

Encouraging news for vinyl industry comes from VI testing at Southwest Research Institute.

- Hydrogen chloride is actually less of a hazard than other fire gases.
- Animals exposed to 5,000 parts per million of hydrogen chloride do not suffer from long term effects.

These are two of the encouraging preliminary results from studies undertaken by the Vinyl Institute last year. The studies, in progress at the Southwest Research Institute in San Antonio, TX, involve two areas of concern: fire safety and toxicity in fire situations. The two areas of testing are separate, but the Vinyl Institute believes that together the results of these tests will help put current inaccuracies concerning PVC products in a more realistic perspective. Both the medical and the fire safety research at Southwest Research Institute are providing valuable data for use in developing fire safety measures and in promoting PVC as a safe and diversified product for building materials and furnishings.

The VI's fire safety research at Southwest has focused on the hydrogen chloride (HCl) decay process in the changing environment of a fire situation. Our tests on HCl test day are designed to quantify the qualitative observation that HCl concentration doesn't remain constant in the fire environment, explains Dr. William Carroll, Director of Technology for PVC Resins and Compounds at Occidental Chemical Corporation. Dr. Carroll heads the Vinyl Institute's Technical Subcommittee on Fire Safety Research.

The VI research is being coordinated with the National Bureau of Standards (NBS) to provide them with data for their hazard assessment model. This complex and progressive model will compile data to produce a computer simulation of a fire situation utilizing information specifying the geometry of the room, the room's furnishings, construction and furnishing materials, rate of flame spread, toxicity, and other factors. The model will simulate the fire's progress and the types of gases it will generate.

The NBS hazard assessment model will provide assistance in fire lighting and prevention, building design and product testing. "An architect could use the model in designing a building," Carroll explains, "changing the geometry of the layout to test

smoke patterns, fire spread and more." The model will also serve as a valuable tool for product development and testing, comparing products and simulating their performance in a fire.

For fire lighters, the hazard assessment model will operate as a kind of crystal ball, indicating which areas of a building are at risk and, with the appropriate input, the rate and course in which the fire will progress. "If you have a fire of a certain size in a certain part of a building," Carroll asked, "what is the hazard to the occupants of the rest of the building?"

The Vinyl Institute is also encouraged by the medical research in progress at Southwest Research Institute which is disproving previously accepted HCl hazard levels. The research involves a series of combustion toxicity tests, exposing balloons and rodents to varying levels of HCl. These pure gas experiments will be followed by tests involving exposure to HCl generated in a fire environment.

For these tests, they are trying to generate stable concentrations of HCl which is contrary to its normal behavior," Carroll said. The studies are attempting to test animal exposure to a specific concentration of HCl, judging the effect at that given level.

(Continued on page 12)



Arthur Grand, fire researcher at Southwest Research Institute monitors HCl concentrations using a continuous analyzer. The process is still in the development stage at Southwest.

He is assisted by Greg Smith, BFGoodrich scientist, and Jessa Betzel, Manager of Fire Performance Testing for Southwest Research Institute.

Viewpoint

The case for plastic conduit vs. steel conduit in construction

by H.F. van der Voort

A considerable amount of publicity has appeared attacking the use of plastic materials in construction. As a part of this general assault, there is either a direct or implied allegation that plastic raceways included in the National Electric Code are dangerous and are not suitable replacements for steel conduit.

This publicity hides a carefully disguised commercial promotion. Plastic conduit is, and has been, replacing metallic conduit materials in construction since it was first introduced in the National Electrical Code (Article 347) in 1962. For reasons of lower costs, its non-corrosive qualities and superior physical properties, more PVC conduit than steel is used in construction today.

A documentary compiled by Carlton Electrical Sciences, Inc. examines a number of tests to determine the case for plastic conduit versus steel conduit. The tests were conducted by experts such as combustion toxicologists, third party certifying organizations and testing laboratories. Each steel allegation regarding PVC has been addressed by a recognized authority and proven to be false. Following are a few examples of the tests conducted involving electrical non-metallic tubing (ENT).

The International Association of Fire Chiefs, the Marriott Corporation and the San Francisco Fire Department, together conducted a test titled "Operation San Francisco Smoke/Sprinkler Test" in October 1983.

Operation San Francisco was designed to evaluate the performance of certain developments in automatic fire detection, alarm and protection systems under actual fire conditions. Test burns were conducted in various room configurations and ENT was used for room and hallway circuit lighting.

It was concluded from these tests that electrical nonmetallic tubing electrical systems, operated officially throughout a three day series of large scale fire tests, even when the rooms went to flashover.

Factory Mutual Research of Norwood, Massachusetts conducted a test titled "Electrical Failure of Wires Inside Plastic Conduit Under Simulated Fire Conditions" in October 1984.

