CHEMISTRY

Linda Garmon reports from Gaithersburg, Md., at the Second International Conference on the Durability of Building Materials and Components

The paint pullers

The single most important property of a protective coating is its ability to hang onto the surface it guards. "Without adhesion, a coating is nothing more than a piece of free-standing plastic film and has no protective functions," explain Henry R. Bleile of the David W. Taylor Naval Ship R&D Center in Annapolis, Md., and Stephen D. Rodgers of the Naval Sea Systems Command in Arlington, Va. But adhesion is a difficult property to measure; indeed, it seems that all existing tests "suffer from a lack of quantifiable, precise correlation between laboratory and field tests," Bleile and Rodgers report.

In their on-going search for a suitable adhesion tester, these researchers recently evaluated the performance of the commercially available, portable Elcometer Adhesion Tester Model 106. This tester includes an aluminum dolly that is glued to a sample paint surface. The dolly is pulled, and the recorded pounds-per-square-inch pressure needed to tear the paint from its surface is that coating's tensile adhesive strength.

In their evaluation of this paint puller's performance, Bleile and Rodgers found that it suffers from an infliction common to most instruments of measure — failure to give absolute units. In other words, the pressure units recorded by the Elcometer do not correspond precisely to the "true" pressures being applied. To correct for this discrepancy, Bleile and Rodgers plotted actual pressure versus the Elcometer's indicated pressure and generated a linear calibration curve. Such a curve can be used to convert the adhesion tester's indicated units into absolute units.

Meanwhile, James Seiler and colleagues of the National Bureau of Standards are developing a new adhesion tester that, unlike its relatives, could be used on curved, as well as flat, painted surfaces. Moreover, unlike the Elcometer, whose pressure is supplied mechanically with springs and knobs, this NBS tester would use pneumatic (compressed air) force to lift paint samples. Because the pneumatic approach provides a smoother lift, its reading might prove to be more accurate than those of the Elcometer Adhesion Tester.

Glass fracture: Shattering results

Glass is actually quite strong — that is, in its unflawed state. "Laboratory prepared, flaw-free glass fibers have achieved breaking strengths on the order of one million pounds per square inch," reports Thomas A. Schwartz of Simpson Gumpertz & Heger Inc., in Cambridge, Mass. "However," he says, "the strength of glass is severely diminished by surface flaws introduced by normal handling and abrasion, reducing the actual in-service strength of glass to less than one percent of the virgin fiber strength."

Schwartz and colleagues have taken a close look at these glass-weakening flaws in an effort to collect data that designers eventually can use to increase the service reliability of window glass. Testing the tensile strength of flawed glass, the researchers found, for example, that certain flaws now considered acceptable by glass manufacturers weaken the glass as much as other types of defects considered unacceptable.

The "acceptable" flaws form when glass is cut into units by first scoring and then bending it across the score line to break it. Certain resultant edges form thin, slanted cracks called "shark teeth." These flaws "are common in architectural glass and are considered acceptable by most glass manufacturers, if the depth of penetration of the shark teeth is limited to one-half the thickness of the plate," says Schwartz. But, he says, "our data show that this criterion is inappropriate and that shark teeth constitute significant weakening defects." Schwartz advises installers to reject glass edges containing shark teeth — especially when the units are intended for areas that receive direct sunlight.

SCIENCE & SOCIETY

Manhunt for nuclear test survivors

The National Association of Atomic Veterans (NAAV) is conducting a search to identify an estimated 250,000 former servicemen who participated in any of the 183 atmospheric nuclear-weapons tests conducted by the U. S. government between 1945 and 1963. During and following many of these tests, military troops were brought in for field exercises — essentially to prove to the troops that they could survive a nuclear blast and still go on to conduct war maneuvers near the blast site. In the past three years, roughly a dozen survivors of these maneuvers have petitioned the Veterans Administration (VA) and won compensation for illnesses — mostly cancers — believed to have resulted from their involvement in these tests. Among them was the late Orville Kelly, NAAV's founder and a participant in 22 above-ground tests.

Several recent scientific studies, most notably one by the Centers for Disease Control (SN: 10/11/81, p. 228), have confirmed an apparent excess of cancers among weapons-tests survivors. But unless nearly the entire exposed population is identified and surveyed, the "apparent" excess cannot be proved. And claiming privacy protection, the Defense Department has refused to publicly identify which veterans participated in the tests, even though it has been estimated that 900 or more may have been over-exposed (SN: 2/11/78, p. 92).

According to Lewis Milford, the National Veterans Law Center in Washington is considering filing suit against the Defense Nuclear Agency to wrest those names from its files. Until such names are received, NAAV will attempt to fill the gap by:

- seeking out "atomic veterans" in regional campaigns,
- advising them of possible health hazards that have been associated with exposure to ionizing radiation,
- encouraging those with illnesses to file claims for compensation from the VA and
- assisting with the processing of such claims.

. . . but not veterans of Japanese blasts

Any "scientifically valid" attempt to study a possible link between cancer and the radiation exposure of U. S. servicemen who entered Nagasaki and Hiroshima at the close of the war with Japan was discounted as "impractical" by a panel of the National Academy of Sciences. More feasible, "albeit costly," it said, would be studying the cause of death for those veterans.

It is unlikely individual doses exceeded 1 rad for any of the men, the panel says, and that most likely the doses received were only a tenth of that or less (a whole-body dose at a level roughly equivalent to that delivered to the chest in one or two routine diagnostic chest X-rays). As a result, the panel stresses that "no study of this population could detect effects that would be predictable from existing knowledge of health hazards associated with radiation exposure, because the expected number of radiation-induced cancers would be very small relative to the number of spontaneous tumors" that could be expected to occur naturally in a random grouping of Americans this size.

A study should be considered, the panel says, only if: "it were thought desirable to attempt to demonstrate the absence of an increase in the risk" of radiation-related cancers; it were felt other of the veterans' experiences were being erroneously attributed to radiation; the effect of a given dose of radiation were revised upward; or there was serious reason to believe the dose estimates recorded at the time were inaccurately low. Interestingly, shortly after a May workshop was held to take in data for this report, preliminary results of several government studies were reported suggesting that there might indeed have been errors in the originally reported doses of neutron radiation (SN: 5/30/81, p. 343).