeles, CA); characteristic physical properties are given in *Table* 1. Infrared spectra, ^{1}H and ^{13}C NMR spectra, and microanalytical data are consistent for the industrial products of the reaction of one mole of linoleic acid with one mole of triethylene tetramine [$H_2N(CH_2CH_2NH)_3H$], recognizing that the degree of dehydration is not known exactly. The products differ principally in their degree of dehydration; their similar viscosities denote similar molecular weights. Microanalytical data: calculated for $C_{24}H_{50}O_2N_4$: C, 67.61; H, 11.74; O, 7.51; N, 13.15; found: amidoamine A—C, 64.9; H, 10.9; O, 9.3; N, 15.0; amidoamine B—C, 67.6; H, 10.3; O, 8.0; N, 13.7; amidoamine C—C, 67.6; H, 10.5; O, 7.7; N, 14.1; and amidoamine D—C, 69.8; H, 11.0; O, 5.3: N, 13.7.

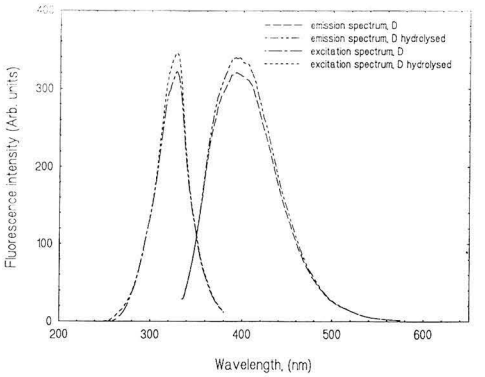


Figure 3—Excitation and emission spectra of amidoamine D, and amidoamine D reacted with 5% water, each at 0.1 wt% in tetrahydrofuran

The infrared spectra of amidoamines A-D in the region of 2000 to 1000 cm^{-1} are shown in *Figure* 2. The significant bands in this region are[16] the amide carbonyl stretching vibration at 1660 cm^{-1}, the C=N bond stretching (in the imidazoline ring) at 1625 cm^{-1}, the amide N-H bending vibration at 1560 cm^{-1}, and the methylene symmetrical bend at 1465 cm^{-1}. In traversing the series from A to D, it can be seen that amide A contains carbonyl and amide groups but no imidazoline rings. Amides B, C, and D contain a progressively increasing proportion of imidazoline rings.

Characterization Methods

^{1}H and ^{13}C NMR spectra of samples dissolved in $CDCl_3$ were obtained on a Bruker AM300 Fourier transform NMR spectrometer operating at 300.013 MHz. Fourier transform infrared (FTIR) spectra of thin films between KBr windows were measured on a Perkin-Elmer 1600 series spectrophotometer. Dynamic mechanical measurements were performed using a Rheovibron instrument in the flexural mode at 1 Hz from −100 to 100°C.

Uncorrected fluorescence spectra were obtained on a Perkin-Elmer LS-50 luminescence spectrophotometer equipped with FL Data Manager Software. Survey scans of the fluorescence spectra of undiluted amidoamines revealed two pairs of bands which are suitable for measurement: excitation at 359 nm and observation at 433 nm, as well as excitation at 310 nm and observation at 384 nm. The latter bands were employed because the intensity of fluorescence is about twice that obtained when the former bands are used. The excitation spectrum for emission at 384 nm and the emission spectrum for excitation at 310 nm are near mirror images of each other. Examples of spectra for amidoamine D dissolved in tetrahydrofuran (0.1% wt/vol) are shown in *Figure* 3. These show slight wavelength shifts compared to the undissolved amidoamine. Also included in *Figure* 3 are spectra at the same concentration of amidoamine D which has undergone hydrolysis (5% H_2O, 18 hr, 60°C). It can be seen that there is virtually no change in the spectra after ring opening occurs which suggests that it is not the imidazoline unit that is responsible for the fluorescence. This is supported by the fact that amidoamine A, which contains very little imidazoline, exhibits strong fluorescence. At the present stage of work, it is not possible to associate any particular structural entity with the fluorescence and it cannot be ruled out that there are traces of unknown components which are responsible.

The consumption of epoxide groups in the reaction between glycidyl ethers and the amidoamine was followed using phenyl glycidyl ether (PGE) as a suitable monofunctional analog of an epoxy resin. The ether (4.4 g) and amidoamine D (2.8 g) were mixed, 1% naphthalene added as an internal standard, and the mixture was sealed in a glass vessel maintained at 60°C in a water bath. Aliquots were periodically withdrawn and dissolved in dichloromethane, then analyzed for naphthalene and unreacted PGE by gas chromatography. For this purpose, a Varian 3400 Gas Chromatograph was used, with a 5 m × 0.33 mm BP1 fused silica capillary column temperature programmed from 100 to 250°C at 10°C/min. For the FTIR study of the hydrolysis kinetics of the amidoamine, a similar sampling procedure to the previously mentioned method was employed, following the mixture of water with the curing agent and equilibration in a temperature-controlled oven. IR spectra in the range 4000-500 cm^{-1} were recorded immediately after the material was withdrawn from the reaction tube, using a thin layer of the liquid sample spread on a KBr window.

CURING REACTIONS AND KINETIC STUDIES

Equal weights of epoxy resin and amidoamine were used in this work in order to duplicate the chemistry of marine primers, many of which employ equal weight mixtures. About 2 g each of the two reactants were mixed and briefly sonicated if necessary to remove entrained air. Films were cast on glass plates using a 10 mil (0.010 in.) drawdown blade, and the glass plates were placed on a steel surface which was heated to 25-85°C by a water-glycol mixture from a circulating water bath. For some

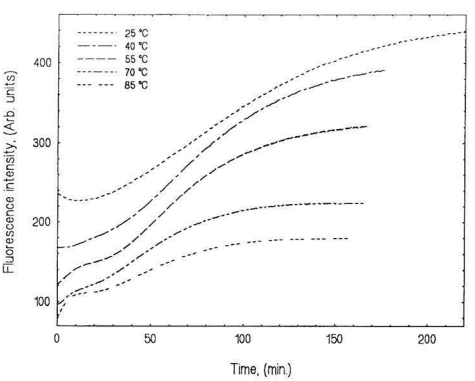


Figure 4—Fluorescence cure-curves for a mixture of amidoamine D and epoxy resin (1:1) at several cure temperatures

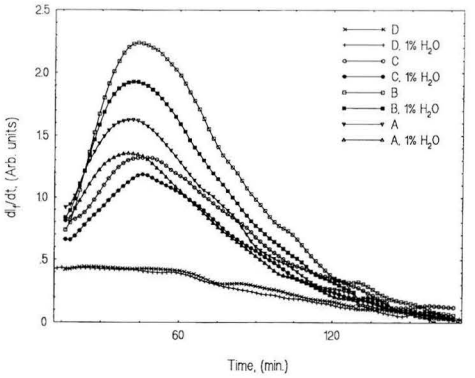


Figure 5—Rate of change of fluorescence (dI_f/dt) as a function of time for dry and wet (1% water added to mix) mixtures of epoxy resin and amidoamines A-D

reactions, a microliter syringe was used to add measured amounts of distilled water to the epoxy resin; these were mixed thoroughly before an amidoamine was added.

The change in fluorescence as a function of time at several cure temperatures for amidoamine A mixed with an equal weight of epoxy resin is presented in *Figure* 4. These data show a gradual increase in fluorescence intensity as the reaction progresses, which stabilizes at longer times. Increasing the temperature increases the reaction rate, as measured by the inflection point for the curves; however, the equilibrium fluorescence intensity follows the opposite trend, showing a substantial decline as the temperature increases beyond the glass transition temperature (T_g) of the forming network.

In *Figure* 5, the first derivatives of the cure-curves for each of the amidoamines at 60°C are shown. The initial and maximum fluorescence intensities, and time to reach maximum intensity at 60°C, are given in *Table* 2. The data show that early in the reaction the rate of change of fluorescence intensity is greatest for amidoamines A and B, has an intermediate value for C, and is least for amidoamine D. This demonstrates that the rate of reaction is faster for amidoamines with high free amine (low imidazoline) content. Curing reactions are complete in 150-180 min at 60°C, and the time needed to react completely is proportional to imidazoline content. Because radiationless deactivation of the excited singlet state by friction or momentum transfer to the matrix becomes more difficult as curing progresses, radiative deactivation is favored and fluorescence intensity increases. Ultimate fluorescence intensity increases from amidoamine D to amidoamine A, indicating that systems with less imidazoline form more highly crosslinked products.

These experiments were repeated after distilled water (1% of total resin weight) was added. The rate of change of fluorescence intensity with time for these systems is also shown in *Figure* 5, and pertinent data are given in *Table* 2. The relative rates of reaction of the amidoamines are not changed by the presence of water. Water has the effect of reducing the relative maximum rate of change of fluorescence, largely because the ultimate maximum of fluorescence intensity is 3-13% less. The times required to reach a plateau value of fluorescence are only about 2-6% faster than those of the dry samples. This is in agreement with earlier reports indicating that moisture has a slight accelerating effect on the cure of epoxides,[17,18] but the acceleration in reaction rate is less than might be expected if the concentration of amine groups is increased by hydrolysis of the imidazoline rings.

To resolve any uncertainty in the role played by water in the overall reaction scheme, the kinetics at 60°C of the reaction between PGE and amidoamine D, and also hydrolyzed amidoamine D (5% water, 18 hr, 60°C) were followed by monitoring the unreacted PGE concentration by gas chromatography. The results are shown in *Figure* 6. The data clearly indicate that the final degree of conversion and the rate of reaction are greatest for the mixture containing the hydrolyzed amidoamine. However, it can be argued that for mixtures in which water is added immediately prior to cure, provided the reaction between the amine and the epoxy resin is fast compared to the rate of hydrolysis, the system is inadequately described by simply using the hydrolyzed amidoamine as a model. We therefore further investigated the hydrolysis by following the changes in IR absorbances of the characteristic functional groups during reaction with water.

The results of FTIR analysis of the reaction between amidoamine D and water are presented in *Figures* 7 and 8. These show the respective changes in intensity of the carbonyl, imine, and amide hydrogen absorbances, internally standardized to the methylene absorbance. These were measured as a function of amount of added water, and also as a function of time following the addition of 5 wt% water. The occurrence of ring-opening hydrolysis is manifested by the disappearance of the imine absorbance,

Table 1—Properties of Amidoamines

Amidoamine	Amine Equivalent Weight, (g)	Viscosity at 25°C, (Pa sec)	Specific Gravity	Film Set Time[a] (hr)
A	118	33	0.95	9
B	131	30	0.95	12
C	133	25	0.95	14
D	141	24	0.94	23

(a) A 250-μm film of a mixture of equal weights of the amidoamine with epoxy resin (EEW = 188) at 25°C.

Table 2—Curing Parameters for Epoxy-Amidoamine Films

Amidoamine	Water	I_o, (Arb. Units)	I_{max}, (Arb. Units)	Time to Cure at 60°C, (min)
A	absent	42	118	153
B	absent	47	145	162
C	absent	36	107	175
D	absent	33	60	178
A	present	40	103	150
B	present	43	126	157
C	present	36	93	166
D	present	32	58	168

and a corresponding increase in the carbonyl and amide hydrogen absorbances. The nonlinear relationship between the extent of hydrolysis and amount of added water is evidence of a reversible equilibrium system and indicates that some unreacted water will always be present in this system. The kinetic measurements show that the maximum extent of conversion is not achieved in less than about 48 hr at 60°C, and very little hydrolysis of the imidazoline ring occurs in the first 2 hr, even for the addition of 5 wt% water. Because imidazoline rings with small substituent groups revert to open-chain amino-substituted amides when exposed to water,[19] it is surprising to find that the rings in these amidoamines are not rapidly hydrolyzed. This unexpected result provides evidence that these curing agents would only slowly react with surface moisture, probably over a period of several months in most practical coatings applications at ambient temperatures. Furthermore, any enhancement in cure kinetics due to the addition of water is most likely only a catalytic effect involving the hydrogen-bonded transition state known to occur during the reaction of epoxies with amines.[17] Therefore, these data suggest that the curing of polyamide-epoxy primers will not be affected by small amounts of water on the substrate.

POLYMER PROPERTIES

When a chromophore in a polymer absorbs a quantum of energy, a localized excited singlet state is produced. The energy of the excited singlet may be dissipated by several competitive processes: temperature-independent conversion to an excited triplet state (intersystem crossing), temperature-dependent intersystem crossing, temperature-independent nonradiative deactivation, temperature-dependent nonradiative deactivation, and temperature-independent radiative deactivation. The rate constants for these processes can be represented as k_{st}, k^T_{st}, k_{nr}, k^T_{nr}, and k_r, respectively.[20,21] At low temperatures where motions of the polymer are sluggish, dissipation of the excitation energy by friction or momentum transfer to the matrix becomes more difficult, and fluorescence intensity increases as re-emission of energy becomes the favored pathway. Thus, the temperature-dependent processes may be ignored at low temperatures, and the fluorescence intensity at the low temperature limit I_o arises only from temperature-independent deactivation processes.

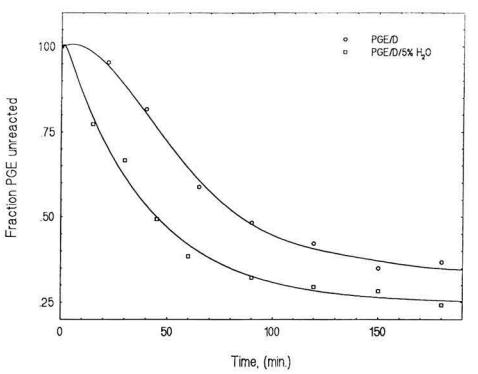


Figure 6—Kinetic measurements showing the amount of phenyl glycidyl ether (PGE) remaining unreacted at 60°C in a PGE/amidoamine D mix (4.4:2.8 g), and the same experiment using amidoamine D that has been reacted with 5% water at 60°C for 18 hr

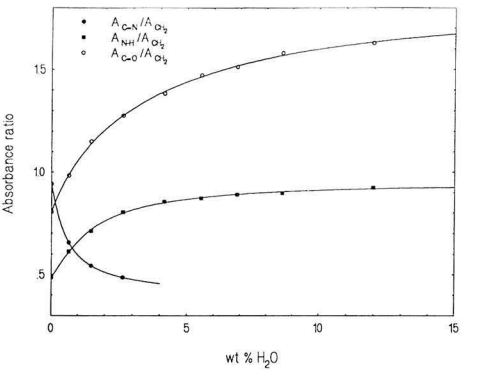


Figure 7—FTIR absorbances of the imine, amide N-H, and amide carbonyl bands, relative to the methylene absorption, as a function of amount of added water to amidoamine D after 72 hr reaction at 60°C

Provided that k^T_{nr} and k^T_{st} can be described by an Arrhenius relationship, the temperature-dependent nonradiative relaxation pathways for the singlet state can be described by the following relationship:

$$\ln [(I_o/I) - 1] = - E_{Act}/RT + k$$

where, I and I_o are the fluorescence intensities at temperature T and the low temperature limit, respectively, E_{Act} is the activation energy, R is the ideal gas constant, and k is constant.[20,21] In this case, a plot of $\ln[(I_o/I) - 1]$ against $1/T$ will be linear if either k^T_{nr} or k^T_{st} is insignificant or if the activation energies for each of these processes are identical. The activation energy for the relevant temperature dependent nonradiative decay processes for the excited singlet state may then be calculated from the slope.

Glass Transition Temperature

Films on glass plates were placed on a hot stage at about 80°C, and the first measurement was taken as soon as the fluorescence intensity stabilized (about 10 min). The temperature was reduced in about 5°C intervals to about −10°C, and the sample was allowed to equilibrate for 15 min at each temperature. The fluorescence intensity of a film was unaffected by its thermal history, for essentially the same data were obtained from a polymer film without regard for the number of times it had been cycled in this way. As observed in earlier studies,[21,22] the fluorescence intensity measured as the temperature was raised differed significantly from that measured as the temperature was reduced, and data obtained as the temperature was raised were not used in this work.

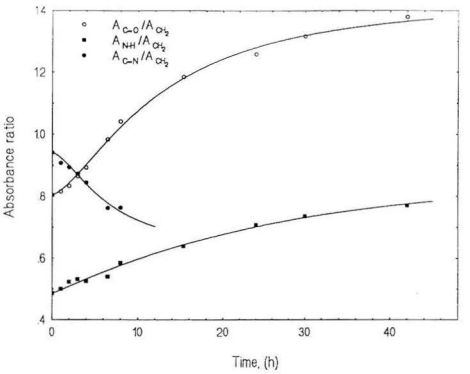


Figure 8—Kinetic measurements showing the FTIR absorbances of the imine, amide N-H, and amide carbonyl bands, relative to the methylene absorption, for 5% added water to amidoamine D reacted at 60°C

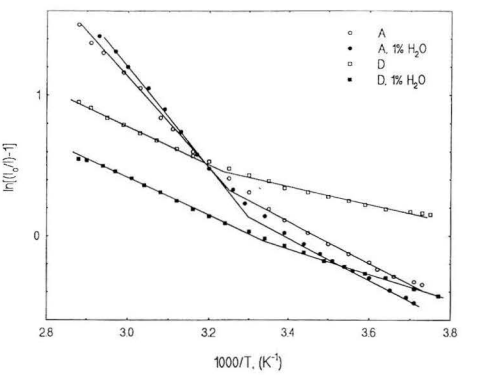


Figure 9—Temperature dependence of the fluorescence intensity of cured equal weight mixtures of epoxy resin and amidoamines A and D. Open symbols represent anhydrous polymers; filled symbols represent polymers to which 1% (wt) of distilled water has been added

The low-temperature limit of fluorescence (I_o) was determined at −98°C for films on the inner wall of sealed glass tubes cooled by liquid nitrogen using the LS-50 phosphorescence accessory. The fluorescence intensity was unchanged at lower temperatures, and thus data obtained at −98°C provided valid measurements of I_o.

An Arrhenius plot of ln $[(I_o/I) - 1]$ against $1/T$ for each film formed a curve which was analyzed by fitting a straight line to points at either end using a linear least squares fitting procedure. Points were added individually to a line and the correlation coefficient was computed after each addition; a point was excluded from a line if it caused the correlation coefficient to decrease. In all cases, lines containing 6 to 10 points with correlation coefficients of 0.99 or greater were obtained. The activation energy E_{Act} was computed from the slope of the line in each temperature range, and the point of intersection of two lines was determined algebraically from their equations.

The temperature dependence of the fluorescence of films prepared from epoxy resin and amidoamines A and D at 60°C are shown in *Figure* 9. The figure illustrates representative data for dry films and films with 1% water. Results for films prepared from the other amidoamines demonstrated the same behavior. Each plot was resolved into two lines and a transition region of three to six points in the center of the plot. The transition temperature at the intersection of the lines was found to be 35 ± 3°C for the dry films and 29 ± 1°C for the films with water. Relevant data are given in *Table* 3.

The resin mixtures contain 1.31 to 1.59 equivalents of amine hydrogen for each epoxy equivalent. Thus, nearly all of the epoxy groups are reacted and very similar polymer networks are formed. However, the crosslink density and the average molecular weight between crosslinks are not identical, and the T_gs of the polymers would be expected to differ. Nonetheless, the transition temperatures determined for the four polymers under dry conditions when measured by dynamic mechanical methods at 1 Hz, shown in *Figure* 10, are remarkably similar to those values derived from the fluorescence measurements, indicating that this temperature corresponds to the glass transition. The dynamic mechanical measurements are all very similar and show no large damping peaks above −100°C, other than the major relaxation at 35-40°C. This suggests that the transition has a significant component arising from the segmental motion of groups which all polymers have in common. The long alkyl side chains on the imidazoline ring are common to all polymers, and it is likely that these act as an internal plasticizer facilitating cooperative motion within the matrix at the glass transition and overriding the influence of crosslink density. Similar small effects of crosslink density on T_g have been noted for aliphatic amine/aliphatic epoxy networks.[23]

When the polymerization is conducted in the presence of water, polymers with remarkably similar transition temperatures are again obtained, but the transition occurs

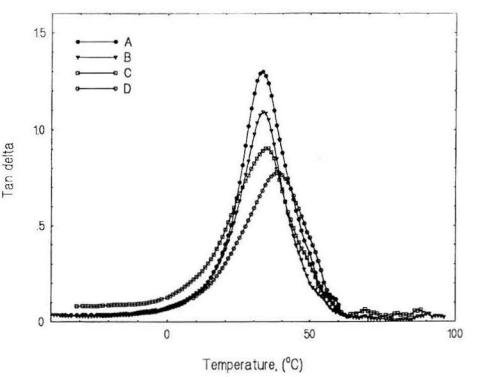


Figure 10—Dynamic mechanical loss (tan δ) measurements at 1 Hz for networks from epoxy resin and amidoamines A-D

about 6°C lower than that for films formed under dry conditions. Because the imidazoline ring does not participate in the curing reaction, the reactions of the $-(CH_2CH_2NH)_2H$ moiety control the crosslink density of the resulting polymers. If hydrolysis of imidazoline rings in amidoamines B-D were to occur, the properties of the products from the four curing agents would be expected to converge, ultimately becoming identical to the products from amidoamine A, but this behavior is not observed. Furthermore, if hydrolysis of epoxy groups to produce diols were to occur, the crosslink density of the products would be reduced and activation energies of intramolecular processes would be diminished. However, the concentration of amines in the reaction mixture is greater than that of epoxy groups, and the reaction of epoxies is faster with amines than water.[2] As will be explained later in the paper, activation energies rise rather than fall when water is present.

Thus, physical processes involving water are more important than its chemical reactions in influencing the properties of the products. Not being consumed by hydrolysis of imidazoline or epoxy rings, water must remain physically contained within the coating film. Water has been shown to exist in epoxy-amine polymers in three states[24]: aggregated water in free volume elements of the polymer, absorbed water on the surface of free volume elements, and water hydrogen bonded to hydrophilic groups of the polymer. Because the dominant effect of water is to plasticize the products and depress the T_g by about 6°C, the first possibility must be discarded because plasticization effects have been shown to be due to a strong interaction between dispersed water and specific segments or groups in the polymer.[25] A choice between the latter two states can be made after study of the activation energies measured under dry and wet conditions.

Activation Energies

The Arrhenius plot of fluorescence intensities for each polymer is resolved into two lines, which correspond to temperature regions on either side of the dynamic mechanically observed glass transition. The activation energy and the respective temperature range for the lines drawn according to those represented in *Figure* 9 are given in *Table* 3. The slope of the line above the transition temperature represents the energy needed for coordinated large scale movements of alkyl segments, and the second line represents the energy of a secondary subgroup motion in the polymer.

The energy of the chain segment motion above the transition temperature shows a marked inverse relationship to imidazoline content. Increasing the concentration of imidazoline rings decreases the crosslink density of the products, creating a looser network where subgroup motion can occur with greater ease. Thus, for the amidoamine having the least imidazoline content, the energy was found to be 26.4 kJ mol^{-1}, whereas in the amidoamine containing principally imidazoline rings, the energy was found to be 11.9 kJ mol^{-1}. The activation energies found in this work are comparable to that of the rotation of methylene chain segments in vinyl polymers. The activation energy for rotation of the polymer chain has been found[26] by phosphorescence techniques to be 18 kJ mol^{-1} in polyethylene and 17 kJ mol^{-1} in poly(vinyl chloride), in reasonable agreement with the measurements in this work. The process occurring below the transition point requires less energy. Measured values lie between 4.8 and 12.6 kJ mol^{-1}, and also are inversely related to imidazoline content.

Table 3—Activation Energies and Transition Temperatures of Cured Epoxy-Amidoamine Copolymers

Amidoamine	Water	Temperature Range, (°C)	E_{Act}, (kJ mol^{-1})	Glass Transition Temperature, (°C)
A	absent	−5 to 75	26.4, 12.6	35.3
B	absent	5 to 79	27.0, 9.5	37.0
C	absent	−4 to 79	21.9, 7.7	31.7
D	absent	−7 to 75	11.9, 4.8	35.9
A	present	−4 to 72	28.3, 12.5	28.4
B	present	−4 to 75	31.4, 11.3	29.0
C	present	−8 to 75	23.7, 9.3	30.1
D	present	−8 to 75	11.3, 7.5	28.1

The presence of water in the reaction mixture raises the measured values of all the activation energies by about 2 kJ mol^{-1}. The increase is most likely due to the formation of new hydrogen bonds which slightly restrict molecular motion. Hydrogen bond energies for $H_2N\text{-}H\cdots NH_3$ and $HO\text{-}H\cdots OH_2$ are 17 and 22 kJ mol^{-1}, respectively,[27] and a small proportion of new hydrogen bonds would be observed in these measurements.

In previous studies concerned with the effects of temperature on fluorescence emission of probe molecules, either dissolved in, or covalently bound to the polymer matrix, a consistent pattern of behavior does not seem to emerge. For example, in the work of Somersall and coworkers,[26] the fluorescence from probe species in polystyrene (PS) and poly(methylmethacrylate) (PMMA) appears to show negligible dependence on reciprocal temperature in the range of −196 to 27°C. However, the data presented by Loutfy[13] for rotameric fluorescent probes dissolved in PMMA show a linear relationship between the logarithm of fluorescence intensity and temperature, with a break in the slope at the T_g of PMMA, just as is seen in this work. The report by Smit and coworkers[21] concerning indole and coumaric acid fluorophores incorporated in PMMA, PS, and poly(vinyl alcohol) lists a wide variation in activation energies and transition temperatures for different probes dissolved in the same polymer. It appears that the mechanism by which the radiationless deactivation occurs has an important bearing on the significance of the data obtained, and further interpretation of the results from our study is impossible until the radiationless singlet deactivation process is better understood.

CONCLUSIONS

The reactions between an epoxy resin and four amidoamines, and the effect of water on these processes, have been investigated. Four amidoamines, which varied in the proportion of imidazoline rings they contain, were reacted separately with the epoxy. Increasing the proportion of

imidazoline rings in the amidoamine slows the rate of the film-forming reaction slightly, but water does not affect the curing time. Imidazoline rings tie up otherwise reactive amine groups, reduce the extent of reaction, and diminish the crosslink density of the products. The proportion of imidazoline rings does not influence the glass transition temperature (T_g) of the resulting film. Water plasticizes the cured film by forming hydrogen bonds to polar functional groups, thereby reducing the T_g by about 6°C. Film formation by a polyamide-epoxy reaction is much faster than the hydrolysis of imidazoline or epoxy rings in the presence of water at ambient conditions.