Under each test condition, the nonmetallic raceway provided circuit integrity from 4 to 6 times longer than that of metallic conduits. Factory Mutual concluded PVC raceways provide an extra margin of safety in a fire situation because electrical circuits will continue to function much longer when protected by PVC conduit than by metallic raceways.

The smoke toxicity issue was addressed by S.C. Packham, Ph.D. ABT of BETR Sciences Inc. and M.B. Crawford, P.E. of Crawford Consulting, Inc. in "An Evaluation of Smoke Toxicity and Toxic Hazard of Electrical Nonmetallic Tubing Combustion Products," appearing in the *Journal of Fire Sciences* in January/February, 1984.

Packham and Crawford conclude that even when large amounts of electrical nonmetallic tubing are exposed to fire conditions severe enough to cause product destruction, the raceway material does not release lethal concentrations of HCl.

In examining the case for plastic conduit versus steel conduit, not only is plastic conduit superior in most applications, but serious problems involving steel conduit come to light.

It is important to recognize the attack by the iron and steel industry for what it is - an effort to protect a vested commercial interest without regard to the real issues of safety and economy.

Update: PVC building products

Since Mr. van der Voort's Viewpoint piece was written, there have been a number of developments relating to PVC building products in general and electrical non-metallic tubing (ENT) in particular.

At the December 12, 1985, hearing in Rochester, N.Y. on the New York State-proposed combustion toxicity regulation, Jack Snell, Director of the Center for Fire Research, National Bureau of Standards (NBS-CFR), invited the State to consider an alternative to its proposed regulation, which is based solely on the matter of toxicity. Snell suggested joining in support of the National Response to Public Concerns About Smoke Toxicity. The "National Response" is a cooperative effort of the US Fire Administration, NBS-CFR, and the National Fire Protection Association (NFPA).

The "National Response" alternative to the state's regulation includes:

- (1) development of a national "screen test" for toxicity with a "cut off level" below which additional information should be generated;

- (2) creation of a national data base and procedures for smoke toxicity and fire hazard assessment;
- (3) a study of the cause of death and injury, both acute and chronic; and
- (4) a national information/education campaign about smoke toxicity hazards of fire including information on prevention, detection and suppression.

At the January 29/30 Toxicity Advisory Committee (of the NFPA), Snell reported that three of the four aspects of the "National Response" plan are underway.

In a related matter, the NFPA Toxicity Advisory Committee, in coordination with recommendations for the 1987 National Electrical Code, reaffirmed their earlier recommendation removing the three story limit for the use of Electrical Non-metallic Tubing (found in Article 331). After a review of the evidence presented, the committee felt there was no valid technical reason for the three-story limitation. It is hoped this action will lead to the elimination of this restriction in the 1987 National Electrical Code.

About Very Important people ...

Dr. Bart A. DiLiddo, who has served as Chairman of the Executive Board of the Vinyl Institute since its organization in late 1982, retired from BFGoodrich Co. on April 1. DiLiddo was honored at a dinner reception on March 4 in Washington, D.C., prior to the Executive Board meeting held the following day. Succeeding Dr. DiLiddo as Vinyl Institute Chairman is Steven W. Schaefer, Senior Vice President of Occidental Chemical Corp.'s Polymers and Plastics operations.

Robert C. Sander, Treasurer of the Vinyl Institute Executive Board, has been promoted to Vice President and General Manager of the Manufacturing Division at Air Products and Chemicals' PVC business, now part of its Industrial Chemicals Division, is managed by Fred Fisher, Business Manager and Vic Bonanni, Assistant General Manager.

At the March 5 meeting of the Executive Board, a nominating commit-

tee proposed the following new officers to succeed Schaefer and Sander: H. Richard "Rick" Flammer of Vista Polymers as Vice Chairman and Fred Timper of CertainTeed Corp. as Treasurer. These nominees were unanimously approved by the Executive Board and assumed their offices that day.

David H. Hall, President of BFGoodrich's Geom-Vinyl Division, is the new Goodrich representative on the Executive Board.



DiLiddo

Schaefer

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Occidental to acquire Tenneco PVC business

Occidental Petroleum Corporation and Tenneco Inc. jointly announced in late December that their chemical subsidiaries, Occidental Chemical Corporation and Tenneco Polymers Inc., have signed a letter of intent under which OxyChem would acquire the polyvinyl chloride business of Tenneco. Both companies are members of the Vinyl Institute.

Tenneco's current PVC resin capacity is approximately 700 million pounds per year. This acquisition will bring Occidental's PVC resin capacity to about 1.35 billion pounds per year, making the company the second largest U.S. producer of the material. BFGoodrich is the largest producer of PVC, with a reported 1.60 billion pound annual capacity.

Tenneco produces PVC at plants in Burlington, New Jersey and Pasadena, Texas. Occidental

Chemical also produces PVC in Burlington, with other plants in Pottstown, Pennsylvania (PVC headquarters), Addis, Louisiana, and Salisbury, Maryland.

