

Getting the lead out

A new Environmental Protection Agency (EPA) regulation will require water suppliers to notify customers about any amount of lead in their water, and to provide details about lead's health effects. Previously, suppliers had to notify customers only if the amount of lead in supplied water was greater than the current federal standard of 50 parts per billion (ppb).

The new regulation, promulgated earlier this month and effective as of June 1988, reflects a growing recognition that lead is neurotoxic at even the smallest concentrations (SN: 6/13/87, p.374). According to Joseph Cotruvo, director of the criteria and standards division of EPA's office of drinking water, the rule puts the EPA in compliance with one of three major lead-related requirements of the Safe Drinking Water Act as amended by Congress in 1986. Another requirement, the banning of all lead-containing plumbing in new construction, was enacted last year.

However, controversy continues to surround the Drinking Water Act's third requirement — the setting of new federal standards for lead in drinking water. Lead was originally one of 40 contaminants for which new standards were to become effective by June 1988. Last month, though, EPA decided to drop lead from that list.

Cotruvo says that the EPA still plans to set lead standards by next summer, but some environmentalists are expressing concern that by separating lead from the package of other contaminants, new lead standards may be delayed for another year.

"Lead is probably the single most serious drinking water contaminant on that list," says Robin Whyatt, of the Natural Resources Defense Council in New York City. "Even a single year of exposure can cause significant, irreversible effects in kids — something that's not true for low-level exposures of most of the other contaminants."

Even if new standards are set by next year, the precise levels of those standards will remain controversial. As of now, according to Cotruvo, EPA is planning to lower the standard from 50 to 20 ppb. Others, including a panel of scientists participating in last month's 6th International Conference on Heavy Metals in the Environment, have recommended standards as low as 10 ppb. Such standards are feasible, they say, using water treatment methods that slow the leaching of lead from pipes and solder.

Meanwhile, the EPA's new notification regulation will require suppliers of lead-contaminated water to describe the potential sources of the lead, its health effects, ways to reduce it, what the water system is doing about it and whether the customer should seek another water supply. Last year, according to EPA estimates, approximately 42 million people were exposed to drinking water with lead concentrations of more than 20 ppb. The new regulation does not require suppliers to take any corrective action below 50 ppb.

Wetlands litigation resolved

The Army Corps of Engineers and the Environmental Protection Agency have never been the best of friends. Nevertheless, under the provisions of the 1972 Clean Water Act, they are jointly responsible for protecting the nation's remaining wetlands. Interagency conflict moved from the back room into the courtroom last year when the EPA reversed an Army Corps-approved permit that would have allowed 32 acres of Massachusetts wetlands to be developed as a shopping mall. The developer sued EPA, and the ensuing court battle was viewed by many as a test of agency authority over wetlands policy. This month, in a victory for environmentalists, a Federal judge upheld the EPA's right to overrule such permits on environmental grounds.

OCTOBER 24, 1987

The ratings game for rally sports

How would you score in a match against a top professional racquetball player? That question bothered statistician David Strauss, who is both an excellent tournament chess player and a keen racquetball competitor. As a chess player, he has a rating indicating how well he plays. That rating, determined by the U.S. Chess Federation, allows him to compare his ability with that of anyone else who plays tournament chess — from world champion to club player. It goes up or down depending on his opponent's rating and whether he wins, loses or draws the match.

Racquetball has no such system, so Strauss, a professor at the University of California at Riverside, set out to develop a racquetball rating scheme. His new system, like that used in chess, is based on the idea that the wider the gap in ability, the greater the difference in rating between two players and the lower the chance of the weaker player winning. It allows players of all strengths to be rated on the same scale. Newcomers can be assigned a rating without disrupting the rank of players already listed.

"It turns out that a system for racquetball works even better than the chess system," says Strauss, "because the actual score of a racquetball match is much more informative than the simple win/draw/loss result of a chess game." For a given score, he uses a mathematical formula to calculate how much each player's rating changes. The formula compares the match's actual score with the theoretically expected score based on the difference in the two players' ratings. A wider margin between actual and expected scores means a greater change in rating. On Strauss's arbitrarily chosen scale, a racquetball world champion would have a rating around 2700. He estimates that his own rating is about 1600.

"The difficulty here is financial," says Strauss. "Somebody has to be persuaded that it's worth collecting results and computing the ratings." Strauss has tested his scheme on published scores from major championship matches and on the results from a local tournament. An account of his system appears in *APPLIED STATISTICS* (Vol.36, No.2). His rating scheme also fits games such as squash, volleyball, badminton and table tennis — any sport in which points can be scored only by the server.

Giving bridge a statistical hand

A little bit of mathematics could help your bridge game. An Australian mathematician has come up with an alternative way to size up the strength of a 13-card hand. Typically, players look at the number and rank of high cards and at how the cards are distributed among the four suits. During the game's bidding stage, on the basis of this information, they bet on how many tricks they believe they can win.

For a long time, players have relied on a point-count system that assigns values to the ace, king, queen and jack in the ratio of 4:3:2:1. Reporting in *APPLIED STATISTICS* (Vol.36, No.1), Richard Cowan argues that a better weighting system under certain circumstances would be 5:4:3:2:1 for ace, king, queen, jack and ten. This scheme works best, says Cowan, when cards are evenly distributed among the four suits.

"The result is counterintuitive," says statistician David A. Binder of Statistics Canada in Ottawa, Ontario, who also happens to play bridge. In actual games, players usually feel that an ace and a king are really worth slightly more than the old point count would indicate and that the queen and jack are worth slightly less. Cowan's result implies the opposite. His weights may work under special circumstances, says Binder, but they probably wouldn't be useful as a general rule. Nevertheless, he says, "performance at the bridge table is the real test."

269