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Changes in Hiding During Latex Film Formation: Part IV. Effect of Toning and Film Thickness

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Cleveland Society for Coatings Technology
Technical Committee

In Part IV of this continuing series, the Cleveland Society for Coatings Technology Technical Committee investigated how titanium dioxide level, toning, and film thickness affect the changes in hiding of a latex flat paint during the first hour of drying. Measurements were made with a computer-interfaced spectrophotometer on paints drawn down over a black substrate. By measuring the reflectance (tristimulus Y) every 15 sec, film brightness, and hence hiding, could be monitored. Results were explained in terms of the three variables of the Kubelka-Munk theory: scattering coefficient (S), absorption coefficient (K), and film thickness (X). From this data, a model has been developed to describe the processes involved.

INTRODUCTION AND REVIEW

In previous work, a method was developed to monitor changes in hiding during latex film formation.[1] Briefly, the method consisted of making a drawdown of the test paint over a contrast ratio chart (Leneta Form 5C) with a 7-mil clearance blade (Dow Film Caster). The wet drawdown over the black portion of the chart was placed against a spacer affixed to the viewport of a computer-interfaced spectrophotometer (Spectro-Sensor II, Applied Color Systems, Inc., Lawrenceville, NJ). By selecting the "Long Term Drift" option, the reflectance[2] (Y) of the drawdown was measured every 6 sec for 60 min. To compensate for differences in calibration associated with placement of the spacer, changes in reflectance ($\Delta Y = Y - Y_i$) relative to the initial reading (Y_i) were plotted as a function of dry time. Because white paints were applied to a black substrate, changes in reflectance were assumed to represent changes in hiding.

During the initial stages of drying, the coating loses hiding due to:

(1) A decrease in the difference of refractive index between pigment and surrounding medium. As the paint dries, pigment-water interfaces are replaced by pigment-polymer interfaces. Because pigment-water has a greater difference in refractive index than pigment-polymer, light scattering and, therefore, hiding decreases.

(2) An increase in optimum titanium dioxide (TiO_2) particle size. Optimum pigment particle size for light scattering is inversely proportional to the difference in refractive index between the pigment and surrounding medium. Optimum particle size for TiO_2 in water is 0.25 μm; in polymer, 0.29 μm. Because typical paint grades of TiO_2 have a mean particle size of 0.25 μm, a decrease in hiding would be expected.

(3) An increase in TiO_2 concentration.[3-7] In the wet coating, TiO_2 particles are separated by a greater distance than in the dry film. Because TiO_2 hiding power decreases with increasing concentration, hiding decreases as the coating contracts during drying.

(4) Loss of hiding from the latex. As the coating dries polymer-water interfaces are lost and hiding decreases.

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*Coatings Research Group, Inc., 2340 Hamilton Ave., Cleveland, OH 44114.

Table 1—Test Formulas

	35% PVC		55% PVC		75% PVC	
	Pounds	Gallons	Pounds	Gallons	Pounds	Gallons
Water	300.00	35.96	300.00	35.96	300.00	35.96
Hydroxyethyl cellulose[a]	6.50	0.57	7.50	0.65	8.50	0.74
Dispersant, 25%[b]	5.60	0.61	8.33	0.91	10.93	1.19
2-Amino-2-methyl-1-propanol[c]	2.00	0.26	2.00	0.26	2.00	0.26
Package preservative[d]	2.00	0.21	2.00	0.21	2.00	0.21
Defoamer[e]	2.00	0.27	2.00	0.27	2.00	0.27
TiO_2, Type II[f]	150.00	4.50	150.00	4.50	150.00	4.50
Calcined clay[g]	131.30	6.00	262.70	12.00	394.10	18.00
Nonionic surfactant[h]	2.00	0.23	2.00	0.23	2.00	0.23
Defoamer[e]	2.00	0.27	2.00	0.27	2.00	0.27
Coalescent[i]	11.33	1.43	7.80	0.99	4.40	0.56
PVA Latex, 55%[j]	343.32	37.94	237.68	26.26	132.05	14.59
Water	98.05	11.75	145.89	17.49	193.70	23.22
	1056.10	100.00	1129.90	100.00	1203.68	100.00

Disperse first eight items at high speed. Let down with remaining items in order listed.

	By weight	By volume	By weight	By volume	By weight	By volume
Total solids, %	46.11	31.77	49.73	31.90	52.91	32.04
Additives as 100% volatile, %	44.52	30.00	48.10	30.00	51.24	30.00
Total pigment, %	26.64	10.50	36.53	16.50	45.20	22.50
PVC, %	—	35.00	—	55.00	—	75.00

(a) Cellosize ER-15000, Union Carbide.
(b) Tamol 731, Rohm and Haas.
(c) AMP-95, ANGUS.
(d) Nuosept 95, Hüls.
(e) PA-188, U.S. Movidyn.
(f) Ti-Pure R-900, DuPont.
(g) Satintone No. 1, Engelhard.
(h) Igepal CTA-639, Rhône-Poulenc.
(i) Texanol, Eastman.
(j) Ucar 367, Union Carbide.

As drying progresses, three distinct types of behavior are observed. If the coating is below the critical pigment volume concentration (CPVC)[8] (Case I), hiding continues to decrease to a final value which is the minimum value ($0 > \Delta Y_f = \Delta Y_m$). If the coating is slightly above CPVC (Case II), hiding will start to increase slightly after it reaches a minimum value, but the wet paint still hides better than the dry film ($0 > \Delta Y_f > \Delta Y_m$). This increase in hiding is due to air void formation. For coatings well above CPVC (Case III), hiding also increases after reaching a minimum value; however, the dry film hides better than the wet paint ($\Delta Y_f > 0 > \Delta Y_m$). These three types of behavior are illustrated in *Figure* 1.

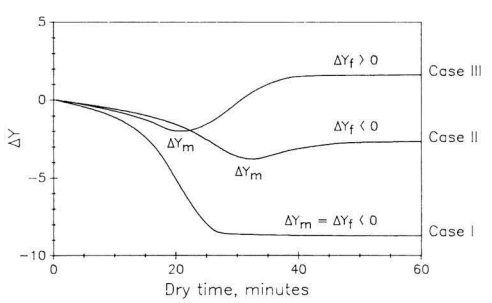

Figure 1—Three types of drying behavior

An alternate way of viewing these results is to plot $\Delta Y_f - \Delta Y_m$, or the increase in reflectance from minimum to final value, as a function of PVC. For paints below CPVC, $\Delta Y_f - \Delta Y_m$ is equal to zero; for paints above CPVC, it is greater than zero and increases with increasing PVC. This type of plot appears in *Figure* 2 for three different oil absorption extenders.

The Technical Committee of the Cleveland Society for Coatings Technology undertook several projects to determine what additional factors influence the changes in hiding during latex film formation. Part I of this series[1] discussed PVC, extender pigment oil absorption, and glycol level; Part II[9] addressed pigment packing effects; and Part III[10] discussed effects of coalescent level, latex polymer glass transition temperature (T_g),[11] and latex particle size. In this latest study, effects of toning, TiO_2 level, and film thickness are investigated.

TEST PAINTS

The starting formulations were 30% nonvolatile by volume (NVV) interior latex flats based on a 55% nonvolatile by weight (NVW) PVA latex and contained 15% PVC (150.0 lb/gal) ASTM D 476-84 Type II rutile TiO_2. The extender pigment level (calcined clay) was 20% (131.3 lb), 40% (262.7 lb), or 60% PVC (394.7 lb/100 gal) for the three formulas producing total PVCs of 35%, 55%, and 75%, respectively. Starting formulations appear in *Table* 1.

For each formula, two additional versions were made by removing 5% or 10% PVC TiO_2 and replacing it with an equal volume of alumina trihydrate (ATH). The TiO_2 grade used is surface treated (about 4%) with ATH; a grade of ATH was chosen with a particle size distribution similar to that of the TiO_2 in the hope that it would have a minimal effect on dry hiding when substituted for TiO_2. Properties of the TiO_2, ATH, and calcined clay appear in *Table* 2. Particle size distributions of the TiO_2 and ATH

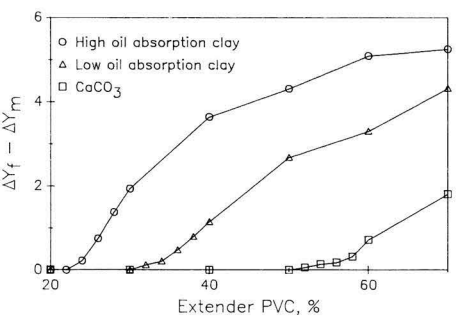

Figure 2—$\Delta Y_f - \Delta Y_m$ as a function of PVC for three different extenders

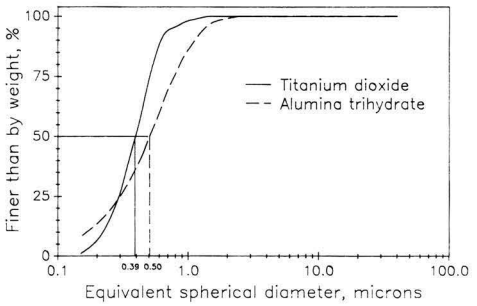

Figure 3a—Particle size distributions of TiO_2 and ATH (gravity sedimentation)

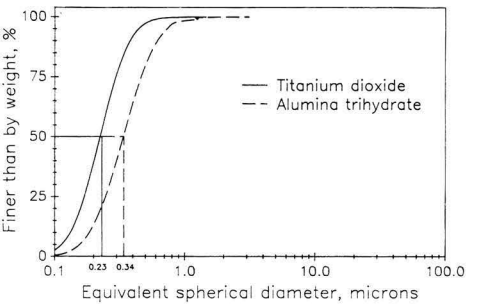

Figure 3b—Particle size distributions of TiO_2 and ATH (photon correlation spectroscopy)

appear in *Figures* 3a and 3b; electron photomicrographs of these pigments appear in *Figures* 4a and 4b.

In all paints, dispersant level was maintained at 0.5% active based on total pigment weight; coalescent level, at 6.0% based on latex solids. Thickener (hydroxyethyl cellulose) level was 6.5, 7.5, and 8.5 lb/100 gal in the 35%, 55%, and 75% paints, respectively. Thickener level was varied to compensate for the decrease in thickening efficiency with increasing PVC.[12]

Each test paint was split into three portions and each was tinted with the equivalent of 0.00, 0.05, or 0.10 fl. oz of black colorant (Aurasperse W 7017 Carbon Black, Engelhard) per gallon which corresponds to 0.000, 0.011, and 0.022 dry oz carbon black per gallon. Black was chosen so that all paint colors would be along or near the achromatic axis[13] in color space and only changes in value (lightness-darkness) would need to be considered.

In effect, this test series represents a full factorial experimental design of three variables each at three levels. Variables and levels are: (1) paint PVC at 35%, 55%, and 75%; (2) TiO_2 PVC at 15%, 10%, and 5%; and (3) colorant levels of 0.00, 0.05, and 0.10 fl. oz per gallon. This produced a total of 27 paints for testing.

PROCEDURE

To characterize the paints, several common tests were performed.

CONTRAST RATIO (ASTM D 2805-88) AND REFLECTANCE: each paint was drawn down over a sealed black and white chart (Leneta Form 5C). The reflectance of the dry film over the black substrate is reported as a percentage of the reflectance of the film over the white substrate. Contrast ratio is a measure of film hiding. Reflectance of the film over the white substrate is also reported as a measure of overall film brightness.

CHANGE IN REFLECTANCE WITH STAINING MEDIUM (ASTM D 3258-80): each paint was drawn down over a sealed white chart (Leneta Form WB) and the decrease in reflectance after the application of staining medium (K&N Ink) is reported. This is a measure of film porosity.

CHANGE IN REFLECTANCE UPON REWET WITH MINERAL OIL: each paint is drawn down over a sealed black chart (Leneta Form 5C) and the decrease in reflectance after application of mineral oil is reported. This is a measure of dry hiding.

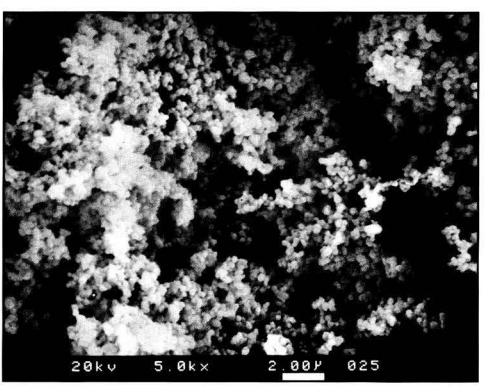

Figure 4a—Electron photomicrograph of TiO_2

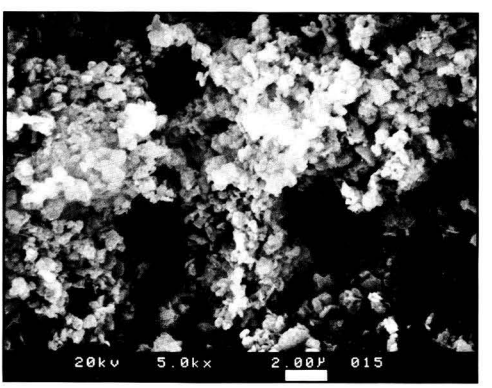

Figure 4b—Electron photomicrograph of ATH

TERMINOLOGY

PVC	Pigment volume concentration.
CPVC	Critical pigment volume concentration.
Y	Reflectance.
Y_i, Y_m, Y_f	Initial, minimum, and final reflectance during drying.
ΔY	Change in reflectance from initial value.
ΔY_m, ΔY_f	Change in reflectance from initial to minimum or final.
$\Delta Y_f - \Delta Y_m$	Change in reflectance from minimum to final.
S	Kubelka-Munk scattering coefficient.
K	Kubelka-Munk absorption coefficient.
X	Film thickness.
S_{rewet}, K_{rewet}	Scattering and absorption coefficients of film rewet with mineral oil.
S_i, S_m, S_f	Initial, minimum, and final scattering coefficients during drying.
S(t)	Scattering coefficient at time t during drying.
S_{TiO_2}	Scattering coefficient mainly due to TiO_2 in the dry film.
S_{space}	Scattering coefficient mainly due to improved spacing of TiO_2 in wet paint.
S_{dry}	Scattering coefficient mainly due to air voids (dry hiding).
A(t)	Fraction of S_{space} present at time t during drying.
B(t)	Fraction of S_{dry} present at time t during drying.
A(m), B(m)	Value of A(t) and B(t) at Y_m or S_m.
R_∞	Reflectance at infinite film thickness.
$R_{i,\infty}$, $R_{m,\infty}$, $R_{f,\infty}$	Initial, minimum, and final reflectance at infinite film thickness.

For each test, films were cast using a 7-mil clearance blade (Dow Film Caster) and allowed to dry at ambient conditions for one week. Results appear in *Table* 3.

Changes in hiding during latex film formation were monitored for each test paint by the method discussed in the **Review** section. Several changes were made to the standard procedure[1]:

Films were cast using a 1.5 mil-clearance Bird Type Film Applicator because some of the test paints had nearly complete hiding when cast with a 7-mil clearance blade.

Spectral included reflectance measurements were made every 15 sec on a CS-5 Chroma-Sensor spectrophotometer (Applied Color Systems, Inc.)

Just prior to positioning the drawdown against the viewport of the spectrophotometer, the wet drawdown was weighed so that the wet film thickness in mils (X) could be determined by the equation:

$$X = (508.27W)/(DA) \quad (1)$$

where: W = grams of paint applied
D = density of paint in lb/gal
A = area of drawdown in sq in.

All wet film thicknesses were maintained at 2.1 mils ±0.1. The initial reflectance (Y_i), change in reflectance to the minimum value (ΔY_m), change in reflectance to the final value (ΔY_f), change in reflectance from minimum to final (ΔY_f-ΔY_m), and the wet film thickness data for each paint appear in *Table* 4.

The effect of film thickness on changes in hiding during drying was determined on the 35%, 55%, and 75% PVC, untoned paints which contained 5% PVC TiO_2. The lower TiO_2 level was chosen so that complete hiding would not occur at high film thicknesses. The paints were drawn down at several wet film thicknesses and measurements were made by the same procedure described previously. As a measure of dry time, the time required for ΔY to reach 90% of ΔY_f for the 35% PVC paint and the time required to reach ΔY_m for the 55% and 75% PVC paints are reported in *Table* 5 along with Y_i, ΔY_m, ΔY_f, $\Delta Y_f - \Delta Y_m$, and wet film thickness.

RESULTS

As expected, increasing the total PVC increased the contrast ratio, dry film reflectance, and reflectance loss when staining medium was applied or when films were rewet with mineral oil. All these trends are a direct consequence of increasing film porosity. As PVC is raised above CPVC, air voids are introduced in the film which act as additional scattering centers (dry hiding) to increase hiding as measured by contrast ratio. When staining medium is applied, the voids are filled and reflectance decreases. As porosity increases, the amount of stain retained in the voids increases and the decrease in reflectance becomes greater. When rewet with mineral oil, the voids are also filled; however, because mineral oil has approximately the same refractive index as binder, film reflectance decreases because a larger proportion of incident light reaches the black substrate. As PVC increases, so does dry hiding and, therefore, the decrease in reflectance when the film is rewet with mineral oil.

Decreasing TiO_2 level decreased contrast ratio. Also, a slight increase in film porosity, as measured by application of staining medium or when rewet with mineral oil, was observed at lower TiO_2 levels. This may be a result of the slightly higher oil absorption of the ATH which was substituted for the TiO_2 to maintain overall PVC. Pigment packing effects may also contribute.

Even if film porosity was not changed by TiO_2 removal, rewetting with mineral oil would cause a greater de-

Table 2—Properties of Pigments[a]

	Type II Titanium Dioxide[b]	Alumina Trihydrate[c]	Calcined Clay[d]
Density, lb/gal	33.3	20.2	21.9
Refractive index	2.73	1.57	1.62
Oil absorption[e]	16	28[f]	50
Mean particle size, microns	0.25	0.25-0.30	1.8
G.E. brightness	96	98	90-92

(a) As reported by manufacturer.
(b) Ti-Pure R-900, DuPont.
(c) Spacerite S-11 ATH, Alcoa.
(d) Satintone No. 1, Engelhard.
(e) Spatula rub-out, ASTM D 281-84.
(f) Experimentally determined.

Table 3—Properties of Paints[a]

Pigment PVC, %			Lampblack,		Contrast	Reflectance Loss	
TiO_2	ATH[b]	Clay	fl oz/gal	Reflectance	Ratio[c]	Rewet[d]	K&N Ink[e]
15	0	20	0.00	91.24	95.61	0.23	5.62
15	0	20	0.05	70.85	99.73	0.46	2.87
15	0	20	0.10	61.35	99.99	0.70	3.09
10	5	20	0.00	90.25	93.87	0.01	6.20
10	5	20	0.05	68.48	99.26	0.52	3.10
10	5	20	0.10	58.37	99.94	0.71	2.02
5	10	20	0.00	88.09	87.80	0.44	5.58
5	10	20	0.05	60.66	97.95	0.63	3.07
5	10	20	0.10	50.97	99.53	0.74	2.45
15	0	40	0.00	93.45	98.76	5.23	31.54
15	0	40	0.05	77.16	100.00	7.39	20.19
15	0	40	0.10	69.54	100.00	8.50	17.09
10	5	40	0.00	92.77	98.22	7.22	31.35
10	5	40	0.05	74.84	99.97	8.99	20.38
10	5	40	0.10	67.35	100.00	10.15	16.72
5	10	40	0.00	91.64	97.27	12.27	34.00
5	10	40	0.05	72.27	99.89	13.07	22.28
5	10	40	0.10	63.66	99.90	13.95	17.02
15	0	60	0.00	94.60	99.54	6.78	34.55
15	0	60	0.05	81.47	99.96	11.75	24.79
15	0	60	0.10	75.62	99.96	13.85	22.05
10	5	60	0.00	94.18	99.27	9.12	39.69
10	5	60	0.05	79.64	99.97	14.15	29.18
10	5	60	0.10	74.27	99.97	16.01	25.17
5	10	60	0.00	93.57	99.01	15.02	41.90
5	10	60	0.05	78.48	99.89	19.12	30.15
5	10	60	0.10	71.76	99.93	21.19	26.49

(a) Films cast with 7-mil clearance blade (Dow Film Caster).
(b) Alumina trihydrate.
(c) ASTM D 2805-88.
(d) Decrease in reflectance when dry film over black substrate is rewet with mineral oil.
(e) ASTM D 3258-80.

crease in hiding in paints having lower TiO_2 level. This is a direct result of the nonlinearity of contrast ratio as a function of the Kubelka-Munk[14] scattering coefficient S for a given film thickness (see *Figure* 5; discussed in the Data Analysis Section). At very low scattering coefficients, S is approximately proportional to contrast ratio (CR) or:

$$\frac{d\,(CR)}{dS} = \text{a positive value at very low S} \qquad (2)$$

However, in the limit of infinite S, the change in contrast ratio asymptotically approaches zero or:

$$\lim_{S\to\infty} \frac{d\,(CR)}{dS} = \text{zero} \qquad (3)$$

Thus, as S decreases, a given decrease in S would produce a greater decrease in CR or a greater loss in reflectance when rewet with mineral oil.

Increasing the level of toning increased hiding (CR). Hiding is a measure of the ability of a coating to obliterate the color of the substrate to which it is applied. This is accomplished by preventing incident light from reaching the substrate. By increasing PVC or TiO_2 level, additional scattering centers are provided and the light is scattered out of the film before it can reach the substrate. By increasing the level of toner, light is absorbed in the film before it reaches the substrate.

Toning the film appeared to decrease film porosity when measured by the application of staining medium

Table 4—Experimental Changes in Hiding During Latex Film Formation[a]

Pigment PVC, %			Lampblack,	Film Thick-				ΔY_f-
TiO_2	ATH[b]	Clay	fl oz/gal	ness, mils	Y_i	ΔY_m	ΔY_f	ΔY_m
15	0	20	0.00	2.1	86.62	−8.56	−8.56	0.00
15	0	20	0.05	2.2	76.88	−8.63	−8.63	0.00
15	0	20	0.10	2.1	69.22	−8.85	−8.85	0.00
10	5	20	0.00	2.1	82.11	−9.23	−9.23	0.00
10	5	20	0.05	2.0	72.89	−9.05	−9.05	0.00
10	5	20	0.10	2.1	65.58	−8.51	−8.51	0.00
5	10	20	0.00	2.1	74.23	−11.62	−11.62	0.00
5	10	20	0.05	2.2	63.84	−10.50	−10.50	0.00
5	10	20	0.10	2.0	57.53	−9.79	−9.79	0.00
15	0	40	0.00	2.2	87.16	−4.11	−0.27	3.84
15	0	40	0.05	2.1	76.77	−3.94	−0.98	2.96
15	0	40	0.10	2.0	70.10	−4.24	−1.34	2.90
10	5	40	0.00	2.2	83.23	−4.67	1.37	6.04
10	5	40	0.05	2.2	73.07	−4.04	0.41	4.45
10	5	40	0.10	2.2	66.16	−4.04	0.14	4.18
5	10	40	0.00	2.1	74.56	−5.48	5.32	10.80
5	10	40	0.05	2.0	65.06	−4.89	4.21	9.10
5	10	40	0.10	2.2	58.44	−4.55	3.61	8.16
15	0	60	0.00	2.1	86.50	−2.57	4.24	6.81
15	0	60	0.05	2.1	75.90	−2.37	4.87	7.24
15	0	60	0.10	2.1	69.94	−2.21	5.24	7.45
10	5	60	0.00	2.1	82.30	−2.73	6.89	9.61
10	5	60	0.05	2.0	71.84	−2.42	7.07	9.49
10	5	60	0.10	2.1	66.34	−2.10	7.54	9.64
5	10	60	0.00	2.1	76.17	−3.22	11.70	14.92
5	10	60	0.05	2.0	65.55	−2.70	11.75	14.45
5	10	60	0.10	2.0	58.93	−2.34	11.99	14.33

(a) 1.5 mil bird blade.
(b) Alumina trihydrate.

Table 5—Changes in Hiding During Latex Film Formation for Different Film Thicknesses

Pigment PVC, %					Experimental				Calculated[c]			
TiO_2	ATH[a]	Clay	Dry Time, min[b]	Film Thickness, mils	Y_i	ΔY_m	ΔY_f	$\Delta Y_f - \Delta Y_m$	Y_i	ΔY_m	ΔY_f	$\Delta Y_f - \Delta Y_m$
5	10	20	31.75	5.6	88.46	−7.03	−7.03	0.00	88.02	−6.72	−6.72	0.00
5	10	20	25.50	3.9	84.23	−8.83	−8.83	0.00	84.12	−8.51	−8.51	0.00
5	10	20	22.00	3.4	82.69	−9.32	−9.32	0.00	82.40	−9.19	−9.19	0.00
5	10	20	11.50	2.1	74.23	−11.62	−11.62	0.00	74.30	−11.64	−11.64	0.00
5	10	40	19.25	5.3	88.02	−3.16	1.62	4.78	87.31	−3.06	2.76	5.82
5	10	40	14.00	3.5	84.22	−3.94	2.96	6.90	82.95	−4.05	3.76	7.81
5	10	40	8.00	2.1	74.56	−5.48	5.32	10.80	74.59	−5.45	5.32	10.77
5	10	40	7.25	1.8	73.60	−5.78	5.58	11.36	72.47	−5.72	5.65	11.37
5	10	60	15.25	5.3	87.81	−2.00	5.42	7.42	87.66	−1.77	5.85	7.62
5	10	60	9.25	3.5	83.61	−2.46	7.87	10.33	83.39	−2.40	8.22	10.62
5	10	60	6.25	2.4	78.23	−3.06	10.69	13.75	78.53	−2.98	10.64	13.62
5	10	60	5.75	2.1	76.17	−3.22	11.70	14.92	76.13	−3.22	11.74	14.96

(a) Alumina trihydrate.
(b) Case I: time required to reach 90% of ΔY_f; Case II and III: time to reach ΔY_m.
(c) Calculated using experimental scattering (S_i, S_m, S_f) and absorption coefficients (K) in *Table* 6.

and increase porosity as measured by rewet with mineral oil. As the film is toned, its reflectance approaches that of the staining medium (K&N Ink). If the film is sufficiently toned, so that it has the same reflectance as the medium, the change in reflectance after application of the medium will be zero regardless of how much medium is absorbed. Further toning will cause an actual increase in reflectance after staining medium is applied. In white paints, change in reflectance upon rewetting with mineral oil measures the change in hiding of the film when dry hiding is eliminated. In toned paints, dry hiding also contributes to tint strength; rewetting with mineral oil will decrease hiding and tint strength, producing a greater decrease in film reflectance than if it were untoned.