"This investment will greatly enhance Occidental's position in the PVC business and represents another step in our program to strengthen and build our chemicals business," said Dr. Armand Hammer, Chairman and Chief Executive Officer of Occidental Petroleum. Dr. Hammer expected a final agreement to be reached during the first quarter of 1986, subject to review by the appropriate governmental agencies and approval of both companies' boards of directors.

Steven W. Schaefer, new Chairman of the Vinyl Institute's Executive Board, is Senior Vice President of Occidental's PVC operations.

Encouraging news ...

abstract from page 2

Preliminary results from testing indicate that animals exposed to 5,000 parts per million of HCl do not suffer any long term effects, based on lung function tests. This dosage level is actually higher than that normally found in a fire situation. Testing at lower and higher levels has not been completed, but evidence suggests that the hazardous nature of HCl has been overestimated.

Traditionally, lethal levels of HCl were thought to be as low as 1,000 to 2,000 parts per million and by some even as low as 200 to 500 parts per million. Unfortunately, these published levels were never tested properly but were accepted as truth," Jiroli said.

As the testing continues at Southwest Research Institute, data on both areas of study are encouraging to all in the vinyl industry. Although the studies are separate in purpose, both the fire research testing and the combustion toxicity testing should help the Vinyl Institute prove that the hazard of HCl has been grossly overestimated in the past through traditional beliefs and is not as acute toxicity tests.

in brief

✓ Vinyl Institute Executive Director Roy Gottesman has responded to accusations linking firefighters' rise in cancer to the use of plastics in construction. Gottesman's letter to the editor appeared recently in the *Cleveland Plain Dealer*, the *Chicago Sun Times* and the *New York Journal of Commerce*. Copies are available from the Vinyl Institute at the address below.

✓ The offices of the Vinyl Institute relocated on January 20th to Wayne, New Jersey. Our new address and phone number is:

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✓ The Annual Meeting of the Vinyl Institute is scheduled for May 27 and 28 in Washington, D.C. Further information regarding the meeting will be provided shortly.

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The Advisory's published quarterly by the Communications Committee of The Vinyl Institute to serve as a forum for discussion of key issues affecting the vinyl industry today.

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advisory

FDA issues proposal on PVC packaging

Following over 10 years of efforts by the plastics industry to demonstrate the safety of polyvinyl chloride (PVC), the Food and Drug Administration proposed a ruling on February 3 to allow the use of PVC in food contact articles such as bottles and packaging. The proposed ruling came after a 1975 proposal strictly limiting the use of PVC in food packaging was determined to be outdated and was withdrawn.

The FDA proposal amends 16 existing food additive regulations and establishes two new regulations. In reworking the 1975 proposed rule, the FDA is proposing to "provide for the safe use of certain vinyl chloride polymers by establishing limits on the amount of residual vinyl chloride monomer they may contain," according to the Federal Register. It further proposes to "codify all known prior sanctions for vinyl chloride polymers and to 'provide for the use of certain previously unregulated vinyl chloride polymers in manufacturing vinyl chloride bottles.' Finally, the FDA proposes to 'delete vinyl chloride vinylidene chloride copolymers from the list of materials that may be used as coatings on fresh citrus fruits.'"

Scientific and legal developments since the 1975 proposed ruling have been credited in FDA's turnaround. In the 1975 ruling, some uses of vinyl chloride polymers (homo and copolymers), including uses in semirigid and rigid food contact articles, were prohibited. The FDA cites "vastly improved production technology which has made it possible for manufacturers to reduce the level of residual vinyl chloride monomer in vinyl chloride polymer by a factor of nearly one million." The agency also cited advances in scientific technology which allows them to determine the safety level of additives that may contain carcinogenic impurities, ensuring safer products for packaging.

The FDA is proposing a 5 part per billion (ppb) limit on residual vinyl chloride monomer (RVCM) for plasticized films and coatings, while vinyl chloride vinylidene chloride would be subject to a 50 ppb RVCM limitation. The proposal limits pipe used to carry water inside a food processing plant to a 50 ppb RVCM level.

The new regulations include section 177.1975 which sets a 10 ppb limit for rigid and semi-rigid PVC food contact articles, while section 181.37 recognizes the prior sanctioned status of both homopolymer and copolymer PVC resins used as films, coatings, water pipe, flexible tubing, gaskets, bottle or jar liners, and rigid sheet.

The February 3 proposal represents a major step forward for the plastics industry in efforts to extend the food packaging market to include PVC products. The proposal extends PVC packaging opportunities to a full range of food contact articles, including a possible market in liquor bottles.

The FDA has requested comments on the proposed ruling due April 4, 1986, to assist in their reaching a final ruling. In order to respond to the FDA's request, the Vinyl Institute has solicited comments from its member companies. VI is working with its legal counsel, Jerome Heckman of Keller and Heckman, to develop a unified industry response from the Society of the Plastics Industry.



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