The relationship between ΔY_m, ΔY_f, and $\Delta Y_f - \Delta Y_m$ and total PVC was discussed in previous work.[1] Decreasing the level of TiO_2 increased all of these quantities (or made them less negative) for the same reasons that changes in reflectance upon rewetting with mineral oil increased with decreasing TiO_2 level: as scattering coefficient decreases, a given change in scattering coefficient produces a larger change in reflectance. This concept is illustrated in *Figures* 6a and 6b (discussed in the **Data Analysis** section). For example, if the initial scattering coefficient (S_i) equals 1.0, it must change (ΔS) by about +0.05 to produce a reflectance change (ΔY) of +1.00 (assuming absorption coefficient [K] is very small [0.001]). If S_i = 3.0 then ΔS = 0.25 for a ΔY = 1.0 assuming K is constant.

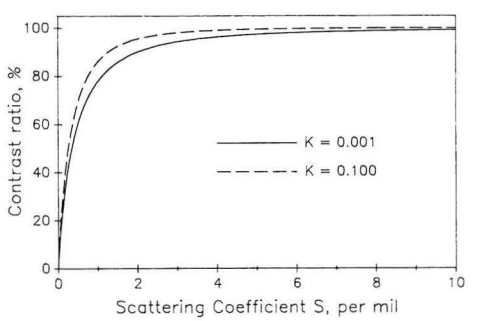

Figure 5—Contrast ratio as a function of scattering coefficient for an untoned (K=0.001) and toned (K=0.050) film having thickness 2.0 mils

The same trends are observed when film thickness is decreased (*Table* 5). Although decreasing film thickness does not change the scattering coefficient on a per wet mil basis, it does change the total scattering of the film or the quantity SX where X is film thickness.

These graphs also help explain why toning can have different effects on changes in hiding during film formation. From the experimental data, increasing toning level for the 35% PVC paint containing 15% PVC TiO_2 decreased the quantity ΔY_m (which equals ΔY_f). In the 35% PVC paint containing 5% PVC TiO_2, ΔY_m increased with higher toning. In *Figure* 6b, which corresponds to a higher TiO_2 level (S_i = 3.0), lines of equal ΔY tend to be sloped inward toward the top of the graph; as absorption coefficient (a measure of toning) increases, a smaller ΔS is required to produce the same ΔY. In other words, as toning increases, the same ΔS will produce a smaller ΔY. In *Figure* 6a, which corresponds to a lower TiO_2 level (S_i = 1.0), equal ΔY lines tend to be sloped inward toward the top of the graph and the opposite is true: as K increases, the same ΔS will produce a greater ΔY. Several reversals of this type occur in the experimental data which can be explained in these terms.

DATA ANALYSIS

As previously mentioned, the test paints represent a full factorial experimental design of three variables, total PVC, TiO_2 PVC, and toner level, each at three levels. This design was chosen because:

Total PVCs of 35%, 55%, and 75% correspond to Case I, II, and III paints, respectively.[1] In effect, this repre-

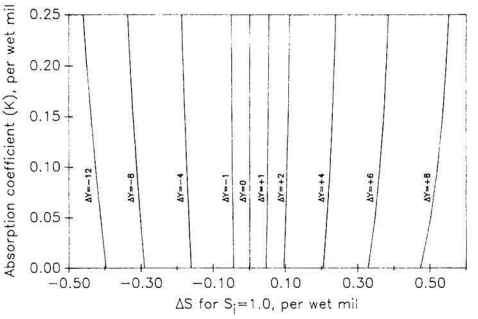

Figure 6a—Changes in reflectance (ΔY) as a function of changes in scattering coefficient (ΔS) for an initial scattering coefficient of 1.0

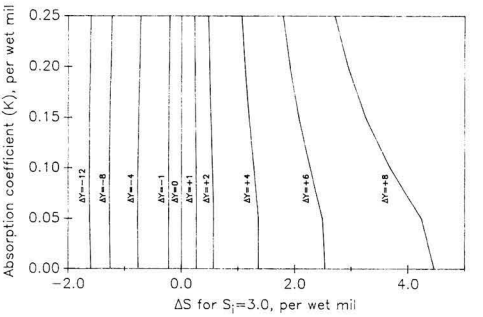

Figure 6b—Changes in reflectance (ΔY) as a function of changes in scattering coefficient (ΔS) for an initial scattering coefficient of 3.0

sents a dry hiding ladder.

The TiO_2 PVC ladder represents a ladder in scattering coefficient if dry hiding were removed.

The toning ladder represents a ladder of absorption coefficient.

It was hoped that, through the proper selection of extender pigments, each of the three variables was being changed independently (i.e., a change in dry hiding would have minimal effect on toning, a change in TiO_2 level would have a minimal change on dry hiding, etc.).

It is clear from the discussion in the Results section that further analysis of changes in hiding during latex film formation should be carried out in terms of the Kubelka-Munk Two-Constant Theory, of which the basic equations are[14,15]:

$$R_G = \frac{[(G - R_\infty)/R_\infty] - R_\infty[G - (1/R_\infty)]e^{SX[(1/R_\infty) - R_\infty]}}{(G - R_\infty) - [G - (1/R_\infty)]e^{SX[(1/R_\infty) - R_\infty]}} \quad (4)$$

and

$$K/S = (1 - R_\infty)^2/2R_\infty \quad (5)$$

where: G = reflectance of substrate
R_G = reflectance of a film at film thickness X
R_∞ = reflectance of film at infinite film thickness
S = scattering coefficient of the film
K = absorption coefficient of the film
e = natural base of logrithm

When the substrate is black, G = 0.0 and equation simplifies to:

$$R_G = \frac{R_\infty(1 + e^{SX[(1/R_\infty) - R_\infty]})}{-(R_\infty)^2 + e^{SX[(1/R_\infty) - R_\infty]}} \quad (6)$$

For all calculations in this paper, reflectances (Y) are reported as percents and were converted to decimal quantities for calculation.

Figure 5 was generated by calculating the reflectance of an untoned (K = 0.001) and toned (K = 0.100) film with S = 1.00 at several film thicknesses X over a white substrate (G = 0.8) and a black substrate (G = 0.0). Contrast ratio, the reflectance of the film over black (Y_b) divided by the reflectance of the film over white (Y_w), was plotted as a function of X.

Figures 6a and 6b were generated by calculating the reflectance of a film (2.0 mil thickness and initial scattering coefficient of S_i) at several K values over a black substrate. Using the same X, the scattering coefficient was varied (ΔS) at each K to produce a given change in reflectance (ΔY). Contour lines of equal ΔY were then plotted as function of ΔS and K.

To apply the Kubelka-Munk equations the quantities S(t), K(t), and X(t) must be determined as a function of time t. This could only be achieved by making three measurements and solving three simultaneous equations, a proposition which is clearly impractical. To eliminate X(t) as a variable, all quantities were expressed as functions of initial wet film thickness; therefore, the units of S(t) and K(t) were per wet mil.

Next, K(t) was assumed to remain constant (K) during the drying process. It was determined for each paint by drawing them down over a black and white chart (Leneta Form 5C) with a 1.5 mil clearance blade.[16] After one week dry, reflectance of each film over the black and white substrates gave two measurements by which scattering (S_{rewet}) and absorption coefficients (K_{rewet}) could be determined; film thickness was assumed to be the initial wet film thickness as determined by equation (1). Each paint was drawn down in triplicate and the average S_{rewet} and K_{rewet} calculated.

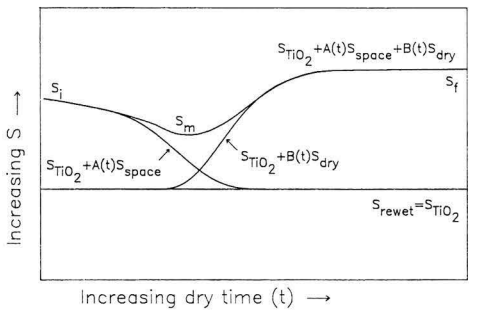

Figure 7—Relation of S_{TiO_2}, S_{space}, and S_{dry} to change in scattering coefficient during latex film formation

Using K_{rewet} (now designated K) and the initial wet film thickness of the drawdowns, changes in scattering coefficients could be determined as functions of dry time. Scattering coefficients were calculated at Y_i, Y_m, and Y_f and will be designated as S_i, S_m, and S_f, respectively. The quantity S_{rewet} is the scattering coefficient of the dry film rewet with mineral oil or scattering coefficient of the film excluding dry hiding. It is mainly a function of the TiO_2 PVC in the dry film and will now be designated as S_{TiO_2}. This quantity can be related to the scattering coefficient S(t) at dry time t as follows:

$$S_{TiO_2} = S_{rewet} \quad (7)$$

$$S(t) = S_{TiO_2} + A(t)\,S_{space} + B(t)\,S_{dry} \quad (8)$$

Where S_{space} is the increase in scattering coefficient in the wet film due mainly to improved TiO_2 spacing[3-7] and S_{dry} is the scattering coefficient due to dry hiding. Constants A(t) and B(t) are functions of time and describe how loss of hiding due to film contraction and gain of hiding due to air void formation progresses during film formation. If the functions A(t) and B(t) can be determined, the change in scattering coefficient during film formation can be predicted. These concepts are illustrated in *Figure* 7.

The quantities S_{space} and S_{dry} can now be determined from S_i and S_f. Initially, when the film is first drawn down, TiO_2 spacing should be maximum and dry hiding absent or A(0) = 1 and B(0) = 0. After the film has dried, excess TiO_2 spacing will be absent and dry hiding

Table 6—Kubelka-Munk Constants of Paints

Pigment PVC, %			Lampblack,	Rewet[b]		During Drying[c]				
TiO_2	ATH[a]	Clay	fl oz/gal	S mil^{-1d}	K mil^{-1d}	S_i mil^{-1d}	S_m mil^{-1d}	S_f mil^{-1d}	S_{space} $mil^{-1d,e}$	S_{dry} $mil^{-1d,f}$
15	0	20	0.00	1.72	0.003	3.23	1.76	1.76	1.51	0.04
15	0	20	0.05	1.70	0.116	3.54	1.85	1.85	1.84	0.15
15	0	20	0.10	1.80	0.231	3.42	1.86	1.86	1.62	0.06
10	5	20	0.00	1.23	0.001	2.18	1.27	1.27	0.95	0.04
10	5	20	0.05	1.39	0.110	2.56	1.45	1.45	1.17	0.06
10	5	20	0.10	1.41	0.226	2.58	1.51	1.51	1.17	0.10
5	10	20	0.00	0.72	0.002	1.40	0.81	0.81	0.68	0.09
5	10	20	0.05	0.80	0.117	1.43	0.82	0.82	0.63	0.02
5	10	20	0.10	0.83	0.217	1.51	0.89	0.89	0.68	0.06
15	0	40	0.00	1.67	0.004	3.24	2.31	3.16	1.57	1.49
15	0	40	0.05	1.81	0.112	3.44	2.51	3.16	1.63	1.35
15	0	40	0.10	1.92	0.243	3.85	2.81	3.47	1.93	1.55
10	5	40	0.00	1.30	0.005	2.42	1.77	2.69	1.12	1.39
10	5	40	0.05	1.41	0.128	2.77	2.06	2.86	1.36	1.45
10	5	40	0.10	1.46	0.240	2.82	2.14	2.85	1.36	1.39
5	10	40	0.00	0.76	0.004	1.46	1.11	1.99	0.70	1.23
5	10	40	0.05	0.82	0.116	1.59	1.22	2.06	0.77	1.24
5	10	40	0.10	0.84	0.217	1.56	1.21	1.95	0.72	1.11
15	0	60	0.00	2.02	0.008	3.41	2.74	5.43	1.39	3.41
15	0	60	0.05	1.93	0.129	3.58	2.94	5.76	1.65	3.83
15	0	60	0.10	1.98	0.236	3.69	3.12	5.78	1.71	3.80
10	5	60	0.00	1.33	0.006	2.35	1.96	4.31	1.02	2.98
10	5	60	0.05	1.48	0.137	2.71	2.28	5.00	1.23	3.52
10	5	60	0.10	1.48	0.228	2.74	2.37	4.97	1.26	3.49
5	10	60	0.00	0.80	0.005	1.57	1.32	3.67	0.77	2.87
5	10	60	0.05	0.87	0.126	1.72	1.47	4.02	0.85	3.15
5	10	60	0.10	0.90	0.228	1.70	1.48	3.87	0.80	2.97

(a) Alumina trihydrate.
(b) Scattering and absorption coefficients of dry films rewet with mineral oil.
(c) Scattering coefficients of paints during drying; calculated using rewet absorption coefficients.
(d) Per wet mil fim thickness.
(e) Equals S_i − S (rewet).
(f) Equals S_f − S (rewet).

Table 7—Average Scattering and Absorption Coefficients: Model 1

Coefficient	Average Value	Standard Deviation
Scattering, mil^{-1}		
Titanium dioxide, S_{TiO_2}[a]		
15% PVC TiO_2	1.84	0.13
10% PVC TiO_2	1.39	0.09
5% PVC TiO_2	0.82	0.05
Spacing, S_{space}[b]		
15% PVC TiO_2	1.65	0.16
10% PVC TiO_2	1.18	0.14
5% PVC TiO_2	0.73	0.07
Dry hiding, S_{dry}[c]		
35% PVC	0.00	assumed
55% PVC	1.35	0.14
75% PVC	3.34	0.36
Factors		
A(m)[d]	0.363	calculated
B(m)[e]	0.100	calculated
Absorption K, mil^{-1}[f]		
0.00 fl oz black/gal	0.004	0.002
0.05 fl oz black/gal	0.121	0.009
0.10 fl oz black/gal	0.230	0.009

(a) Average of scattering coefficient for all rewet paints at equal TiO_2 PVC.
(b) Average of S_{space} of all paints at equal TiO_2 PVC.
(c) Average of S_{dry} of all paints at equal PVC.
(d) Fitted constant for amount of S_{space} at Y_m for all 55% and 75% PVC paints.
(e) Fitted constant for amount of S_{dry} at Y_m for all 55% and 75% PVC paints.
(f) Average of absorption coefficient for all paints with equal lampblack level.

maximum or $A(\infty) = 0$ and $B(\infty) = 1$. If we assume that the slight delay before the wet films are placed in the spectrophotometer to measure changes in hiding is negligible and that the film is completely dry after one hour, equation (8) becomes:

$$S_i = S_{TiO_2} + S_{space} \quad (9)$$

$$S_m = S_{TiO_2} + A(m)\, S_{space} + B(m)\, S_{dry} \quad (10)$$

$$S_f = S_{TiO_2} + S_{dry} \quad (11)$$

In practice, S_{space} and S_{dry} are determined by subtracting S_{rewet} from S_i and S_f, respectively. These quantities are listed in *Table* 6 for all test paints.

These quantities can also be related to Case I, II, and III paints. In Case I, dry hiding is absent and $S_{dry} = 0$. For Case II, the wet paint hides better than the dry film or $S_{space} > S_{dry}$. For Case III, the dry paint hides better than the wet film or $S_{dry} > S_{space}$.

Using this theory, two models were developed to predict changes in hiding during latex film formation. These models are discussed in the following sections.

Model 1

(1) S_{TiO_2} and S_{space} were assumed to be dependent only on TiO_2 level and were averaged over all paints containing equal TiO_2 PVC.

(2) S_{dry} was assumed to be dependent only on total PVC and was averaged over all paints at equal PVC. For the 35% PVC paints, S_{dry} was assumed to equal zero.

(3) K was assumed to be dependent only on toner level and averaged over all paints with equal toner level.

(4) The quantities A(m) or B(m) were assumed to be equal for all 55% and 75% PVC paints. They were determined by minimizing the quantity:

$$[Y_{m,\,experimental} - Y_{m,\,calculated}]^2 \quad (12)$$

where $Y_{m,\,experimental}$ is Y_m determined by measuring changes in reflectance during latex film formation, $Y_{m,\,calculated}$ was calculated from equation (4) using the average S_{TiO_2}, S_{space}, and S_{dry}, and the summation was carried out over all 55% and 75% PVC paints simultaneously.

Model 2

(1) S_{TiO_2}, S_{space}, and S_{dry} were assumed to be dependent only on TiO_2 level and overall PVC and were averaged for all paints having equal TiO_2 level and total PVC. For the 35% PVC paints, S_{dry} was assumed to equal zero.

(2) K was assumed to be dependent only on toner level (as in Model 1) and averaged over all paints with equal toner level.

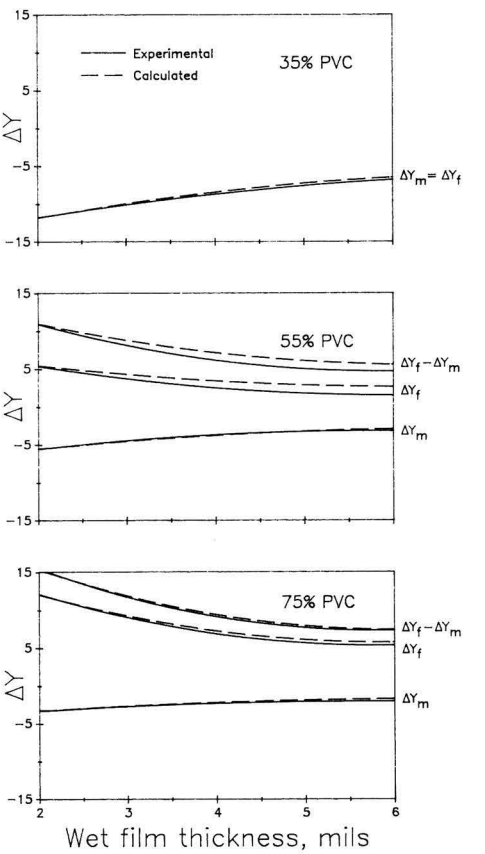

Figure 8—Changes in hiding during latex film formation as a function of wet film thickness

Table 8—Average Scattering and Absorption Coefficients: Model 2

Coefficient	Average Value	Standard Deviation
Scattering, mil^{-1}		
Titanium dioxide, S_{TiO_2}[a]		
15% PVC TiO_2, 35% PVC	1.74	0.06
10% PVC TiO_2, 35% PVC	1.34	0.10
5% PVC TiO_2, 35% PVC	0.78	0.05
15% PVC TiO_2, 55% PVC	1.80	0.13
10% PVC TiO_2, 55% PVC	1.39	0.08
5% PVC TiO_2, 55% PVC	0.81	0.04
15% PVC TiO_2, 75% PVC	1.98	0.05
10% PVC TiO_2, 75% PVC	1.43	0.09
5% PVC TiO_2, 75% PVC	0.86	0.05
Spacing, S_{space}[b]		
15% PVC TiO_2, 35% PVC	1.66	0.17
10% PVC TiO_2, 35% PVC	1.10	0.13
5% PVC TiO_2, 35% PVC	0.66	0.03
15% PVC TiO_2, 55% PVC	1.71	0.19
10% PVC TiO_2, 55% PVC	1.28	1.14
5% PVC TiO_2, 55% PVC	0.73	0.04
15% PVC TiO_2, 75% PVC	1.58	0.17
10% PVC TiO_2, 75% PVC	1.17	0.13
5% PVC TiO_2, 75% PVC	0.81	0.04
Dry hiding, S_{dry}[c]		
35% PVC	0.00	assumed
15% PVC TiO_2, 55% PVC	1.45	0.10
10% PVC TiO_2, 55% PVC	1.41	0.04
5% PVC TiO_2, 55% PVC	1.19	0.07
15% PVC TiO_2, 75% PVC	3.68	0.23
10% PVC TiO_2, 75% PVC	3.33	0.30
5% PVC TiO_2, 75% PVC	3.00	0.14
Factors		
A(m)[d]		
55% PVC	0.394	calculated
75% PVC	0.492	calculated
B(m)[e]		
55% PVC	0.064	calculated
75% PVC	0.055	calculated
Absorption K, mil^{-1}[f]		
0.00 fl oz black/gal	0.004	0.002
0.05 fl oz black/gal	0.121	0.009
0.10 fl oz black/gal	0.230	0.009

(a) Average of scattering coefficient for all rewet paints at equal TiO_2 PVC and total PVC.
(b) Average of S_{space} of all paints at equal TiO_2 PVC and total PVC.
(c) Average of S_{dry} of all paints at equal TiO_2 PVC and total PVC.
(d) Fitted constant for amount of S_{space} at Y_m for all paints at equal total PVC.
(e) Fitted constant for amount of S_{dry} at Y_m for all paints at equal total PVC.
(f) Average of absorption coefficient for all paints with equal lampblack level.

Table 9—Calculated Changes in Hiding During Latex Film Formation: Model 1[a]

Pigment PVC, %			Lampblack, fl oz/gal	K mil^{-1}[c]	S_i mil^{-1}[c]	S_m mil^{-1}[c]	S_f mil^{-1}[c]	Y_i	Y_m	Y_f
TiO_2	ATH[b]	Clay								
15	0	20	0.00	0.004	3.49	1.84	1.84	87.48	78.95	78.95
15	0	20	0.05	0.121	3.49	1.84	1.84	76.26	67.58	67.58
15	0	20	0.10	0.230	3.49	1.84	1.84	69.53	60.24	60.24
10	5	20	0.00	0.004	2.57	1.39	1.39	83.86	74.02	74.02
10	5	20	0.05	0.121	2.57	1.39	1.39	72.46	62.87	62.87
10	5	20	0.10	0.230	2.57	1.39	1.39	65.35	55.51	55.51
5	10	20	0.00	0.004	1.55	0.82	0.82	76.02	62.85	62.85
5	10	20	0.05	0.121	1.55	0.82	0.82	64.77	52.64	52.64
5	10	20	0.10	0.230	1.55	0.82	0.82	57.39	45.68	45.68
15	0	40	0.00	0.004	3.49	2.57	3.19	87.48	83.88	86.50
15	0	40	0.05	0.121	3.49	2.57	3.19	76.26	72.48	75.20
15	0	40	0.10	0.230	3.49	2.57	3.19	69.53	65.38	68.35
10	5	40	0.00	0.004	2.57	1.95	2.74	83.86	79.91	84.69
10	5	40	0.05	0.121	2.57	1.95	2.74	72.46	68.51	73.31
10	5	40	0.10	0.230	2.57	1.95	2.74	65.35	61.20	66.27
5	10	40	0.00	0.004	1.55	1.22	2.17	76.02	71.47	81.51
5	10	40	0.05	0.121	1.55	1.22	2.17	64.77	60.50	70.09
5	10	40	0.10	0.230	1.55	1.22	2.17	57.39	53.18	62.84
15	0	60	0.00	0.004	3.49	2.77	5.18	87.48	84.84	91.06
15	0	60	0.05	0.121	3.49	2.77	5.18	76.26	73.46	80.34
15	0	60	0.10	0.230	3.49	2.77	5.18	69.53	66.43	74.26
10	5	60	0.00	0.004	2.57	2.15	4.73	83.86	81.39	90.33
10	5	60	0.05	0.121	2.57	2.15	4.73	72.46	69.97	79.48
10	5	60	0.10	0.230	2.57	2.15	4.73	65.35	62.71	73.24
5	10	60	0.00	0.004	1.55	1.42	4.16	76.02	74.41	89.21
5	10	60	0.05	0.121	1.55	1.42	4.16	64.77	63.24	78.18
5	10	60	0.10	0.230	1.55	1.42	4.16	57.39	55.87	71.72

(a) Calculated at experimental film thickness.
(b) Alumina trihydrate.
(c) Per wet mil film thickness.

Table 10—Calculated Changes in Hiding During Latex Film Formation: Model 2[a]

Pigment PVC, %										
TiO_2	ATH[b]	Clay	Lampblack, fl oz/gal	K mil^{-1}[c]	S_i mil^{-1}[c]	S_m mil^{-1}[c]	S_f mil^{-1}[c]	Y_i	Y_m	Y_f
15	0	20	0.00	0.004	3.40	1.74	1.74	87.20	78.03	78.03
15	0	20	0.05	0.121	3.40	1.74	1.74	75.96	66.69	66.69
15	0	20	0.10	0.230	3.40	1.74	1.74	69.19	59.33	59.33
10	5	20	0.00	0.004	2.44	1.34	1.34	83.17	73.32	73.32
10	5	20	0.05	0.121	2.44	1.34	1.34	71.75	62.22	62.22
10	5	20	0.10	0.230	2.44	1.34	1.34	64.60	54.86	54.86
5	10	20	0.00	0.004	1.44	0.78	0.78	74.68	61.68	61.68
5	10	20	0.05	0.121	1.44	0.78	0.78	63.50	51.60	51.60
5	10	20	0.10	0.230	1.44	0.78	0.78	56.13	44.71	44.71
15	0	40	0.00	0.004	3.51	2.57	3.26	87.54	83.85	86.74
15	0	40	0.05	0.121	3.51	2.57	3.26	76.32	72.44	75.46
15	0	40	0.10	0.230	3.51	2.57	3.26	69.60	65.34	68.64
10	5	40	0.00	0.004	2.67	1.98	2.80	84.36	80.16	84.96
10	5	40	0.05	0.121	2.67	1.98	2.80	72.97	68.76	73.59
10	5	40	0.10	0.230	2.67	1.98	2.80	65.90	61.45	66.57
5	10	40	0.00	0.004	1.54	1.17	2.00	75.91	70.69	80.28
5	10	40	0.05	0.121	1.54	1.17	2.00	64.66	59.77	68.87
5	10	40	0.10	0.230	1.54	1.17	2.00	57.28	52.47	61.57
15	0	60	0.00	0.004	3.56	2.96	5.66	87.69	85.63	91.71
15	0	60	0.05	0.121	3.56	2.96	5.66	76.49	74.29	81.15
15	0	60	0.10	0.230	3.56	2.96	5.66	69.79	67.34	75.23
10	5	60	0.00	0.004	2.60	2.19	4.76	84.02	81.64	90.38
10	5	60	0.05	0.121	2.60	2.19	4.76	72.61	70.21	79.54
10	5	60	0.10	0.230	2.60	2.19	4.76	65.52	62.97	73.31
5	10	60	0.00	0.004	1.67	1.42	3.86	77.33	74.46	88.50
5	10	60	0.05	0.121	1.67	1.42	3.86	66.02	63.30	77.38
5	10	60	0.10	0.230	1.67	1.42	3.86	58.65	55.93	70.81

(a) Calculated at experimental film thickness.
(b) Alumina trihydrate.
(c) Per wet mil film thickness.

(3) The quantities A(m) and B(m) were assumed to be different for the 55% and 75% PVC paints; they were optimized separately for each PVC level [the summation in equation (12) was carried out over paints of equal total PVC].

The average scattering coefficients S_{TiO_2}, S_{space}, S_{dry}, absorption coefficients K, and the optimized constants A(m) and B(m) for Models 1 and 2 appear in *Tables* 7 and 8, respectively; the quantities S_i, S_m, S_f, Y_i, Y_m, and Y_f calculated from both models appear in *Tables* 9 and 10; and the calculated quantities ΔY_m, ΔY_f, and ΔY_f-ΔY_m for both models are compared to experimental results in *Table* 11.

The effect of film thickness on changes in hiding during latex film formation can be calculated with Kubelka-Munk theory. Using the values of S_i, S_m, and S_f determined from the experimental data (not the average values from the models) for the untoned 35%, 55%, and 75% PVC paints containing 5% PVC TiO_2, the values Y_i, ΔY_m, ΔY_f, and ΔY_f - ΔY_m were calculated at the experimentally run film thicknesses using equation (6). These results appear in *Table* 5 and are graphed in *Figure* 8.

DISCUSSION

Overall, both models showed reasonable agreement with experiment. Both predicted the increase in the magnitude of ΔY_m and ΔY_f with decreasing TiO_2 level and the increase in ΔY_m, ΔY_f, and ΔY_f - ΔY_m with increasing total PVC. They also predicted several, but not all, of the trends which resulted from toning. In general, Model 2 gave better agreement with the experimental data than Model 1 (see average deviations in *Table* 11).

In both models, S_{TiO_2} was assumed to be the scattering of TiO_2 in the dry film and to be dependent only on TiO_2 PVC. Actually, several other factors contribute to S_{TiO_2}. Extender pigments will scatter light slightly; they do not have exactly the same index of refraction as binder at all wavelengths. Also, because extender dilution efficiency is often less than one, increasing extender PVC will decrease TiO_2 efficiency.[17] This effect is not taken into account in Model 1 where S_{TiO_2} is only a function of TiO_2 pigment; it is accounted for in Model 2 where S_{TiO_2} is a function of both TiO_2 and total PVC.

S_{TiO_2} is also dependent on colorant level. Colored pigments will transmit or scatter light at wavelengths which

are not absorbed. For example, a green pigment will scatter green light. This phenomenon was minimized by choosing carbon black which adsorbs almost equally at all visible wavelengths (except for undertones).[18] Also, the colorant contains a high concentration of surfactants which can change the dispersion characteristics, and thus the efficiency, of TiO_2.[19,20] This is probably why S_{TiO_2} shows a slight increase with increasing colorant additions.

S_{TiO_2} was determined from films rewet with mineral oil. Because mineral oil does not have exactly the same refractive index as binder or extender pigments, it will also contribute slightly to light scattering. It was also assumed that mineral oil will completely fill the air voids in the dry film. If air voids are present, S_{TiO_2} will be too high. This is probably why S_{TiO_2} showed a slight increase with total PVC.

The quantity S_{space} represents the additional scattering due to improved spacing of TiO_2 in the wet film compared to the dry film. In Model 1, it was considered to be dependent only on TiO_2 PVC. This quantity is also dependent on extender and binder level because they do not have the same refractive index as water. This is accounted for to some degree in Model 2. Again, colorant can contribute by scattering light and can change the degree of dispersion of TiO_2 (S_{space} increases with increasing colorant level).

In Model 1, the quantity S_{dry} was considered to be dependent only on total PVC; it represents the dry hiding of the film. However, because ATH did not have exactly the same oil absorption of particle size distribution as TiO_2, a dependence on TiO_2 PVC was observed in Model 2. Also, S_{dry} is dependent on colorant level for the same reasons S_{TiO_2} and S_{space} are.

When determining the value S_{space} it was assumed that, from equation (11), A(t) = 0 and B(t) = 1 at 60 min. Actually, the film is still contracting and air void formation is still progressing after this time. In the 35% PVC paints after 60 min of dry (S_{space} and S_{dry} should equal

Table 11—Comparison of Changes in Hiding During Latex Film Formation for Models 1 and 2[a] with Experimental Results

Pigment PVC, %				Experimental			Model 1			Model 2		
TiO_2	ATH[b]	Clay	Lampblack, fl oz/gal	ΔY_m	ΔY_f	ΔY_f-ΔY_m	ΔY_m	ΔY_f	ΔY_f-ΔY_m	ΔY_m	ΔY_f	ΔY_f-ΔY_m
15	0	20	0.00	−8.56	−8.56	0.00	−8.52	−8.52	0.00	−9.17	−9.17	0.00
15	0	20	0.05	−8.63	−8.63	0.00	−8.68	−8.68	0.00	−9.27	−9.27	0.00
15	0	20	0.10	−8.85	−8.85	0.00	−9.29	−9.29	0.00	−9.86	−9.86	0.00
10	5	20	0.00	−9.23	−9.23	0.00	−9.85	−9.85	0.00	−9.85	−9.85	0.00
10	5	20	0.05	−9.05	−9.05	0.00	−9.59	−9.59	0.00	−9.54	−9.54	0.00
10	5	20	0.10	−8.51	−8.51	0.00	−9.85	−9.85	0.00	−9.74	−9.74	0.00
5	10	20	0.00	−11.62	−11.62	0.00	−13.18	−13.18	0.00	−13.00	−13.00	0.00
5	10	20	0.05	−10.50	−10.50	0.00	−12.13	−12.13	0.00	−11.90	−11.90	0.00
5	10	20	0.10	−9.79	−9.79	0.00	−11.71	−11.71	0.00	−11.42	−11.42	0.00
15	0	40	0.00	−4.11	−0.27	3.84	−3.59	−0.98	2.61	−3.69	−0.80	2.89
15	0	40	0.05	−3.94	−0.98	2.96	−3.78	−1.05	2.73	−3.88	−0.86	3.02
15	0	40	0.10	−4.24	−1.34	2.90	−4.16	−1.18	2.98	−4.27	−0.96	3.30
10	5	40	0.00	−4.67	1.37	6.04	−3.95	0.82	4.78	−4.20	0.60	4.80
10	5	40	0.05	−4.04	0.41	4.45	−3.95	0.85	4.79	−4.21	0.62	4.83
10	5	40	0.10	−4.04	0.14	4.18	−4.15	0.91	5.07	−4.45	0.67	5.12
5	10	40	0.00	−5.48	5.32	10.80	−4.55	5.49	10.04	−5.22	4.37	9.59
5	10	40	0.05	−4.89	4.21	9.10	−4.27	5.32	9.59	−4.89	4.21	9.10
5	10	40	0.10	−4.55	3.61	8.16	−4.21	5.45	9.66	−4.81	4.29	9.10
15	0	60	0.00	−2.57	4.24	6.81	−2.64	3.58	6.22	−2.05	4.03	6.08
15	0	60	0.05	−2.37	4.87	7.24	−2.80	4.09	6.88	−2.20	4.67	6.86
15	0	60	0.10	−2.21	5.24	7.45	−3.10	4.73	7.83	−2.45	5.45	7.89
10	5	60	0.00	−2.73	6.89	9.61	−2.48	6.47	8.94	−2.38	6.37	8.75
10	5	60	0.05	−2.42	7.07	9.49	−2.49	7.02	9.51	−2.40	6.92	9.32
10	5	60	0.10	−2.10	7.54	9.64	−2.64	7.88	10.52	−2.55	7.79	10.34
5	10	60	0.00	−3.22	11.70	14.92	−1.62	13.18	14.80	−2.87	11.17	14.03
5	10	60	0.05	−2.70	11.75	14.45	−1.53	13.41	14.94	−2.72	11.36	14.09
5	10	60	0.10	−2.34	11.99	14.33	−1.52	14.33	15.85	−2.73	12.16	14.88
Average deviation[d]				—	—	—	0.64	0.82	0.66	0.50	0.59	0.62

(a) Calculated at experimental film thickness.
(b) Alumina trihydrate.
(c) Per wet mil film thickness.
(d) Average of the deviations between experimental results and calculated models; $\Delta Y_f - \Delta Y_m$ for the 35% PVC paints was not included.

zero), S_f is slightly greater than S_{TiO_2}. This indicates that film contraction was still occurring.

In both models, K was considered to be a function of colorant level and constant during drying. The calcined clay extender used can also contribute to K because of its yellow undertone. Also, the same effects that change TiO_2 efficiency (film concentration, extender dilution efficiency, etc.) can affect colorant absorption efficiency. By assuming that K remains constant during drying, changes in K are reflected as exaggerated changes in S. This problem could be overcome if changes in reflectance of identical films could be measured over two substrates of different reflectance, simultaneously.

The constants A(m) and B(m) quantify what fractions of the loss in scattering coefficient due to film contraction and the gain in scattering coefficient due to air void formation are present at the minimum point. In Model 1, A(m) = 0.363 and B(m) = 0.100. This indicates that the processes of air void formation and film contraction do not occur during two distinct phases of drying, but overlap considerably. The point S_m is not the point at which one process ends and the other begins, but the point at which the two processes exactly balance each other. Data from Model 2, where A(m) = 0.393 and B(m) = 0.064 at 55% PVC and A(m) = 0.492 and B(m) = 0.55 at 75% PVC, indicates that, at higher PVCs, a greater percentage of film contraction must occur to balance a smaller percentage of air void formation. Although all paints are at equal NVV, film contraction is less in high PVC paints, because gross film height now contains air voids. Therefore, a greater percentage of contraction is required to balance the development of dry hiding. Also, because the higher PVC paints have greater dry hiding, a smaller percentage of dry hiding is required to balance film contraction.

Although constants A(m) and B(m) were empirically determined, there is evidence to support their non-zero value. If film contraction and air void formation were two distinct processes, then the point S_m would represent the scattering of the film at maximum contraction without air void formation. This is what the quantity S_{rewet} measures. However, in all of the 55% and 75% PVC paints, S_m is considerably greater than S_{rewet} (*Table* 6).

In previous work,[1] changes in hiding during latex film formation were studied for identical paints differing only in glycol level. As expected, increasing glycol level increased the time at which ΔY_m occurred. However, as ΔY_m moved to longer times, it became more negative in value. Because glycols do not slow the initial rate of water evaporation substantially,[21] initial film contract occurs unimpeded. As glycol concentration increases, drying slows, reducing air void formation. Thus, more film contraction can occur before air void formation begins and ΔY_m becomes more negative.

The dependence of the measured changes in hiding during film formation on film thickness showed excellent agreement with those predicted by the Kubelka-Munk theory. Generally, as film thickness increases, the magnitudes of ΔY_m, ΔY_f, and $\Delta Y_f - \Delta Y_m$ decreases. In thin films, these quantities actually represent changes in reflectance due to hiding of the black substrate and hiding of the internal color of the film (tint strength). As film thickness increases, substrate effects become negligible; however, tint strength will still be present. In the limit of infinite film thickness, ΔY_m, ΔY_f, and $\Delta Y_f - \Delta Y_m$ will approach $\Delta R_{m,\infty}$, $\Delta R_{f,\infty}$, and $\Delta R_{m,\infty} - \Delta R_{m,\infty}$, or changes in the Kubelka-Munk infinite film thickness reflectance. Infinite film thickness reflectances are only dependent on S (for a constant K) and an extrapolation of this type could be a possible method by which changes in tint strength during film formation could be determined.

SUMMARY

Changes in hiding during film formation were monitored for a series of latex paints with varying levels of dry hiding, TiO_2, and toner. Results were explained in terms of the Kubelka-Munk Two-Constant Theory. By assuming that absorption coefficient K does not change during drying, the change in scattering coefficient was calculated. Thus, the quantities S_i, S_m, and S_f correspond to the scattering coefficients at the initial (Y_i), minimum (Y_m), and final (Y_f) reflectances, respectively.

Using these quantities, a model was developed that described how the scattering coefficient changed as a function of dry time:

$$S(t) = S_{TiO_2} + A(t)\, S_{space} + B(t)\, S_{dry}$$

where: $S(t)$ = scattering coefficient at time t
S_{TiO_2} = scattering coefficient of TiO_2 in the dry film
S_{space} = additional scattering mainly due to the improved efficiency of TiO_2 in the wet film
S_{dry} = scattering due to dry hiding

The constants A(t) and B(t) are functions of time which describe how scattering is lost during film concentration and gained during air void formation.

By determining A(m) and B(m), the value of the constants at minimum scattering, it was concluded that film contraction and air void formation do not occur during two distinct phases of drying. Rather, these processes overlap to a large extent, indicating that air void formation appears before film contraction is complete.

By using this model, changes in scattering coefficient during drying were related to changes in hiding for Case I, II, and III type coatings. Generally:

Case I: $\Delta Y_f > 0; \Delta Y_f = \Delta Y_m$
$\Delta Y_f - \Delta Y_m = 0$
$S_{dry} = 0$
$S_m = S_f$

Case II: $0 > \Delta Y_f > \Delta Y_m$
$\Delta Y_f - \Delta Y_m > 0$
$S_{space} > S_{dry}$
$S_i > S_f$

Case III: $\Delta Y_f > 0 > \Delta Y_m$
$\Delta Y_f - \Delta Y_m > 0$
$S_{space} < S_{dry}$
$S_i < S_f$

In Case I, the coating is below the CPVC and hiding decreases to a final value which is the minimum value. In

Case II, the coating is slightly above CPVC and hiding will start to increase slightly after it reaches a minimum value, but the wet paint still hides better than the dry film. In Case III, the coating is well above CPVC and hiding also increases after reaching a minimum value; however, the dry film hides better than the wet paint.

Film thickness was found to have a strong influence on changes in hiding during film formation. As film thickness decreased, the quantities ΔY_m, ΔY_f, and $\Delta Y_f - \Delta Y_m$ increased in magnitude; however, the quantities S_i, S_m, and S_f remained unchanged. Because of this strong dependence, film thickness must be carefully controlled when changes in hiding during film formation are monitored by reflectance measurements and scattering coefficients are not calculated.

The developed model gives a theoretical foundation for investigating the dynamics of film formation. By determining how the constants A(t) and B(t) change with time, not only can final hiding be predicted, but also, how it changes during drying. This model can now be used to unify static equations, which relate paint properties to final hiding, into a dynamic model which fully describes the drying process.

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Influence of Extender Pigments on the Performance of Ethyl Silicate Zinc-Rich Paints

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Most technical specifications for zinc-rich paints based on ethyl silicate require a minimum content of 75% (by weight) of metallic zinc in the dry film. For the same metallic zinc content, the solids balance can be made using only the binder and zinc dust, or using the binder, zinc dust, and auxiliary pigments. The presence of auxiliary pigments other than zinc dust in the dry film composition of zinc-rich paints is of uncertain origin, especially in regard to its anticorrosive properties. In this work, the effect of extender pigments on the zinc-rich paints' performance is analyzed by electrochemical techniques, salt spray, and field exposure tests. The paints were prepared with 75% and 60%, by weight, metallic zinc in the dry film. For each zinc content three kinds of paint were produced: the first paint with zinc dust and binder; the second paint with zinc dust, binder, and agalmatolite; and the third paint with zinc dust, binder, and barite. All the tests showed that, for the same metallic zinc content in the dry film, the presence of fillers (barite or agalmatolite), within the contents used did not impair the paints' anticorrosive properties from the galvanic point of view. On the contrary, in some cases, we observed that the fillers presence improved the paints' performance.

INTRODUCTION

Zinc-rich paints have been used for many years in order to protect steel effectively in aggressive atmospheres, mainly in marine and industrial environments, against corrosion. The protection mechanism of this type of paint is based on the galvanic action of metallic zinc.[1] Basic information about the evolution in formulations, characteristics, and applicability has already been made by Munger.[2]

The metallic zinc content in the dry film is a very important parameter to be emphasized in the technical specifications of zinc-rich paints. However, as observed by Lindquist et al.,[3] this parameter is not the only factor determining the performance of this kind of paint. For example, Fragata,[4,5] Del Amo,[6] and Pereira[7] verified that the chemical nature of the binder and the zinc particle size are also very important.

With regard to the ethyl silicate paints, most of the technical specifications require a minimum content of 75%, in weight, of metallic zinc in the dry film. For the same metallic zinc content in the dry film, the solids balance can be made considering two alternatives: using only the binder and zinc dust; and partial substitution of binder with auxiliary pigments. This produces paints having a higher pigment volume concentration (PVC) than in the previous case.

In respect to this latter alternative, different auxiliary pigments may be used. Some manufacturers use coloring pigments, for example, chromium oxide and iron oxide, in order to get contrast between the paint and the metallic substrate to be coated. Others, for technical reasons, use extender pigments, for example, barite, mica, and talc.

The presence of auxiliary pigments other than zinc dust is of uncertain origin, especially in regard to the galvanic protection properties over the steel substrate. The goal of

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Table 1—Description of the Paints

Paint	Metallic Zinc Content in the Dry Film (%w)	Main Components of the Dry Film[a]
Zn60	60.0	ethyl silicate zinc dust
ZnA60	60.0	ethyl silicate zinc dust agalmatolite
ZnB60	60.0	ethyl silicate zinc dust barite
Zn75	75.0	ethyl silicate zinc dust
ZnA75	75.0	ethyl silicate zinc dust agalmatolite
ZnB75	75.0	ethyl silicate zinc dust barite

(a) Because of the marked tendency for zinc dust to settle-out, thickening and antisettling agents were used.

Table 2—Paint Characteristics

Paints	Zn60	ZnA60	ZnB60	Zn75	ZnA75	ZnB75
PVC (%)	28.20	41.30	38.20	38.90	59.10	55.20
CPVC (%)[a]	66.98	62.43	66.93	66.99	62.43	66.93
PVC/CPVC	0.42	0.66	0.57	0.58	0.95	0.82
Zn° by volume % in the dry film	27.30	29.20	30.20	37.80	41.70	43.60
Filler content by volume % in the dry film	0.82	12.10	8.00	1.10	17.30	11.60
Volume ratio of Zn°/filler	33.25[b]	2.41	3.75	33.25[b]	2.41	3.75
Weight ratio of Zn°/filler	119.3	6.50	6.52	119.3	6.50	6.52
Filler content by weight % in the dry film	0.50	9.50	9.40	0.60	11.14	11.10
Zn° by weight % in the dry film	60.00[c]	60.00[c]	60.00[c]	73.50[c]	73.50[c]	73.50[c]

(a) Determined from oil absorption values, only for comparative purposes.
(b) Thickening and antisettling agents were also considered as filler.
(c) Determined by the hydrogen evolution method, NBR 6639.[8]

this paper is to analyze this question. Using electrochemical techniques, salt spray, and field exposure tests, this paper describes a study of the performance of zinc-rich paints based on ethyl silicate having the same metallic zinc content in the dry film, with and without extender pigments.

EXPERIMENTAL

Paints Studied

The paints were prepared with 75% and 60%, by weight, metallic zinc in the dry film. For each zinc content three kinds of paint were produced: the first paint with zinc dust and binder; the second paint with zinc dust, binder, and agalmatolite (aluminum and potassium hydrated silicate, 350 mesh); and the third paint with zinc dust, binder, and barite (barium sulfate, 500 mesh). *Table* 1 shows the convention adopted and main components for each paint.

The choice of two metallic zinc contents, 75% and 60%, was based on the fact that the first one is required in technical specifications and the second one was used for testing the influence of PVC on the anticorrosive properties of paints with low zinc content in the dry film.

The zinc dust employed in the composition of the paints had the following technical characteristics: metallic zinc content—95.1%; average diameter of particles—7 μm; density at 20°C—7.10 g.cm^3; specific area—1350-1400 cm^2.g^{-1}; and oil absorption—6 g oil/100 g pigment.

The final technical characteristics of the paints used in this research are shown in *Table* 2.

Test Samples Preparation

Test samples were prepared from AISI (American Iron and Steel Institute) 1020 mild steel sheets. Surface treatment consisted of degreasing with adequate solvents and sandblasting to a white metal, grade Sa3 of the Svensk Standard SIS 055900; the average anchorage profile was 35 μm. After surface preparation, one coat of the selected paint was applied at 50 ± 5 μm. The samples were kept for at least 10 days at 23°C and 60% relative humidity.

Salt Spray and Field Exposure Tests

The salt spray test was carried out according to ASTM (American Society for Testing and Materials) method B 117. In all specimens, a 75 mm scratch parallel to the largest dimension was made on the coating penetrating through to the substrate.

The field exposure test was performed at an atmospheric corrosion site characterized as urban-marine with the following features: average chloride content = 17.0 mg $Cl^- \cdot m^{-2} \cdot d^{-1}$; and average SO_2 content = 4×10^{-3} mg $SO_3 \cdot cm^{-2} \cdot d^{-1}$.

The specimens were rectangular in shape with 100 × 150 mm dimensions exposed at 30° to the horizontal with the skyward surface facing north.

Electrochemical Tests

The free potential of each paint was monitored with two kinds of specimens: totally coated specimens; and specimens with a partial area uncoated, as shown in *Figure* 1, of 5% and 10%, respectively, for 60% and 75% zinc-rich paints.

The polarization curves and impedance measurements were performed in a classical three electrode cell. The polarization curves were obtained at 10^{-4} V.s^{-1} with two waiting times in the free potential: 3 hr and 30 days. The apparatus for impedance measurements consisted of an OMNIMETRA PG-01 Potentiostat and an FTA Solartron 1250 coupled to a PC-XT. The electrolyte used in all tests was a 3.5% NaCl solution at 25°C and pH = 7.

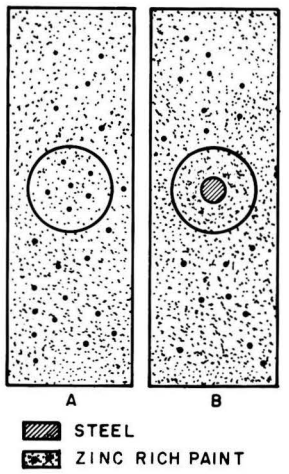

Figure 1—Specimens used in electrochemical tests: A—totally coated; and B—with a partial area uncoated

RESULTS AND DISCUSSION

Salt Spray Test

In this test, the time necessary for the appearance of iron corrosion products (red corrosion) in the scratch was determined (see *Table* 3). These results show that the addition of fillers (A or B) to the paints with 60% of metallic zinc in the dry film, improved their behavior. Indeed, red corrosion was visible in the scratch of Zn60 paint after 460 hr while for ZnA60 and ZnB60 the elapsed times were 740 and 660 hr, respectively. For 75% zinc-rich paints (Zn75, ZnA75, and ZnB75), the salt spray test did not show any influence of the filler until 2060 hr of exposure time.

Free Potential Time Curves

The interpretation usually given to the potential versus time curves relative to zinc-rich paints is that the lower the potential value maintained in function of time, the better the performance expected for the paint, because the steel is better cathodically protected by the free zinc in the paint.

In *Figure* 2, the results for 75% zinc-rich paints are presented. It is possible to see that all curves start (time = 0) around −1.1V, the known free potential for zinc in seawater.[9] In this figure, the potentials for ZnB75 paint are quite constant during the first 30 days of immersion. This behavior is the same for totally coated specimens and for specimens with a partially uncoated area. In the same figure, it also can be seen that ZnA75 and Zn75 paints are characterized by higher potentials than ZnB75 throughout the test, but with similar variation between them in the two groups of specimens. In effect, the Zn75 and ZnA75 totally coated specimens exhibited their potential values varying in range (−1.1V, −0.9V), and for

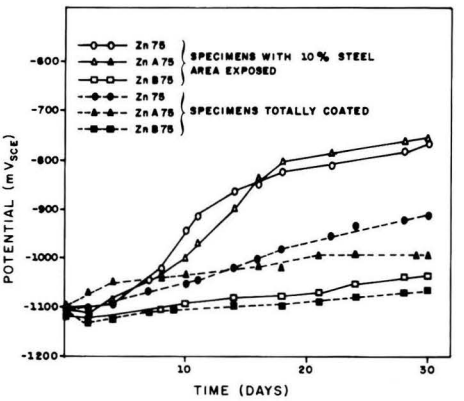

Figure 2—Potential × time curves for 75% zinc paints

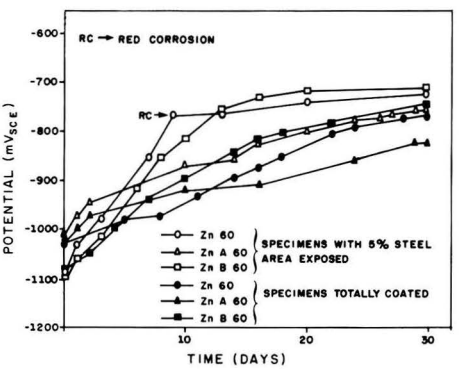

Figure 3—Potential × time curves for 60% zinc paints

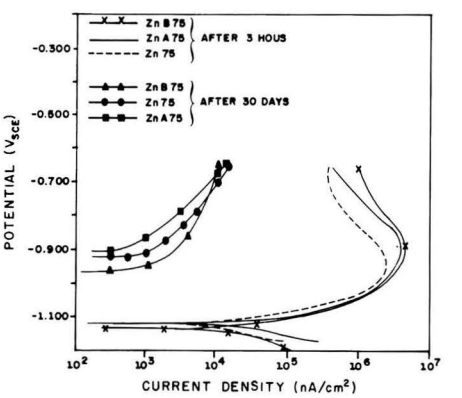

Figure 4—Polarization curves for 60% zinc paints

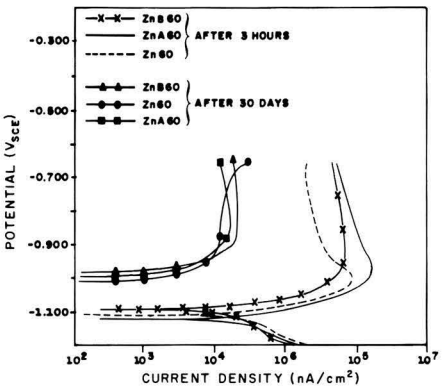

Figure 5—Polarization curves for 75% zinc paints

the specimens with 10% steel area exposed, the range expanded approximately (−1.1V, −0.75V).

Based on the interpretation given, among the three paints, one would expect similar performances for the Zn75 and ZnA75 paints and a better performance for ZnB75. So, coherently with the salt spray results, no deleterious effects were noted in consequence of the addition of fillers to the paint pigmented with 75% zinc dust. It is interesting to observe that although there was a difference in potential versus time curves, 2060 hr of salt spray were not enough to differentiate these paints and no corrosion was detected. Consequently, the potential versus time measurements were more selective.

In *Figure* 3, results for 60% zinc-rich paints are presented. For these paints, the initial free potentials are between −1.1V and −1.0V, and only the ZnA60 totally coated specimens presented a potential value around −0.9V for the first 30 days of immersion. The other paints presented more anodic potential values after the same period of time. For the Zn60 paints with partially uncoated area, red corrosion was quickly detected. The potential time behavior of the ZnA60 totally coated paint is coherent, with a better performance presented by this paint in the salt spray test.

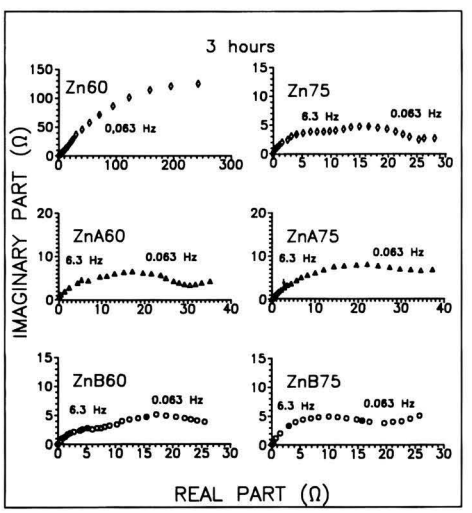

Figure 6—Impedance diagrams after 3 hr of immersion time

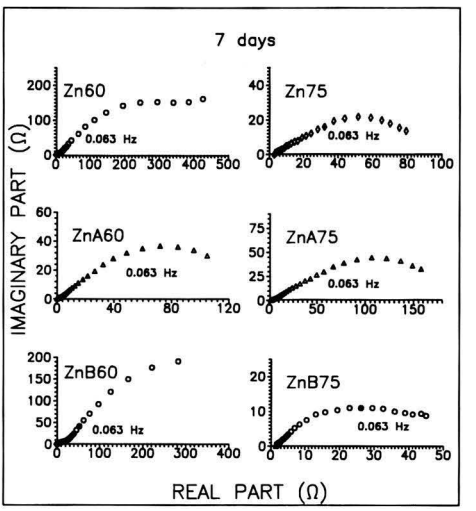

Figure 7—Impedance diagrams after seven days of immersion time

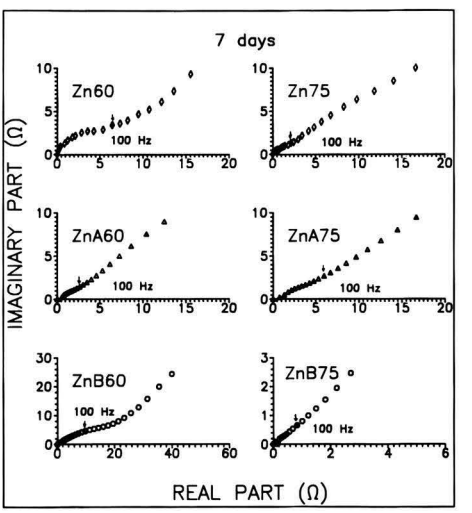

Figure 8—Impedance diagram after seven days of immersion time (high frequency region)

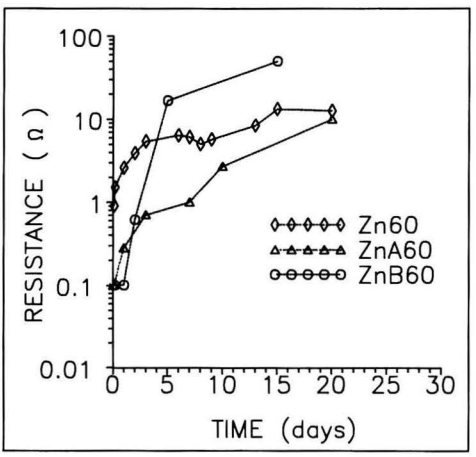

Figure 9—100 Hz loop limit for 60% zinc paints in function of immersion time

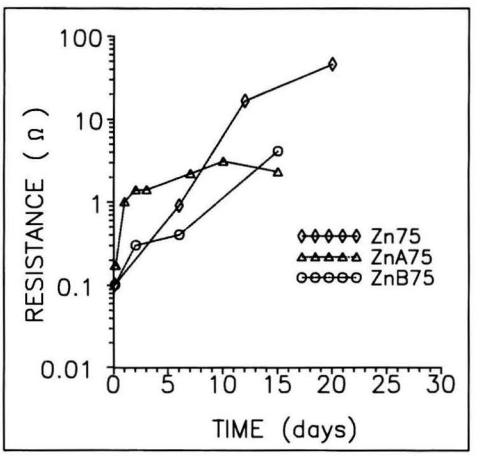

Figure 10—100 Hz loop limit for 75% zinc paints in function of immersion time

Polarization Curves

Only totally painted samples were used. The results are presented in *Figures* 4 and 5. It is possible to see that for both the 60% and 75% zinc-rich paints no deleterious influence was detected; either for 3 hr or for 30 days of immersion time. Indeed, the anodic currents are quite the same for all paints, and even the highest currents detected in some cases are for A or B charged paints.

Electrochemical Impedance

In *Figures* 6 and 7, impedance results for three hours and seven days immersion times are shown, respectively. For longer immersion times (> seven days), no important changes were detected with respect to the parameters studied in this paper, so the results will be shown only for these two periods. For three hours (*Figure* 6), all diagrams are characterized by depressed capacitive loops where it is very difficult to determine the number of time constants presented. An exception to this behavior is shown by the Zn60 paint. For the seven days of immersion time (*Figure* 7), at least two time constants can be noted: one around 100Hz and another in lower frequencies. Although the loops in high frequencies can not be seen easily in *Figure* 7, they do exist as shown in expanded scale in *Figure* 8. From the diagrams given in *Figure* 8, it is possible to estimate a resistance value by extrapolation of the quasi-linear portion back to the real part. These values are plotted in *Figure* 9 (60% zinc-rich paint) and *Figure* 10 (75% zinc-rich paint) in function of exposure time.

In *Figures* 11 and 12, diagrams are shown for zinc analytical grade (99.9%) and for a thick porous zinc layer obtained by metallic spraying on steel, respectively. It is possible to note that pure zinc exhibits two separate time constants after two hours of immersion time, when its surface is polished and brilliant. This behavior changes gradually as the surface becomes covered with white corrosion products, until the time constants can no longer be separated as is shown for six days in *Figure* 11. However, the porous zinc layer, despite any time range, always exhibits a depressed capacitive loop at the same frequency range observed for pure zinc. Our interpretation of these last experiments is that either a partial coverage of a reactive zinc surface (*Figure* 11) or a zinc porous layer (*Figure* 12) may be responsible for the behavior observed for most zinc-rich paints studied in this paper during the first hours of immersion. The approach of a porous layer has already been made previously for the zinc-rich paints.[10] In fact, comparing *Figures* 11 and 12 with *Figure* 7, it is possible to note that for six days (pure zinc) and three days (porous zinc) the diagrams, except

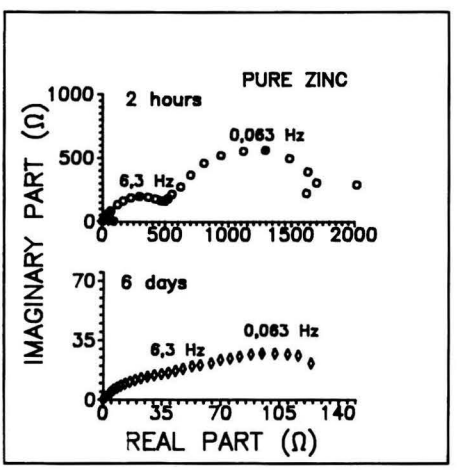

Figure 11—Impedance diagrams for pure zinc after 2 hr and 6 days of immersion time

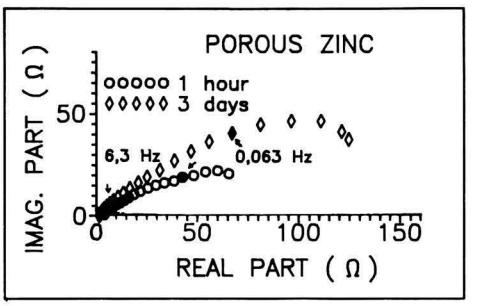

Figure 12—Impedance diagrams for zinc coated steel obtained by metal spraying after 1 hr and 3 days of immersion time

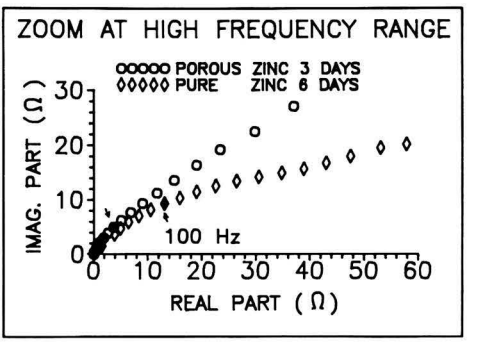

Figure 13—Impedance diagrams of pure zinc and zinc coated steel in high frequency regions

for the capacitive loop at high frequencies, are qualitatively similar with those obtained for the painted steel after three hours of immersion time. The capacitive loop detected around 100Hz for the painted samples is not detected for the other materials as is shown in *Figure* 13 on an expanded scale.

The previously stated impedance results can now be analyzed in terms of the relative paints' performance. In *Figure* 7, for three hours of immersion, only the Zn60 sample presented a diagram different from the others. These results, coincident with the worst corrosion behavior of the Zn60 painted samples, leads to the conclusion that the addition of fillers, A or B, may allow a higher free zinc content in the dry film structure (*Table* 2). This could be a reason for the best performances being detected with the ZnA60 or ZnB60 paints when compared with Zn60. The same interpretation may be extended to the 75% paints in which the effect of the fillers is shadowed by the higher zinc content.

For seven days immersion time (*Figure* 7), the impedance diagrams for each paint are no longer similar to pure (*Figure* 11) or porous (*Figure* 12) zinc. Depending on the paint, the loop in the high frequency range becomes more and more important. This loop also was detected by Almeida et al.[11] and the resistance associated with it, in spite of some discrepancies, was related with the performance of the paint. The loop around 100Hz may be related to some interactions between the substrate and the zinc present in the film. The changes noted in the resistance associated with this loop in function of time are in agreement with the hypothesis of zinc-substrate interactions. Indeed, in *Figures* 9 and 10, it is possible to see that the value of this resistance increases with time. This increment may represent a loss of cathodic protection offered by the zinc paint. The lower the resistance, the higher the zinc-substrate interaction, very probably because the quantity of free zinc is higher, and higher protection is offered by the paint. Following this reasoning, *Figures* 9 and 10 suggest, respectively, that paints ZnA60 and ZnB75 are most probably the best performing paints. This is in agreement with all other laboratory measurements made in this work.

Table 3—Results of Salt Spray Test

Paint	Time Necessary for the Appearance of Red Corrosion in the Scratch (hours)
Zn60	460
ZnA60	740
ZnB60	660
Zn75	2060
ZnA75	2060
ZnB75	2060

Field Exposure Tests

The observations from field tests concern four months of exposure time. Until this time, only the Zn60 paint shows red corrosion on the surface. This result is in agreement with the salt spray test and impedance measurements which pointed out the Zn60 as the paint with worst performance.

General Remarks

The anticorrosion effectiveness of zinc-rich paints depends on many factors, such as metallic zinc content in the dry film and electrical contact between the zinc particles and steel. Of course, this electrical contact is directly associated with metallic zinc concentration in the dry film and the PVC/critical pigment volume concentration (CPVC) ratio.

Based on the results shown, certain questions arise. Would the increase in zinc content have the same effect on the paints' performance as an increase in PVC? Is filler A better than filler B? Why, among the paints pigmented with 60% zinc dust, did the one charged with filler A have the better performance, while, among the 75% zinc paints, the better performance was observed for the one charged with filler B? To answer these questions, it is necessary to prepare paints following another criterion than the one adopted in this work. Comparison between the two classes of paints (60% and 75%) is a difficult task precisely because they have different contents of zinc, which is not an inert pigment. The purpose of using different paint classes (60% and 75%) was merely to test

the influence of the same fillers even when the zinc content is lower than the normally used 75%.

All the tests carried out showed that, for the same metallic zinc content in the dry film, the presence of fillers did not affect the paints' anticorrosive protection from the galvanic point of view. In many cases, we observed that the fillers' presence improved the paint performance. However, that does not mean that fillers have anticorrosive properties.

In reality, as can be seen in *Table* 2, for the same metallic zinc content in the dry film, the PVC/CPVC ratio is higher for paints with fillers. A higher PVC/CPVC ratio leads to more porous and permeable films, which improves the electrical contact between zinc particles and steel. Additionally, the amount of "free" zinc in the film is greater. These factors contribute to the improvement of paint performance from the galvanic point of view.

However, it is important to remember that the zinc-rich paint effectiveness does not depend solely on electrochemical factors. There are other factors such as mechanical properties (cohesion, flexibility, etc.) that are very important. So, the addition of auxiliary pigments should be controlled carefully in order not to impair the film's physical and chemical characteristics.

We observed that the salt spray test afforded a discrimination of the performance of 60% zinc paints. The same did not occur with the 75% zinc paints. In this respect, the electrochemical tests (potential × time curves and electrochemical impedance) were more selective.

SUMMARY

The aim of this paper was to analyze the effect of auxiliary pigments on the performance of zinc-rich paints. To attain this goal, special formulations were developed maintaining the metallic zinc content in the dry film and varying the kinds of fillers. The results presented clearly show that these additions can, at least in some cases, improve the corrosion protection offered by the paint, from a galvanic point of view, instead of causing harmful effects on it. However, it is important to remember that the final performance of zinc-rich primers, in a paint system, does not depend solely on electrochemical features of the film, but on the equilibrium of electrochemical and physical features, for example, flexibility, cohesion, and adherence.

ACKNOWLEDGMENT

The authors are grateful to A. Bott, of the Federal University of Rio de Janeiro, and to the JOURNAL OF COATINGS TECHNOLOGY Editorial Review Board whose pertinent remarks allowed them to improve the text.

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Society Meetings

BIRMINGHAM ..... OCT.

"Environmental Themes"

An announcement was made that G.W. Jenkins, of M.C.I.F. Ltd., is not eligible for the Club's Executive Committee. His place on the Committee will be taken by Graham H. Jones.

Bob McD. Barrett, of B.I.P. Chemicals Ltd., was presented with his Past-Presidents Pin in honor of his dedication while serving as Club President.

Also, a 25-Year Pin was presented to S. J. Mitchell, marking his quarter-century membership in the Club.

The meeting's speaker was Frank Hauxwell, of ICI Colours Ltd., who discussed "ENVIRONMENTAL THEMES FOR THE PIGMENT MAKER."

The speaker explained the pressures in the pigment industry. He said that key legislation in the E.E.C. covering air/water emissions, right-to-know, cradle to grave concepts, and waste reduction are beginning to take effect.

Dr. Hauxwell emphasized that the pressure on the pigment maker is to make manufacturing processes safer, to provide clearer instructions for safe handling and use, and to allow a better understanding about disposal, including environmentally acceptable packaging. According to the speaker, what this will do is make lead times longer and increase costs.

He said that a line must drawn somewhere and a balanced approach must be taken; hence, the role of ETAD.

Dr Hauxwell said the possible solutions to some of the problems may lead to: more compact physical form, environmentally friendly packaging, and supplier disposal.

In conclusion, the speaker commented on the speed of legislation, access to reliable and trustworthy information, and the effective use of pigments, combined with safe disposal of pigment packaging.

DAVID C. MORRIS, *Secretary*

CDIC ..... SEPT.

"Opaque Polymer"

The new Society officers for 1992-93 were installed as follows: President—Alipio R. Rubin, of Rubin Dispersions; Vice President—Paul R. Guevin, of P.R. Guevin Associates; Secretary—Jeffery I. Buchman, of AKZO Coatings, Inc.; and Treasurer—Alan L. Machek, of Dow Corning Corporation.

William M. Hollifield, of Perry & Derrick Company, Inc., will serve as the Society Representative to the FSCT's Board of Directors.

The traditional Hüls America President's gavel was presented to Mr. Rubin.

Hugh Lowrey, of Perry & Derrick Company, Inc., reported his clarifications of the By-Laws to adopt a set of standing rules which would cover the procedures with regard to expenses for various officers. The membership voted to approve the request to adopt the amendments to the standing rules.

Andrew N. Nogueira, Consultant, proposed that the amount of scholarship money be raised from the current level of $700 to a new level of $900. Mr. Nogueira's motion was carried unopposed.

Elmer Williams Jr., of Rohm and Haas Company, was the evening's technical speaker. His talk was entitled, "OPAQUE POLYMER: THE ALL PURPOSE PIGMENT."

Dr. Williams said that this emulsion particle imparts hide to a paint film by scattering light similar to a pigment particle. He pointed out that even though it is not a replacement for white pigment, its main strength lies in its supplemental properties to the base pigment load.

The speaker discussed various formulations including interior flats and semigloss topcoats. Hiding optimization techniques were explained, with an emphasis on formulation flexibility. Also talked about was color consistency and handling and safety.

In conclusion, Dr. Williams explained, in detail, pigment to binder reductions as a function of hide, along with the corresponding drop in formulation costs.

The meeting's educational speaker was Financial Consultant Shawn Hill, of CIGNA Corporation. He topic was "ESTATE PLANNING: WAYS TO AVOID TAXES."

JEFFERY I. BUCHMAN, *Secretary*

CDIC ..... OCT.

"Acrylic Polyols"

The speaker for the meeting's technical program was Dan Nelson, of S.C. Johnson Polymers. He presented a talk on "ACRYLIC POLYOLS FOR HIGH PERFORMANCE, HIGH SOLIDS COATINGS."

Mr. Nelson gave a summary of the characteristics and expected results of formulations featuring high solids polyols. He also described the formulation process for higher performance products.

Acrylic modifications and unmodified acrylics were discussed.

Bill Weust, Director of Customer Service, for Cincinnati Gas and Electric Company, was the meeting's educational speaker. His topic of discussion was the customer inquiries his office handles throughout the year.

JEFFERY I. BUCHMAN, *Secretary*

BIRMINGHAM CLUB OFFICERS (from left)—Standing: R. McD. Barrett, G.C. Simmons, Bernard E. Myatt, and Gerry J. Gough. Seated: Susan Roy, D.A.A. Wallington, and David C. Morris

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BIRMINGHAM (First Thursday—Strathallan Hotel, Birmingham, England). D.C. MORRIS, PPG Industries (UK) Ltd., P.O. Box 359, Birmingham, B16 0AD, England.

CDIC (Second Monday—Location alternates between Columbus, Cincinnati, Dayton, and Indianapolis). JEFFERY I. BUCHMAN, Akzo Coatings, Inc, P.O. Box 147, Columbus, OH 43216-0147 .

CHICAGO (First Monday—Sharko's Restaurant, Villa Park, IL). NATU C. PATEL, Ace Hardware Corp., Paint Div., 21901 S. Central Ave., Matteson, IL 60443.

CLEVELAND (Third Tuesday—Brown Derby, Independence, OH in Nov., Mar., and Apr.; Cleveland Hilton, Cleveland, OH, in Feb.; Landerhaven, Mayfield Heights, OH, in May). CONSTANCE F. WILLIAMS, The Glidden Co., 801 Canterbury Rd., Westlake, OH 44145.

DALLAS (Thursday following second Wednesday—Holiday Inn Crowne Plaza, Dallas, TX). BENNY PUCKETT, Kelly-Moore Paint Co., Inc., 301 W. Hurst Blvd., Hurst, TX 76053.

DETROIT (Second Tuesday—meeting sites vary). JANE ALLEN, Reichhold Chemicals, Inc., 814 Commerce Dr., Oakbrook, IL 60521.

GOLDEN GATE (Monday before third Wednesday—alternates between Francesco's in Oakland, CA, and Holiday Inn in S. San Franscisco). RICHARD COOPER, Synergistic Performance Corp., 5801 Christie Ave., #590, Emeryville, CA 94608.

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LOUISVILLE (Third Wednesday—Executive West Motor Hotel, Louisville, KY). WILLIAM LEIGHTNER, C.L. McGuire & Co., 8134 Newlagrange Rd., Louisville, KY 40222.

MEXICO (Every fifteen days—Gabriel Mancera, Mexico City, Mexico). SERGIO ROJAS, Pinturas International, S.A. De C.V., Ganaderos 234, Col. Granjas Esmeralda, 09810 Mexico, D.F., Mexico.

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TORONTO (Second Monday—Cambridge Motor Hotel, Toronto). BOB C. NG, Hoechst Canada Inc., 100 Tempo Ave., Willowdale, Ont. M2H 2N8, Canada.

WESTERN NEW YORK (Third Tuesday—meeting sites vary). MARKO MARKOFF, 182 Farmingdale Rd., Cheektowaga, NY 14225.

CLEVELAND.....SEPT.

"Nitroparaffin Additives"

A moment of silence was observed in memory of former Society member Jack McNally who died recently. Mr. McNally also was a member of the Cleveland PCA.

President Roy A. Glover, of The Mahoning Paint Corporation, presented Ben J. Carlozzo, of Tremco, Inc., with his Past-President's Pin. Mr. Carlozzo was recognized for his dedicated service on behalf of the Society.

Thomas Elias, of Dar-Tech, Inc., presented Mr. Glover with the Hüls America President's gavel.

Chicago Society member Gregory McWright, of Angus Chemical Company, was the meeting's speaker. His topic was "NITROPARAFFIN ADDITIVES FOR IMPROVED PERFORMANCE IN SOLVENT-BORNE PAINTS."

The speaker began his presentation by defining nitroparaffins as short-chained saturated hydrocarbons. He said they have several historical uses, including: fuel, fuel additives, solvents, and explosives.

Mr. McWright said the four main properties of nitroparaffins are: high energy of adsorption, azeotrope formation, medium evaporation rate, and electrical conductance.

The speaker stated that if a blend, by weight, of nitroparaffins is incorporated into a coating, several benefits can be achieved, including: improved pigment surface wetting; excellent substrate wetting, hence improved film properties; improved cure times; and better electrostatic spray application.

Q. Can you use nitroparaffins in water-based paints?

A. No, they are not compatible with water-based systems.

Q. How does the odor of nitroparaffins compare to some solvents? Can you use nitroparaffins in a trade solvent-based formula?

A. The odor is not any stronger, or weaker, than any solvents that would be used in a trade solvent-based formula.

CONSTANCE F. WILLIAMS, *Secretary*

CLEVELAND .....OCT.

"Elastomeric Wall Coatings"

It was announced that Brenda L. Carr, of Coatings Development Company, was replacing Fred G. Schwab, of Coatings Research Group, Inc., as the Society Representative to the FSCT's Board of Directors.

The meeting's first speaker was Society Vice President Freidun Anwari, of Coatings Research Group, Inc. Mr. Anwari presented an overview of the Society's Technical

Committee's 1992 Annual Meeting presentation, "CHANGES IN HIDING DURING LATEX FILM FORMATION. PART V: EFFECT OF OPAQUE POLYMER."

Mr. Anwari said that the Technical Committee has developed a technique to measure what happens during the latex paint drying process. He then described this process in detail.

The second speaker was John Craddock, of Rohm and Haas Company, whose topic was "ELASTOMERIC WALL COATINGS."

The speaker stated the five key performance properties of elastomeric coatings: water resistance, alkali resistance, dirt pick-up resistance, limited crack bridging, and ease of formulation.

Mr. Craddock said that typical substrates coated with elastomeric coatings include concrete, stucco, cement-fiber shingles, and cinder blocks. He explained that over these substrates, there are several types of failure: UV degradation, alkali degradation and functional failure (fatigue), and cracking and wrinkling.

According to Mr. Craddock, the binder variables that exist are as follows: glass transition temperature; effect of crosslinker; effect of nonfunctional monomers; acid type and acid level, which can affect dirt pick-up resistance; percent elongation; and tensile strength. He then explained these binder variables.

The speaker described several tests which Rohm and Haas uses to evaluate elastomeric coatings, including a crack bridge test, a water vapor transmission wet cup method, a lab dirt pick-up test method, and a wind driven rain test, among others.

In conclusion, Mr. Craddock stated that elastomeric coatings are not for consumer use because their application must be controlled. Also, special techniques are needed to roll the elastomeric coatings to get the high film build necessary to prevent or minimize cracking.

Q. How many applications of elastomeric coatings are needed for good properties?

A. I recommend two coats to minimize pinholes.

Q. Are elastomeric coatings one- or two-package systems?

A. Elastomeric coatings are a one-package system, ambient cure.

CONSTANCE F. WILLIAMS, *Secretary*

CDIC SOCIETY OFFICERS (from left)—Standing: Kenneth Pendleton, Dennie A. Nie, Nelson W. Barnhill, Jimmie A. Merritt, James E. Flanagan, Hugh Lowrey, Hartzel Strader, and Lewis P. Larson. Seated: Paul R. Guevin Jr., Alipio R. Rubin, Jeffery I. Buchman, Alan L. Machek, and Bill M. Hollifield

HOUSTON.....SEPT.

"Wetting and Dispersion"

Gary A. Weaver, of Hüls America, Inc., presented the President's gavel to Terry F. Cogan, of Raw Materials Corporation.

Technical Committee Chairman David Siller, of Kenrich Petrochemicals, Inc., needs member companies to help with sample preparation for the Committee's project.

The meeting's technical speaker was Ed Orr, of BYK-Chemie USA, who spoke on "PRINCIPLES OF PIGMENT WETTING AND DISPERSION." Mr. Orr is a member of the New York Society.

The speaker began his presentation by stating that the emphasis is shifting away from solvent-based coatings. This has led to the increase in emulsion and powder coatings. The result is, wetting and dispersing additives have had to change to keep pace. According to Mr. Orr, the key is keeping a proper balance of the properties.

He said there are many types of wetting and dispersing agents. They function to aid in adjusting interfacial tension, as well as surface tension.

Mr. Orr discussed the difference between titanium dioxide and phthalo blue as far as particle size is concerned. Four subcategories of polycarboxylic acid dispersants also were examined.

Q. Was there an evaluation performed with the scanning electron microscope to see if the additives brought actual pigment particles together, that is, a congealing phenomenon?

A. The additives were actually bringing the smaller particle sized pigments into contact with the titanium dioxide. There is an association between the two pigment particles.

Q. Are there additives which cause complete and utter separation to the pigment particles?

A. Yes. Depending upon the choice of additive, one can actually cause pigments to migrate to a positively or negatively charged pole. This has been demonstrated microscopically.

THOMAS W. FITZGERALD JR., *Secretary*

CLEVELAND SOCIETY OFFICERS (from left)—Michael A. Wolfe, Constance F. Williams, Roy A. Glover, Brenda L. Carr, Freidun Anwari, Ben J. Carlozzo, and Richard A. Mikol

HOUSTON .....OCT.

"Rheological Modifiers"

Technical Committee Chairman David Siller, of Kenrich Petrochemicals, Inc., reported that Committee members were proceeding with their current project. Also, volunteers are needed to mix paint for their project.

Philadelphia Society member C. Warren Vanderslice, of Aqualon Company, was the meeting's technical speaker. His topic of discussion was "RHEOLOGICAL MODIFIERS FOR AQUEOUS SYSTEMS."

The speaker gave a brief history of thickeners for coatings.

According to the Mr. Vanderslice, cellulosic thickeners have become the industry standard. They impart stability to paints, prevent syneresis, help application properties, and can act as antifreeze agents. Cellulosic thickeners also can help spatter resistance and control drying time.

The speaker explained that cellulosic thickeners can be added to paints in the following ways: dry, in slurry form, or as a pre-gel. The first two methods currently are the most popular in use today.

Mr. Vanderslice stated that synthetic thickeners, urethane and acrylic, also have become popular.

Polyurethanes were described by the speaker as the best thickeners. They are lower in molecular weight and give good spatter resistance.

Mr. Vanderslice reported that bentonites and other treated clays and silicas also are used as thickeners.

In conclusion, he stated that a broad range of thickener choices is available to the formulator.

Q. What types of surface treatments are typically used to treat cellulosic thickeners.

A. These are typically dialdhyde types. These are for a hemiacetal linkage which is subject to base cleavage.

THOMAS W. FITZGERALD JR., *Secretary*

KANSAS CITY .....NOV.

By-Laws Committee

It was announced that Terryl F. Johnson, Federation Honorary Member, has accepted the position of Chairman of the By-Laws Committee for 1992-93.

LAWRENCE J. MURPHY, *Secretary*

LOUISVILLE SOCIETY OFFICERS (from left)—Timothy L. Fortney, Kris J. Grauer, Lloyd Browning, William Leightner, and Mike Moilanen

LOS ANGELES .....NOV.

"Associative Thickeners"

A moment of silence was observed in memory of Society member Verlin Denney, of Mar-Lak Products Company, who died recently.

President Sandra L. Dickinson, of Synergistic Performance Corporation, announced that the following Society members had won awards at the FSCT Annual Meeting in Chicago, IL: Treasurer Phil C. Bremenstuhl, of Ashland Chemical, Inc.—Second Prize in the Society Secretaries Awards competition; Vice President V.C. "Bud" Jenkins, consultant (on behalf of the Technical Committee)—Third Prize in the A.F. Voss/*American Paint & Coatings Journal* Awards competition; and Mark Georgantas (on behalf of the Technical Committee)—Second Prize in the Society Speaker Awards competition.

Environmental Affairs Committee Chairman Dave Muggee, of E.T. Horn Company, reported on the following environmental matters:

The South Coast Air Quality Management District—The SCAQMD has proposed Rules 2000-2014 concerning VOC [reactive organic compounds (ROC)] Reclaim Facilities. Rule 2013 deals with measuring and reporting emissions of ROC. It would require daily reporting for "major ROC product users," which is any facility using greater than 25 gallons per day of ROC-containing materials determined by the Executive Officer of the district. Also, section 2013-1 requires the maintenance of records of use, purchases, inventories, disposal, and miscellaneous imports and exports.

Proposition 65—New regulations have been issued concerning specific regulatory levels posing no significant risk. The Office of Environmental Health Hazard Assessment has amended regulations to allow the lead agency to establish no significant risk levels based on state or federal assessments and based on risk assessments using the default procedures specified in section 12703.

Department of Transportation Hazardous Materials Transportation—Clarification on definitions and training will be issued concerning requirements for HM 126F.

California Air Resources Board—CARB is holding public consultations on proposed amendments to AB2588 Air Toxics Hot Spots Regulations. The amendments include: changes to the procedures for the biennial updates of the emission inventories; changes to the reporting requirements for facilities that emit less than 10 tons per year of criteria pollutants; and changes to other portions of the regulation to improve or clarify the reporting requirements.

State Water Resources Board—Amended storm water regulations have been issued that appear to lessen the burden on most businesses. Section B. Monitoring Program and Reporting Requirements have some interesting exclusions under section 9.a and b.

Los Angeles County Fire Department—Business Plan Inventory forms have been mailed.

Also, the Small Business Administration has proposed reductions in the number of reporting parties under SARA III, Sect. 313 (Form R) by exempting businesses that release or transfer less than 5000 pounds per year of hazardous chemicals to the EPA.

LOS ANGELES SOCIETY OFFICERS (from left)—John C. Kulnane, Melinda K. Rutledge, V.C. "Bud" Jenkins, Sandra L. Dickinson, Philip C. Bremenstuhl, Jan P. Van Zelm, and James D. Hall

Marie A. Kaneko, of the City of Commerce Public Library, discussed the resources available to Society members at the facility. She said that the coatings reference materials were underutilized. Ms. Kaneko indicated that many new materials recently were added to the library's collection, including an old color index from the British Society of Dyers and Colorists.

She invited members to donate titles to the library since coatings texts cost anywhere from $75-100.

The meeting's technical speaker was Philadelphia Society member David A. Bryant, of RHEOX, Inc. His topic was "Novel Nonurethane Nonionic Associative Thickeners."

The speaker described some properties critical to an understanding of rheology modification, and reviewed various instruments used to measure rheology. Mr. Bryant also discussed recovery after sheering and the influence of various thickeners. Early thickeners, defined as polyether-polyurethanes, and new thickeners, polyether-polyols, were examined in detail.

In conclusion, Mr. Bryant stated that polyether-polyols offer a balance of properties with good physical and color stability. The film properties are such that good gloss is possible.

Q. Have you done hiding power evaluations using a spectrophotometer to quantify the readings versus the dry film thickness?

A. No, RHEOX has not done this type of test. People have reported a loss of hiding power, but they have not been able to duplicate the result.

John C. Kulnane, *Secretary*

LOUISVILLE .....SEPT.

"Surface Smoothness"

FSCT President-Elect and Society Outstanding Service Award Committee Chairman John A. Lanning, of Courtaulds Coatings, Inc., discussed the Award. Mr. Lanning said the Award is designed to honor a member who either has performed some very outstanding service for the Society or the coatings industry during the past year.

Technical Committee Chairman Linda Cox, of Akzo Coatings, Inc., reported that the Committee is working on two projects. The first one is a continuation of last year's rheological study. The second project focuses on the effects of oven fouling in the laboratory. This program is designed to identify any cause-effect relationships and allow the chemist to formulate around the problem. Ms. Cox asked for two volunteers to make 50 different drawdowns each.

A presentation on "Surface Smoothness and Its Influence on Paint Appearance—How to Measure and Control It" was delivered by Gabriele Kigle-Boeckler, of BYK-Gardner, Inc.

Ms. Kigle-Boeckler said that her company conducted a case study of several variables that contribute to surface smoothness. Some of the variables included substrate roughness, three types of paint systems, and baking conditions. In all, a total of 18 variations were studied.

The speaker described the effect of roughness, such as the paint system used, baking position, etc.

In conclusion, Ms. Kigle-Boeckler stated that specular gloss does not give enough information on the appearance of a coating, and that the waviness must be considered and can be measured and quantified.

William Leightner, *Secretary*

NEW YORK SOCIETY OFFICERS (from left)—Cary Grobstein, Armand J. Stolte, Michael C. Frantz, George M. Amrich Jr., and Richard J. Himics

LOUISVILLE .....OCT.

"Two-Component Epoxies"

Vice President Tim Fortney, of American Dispersions, Inc., announced that the Executive Committee had nominated two individuals, Kris J. Grauer, of Ashland Chemical Company, and Larry F. Pitchford, of Reynolds Metals Company, to replace Jim Hoeck, of AKZO Coatings, Inc., as Society Representative to the FSCT's Board of Directors.

No nominations were received from the floor, therefore the nominations were closed.

Voting will take place during November's meeting.

George Roy, of Rhone-Poulenc, discussed "Two-Component Epoxies—Waterborne or High Solids."

A background on the development of epoxy resins was presented. The speaker stated that epoxy resins were first synthesized in 1942. Mr. Roy explained that the oil embargo in 1973 ignited research and development efforts to reduce the dependence on petroleum solvents in epoxy resins and develop water reducible epoxies.

According to the speaker, these new products display good flash rusting resistance and are especially good for marginally prepared surfaces.

Mr. Roy said that water-based epoxies are used in the following industries: automobile, air, concrete sealer, flexible plastic, and thin film refinish. High-solids solvent-based material are used in the following coatings: chemical resistant, marine, deck, bridge, self-leveling floor finishes, and thick film applications.

William Leightner, *Secretary*

NEW ENGLAND SOCIETY OFFICERS (from left)—Charles Shearer, Joanne Monique, Joseph H. Weinburg, and John P. Lukens

Future Society Meetings

Baltimore

(Feb. 12)—Joint Meeting with Baltimore PCA.

(Mar. 18)—Technical Committee.

(Apr. 15)—Educational Committee. Nominations.

(May 20)—Manufacturing Committee. Elections.

Birmingham

(Feb. 4)—"Squeezing Out the Solvent"—J. Bridle, Cray Valley Products Ltd.

(Mar. 4)—"Rheology and Its Implications for the Coatings Industry"—M. Power, Carri-Med Ltd.

(Apr. 1)—"Recent Advances on the Issue of Chrome VI Replacement in Metal Pretreatment Processes"—J. Roberts, Henkel Metal Chemicals Ltd.

(May 6)—64th Annual General Meeting.

CDIC

(Feb. 8)—"ISO 9000"—David Dunn, Boehringer Mannheim.

(Mar. 8)—"Water-Based Polyurethanes"—Paul J. Hoffman, Miles, Inc.

(Apr. 12)—"Waterborne Resins"—Richard Johnson, Cargill, Inc.

(May 10)—Speaker to be announced, King Industries, Inc.

Chicago

(Feb. 1)—"New Development in VOC Compliant Coatings for Consumer Paints"—Richard Johnson, Cargill, Inc.

(Mar.1)—"Expert Systems in the Chemical Industry and Their Ability to Improve Productivity for Sales, Production, and Lab Functions"—Harold Small, MTL Computer Systems, Inc.

(Apr. 5)—"Solvent Selection for Waterborne Industrial Coatings"—Ronald K. Litton, Eastman Chemical.

(Mar. 7)—Annual Awards Banquet.

Cleveland

(Feb. 16)—Environmental Committee Symposium.

(Mar. 16)—"Formulating Color Without Heavy Metal Pigments"—Jim Delaney, CIBA-GEIGY.

(Apr. 20)—"Carbon Black Microdispersion—Effect on Jetness and Undertone in Coatings"—Jerry Rogers, Columbian Chemicals.

(May 18)—To be announced—Richard Ressmeyer, Intermuseum Conservatory.

Dallas

(Apr. 15)—"Complying with Emissions Regulations—A Raw Material Suppliers' View"—Daniel N. King, Exxon Chemical Co.

(May 13)—"Color Perception and Measurement"—Romesh Kumar, Hoechst Celanese Corp.

Golden Gate

(Mar. 15)—"Silicones in the Coatings Industry: The Influence of Chemical Structure Upon Properties"—Edward Orr, Byk-Chemie.

(Apr. 19)—"The Foam Story"—Jay W. Adams, Tego Chemie.

(May 17)—"Statistical Design in High Solids Polyurethane Coatings"—Sherri L. Bassner, Air Products and Chemicals, Inc.

(June 14)—Manufacturing Committee Seminar.

Houston

(Feb. 6)—50th Anniversary Celebration.

(Apr. 14)—"Complying with Emissions Regulations—A Raw Material Suppliers' View"—Daniel N. King, Exxon Chemical Co.

(May 12)—"Color Perception and Measurement"—Romesh Kumar, Hoechst Celanese Corp.

Montreal

(Feb. 3)—Annual Symposium. "Waterborne Coatings/Low VOC."

(Mar. 3)—"Techniques for the Analysis and Identification of Coatings for Legal Purposes"—Speaker from the Royal Canadian Mounted Police, Forensic Labs.

(Apr. 7)—Technical Committee Presentation—Daniel Letourneau, Chateau Paints.

(May 5)—Past-Presidents' Night. Manufacturing Committee Presentation—Gerard Paradis, BASF Canada.

New England

(Feb. 18)—"Dealing with Pollution Prevention Regulations in the Coatings Industry"—Robert B. Pojasek, GEI Consultants, Inc.

(Mar. 18)—"Meeting the Challenge of the Nineties with VOC Compliant Silicones"—Lee Hertz, Wacker Silicones.

(May 25-26)—Tech Expo '93.

New York

(Feb. 4)—Joint Legislative Update Meeting with Metropolitan New York PCA.

(Mar.)—Mini Workshop. Waste Minimization, Plant Safety, Purchasing, Anatomy of a Paint, etc.

(Apr. 13)—"Modern Trends in Organic Pigment Technology"—Hugh M. Smith, of Sun Chemical.

(May 11)—PaVaC Meeting. To be announced—Frank Jones, Eastern Michigan University.

Philadelphia

(Feb. 11)—"Adhesion to Weathered Chalky Surfaces"—Krishan Sehgal, Union Carbide.

(Apr. 16)—Awards Night Dinner Dance.

(Mar. 11)—"Filtering Those Difficult High Solids Paints"—Pete Scovic, Ronnigen Petter.

(May 13)—Manufacturing Committee Presentation. "ISO 9000"—Speaker to be announced.

Pittsburgh

(Feb. 8)—"How Environmental Issues Impact the Coatings Industry"—Hugh M. Smith, Sun Chemical.

(Mar. 8)—"Theory and Application of Defoamers"—Alfred A. Lamy, Ultra Additives.

(Apr. 12)—Environmental Symposium.

(May 10)—"Psychology of Color"—Andrea Piontelc, PPG Industries, Inc.

St. Louis

(Feb. 16)—Education Night.

(Mar. 16)—Manufacturing Night.

(May 18)—"Pigments for High Solids and Water Borne Coatings"—Speaker from CIBA-GEIGY.

(June 4-5)—Joint Meeting with Kansas City Society. Holiday Inn, Lake of the Ozarks, MO.

Toronto

(Feb. 8)—"The Future of Ontario's Economy"—Hon. Ed Philip, Minister of Industry.

(Mar. 8)—Annual Symposium.

Elections

BALTIMORE

Active

Crain, Alan N.—Duron, Inc., Beltsville, MD.
Engel, William M.—Lenmar, Inc., Baltimore, MD.
Prichep, Ronald H.—Fuisz Technologies, Chantilly, VA.
Rotman, Tatyana—Lenmar, Inc., Baltimore.

Associate

Fedorchak, Gregory A.—Hilton Davis Co., Freehold, NJ.
Miller, Charles D.—C.D. Miller Sales Corp., Whippany, NJ.
Schepise, Linda M.—Loos & Dilworth, Inc., Bristol, PA.

Retired

Goldstein, Jerry S.—Lutherville, MD.

BIRMINGHAM

Active

Parsons, Stephen P.—PPG Industries UK Ltd., Birmingham.

Associate

English, Steven—Dow Chemical Co., Ltd., Stockley Park, Uxbridge.
Hadley, Harry V.—Akzo Resins BV, Hersham, Walton-on-Thames, Surrey.

CDIC

Active

Farmer, Rex L.—Rubber-Seal Products, Dayton, OH.
Lohman, Roger J.—Chemquest Inc., Cincinnati, OH.
Neumann, James E.—Rubber-Seal Products, Dayton.
Swint, Jill M.—Akzo Coatings, Inc., Columbus, OH.
Widdecombe, John G.—Plastic Coatings Corp., Saint Albans, WV.

Associate

Bull, Victor A.—Specialty Coatings Systems, Inc., Indianapolis, IN.
Imes, John E.—Du Pont Co., Dublin, OH.
Reese, Phillip Scott—Deeks and Co., Cincinnati, OH.
Savage, Timothy M.—Troy Corp., E. Hanover, NJ.
Von Wahlde, Robert C.—W.R. Grace & Co., Cincinnati.

CHICAGO

Active

Chavez, Dawn M.—Mautz Paint Co., Madison, WI.
Lane, Kelley R.—Amoco Chemical Co., Naperville, IL.
Miller, Rick E.—Armstrong Containers, Westchester, IL.
Salvador, Roman B.—Valspar Corp., Wheeling, IL.
Schmidt, Gary R.—U.S. Movidyn, Chicago, IL.
Smith, Philip M.—U.S. Movidyn, Chicago.
Taylor, Kent J.—Reichhold Chemical, Chicago.

Associate

Chmielewski, Mark C.—Wm. B. Tabler Co., Inc., Lockport, IL.
Fries, Edward S.—U.S. Movidyn, Chicago, IL.
Gistis, James—ICI Resins US, Elmhurst, IL.
Martz, William D.—ECC International, Chicago.
Miller, Robert M.—Hoechst Celanese Corp., Somerville, NJ.
Stanwyck, D. Brett—American Cyanamid Co., Mt. Prospect, IL.

Retired

Lesnefsky, Edward J.—Hickory Hills, IL.

CLEVELAND

Active

Amidon, Carl A.—Lord Corp., Erie, PA.
Andrews, Jeffrey D.—Montana Products, Inc., Burbank, OH.
Carlozzo, Ben J.—Mameco International, Cleveland, OH.
Genova, Vincent M.—AExcel Corp., Mentor, OH.
Heyl, David A.—Day-Glo Color Corp., Cleveland.
Liebau, Gregory R.—Harrison Paint Corp., Canton, OH.
Olszanski, Dennis J.—OMG Corp., Cleveland.
Parsons, Larry I.—Morton International, Orrville, OH.
Paskoff, Philip H.—Man-Gill Chemical, Bedford, OH.
Seguin, Kenneth J. Jr.—Harrison Paint Corp., Canton.
Tennant, Mark D.—Morton International, Orrville.
Zaleski, Richard R.—Continental Products, Euclid, OH.

Associate

Bouchard, William R.—GE Silicones, Independence, OH.
Hanson, Michael C.—Lyndhurst, OH.
Machek, Alan L.—Dow Corning Corp., Milford, OH.
Nortz, William H.—FBC Co., Rocky River, OH.
Sullivan, Thomas R.—J.M. Gillen Co., Natrona Hts., PA.
Walburn, Brett—Dar-Tech Inc., Cleveland, OH.

Educator/Student

Conroy, Edward E.—Case Western Reserve University, Mentor, OH.

DALLAS

Active

Gidley, Sandra S.—Cron Chemical Corp., Dallas, TX.
Schiller, Robert M.—Kerr-McGee Chemical, Oklahoma City, OK.

Associate

Gibney, Robert C.—Kerr-McGee Chemical, Dallas, TX.
Guillory, Jud J.—KRONOS, Inc., Westlake, LA.
Harris, Patricia A.—KRONOS, Inc., Westlake.
Hohner, William R.—R.B. Patterson Co., Inc., Dallas.
Saba, Phillip S.—Cron Chemical Corp., Dallas.

DETROIT

Active

Miller, Gerald P.—Schabel Products Corp., Belleville, MI.

Associate

Schreurs, Jeffrey W.—Poly-Resyn, Inc., Dundee, IL.

GOLDEN GATE

Active

Barclay, William A.—Dorsett & Jackson, Inc., Yountville, CA.
Dulava, Bohdan A.—Western Colloids, Oakland, CA.
Enas, Dave E.—Flint Ink Corp., Berkeley, CA.
Hatch, Kent M.—Morton International, Dixon, CA.
Ng, Y. Dominic—Morton International, Dixon.
Perry, Robert H.—Robert H. Perry & Associates, San Carlos, CA.
Tanedo, Rose M.—Technical Coatings, Santa Clara, CA.
Truman, Wilson J. Jr.—Morton International, Dixon, CA.

Associate

Forster, Wendell C.—McWhorter, Inc., Los Angeles, CA.
Frattini, John C.—Ashland Chemical, Newark, CA.
Knudsen, John W.—Celite Corp., Fairfield, CA.
Pajor, Jerome J.—Cookson Pigments, Inc., Rancho Santa Margarita, CA.
Read, Michael F.—Baysys, San Francisco, CA.
Seppala, Roy M.—Rhone-Poulenc, Inc., Walnut Creek, CA.
Skarvan, Robert J.—McWhorter, Inc., Los Angeles.
Venegas, Rudy H.—Dowd and Guild Inc., San Ramon, CA.
Wursta, Theodore P.—Air Products & Chemicals, Redondo Beach, CA.

HOUSTON

Associate

Schwalbach, Joseph M.—Vista Chemical Co., Houston, TX.

KANSAS CITY

Active

Henke, Gary R.—Tnemec Inc., N. Kansas City, MO.
Klusener, Alan R.—Tnemec Inc., N. Kansas City.
Leslie, Robert K.—Tnemec Inc., N. Kansas City.
Mead, Timothy A.—Tnemec Inc., N. Kansas City.
Sanders, Curry D.—Tnemec Inc., N. Kansas City.

LOS ANGELES

Active

Gruner, M. Saul—Ameritone Paint, Rancho Dominguez, CA.
Jordan, Ben E.—Akzo Coatings, Inc., Orange, CA.
Knight, Gary—Knight's Paint & Decorating, Fresno, CA.
Lindblom, Gregg W.—Smiland Paint Co., Los Angeles, CA.
McNaughton, Michael P.—Fine Line Paint Corp., Sante Fe Springs, CA.
Milici, Steve—Lilly Industrial Coatings, Montebello, CA.
Ramirez, Jose—Evr-Gard Coatings, Paramount, CA.
Rutherford, Mark A.—Calcoast Analytical-ITL, W. Los Angeles, CA.
Sremba, Jerry F.—Enviro-Waste Tech., Inc., Irvine, CA.
Vilbar, Nerissa L.—Major Paint Co., Torrance, CA.
Wursta, Theodore P.—Air Products & Chemicals, Redondo Beach.

Associate

Behnia, Nina B.—Eagle Monitoring Systems, Inc., Irvine, CA.
Boorn, Graham M.—G.M. Boorn & Associates, Long Beach, CA.
Closs, Donald K.—Dow Corning Corp., Irvine.
Ehmke, Ronald S.—Rhone-Poulenc P.I.A., San Leandro, CA.
Hermsen, Nanette L.—Dow Chemical Co., City of Industry, CA.
Holstine, Donald R.—The C.P. Hall Co., Torrance, CA.
Hudson, Christy Ann—Pacific Micro, Seal Beach, CA.
Keane, Mary M.—Michelman Inc., Cincinnati, OH.
Umphrey, Jay—Ashland Chemical, Inc., Sante Fe Springs, CA.

Retired

Little, Kent E.—Issaquah, WA.

MONTREAL

Active

Chaks, Gary—Witco Corp., Pointe Claire, Que.
Nguyen, Thinh Quoc—International Paints, Baie D'Urfe, Que.
Lussier, Christine M.J.C.—International Paints, Baie D'Urfe.
Sanchez, Alvaro—Feldkirch Inc., Dorval, Que.

Associate

Moreau , Paul C.—Canada Colors & Chemicals, Ville St-Laurent, Que.
Webster, Allan—ICI, Boucherville, Que.

Educator/Student

Alain, Morissat—Ecole Quebecoise du Meuble, Victoriaville, Que.

NEW ENGLAND

Active

Crochiere, George K.—W.R. Grace & Co., Lexington, MA.
Denholm, James E.—Barr-Chem Associates, Inc., Portsmouth, NH.
Johnson, Joseph E.—Cabot Corp., Billerica, MA.
Lalumiere, Robert J.—Browning Thermal, Enfield, NH.
Parigian, Theodore G.—ICI Resins US, Wilmington, MA.
Perito, Diane C.—ICI Resins US, Wilmington.
Rowe, Peter G.—Key Polymer Corp., Lawrence, MA.
Townsend, Gary A.—ICI Resins US, Wilmington.

Associate

Degnan, H. Laurie—D.N. Lukens Inc., Westboro, MA.
Newell, David A.—Inolex Chemical Co., Attleboro, MA.
Rattigan, James T.—Rhone-Poulenc, Brighton, MA.
Smulski, Stephen J.—Wood Science Specialists Inc., Shutesbury, MA.

NEW YORK

Active

Hermele, Jules J.—American Safety Tech, Roseland, NJ.
Lasaponara, Joseph A.—L & F Products, Montvale, NJ.
Lombardo, Vincent—Randolph Products, Carlstadt, NJ.
Prichard, Marshall L.—Minwax Corp., Montvale.
Spencer, Robert J.—Environmental Risk Ltd., Clifton, NJ.
Tepperman, Peter—Seagrave Coatings, Carlstadt.
Urbanski, Arthur N.—Courtaulds Coatings, Union, NJ.

Associate

D'Amico, Chuck D.—Ultra Additives Inc., Paterson, NJ.
Diretto, Anna M.—Rhone-Poulenc, Inc., Morrisville, PA.
Merritt, George E.—Ashland Chemical Inc., Boonton, NJ.
Potter, Mark W.—Formula 40 USA, Inc., New Haven, CT.
Schock, Steven D.—H. Schock & Sons, Inc., Newark, NJ.

Retired

Falco, John J.—Westfield, NJ.
Waynor, Hugo A.—E. Brunswick, NJ.

PHILADELPHIA

Active

Chelak, William—Buckman Laboratories, Inc., Philadelphia, PA.
Dubowik, David A.—Air Products & Chemicals, Allentown, PA.
Erhan, Semih M.—Ertech Inc., Philadelphia.
Hunter, Edward T.—Sau-Sea, Inc., Southampton, NJ.
Ingram, John R.—M.A. Bruder & Sons, Inc., Philadelphia.
Mooney, James T.—Rohm and Haas Co., Spring House, PA.
Pfeiffer, John B.—Air Products & Chemicals, Allentown.
Quashie, Sape—Du Pont Co., Philadelphia.
Rose, Dennis A.—Manning, Birdsboro, PA.

Shah, Vishnu M.—Rohm and Haas Co., Spring House.
Sladek, Joseph F.—M.A. Bruder & Sons, Inc., Philadelphia.
Stanko, David P.—Silberline Mfg. Co., Tamaqua, PA.
Stephens, James F.—Rhone-Poulenc, Inc., Cranbury, NJ.
Wasowski, Lawrence A.—Air Products & Chemicals, Inc., Allentown.

Associate

Reinert, Terry S.—IBC Systems, Reading, PA.
Rosa, Gretchen M.—Monsanto Chemical Co., Norristown, PA.
Tirpak, George—Tego Chemie Service, E. Brunswick, NJ.
Willams, Wesley S.—Prospect Industries, N. Brunswick, NJ.

Retired

Smalley, Eugene R.—Woodbury, NJ.

PIEDMONT

Active

Frauenhoffer, Nicholas J.—Rohm and Haas Co., High Point, NC.
Holloway, Michael G.—The Feldspar Corp., Asheville, NC.
Waters, Gary L.—Compliance Coatings, Clemmons, NC.

Associate

Lasine, Stephen B.—Harcros Chemicals, Greensboro, NC.
Link, Robert F.—Southern States Mineral and Chemical Co., Savannah, GA.

PITTSBURGH

Active

Calhoun, Gary D.—ICI Resins US, Medina, OH.
Hurst, Thomas A.—Rhone-Poulenc, Inc., Sylvania, OH.
Hritz, George A.—Savereisen Cements, Pittsburgh, PA.
Jakiela, Lisa E.—PPG Industries, Inc., Allison Park, PA.
Jamison, Jack J.—Nolf Container & Chemical, Sewickley, PA.
Kondos, Dean A.—PPG Industries, Inc., Allison Park.
McGuire, Kathleen A.—PPG Industries, Inc., Springdale, PA.
Misyan, Arthur D.—PPG Industries, Inc., Allison Park.
Mysliwczyk, Richard G.—Watson-Standard Co., Pittsburgh.
Repko, Richard D.—PPG Industries, Inc., Springdale.
Rinehart, Walter S.—The Valspar Corp., Rochester, PA.
Spence, Donna J.—The Valspar Corp., Pittsburgh.
Suhu, Norman Y.—PPG Industries, Inc., Allison Park.
Warren, Clyde Ellis—The Valspar Corp., Pittsburgh.
Zadroga, Albert C.—PPG Industries, Inc., Springdale.

Retired

Christenson, Roger M.—PPG Industries, Inc., Gainesville, FL.

TORONTO

Active

Aitken, Todd A.—Benjamin Moore & Co., Ltd., Toronto, Ont.
Cruz, Lea G.—CSJ Manufacturing & Trading Co., Scarborough, Ont.

McLean, James M.—Steelcase Canada, Don Mills, Ont.
Snyder, Robert E.—A.R. Monteith (77) Ltd., Mississauga, Ont.

Associate

Anderson, Dean—Monsanto Canada, Streetsville, Ont.
Reeves, Tanya E.—ICI Paints (Canada) Inc., Concord, Ont.

21st Western Coatings Societies' Symposium and Show To Feature Exhibits, Technical Program, and Entertainment

The 21st Western Coatings Societies' Symposium and Show will be held on March 23-25, at the Disneyland Hotel & Convention Center, in Anaheim, CA. The event is sponsored by the Golden Gate, Los Angeles, Pacific Northwest, and Rocky Mountain Societies for Coatings Technology.

Currently, 97 companies have contracted 14,200 square feet of exhibit space for the three-day show.

In addition, the symposium on "Visions—Opportunities—Challenges," will feature three days of two concurrent sessions of technical presentations. A total of 23 papers are scheduled for presentation during the symposium, including:

"New Catalysts for High Solids Coatings"—Robert Middlemiss, of Mooney Chemicals, Inc.;

"Plant Housekeeping Considerations with Nonmercurial Biocides"—Jeffrey Hinkle, of Hüls America, Inc.;

Presentation by the National Paint and Coatings Association (NPCA), Southern California Paint and Coatings Association (SCPCA), and California Paint Council (CPC)—J. Andrew Doyle, of NPCA, Sandra Skomesa, of SCPCA, and Mathew Duston, of CPC;

"Exterior Studies of Exterior Latex House Paint Containing Kaolin Clay Pigments"—Thad T. Broome, of J.M. Huber Company;

"The Influence of Fine Particle Functional Extender Pigments on the Hiding Power of Titanium Dioxide"—Adrian Adkins, of Schoofs, Inc., and Terry R. Clever, of Alcoa North America Industrial Chemicals;

"Optimizing Lightfastness of Organic Pigments through Particle Size Control"—Romesh Kumar, of Hoechst Celanese Corporation;

"Gloss: Factors Influencing Gloss Development and Formulating Guidelines to Achieve Gloss in Paint"—Rebecca Craft Tulloch, of E.I. du Pont de Nemours & Company, Inc.;

"Ion Exchanged Alternatives to Chromate for Corrosion Inhibition"—Michael Maule, of W.R. Grace Company;

"Waterborne Epoxy Resin Emulsion"—Marcel Gaschke, of CIBA-GEIGY Corporation;

"High Solids Solvent Free Baking Enamels"—Richard Farmer, of Cargill Resin Products Division;

"Optical Brighteners—More Than Just Clean Laundry"—Timothy Geran, of CIBA-GEIGY Corporation;

"HVLP Spray Gun Technology"—Glen L. Muir, of Graco Inc.;

"Graffiti Abatement and Prevention Handbook"—V.C. "Bud" Jenkins, of the Los Angeles Society for Coatings Technology;

"The Cal Poly Polymers and Coatings Program: From Dream to Reality"—Dane

Daryl F. Gates

Jones, James D. Westover,, and Max T. Wills, of California Polytechnic State University;

"ELRAP: Environmental, Legislative, and Regulatory Advocacy Program of the Southern California Paint and Coatings Association"—Robert Wendoll and Raymond Robinson, of SCPCA;

"Aqueous Suspensions of Cellulosic Thickeners: Function and Mechanisms in Water Based Coatings"—C.W. Vanderslice, H.F. Haag, and C.L. Burdick, of Aqualon Company;

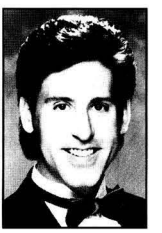
"Ultrafine Titanium Dioxide: Its Properties and Applications in Coatings"—Stuart G. Heyes, of Tioxide Specialties, Inc.;

"The Utility of Glycol Based Ethers as Cosolvents in Water Based"—Douglas K. Pollack, of Dow Chemical Company;

"Safe Paint Biocides"—Judith Ross and Angela Downey, of Rohm and Haas Company;

"System Design Considerations for Powder Coatings Operations"—Michael Cravens, of Powdercoat Services, Inc.;

"Investigation of Long-Term Yellowing of Architectural Enamels as a Function of



Danny Gans

Marie Osmond

Coating Composition"—Jeffrey H. Danneman and Arthur C. Smith, of Reichhold Chemicals Inc.;

"Developments in the European Low VOC Architectural Coatings Market"—David Sykes, of Rohm and Haas Company; and

"Economic Outlook: 1993-1994"—Richard A. Stuckey, of E.I. du Pont de Nemours and Company, Inc.

* * * * *

The Western Coatings Societies' Symposium and Show Industry Luncheon will be held on Wednesday, March 24, and feature guest speaker Daryl F. Gates, retired Chief of the Los Angeles Police Department. He had served the LAPD for 43 years prior to his retirement last March, the last 14 years as Chief.

A dinner and show will take place on Thursday, March 25, the final evening of the event. Featured will be Danny Gans, impressionist, comedian, singer, and actor. He has been hailed as the "Sammy Davis Jr. of the 90s." Mr. Gans' repertoire includes well over 100 voice impersonations.

Concluding the WCSSS festivities will be Marie Osmond and the Joe Diamond Orchestra. Ms. Osmond will perform the hit songs from her album, "There's No Stopping Your Heart."

* * * * *

For more information on the 21st Western Coatings Societies' Symposium and Show, contact: Sam A. Rumfola, c/o TCR Industries, 26 Centerpointe Dr., #105, La Palma, CA 90623; (714) 521-5222.

People

Beverly Spears, Purchasing Manager at Preservative Paint Company, Seattle, WA, has received an Industry Achievement Award from the National Paint and Coatings Association. The award for "distinguished achievement in community service," is for her work with the Puget Sound Paint and Coatings Association on the "Picture-it-Painted—Christmas in April" program. Ms. Spears has nearly 20 years of experience in purchasing and inventory control, the last six years with Preservative Paint. She is a member of the Pacific Northwest Society.

Sartomer Company, Exton, PA, has announced two promotions within its Norsolene Resins Group. **Michael D. Kaza** has been named Business Manager overseeing all sales, marketing, and research and development activities of Norsolene. Mr. Kaza, a 19-year veteran of the chemical industry, joined Sartomer in 1989 as Technical Manager/Norsolene Resins. **Victor Martinez** has been promoted to Sales Marketing Manager/Norsolene Resins where he will be in charge of sales and marketing of the group's products in North America, South America, and Asia. Most recently serving as Product Sales Manager, Mr. Martinez has been with the company since 1985.

John C. Hauck, of Miles, Inc., Elkhart, IN, is the recipient of Steel Structures Painting Council's (SSPC) John D. Keane Award of Merit. This award, SSPC's most prestigious, is presented for longstanding and meritorious service to the association and to the protective coatings industry. Mr. Hauck coauthored a paper entitled, "Prequalification of Contractors: One Giant Step Toward Increasing the Service Life of Coatings," which won the SSPC Best Paper Award in 1986 and spearheaded the development of a national certification program for painting contractors. He has been a frequent contributor to the *Journal of Protective Coatings and Linings* and is a strong spokesperson for facility owners and other end users of protective coatings. Mr. Hauck was elected to the SSPC Board of Governors in 1987, served on the association's Executive Committee since 1986, and presided over the Board of Governors from 1989-1990. He was the President of SSPC in 1991.

The position of Manufacturing and Engineering Manager for the Industrial Coatings Division of H.B. Fuller Company, St. Paul, MN, has been filled by **Peter Johnson**. In his new role, Mr. Johnson will be responsible for all manufacturing and engineering operations at the division level; managers of the division's facilities in Vadnais Heights, MN; Conyers, GA; and Tinley Park, IL, will report to him.

John G. Von Ohlen has accepted the promotion to Commercial Manager/Acetyls for Quantum Chemical Corporation's USI Division, Cincinnati, OH. In this position, Mr. Von Ohlen will be responsible for the short- and long-term business planning and asset management for vinyl acetate monomer, acetic acid, and methanol. He previously served as Regional Sales Manager/Polymers in the company's Cleveland region.

The Dexter Corporation's Packaging Products Division, Waukegan, IL, has announced the following appointments: **Thomas M. Daly**—Vice President and General Manager/Americas, Waukegan; **John W. Ramler**—Vice President of Marketing/Flexible Packaging, Waukegan; **Mathew J. Miller**—Flexible Packaging Sales Team, Waukegan; **Brian M. Maher**—Health, Safety and Environmental Specialist, Waukegan; and **Wayne Wood**—Human Resource Manager, Birmingham, AL.

Mr. Daly is a member of the Chicago Society.

The Board of Directors of USG Corporation, Chicago, IL, has elected **Donald E. Roller** to the position of President and CEO of the corporation's largest subsidiary, United States Gypsum Company. Formerly President and CEO of USG's second largest subsidiary, USG Interiors, Mr. Roller assumed his new responsibilities on January 1. He has been with the company for 32 years.

Bohlin Instruments, Inc., Cranbury, NJ, has named **John Casola** to the position of National Sales Manager. In this capacity, Mr. Casola will use his more than 13 years of rheological instrumentation expertise, specializing in the field, customer service, and sale arenas. He has been with Bohlin since its inception in the United States in 1987.

The appointment of **Mike Duni** as Sales Manager for Datacolor International, Lawrenceville, NJ, has been announced. In his new position, Mr. Duni will be responsible for the development, marketing, and coordination of support of retail paint products for trade sales paint manufacturers. Previously, he was a Technical Sales Representative for the company covering the Southwest.

M. Duni

The Asphalt Roofing Manufacturers Association (ARMA) has elected its officers for the coming year. They are: President—**Michael Vidan**, of Gypsum & Roofing Division, Georgia-Pacific Corporation; First Vice President—**Donald F. Smith**, of GS Roofing Products Company; Second Vice President—**John M. Sergey**, of GAF Building Materials Corporation; Treasurer/Secretary—**Gregory T. Faherty**, of Siplast Corporation; and Executive Vice President—**Richard D. Snyder**, of ARMA.

Also, members of the 1993 ARMA Executive Committee include: **Gregory T. Faherty**; **J.D. Hasselbach**, of Celotex Corporation; **J.P. Humphreys**, of Tamko Asphalt Products, Inc.; **John M. Sergey**; **Donald F. Smith**; **Michael A. Vidan**; **Dixon Walker**, of Roofing Systems Division, Manville Sales Corporation/Schuller International; and **Harold Work**, of Elk Corporation of America.

Joseph S. Klach has accepted the position of Regional Manager/Eastern Region for Liquid Carbonic Specialty Gas Corporation, Chicago, IL. Shortly after joining Liquid Carbonic as a Chemist in 1979, Mr. Klach was promoted to Plant Manager for the company's specialty gas facility in Pasadena, TX. He most recently served as Liquid Carbonic's Southern Regional Manager in Houston, TX, a position he has held since 1986.

Also, **Luciane R. Cimino** and **Joseph J. Ruble** have joined Liquid Carbonic as Managers of Planning and Analysis. In this position, Ms. Cimino and Mr. Ruble will evaluate capital projects, assist the company's business units in developing long-range plans, and help identify growth opportunities for corporate development.

The Instrument Society of America (ISA), Research Triangle Park, NC, has announced its slate of officers for 1992-93. They include: President—**Howard P. Zinschlag**, of MEMC Electronic Materials; President-Elect Secretary—**C. Blair Ives, Jr.**, of C.B. Ives & Company; Treasurer—**Robert W. Lindner**, of Control Associates, Inc.; Vice President/Automation and Technology Department—**John S. Sawvel, Jr., P.E.**, retired; Vice President/Publications Department—**John H. McCamey**, of McCamey & Associates; Vice President/Standards and Practices Department—**Warren C. Weidman, P.E.**, of Gilbert Commonwealth, Inc.; Vice President-Elect/Automation and Technology Department—**John Burkland**, of Technical Automation Services Corporation; Vice President-Elect/Publications Department—**Perry Grady**, of North Carolina State University; and Vice President-Elect/Standards and Practices Department—**Marjorie Widmeyer**, of Washington Public Power Supply System.

In addition, the following ISA awards were presented: Honorary Member—**Paul W. Murrill**, of Gulf State Utilities Company; Albert F. Sperry Founder Award—**Harry Edward Weaver, Jr.**, Private Consultant; Douglas H. Annin Award—**David William Spitzer**, of Nepera, Inc.; Standards and Practices Award—**Francis J. McGowan**, of Factory Mutual Research Corporation; Excellence in Documentation Award—**Fred M. Cain**, of Valtek Inc.; Donald P. Eckman Education Award—**Edwin F. Gregg**, self-employed; Golden Achievement Award—**George W. McGee**, retired; UOP Technology Award—**Theodore P. Wang**, Electric Company, Inc.; Four/Five Year Student Paper Award—**Warren R. Mitchell**, of University of Alberta; and Two/Three Year Student Paper Award—**Barry E. Sailes**, of Southern Alberta Institute.

The following individuals have been elected to the member grade of Fellow in ISA: **Hashem Mehrdad Hashemian**, of Analysis and Measurement Services Corporation; **Eugene F. Holben**, of Conameter Corporation; **Azim Kaya**, of the University of Akron; and **James J. Pinto**, of Action Instruments, Inc.

These four individuals have been presented with the Distinguished Society Service Award for outstanding service and contributions to ISA: **Peter A. Gorka**, of Northern Indiana Public Service Company; **Clifford Thomas Johnson**, of Parsons Main, Inc.; **David Melvin Nelson**, of Fluidyne Engineering Corporation; and **Murray Douglas Willer**, of Willer Consulting.

Obituary

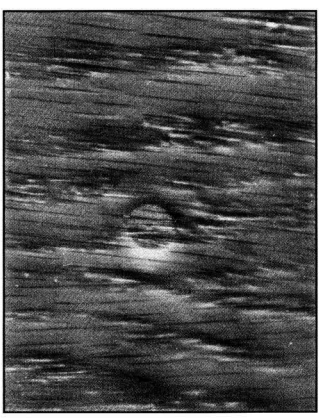
Ray Howl, Works Director, Newtown Industrial Finishes Ltd., Birmingham, England, died recently. He was 50 years old.

In 1958, Mr. Howl left Bordesley Green Technical College to work at Learners Paints as a Laboratory Technician. In 1960 he joined Arthur Holden & Sons to work in the Industrial Paint Laboratory. In January of 1964, Mr. Howl joined Newtown Industrial Finishes Ltd. Over the next 25 years he played a key role in the development of the company, eventually becoming Works Director with special responsibility for purchasing.

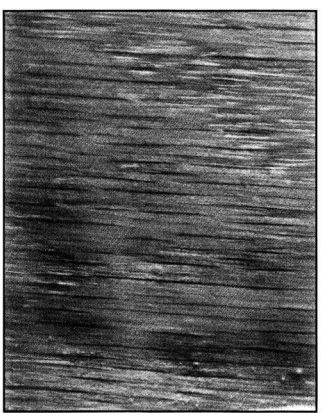
Mr. Howl had been a member of the Birmingham Paint, Varnish and Lacquer Club since 1971.

Errata

corrected 3 Jun 93 /AP



No surfactant



With 1%, 2,4,7,9-tetramethyl-5-decyn-4,7-diol

Figure 8—Evaluation of retraction. The application of an aqueous wood top-coat, based on Goodyear Pliolite 7104 latex and formulated with 1% surfactant, to sealed oak plywood shows that 2,4,7,9-tetramethyl-5-decyn-4,7-diol will eliminate retraction

In the September 1992 issue of the JCT (Vol. 64, No. 812, Pages 65-74), please note the correction made to *Figure* 8 in the article entitled, "The Importance of Low Dynamic Surface Tension in Waterborne Coatings."

The correction to the figure is shown on the left.

In the November 1992 issue of the JCT (Vol. 64, No. 814, Pages 27-31), please note the following author address correction for the article "Carbon Filled Paints of Improved Electrical Conductivity."

A. Calahorra*, D. Aharoni†, and H. Dodiuk†

*Tambour Ltd., POB 2238, Acco, 24121, Israel. (To whom correspondence should be addressed.)

†Rafael, POB 2250, Haifa, Israel.

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We are sorry for any inconvenience these errors may have caused—*Editor.*

Literature

Service Brochure

A full-color, 16-page publication detailing a company's worldwide organization and history has been released. The brochure also highlights the firm's specialized target market groups, technical innovation, service, compliance, and quality. For a copy of "Drew. A History of Results," contact Marketing Services, Drew Industrial Div., One Drew Plaza, Boonton, NJ 07005.

Circle No. 303 on Reader Service Card

Rheological Additive

Details on the use of an associative thickener in several systems, including high quality latex paints, adhesives, sealants, and inks are given in a new 12-page bulletin. Also included are viscosity profiles, chemical and physical data; solvent, surfactant, and dispersant interactions; and various starting formulations. Write RHEOX, Inc., P.O. Box 700, Hightstown, NJ 08520, for a free copy of the RHEOLATE® 300 brochure.

Circle No. 304 on Reader Service Card

Gas Monitoring System

A new eight-page bulletin focusing on continuous monitors for detecting toxic gases, oxygen, and combustible gases has been issued. The literature contains photos and brief descriptions of instruments for safety and health; environmental and emissions monitoring; process control and analysis; data acquisition; and leak detection. To receive a copy of "A Guide to MSA Gas Monitoring Systems" (Bulletin No. 0700-27), write MSA, P.O. Box 427, Pittsburgh, PA 15230.

Circle No. 305 on Reader Service Card

Color-Control System

A new computerized color matching and control system for applications in the paint, coatings, plastics, cosmetic, and related industries is the subject of a product release. Two software packages for paints and plastics are designed with functions and features that are tailored to specific applications. For further details on the C•A•T/MAT-200 color-control system, contact Color and Appearance Technology, Inc., Princeton Commerce Center, 29 Emmons Dr., Bldg. G-2, Princeton, NJ 08543-3709.

Circle No. 306 Reader Service Card

Cleaner and Brightener

Specifications on how a cleaner and brightener works after it is applied to weathered exterior surfaces are presented in a new four-page, five-color brochure. The publication also contains product application photos as well as easy-to-understand application instructions. Write The Flood Co., P.O. Box 399, Hudson, OH 44236-0399, for more technical information on DEKSWOOD® cleaner and brightener.

Circle No. 307 on Reader Service Card

Spectrophotometer

The introduction of a portable sphere spectrophotometer, which has special features specifically for the textile industry, has been made through literature. The instrument reportedly stores 24 standard colors with tolerances for pass/fail operation and provides 555 shade tagging out-put. More information on model SP78 spectrophotometer is obtainable from X-Rite, Inc., 3100 44th St., S.W., Grandville, MI 49418.

Circle No. 308 on Reader Service Card

Starting Formulations

A series of 30 new and updated coatings starting formulations is highlighted in a data sheet. The formulations, which are designed for use by coatings manufacturers as a starting point in developing their coatings products, include starting formulations, manufacturing and application instructions, curing schedules, and handling precautions. For information or technical assistance, write Shell Chemical Co., Manager, Resins Communications, One Shell Plaza, P.O. Box 2463, Houston, TX 77252-2463.

Circle No. 309 on Reader Service Card

Solvent Kit

A new solvent kit for use in the removal of coatings and polymer claddings that to protect optical fibers is being offered. The kit consists of one pint each of six different solvents designed to strip the coatings and/or claddings from various types of optical fibers. For more in-depth information, write Dynaloy, Inc., 7 Great Meadow Ln., Hanover, NJ 07936.

Circle No. 310 on Reader Service Card

Impact Copolymers

A line of polypropylene impact copolymers is highlighted in a product release. The copolymers will be targeted toward automotive, appliance, durable consumer products, and packaging applications. Further information on the ACCTUF™ line of impact copolymers is obtainable from Amoco Corp., 200 E. Randolph Dr., Chicago, IL 60601-7125.

Circle No. 311 on Reader Service Card

Multifunctional Surfactant

Literature focusing on a multifunctional surfactant which contains zero volatile organic compounds (VOCs) has been printed. The product reportedly helps prevent crawling, cratering, and pinholing and helps reduce nailhead and flash rusting. For more information on STRODEX PK-OVOC, write Dexter Chemical Corp., 845 Edgewater Rd., Bronx, NY 10474.

Circle No. 312 on Reader Service Card

Case Studies

A new brochure featuring practical case studies and photographs of plant installations in specialty chemical, pharmaceutical, metal processing, and electronics industries has been released. The eight-page publication also describes how engineers work with customers to solve processing challenges. For a free copy of the brochure, "Your Advantage is Corning for Chemical Process Systems," contact William Jackson, Corning Inc., Corning Process Systems, Big Flats Plant, Big Flats, NY 14814.

Circle No. 313 on Reader Service Card

Thixotropic Fiber

Specification sheets have been released on two new thixotropic fiber products. The ceramic fibers have been specifically engineered to be used as mechanical thixotopes in coatings applications, offering reinforcement and fire resistance as secondary structural benefits. For copies of the data sheets highlighting Fiberfrax® HS thixotropic fibers HS70/70C and HS-95C, request forms C-2053-EF and C-2054-EF, respectively, from The Carborundum Co., Fibers Div., P.O. Box 808, Niagara Falls, NY 14302-0808.

Circle No. 314 on Reader Service Card

Capillary Electrophoresis

An application note on a capillary electrophoresis has been released. The four-page bulletin illustrates three figures showing a sample dialysis technique. To receive a free copy of Application Note #2, entitled "Capillary Gel Electrophoresis of PCR Products: Easy Sample Preparation Method," contact J&W Scientific, 91 Blue Ravine Rd., Folsom, CA 95630.

Circle No. 315 on Reader Service Card

Paint Resin

A paint resin with virtually no volatile organic compounds has been introduced through literature. The resin is designed to be used in flat, eggshell, and semigloss formulations For more in-depth details on Airflex® 738 resin, write Air Products and Chemicals, Inc., Polymer Chemical Div., 7201 Hamilton Blvd., Allentown, PA 18195.

Circle No. 316 on Reader Service Card

Media Mill

Technical information has been released on a new series of media mills. Production units with capabilities as high as 2000 GPH are available. Contact Premier Mill Corp., One Birchmont Dr., Reading, PA 19606-3298, for further details on the HFR (High Flow Recirculation) series of media mills.

Circle No. 317 on Reader Service Card

Silicone Resins

A family of silicone resins for high temperature coatings is now available. The six resins provide effective coatings at temperatures up to 250°C. For more in-depth information on Rhodorsil® silicone resins, contact Dick Marsh, Rhone-Poulenc Inc., 311 Marble Mill Rd., Marietta, GA 30060.

Circle No. 318 on Reader Service Card

Thermoplastic Valves

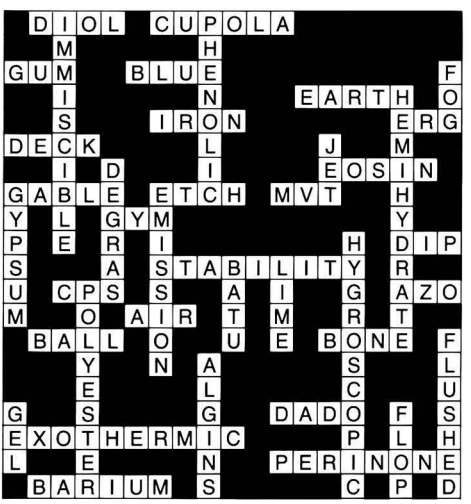
Automatic flow control valves which reportedly maintain a constant pre-determined rate of liquid flow are highlighted in a catalog. The valves can also operate at temperatures up to 180°F (82°C) depending upon the body and diaphragm material selected. For further information on the Series "FC" valves, write Plast-O-Matic Valves, Inc., 430 Route 46, Totowa, NJ 07512.

Circle No. 319 on Reader Service Card

Line Striper

The introduction of an airless paint sprayer weighing only 150 pounds has been made through literature. The striper was developed for a wide variety of striping applications, such as parking lots, athletic fields, roads, curbs, and general painting. Contact Titan Tool Inc., 556 Commerce St., Franklin Lakes, NJ 07417, for further details on the Promark 690 Line Striper.

Circle No. 320 on Reader Service Card



Solution to December's *"CrossLinks"*

Metallograph

A new inverted, bench-top metallograph is the focus of a data sheet. The instrument reportedly offers versatility in the inspection and imaging of samples, ranging from routine metallography to the demanding requirements of polymers, composites, ceramics, and electronic components. For more technical details on the AXIOVERT 100A bench-top metallograph, contact Audrey Smith, Zeiss Inquiry Service, c/o BMS, 325 N. MacQuesten Pkwy., Mount Vernon, NY 10550.

Circle No. 321 on Reader Service Card

Fillers

A data sheet describing cellulose fiber functional fillers has been printed. Applications include: thermoset and thermoplastic resins; building products such as textured coatings, grouts, and tile adhesives; pet food; asphalt mixtures; rubber goods; gaskets; sealants; brake linings; latex paints and welding electrodes. Write Celite Information Center, 1601 Park Ave., W., Denver, CO 80216, for a copy of the data sheet (#FF-545) on Fibra-Cel® cellulose fiber functional fillers.

Circle No. 322 on Reader Service Card

Gloss Meter

A compact, portable gloss meter that provides gloss readings at 20, 60, and 85° angles in a number of applications, including paints, plastics and films, paper, furniture, and automobile parts, is the subject of a product release. The instrument measures only 1.7" x 5.6" x 2.8" and weighs only 1.1 pounds. More information on the Multi-Gloss 268 Gloss Meter is obtainable from Minolta Corp., Instrument Systems Div., 101 Williams Dr., Ramsey, NJ 07446.

Circle No. 323 on Reader Service Card

Surfactants

A 24-page booklet on an expanded series of polyalkylene oxide-modified dimethylpolysiloxanes has been printed. Product features, benefits, properties, and performance are described and a section on applications covers typical end-use and includes a selection guide. Copies of the booklet on SILWET® Surfactants, designated SC-906B, are available from Union Carbide OrganoSilicon Products, Systems and Services, Dept. H2375, 39 Old Ridgebury Rd., Danbury, CT 06817-0001.

Circle No. 324 on Reader Service Card

Powder Coatings

A new range of primerless powder coatings designed for coatings applied by electrostatic spraying is the topic of a data sheet. The coatings require no primer and can be applied directly to metallic surfaces. Contact Richard B. Cuddeback, Product Manager/Engineering Polymers, Elf Atochem North America, Inc., Three Parkway, Philadelphia, PA 19102 for more information on Rilsan® ESY coatings.

Circle No. 325 on Reader Service Card

Acrylic Binders

A new line of formaldehyde-free and acrylonitrile-free acrylic binders for textile, nonwovens, and paper applications is being introduced through literature. These products can be blended to custom design a specific glass transition temperature and hand. Contact John Kolackovsky, Rohm Tech Inc., 83 Authority Dr., Fitchburg, MA 01420, for further details on the Rohamere FF line of acrylic binders.

Circle No. 329 on Reader Service Card

Hardness Tester

A new electronic instrument that is designed to measure and record hardness of paint and many other nonmetallic materials is the focus of a product sheet. The hardness rocker oscillates on a flat specimen and automatically starts and stops cycle count. For further details on the Gardner/Sward Hardness Tester, contact Paul N. Gardner, Sr., Paul N. Gardner Co., Inc., P.O. Box 10688, Pompano Beach, FL 33061-6688.

Circle No. 330 on Reader Service Card

Moisture Scavenger

A technical bulletin on a oxazolidine-based moisture scavenger for urethane systems has been printed. The publication presents the product's typical properties, performance properties, and applications for one-component and two-component polyurethanes as well as formulation guidelines. To receive Technical Bulletin #85 on ZOLDINE® MS-52 moisture scavenger, write ANGUS Chemical Co., 1500 E. Lake Cook Rd., Buffalo Grove, IL 60089.

Circle No. 326 on Reader Service Card

Black Oxide Conversion Coating

An illustrated data sheet focuses on the development of an improved process for black oxide conversion coating of die cast zinc components. The literature also describes other pretreatment and post treatment services including cleaning, deburring, burnishing, and sealing offered by the company. For a free copy of the data sheet, write Cleveland Black Oxide, 846 Broadway, Cleveland, OH 44115.

Circle No. 327 on Reader Service Card

Architectural Coatings and Printing Inks

A new six-page brochure describing a complete line of additives for architectural coatings and printing inks has been printed. The publication lists the products available that function as defoamers and air release agents, rheology modifiers, fungicides, dispersants and wetting agents, stabilizers, and antiblocking agents. Copies of the brochure, "Additives for Architectural Coatings and Printing Inks," are available from Henkel Corp., Coatings and Inks Div., 300 Brookside Ave., Ambler, PA 19002.

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Coming Events

FEDERATION MEETINGS

For information on FSCT meetings, contact Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422 (215) 940-0777, FAX: (215) 940-0292.

1993

(May 16-19)—Federation "Spring Week." Board of Directors Meeting on the 16th; Incoming Society Officers Meeting on the 17th; Spring Seminar on the 18th and 19th, "The Influence of Substrates and Application Methods/Techniques on Coatings Performance." South Shore Harbour Resort and Conference Center, League City (Houston), TX.

(Oct. 27-29)—71st Annual Meeting and 58th Paint Industries' Show. World Congress Center, Atlanta, GA.

1994

(May 12-15)—Federation "Spring Week." Spring Seminar on the 12th and 13th; Incoming Society Officers Meeting on the 14th; Board of Directors Meeting on the 15th. Marriott City Center Hotel, Minneapolis, MN.

(Oct. 12-14)—72nd Annual Meeting and 59th Paint Industries' Show. New Orleans Convention Center, New Orleans, LA.

1995

(Oct. 9-11)—73rd Annual Meeting and 60th Paint Industries' Show. Cervantes Convention Center, St. Louis, MO.

SPECIAL SOCIETY MEETINGS

1993

(Feb. 4)—New York Society. Joint Legislative Update and Exposition. Landmark II, East Rutherford, NJ. {Sidney J. Rubin, Empire State Varnish Co., Inc., 38 Varick St., Brooklyn, NY 11222; (718) 388-5450}.

(Feb. 6)—Houston Society. 50th Anniversary Celebration. University Club, Houston, TX. {Willy C.P. Busch, 12354 Ledger Ln., Houston, TX 77015; (713) 453-6806}.

(Feb. 24-26)—20th Annual Waterborne, Higher-Solids, and Powder Coatings Symposium. Cosponsored by the Southern Society for Coatings Technology and the University of Southern Mississippi (USM). Hyatt Regency Hotel, New Orleans, LA. {Robson F. Storey or Shelby F. Thames, Dept. of Polymer Science, USM, Southern Station Box 10076, Hattiesburg, MS 39406-0076; (601) 266-4868/4080}.

(Mar. 10)—Piedmont Society Symposium and Exhibition. "Plain and Simple: Compliance." Holiday Inn Market Square, High Point, NC. {Robert C. Matejka, Akzo Coatings Inc., 1431 Progress St., P.O. Box 2124, High Point, NC 27261; (919) 841-5111}.

(Mar. 17-19)—Southwestern Paint Convention. "Back to the Future." Dallas and Houston Societies. Four Seasons Resort and Club, Las Colinas (Irving), TX. {Steve Stephens, Ribelin Sales, Inc., P.O. Box 461673, Garland, TX 75046-1673; (214) 272-1594}.

(Mar. 23-25)—Western Coatings Societies' 21st Biennial Symposium and Show. "Visions—Opportunities—Challenges." Golden Gate, Los Angeles, Pacific Northwest, and Rocky Mountain Societies. Disneyland Hotel and Convention Center, Anaheim, CA. {Donald I. Jordan, Cargill, Inc., 2801 Lynwood Rd., Lynwood, CA 90262; (213) 537-9935; or Sandra L. Dickinson, Synergistic Performance Corp., 17821 E. 17th St., Ste. 190, Tustin, CA 92680; (714) 544-8200}.

(Apr. 13)—Pittsburgh Society Symposium. "An Environment Responsible 90s." Airport Marriott, Pittsburgh, PA. {William C. Spangenberg, Hammond Lead Products Inc., 1910 Cochran Rd., Pittsburgh, PA 15220; (412) 344-5811).

(Apr. 21-23)—Southern Society Annual Meeting. "Waterborne Coatings—Riding the Wave to the Future." Opryland Hotel, Nashville, TN. {Mary Finnigan, McCullough & Benton, Inc., 2900 G Carolina Center, Charlotte, NC 28208; (704) 392-2101}.

(Apr. 29-May 1)—Pacific Northwest Society Symposium. Red Lion Hotel, Bellevue, WA. {Richard C. Tomczak, Van Waters & Rogers, Inc., 8201 S. 212th, Kent, WA 98032; (206) 872-5097}.

(May)—Philadelphia Society Seminar. "Waterborne Coatings Formulations." Airport Hilton, Philadelphia, PA. {Peter C. Kuzma, V.I.P. Products Corp., 3805 Frankford Ave., Philadelphia, PA 19124; (215) 535-3025}.

(May 25-26)—New England Society. Tech Expo '93. Sheraton Tara, Danvers, MA. {Joanne Monique, Ashland Chemical, Inc., 400 Main St., Tewksbury, MA 01876; (800) 962-5388}.

(June 4-5)—Joint Meeting of the Kansas City and St. Louis Societies. Holiday Inn, Lake of the Ozarks, MO.

(June 14)—Golden Gate Society. Manufacturing Committee Seminar.

OTHER ORGANIZATIONS

1993

(Jan. 16-20)—Roof Coatings Manufacturers Association (RCMA) Annual Conference & Expo '93. The Ocean Grand Hotel, Palm Beach, FL. (RCMA, 6000 Executive Blvd., Suite 201, Rockville, MD 20852-3803).

(Jan. 19-20)—"Accelerated and Outdoor Durability Testing." Symposium sponsored by ASTM Committee G-3 and Subcommittee D01.27. Ft. Lauderdale, FL. (Warren D. Ketola, 3M Co., Bldg. 553-A, 3M Center, St. Paul, MN 55144, or Douglas Grossman, The Q-Panel Co., 26200 First St., Cleveland, OH 44145).

(Jan. 20-22)—Pretreat '93 Conference. Sponsored by *Products Finishing*. Orlando Marriott, Orlando, FL. (Cindy Goodridge, Gardner Management Services, 6600 Clough Pike, Cincinnati, OH 45244).

(Feb. 2-4)—"Fundamentals of Corrosion and Its Control." Training course sponsored by LaQue Center for Corrosion Technology. Holiday Inn, Wrightsville Beach, VA. (LaQue Center for Corrosion Technology, Inc., P.O. Box 656, Wrightsville Beach, NC 28480).

(Feb. 4-6)—Surfaces '93. Sponsored by the Western Floor Covering Association (WFCA). Sands Expo & Convention Center, Las Vegas, NV. (Louis Bell, WFCA, 1729 S. Douglass Rd., Ste. A, Anaheim, CA 92806).

(Feb. 8-10)—"Basic Coatings for Sales and Marketing Personnel." Short course sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (UMR Coatings Institute, 142 Schrenk Hall, Rolla, MO 65401).

(Feb. 21-26)—16th Annual Meeting of The Adhesion Society, Inc. Williamsburg Lodge, Colonial Williamsburg, VA. (Louis H. Sharpe, 28 Red Maple Rd., Hilton Head Island, SC 29928, or F.J. Boerio, Dept. of Materials Science and Engineering {ML 12}, University of Cincinnati, Cincinnati, OH 45221).

(Mar. 7-12)—Corrosion/93. Sponsored by the National Association of Corrosion Engineers (NACE). New Orleans, LA. (NACE, P.O. Box 218340, Houston, TX 77218-8340).

(Mar. 8-12)—"Basic Composition of Coatings." Short course sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (UMR Coatings Institute, 142 Schrenk Hall, Rolla, MO 65401).

(Mar. 15-17)—"Coating Process Fundamentals." Short course sponsored by the University of Minnesota. Antwerp, Belgium. (Jackie O'Brien, Dept. of Chemical Engineering & Materials Science, University of Minnesota, 421 Washington Ave. SE, Minneapolis, MN 55455).

(Mar. 15-19)—"Introduction to Paint Formulation." Short course sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (UMR Coatings Institute, 142 Schrenk Hall, Rolla, MO 65401).

(Mar. 16-18)—European Coatings Show '93. Exhibition and Congress. Nuremberg, Germany. (Ina Füllkrug, Vincentz Verlag, Schiffgraben 41-43, D-3000, Hannover 1, Germany).

(Mar. 20-21)—Eastern Decorating Products Show. Sponsored by the National Decorating Products Association (NDPA). World Trade Center, Boston, MA. (Teri Flotron, NDPA, Marketing Communications Director, 1050 N. Lindbergh Blvd., St. Louis, MO 63132-2994).

(Mar. 22-26)—Davos Recycle '93 Forum and Exhibition. Sponsored by Maack Business Services. Davos, Switzerland. (Maack Business Services, Moosacherstr. 14, CH-8804, AU/Zürich, Switzerland).

(Mar. 23-25)—International Symposium on Advanced Infrared Spectroscopy (AIRS). Sponsored by The Spectroscopic Society of Japan. Sanjo Conference Hall, The University of Tokyo, Tokyo, Japan. (Hirokazu Toriumi, AIRS Organizing Committee, Dept. of Chemistry, College of Arts and Sciences, The University of Tokyo, Komaba, Meguro, Tokyo 153, Japan).

(Mar. 27-31)—American Chemical Society (ACS) Spring Seminar on "Raw Materials." Pittsburgh, PA. (ACS, 1627 K St., N.W., Suite 1000, Washington, D.C. 20006).

(Apr. 12-16)—Spring Meeting of the Materials Research Society. San Francisco Marriott Hotel, San Francisco, CA. (Materials Research Society, Meetings Dept., 9800 McKnight Rd., Pittsburgh, PA 15237).

(Apr. 13-15)—Surface Coating '93 Exhibition. Sponsored by Chemical Coaters Association International (CCAI). Grand Center Convention Facility and Amway Grand Hotel, Grand Rapids, MI. (CCAI, P.O. Box 54316, Cincinnati, OH 45254).

(Apr. 18-21)—Inter-Society Colour Council (ISCC) Annual Meeting and Symposium. Doubletree Hotel, Newport, RI. (Romesh Kumar, Program Chairman, 1993 ISCC Annual Meeting, Hoechst Celanese Corp., 500 Washington St., Coventry, RI 02816).

(Apr. 18-23)—"Durability of Coatings." Symposium sponsored by American Chemical Society, Division of Polymeric Materials: Science Engineering, Denver, CO. (Jonathan W. Martin, NIST, Bldg. 226, Rm. B348, Gaithersburg, MD 20879; David Bauer, Ford Motor Co., SRL-E3198, P.O. Box 2053, Dearborn, MI 48121; F. Louis Floyd, Glidden Research Ctr., 16651 Sprague Rd., Strongsville, OH 44136).

(Apr. 20-21)—"Color Pigments, Regulations, and the Environment." Symposium cosponsored by the Dry Color Manufacturers' Association (DCMA) and the Inter-Society Color Council. Newport, RI. (DCMA, P.O. Box 20839, Alexandria, VA 22320-1839).

(Apr. 20-22)—Surface Treatment '93. "Computer Methods and Experimental Measurements for Surface Treatment Effects." International Conference sponsored by Wessex Institute of Technology. Novotel, Southampton, United Kingdom. (Sue Owen, Conference Secretariat, Wessex Institute of Technology, Ashurst, Southampton, Hants, United Kingdom So4 2AA).

(Apr. 26-30)—"Applied Rheology for Industrial Chemists." Short course sponsored by Kent State University (KSU), Kent, OH. (Carl J. Knauss, Director, Cooperative & Continuing Education—Chemistry, KSU, P.O. Box 5190, Kent, OH 44242-0001).

(Apr. 27-30)—Architectural Spray Coaters Association (ASCA) 8th Annual Conference. Sheraton San Marcus Resort & Conference Center, Chandler, AZ. (ASCA, 230 W. Wells St., Ste. 311, Milwaukee, WI 53203).

(May 2-6)—RadTech Europe '93. Third Annual RadTech conference. Sponsored by RadTech Europe. Italian vessel T/S Eugenio Costa. (RadTech Europe, Business Office, Pérolles 24, CH-1700 Fribourg, Switzerland).

(May 3-7)—11th Annual Atlas School of Natural and Accelerated Weathering. Sponsored by Atlas Electric Devices Co. Miami, FL. (Margaret MacBeth, Atlas Electric Devices Co., 4114 N. Ravenswood Ave., Chicago, IL 60614).

(May 4-6)—Hazardous Materials and Environmental Management Conference and Exhibition (HazMat West/Spring). Sponsored by Tower Conference Management Company. Long Beach Convention Center, Long Beach, CA. (Tower Conference Management Co., 800 Roosevelt Rd., Bldg. E—Ste. 408, Glen Ellyn, IL 60137-5835).

(May 4-6)—Plasticoat '93 Conference and Exhibition. Sponsored by *Products Finishing*. Drawbridge Estate & Convention Center, Ft. Mitchell, KY (Greater Cincinnati, OH area). (Cindy Goodridge, Gardner Management Services, 6600 Clough Pike, Cincinnati, OH 45244).

(May 4-6)—"Continuous Steel Strip Plating" Symposium. Sponsored by American Electroplaters and Surface Finishers Society (AESF). Ritz-Carlton Dearborn, Dearborn, MI. (AESF, Central Florida Research Park, 12644 Research Pkwy., Orlando, FL 32826-3298).

(May 4-6)—"Fundamentals of Corrosion and Its Control." Training course sponsored by LaQue Center for Corrosion Technology. Holiday Inn, Wrightsville Beach, NC. (LaQue Center for Corrosion Technology, Inc., P.O. Box 656, Wrightsville Beach, NC 28480).

(May 10-14)—"Dispersion of Pigments and Resins in Fluid Media." Short course sponsored by Kent State University (KSU), Kent, OH. (Carl J. Knauss, Director, Cooperative & Continuing Education—Chemistry, KSU, P.O. Box 5190, Kent, OH 44242-0001).

(May 17-19)—Styrenics '93. Sponsored by Maack Business Services. Zürich Hotel International, Zürich, Switzerland. (Maack Business Services, Moosacherstr. 14, 8804 Au/Zürich, Switzerland).

(May 17-21)—"Introduction to Paint Formulation." Short course sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (UMR Coatings Institute, 142 Schrenk Hall, Rolla, MO 65401).

(May 17-22)—"Interpretations of IR and Raman Spectroscopy." Course sponsored by Fisk Infrared Institute. Vanderbilt University, Nashville, TN. (Fisk Infrared Institute, P.O. Box 265, French Village, MO 63036).

(May 24-28)—"Adhesion Principles and Practice for Coatings and Polymer Scientists." Short course sponsored by Kent State University (KSU), Kent, OH. (Carl J. Knauss, Director, Cooperative & Continuing Education—Chemistry, KSU, P.O. Box 5190, Kent, OH 44242-0001).

Advertisers Index

NOTE: The Advertisers' index is published for the convenience of our readers and as an additional service to our advertisers. The publisher assumes no liability for errors or omissions.

'Humbug' from Hillman

Some 50 years ago, Bennett Cerf told this one: "The teacher was determined to increase the vocabulary of her graduating class. "Now, boys," she said, "you've all heard about the great Prince Machiavelli. Can anybody use his name in a sentence?"

Little Willie's hand was up in a flash. "My father," he declared proudly, "can Machiavelli good pair of pants for $10."

The class had scarcely recovered from that blow when the teacher asked for a sentence containing the word "meretricious." Willie—in fact we might almost call him "irrepressible Willie"—was right back on his feet with, "I wish you a Meretricious and a Happy New Year."

It's too late to wish my loyal readers a "Meretricious" but it's not quite too late to wish for all of you "A Joyous and Healthy 1993!"

And, while we're quoting Bennett Cerf, here's another from him which might be appropriate for the recent New Year's Eve.

The patrolman strolled up to a drunk who was leaning against a four-story building and remarked to him pleasantly, "And what is it you think you're doing there, my friend?"

"Holding up thish building," painfully pronounced the drunk solemnly.

"Oh, is that it," laughed the cop, "Well, I think you had better come with me, where it's safe and let the building fall down."

The drunk went with the cop and the building fell down.

—Bennett Cerf, Laughing Stock 1945

My old friend and former associate, Julius Nemeth, impressed by Saul Spindel's contribution, "Lawyer's Clean Up" in the September column, came up with a couple of more jibes at Dan Quayle's second favorite target.

—Someone once said that if it wasn't for lawyers, we wouldn't need any.

—A recent *Good Housekeeping* cartoon showed a law professor exhorting his students with, "Remember, you win some and you lose some, but you get paid for all of them."

My long friendship with Frank Borrelle obligates me to publish the following, which he plucked from that fine publication, *Surface Coatings Australia*. I admit that it isn't funny and it's not even humbug but maybe it will influence someone to adopt a new lifestyle and become a happy loser. What one will do for a friend!

A Winner Says:	**A Loser Says:**
Let us look into that.	No one knows anything about it.
I was lucky.	I was unlucky.
Yes, I will. No, I will not.	Yeah...well...maybe...but...
I'll make time to do it.	How do you expect me to find time.
Let's get to the point.	Well, it's hard to say exactly.
I'm sorry. I've not made myself clear.	You misunderstand me.
I made a mistake. I'll correct it.	It wasn't my fault.
We seem to have differing opinions on this matter.	I'm entitled to my opinion, aren't I.
I'm OK, but I can be better.	I'm not as bad as many others.
Tell me	As I have often said.
Now Smith is a man I could learn something from.	Smith thinks he knows it all.
What happens in Department A is my business too.	I don't work in Department A.
There must be a better way.	This is how we've always done it.

Well, on the other hand, there were lots of winners and losers in November.

An anonymous but considerate friend sent us a copy of Rotary's *Stripped Gears*, from which we chose:

—If you can't pay your bill at a sidewalk cafe, do they throw you inside?

—If ignorance is bliss, why aren't more folks happy?

—They say nothing is impossible, but how do you get off a mailing list?

—Most people don't like to repeat gossip, but what else can you do with it?

—Why is the third driver in line always the first to see the light change?

—Walter C. Rybolt

It appears that Chris Johnson of the Philadelphia Society was so affected by some of the recent columns that he couldn't resist contributing this:

A marine biologist had developed a formula to keep aquatic animals alive forever. The key ingredient to this was the fresh dropping of a myna bird. One day while rushing with the bird to give the lab porpoise his dose, the scientist stepped over a sea lion that had fallen in the doorway. The man was apprehended later that day by police for CROSSING A STAID LION WITH A MYNA FOR AN IMMORTAL PORPOISE.

IS THERE ANY WAY TO STOP ALL THIS? HELP!!!!!!

Stuart Lipskin found this retrospective of 1912 in the pages of the *Ambler Whitemarsh Valley News* (WHAAT?)—"Skim-milk paint has recently been going the rounds of the agricultural press. Skim-milk will make a fairly good paint or wash, but whole-milk paint is much better since the grease in the milk is what sets the paint."

As Humbug's faithful are aware, I have long been dedicated to lessening the scientific value of this fine Journal. I confess that my campaign has been less than successful but there is reason to hope. With the election of the highly respected Colin Penny to the Presidency of the Federation, we will be led by a past contributor to this column. Obviously, although he has been tainted by association with Humbug, the rank and file has seen fit to elect him to our highest office. . . . . a tribute to them as well as to Colin.

—Herb Hillman
Humbug's Nest
P.O. Box 135
Whitingham, VT 05361

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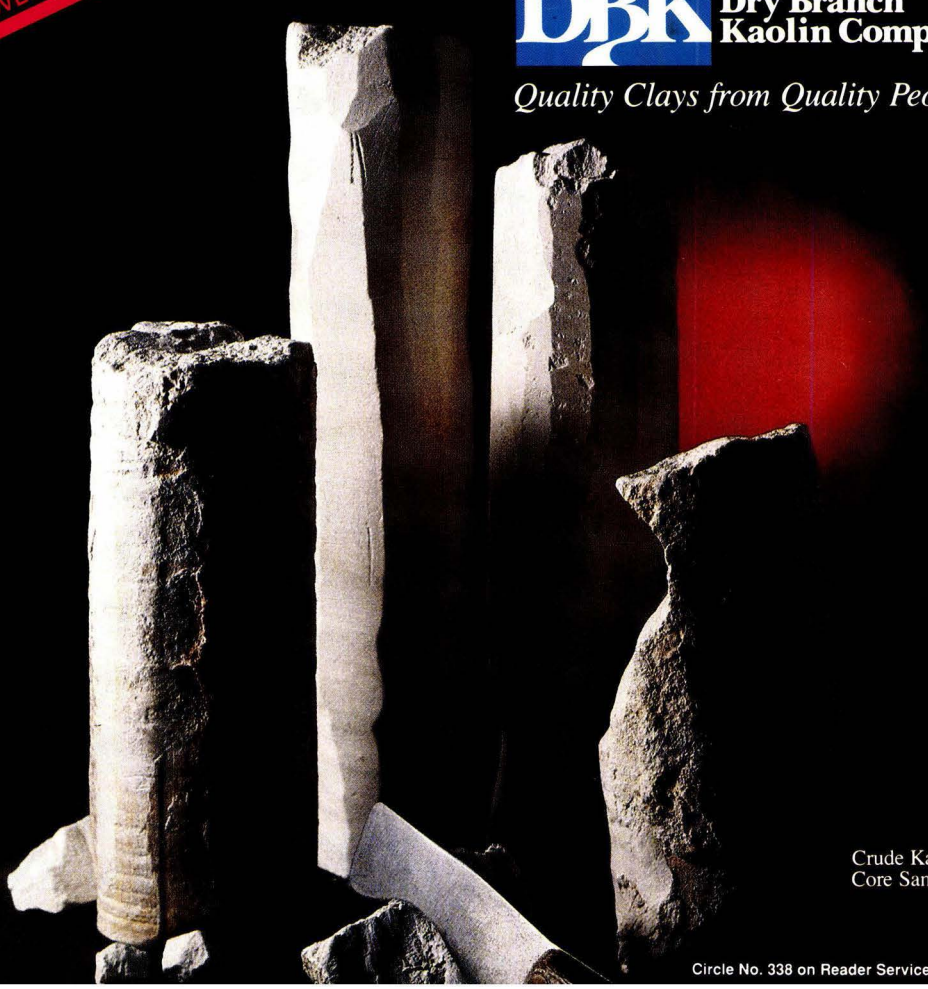

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