

suggesting a link between the falling sperm counts and a laundry list of man-made chemicals that mimic the sex hormone estrogen—PCBs, dioxin, pesticides, and others.

However, Skakkebaek admits that most of the studies he analyzed show no decline in sperm counts since 1970, around the time when synthetic-chemical use was at its peak. In his articles Skakkebaek drew a downward-sloping straight line that makes the sperm-count decline look as if it's continuing into the present, though he admitted that he found no evidence to warrant that conclusion. "We never said it was a continuous decline," he said at last year's annual meeting of the Toxicology Forum.

In February, a study in the *New*

England Journal of Medicine did report a continuing decline in sperm counts at a French sperm bank, but an accompanying editorial pointed out the study's limitations. The French report also flies in the face of two analyses in the *BMJ* and *Fertility and Sterility* that compile data from 48 of the 61 studies Skakkebaek analyzed and actually find a slight increase in sperm counts in the past twenty years.

Skakkebaek's study has come under severe criticism in the same journal that published it: last July, *BMJ* published a rebuttal and a highly skeptical editorial.

Entitled "Falling sperm quality: fact or fiction?" the editorial pointed out that Skakkebaek's study failed to control for factors such as patients' ages,

length of abstinence before examination, and the different selection methods in the studies it reviewed. The editorial also pointed out that a 1979 study that covered nearly as many men as Skakkebaek's and used more care in selection criteria found no decline in sperm counts from 1951 to 1977.

The *BMJ* rebuttal—by Peter Bromwich, the medical director of a British fertility clinic—charged that because the cutoff point for sperm-count data admitted into most studies in the 1940s was three times higher than it is today, and because Skakkebaek did not adjust for this, his comparisons are invalid. The apparent decline may reflect nothing more than a change in methodology.

An additional reason to be skeptical

Cleaning Up Superfund

BORN amid the national outcry over Love Canal, Superfund was misguided from the start. It was designed to clean up some 400 toxic-waste sites, and every state "was guaranteed at least one site on the list," writes Kent Jeffreys in his excellent policy study *Reinventing Superfund*.

What began as an environmental pork-barrel program quickly deteriorated. By changing the legal liabilities of cleaning up hazardous sites and dramatically expanding the legal and scientific notions of hazard, Superfund has raised clean-up costs astronomically. And yet it has failed to clean up more than a handful of sites. In fact, more sites have been added to the list than have been cleaned up. This is what Carol Browner, administrator of the Environmental Protection Agency, describes as "substantial progress in cleaning up hazardous-waste sites."

The problem with Superfund is best illustrated with a few statistics. There are now 1,320 Superfund sites on the National Priority List, up from 400 in 1981. The total number is expected to rise to more than 3,000. Only 51 sites had been completely cleaned up and taken off the list as of Fiscal Year 1993—roughly 5 per cent of the total.

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Furthermore, average clean-up time is now 13 years; and the time is growing, not shrinking. The problem isn't slow-moving clean-up crews. The average clean-up doesn't even begin until eight years after the site has been discovered and listed by federal authorities. The Brio site in eastern Texas is a typical case; it was added to the Superfund list in 1984 and clean-up hasn't started yet.

Meanwhile, costs are climbing. The Federal Government alone spends an average of \$30 million per site. The total cost of Superfund to the Federal Government from 1980 to 1994 was \$15.2 billion. Over the same period the private sector spent more than \$45 billion. If all 3,000 potential sites are cleaned up, combined government and private-sector cost could exceed \$150 billion.

Why is Superfund so expensive? Fully 88 per cent of the money spent goes to lawyers and consultants. Excessive legal liability, plus the intrinsically high cost of clean-up, leads governments and corporations to sue in order to spread the cost.

Behind the large price tag is a small mountain of junk science. Finally, some congressmen, led by Mike Oxley (R., Ohio), are beginning to ask the fundamental question that bureaucrats have ignored for a decade and a half: How many of the 1,320 Superfund sites are actually hazardous to public health? According to the

federal Agency for Toxic Substances and Disease Registry, only 0.9 per cent of Superfund sites are "urgent hazards," and only 19 per cent of the listed sites pose actual or potential health risks.

The other 81 per cent of sites are risky only if you accept the government's default assumptions. When there is a gap in available scientific knowledge, rather than gather that knowledge, the agencies "err on the side of safety."

Here are eight key questions for which science has yet to issue definitive answers. Alongside them are the government's default assumptions.

How do animal test results relate to humans? If a substance causes cancer in animals, it is assumed to cause cancer in humans.

Do you count benign as well as cancerous tumors in test animals? Both are counted and used to estimate the carcinogenic risk for humans.

When both positive and nonpositive cancer data exist, do you use the nonpositive data as well? If you have positive data, the nonpositive data should not be used to indicate a level of safety.

Which animal species should be used to represent humans? The animal species used is the one with the greatest demonstrated sensitivity to a particular substance. Imagine two substances, A and B. A causes tumors in rats, but not in mice. B causes tu-

is that the supposed sperm-count decline is at variance with a more direct measure of men's ability to reproduce: fertility rates. As Richard Sherins noted in a February *New England Journal of Medicine* editorial, surveys of the general population by Princeton and the National Center for Health Statistics have found that "rates of infertility have remained constant during the past three decades (at 8 to 11 per cent), and male infertility has accounted for approximately one-third of cases." Sherins, director of andrology at the Genetics & IVF Institute in Fairfax, Va., also pointed out in an interview that unlike the fertility surveys, sperm-count studies have not been representative of the general population. By relying on samples from

fertility clinics and sperm banks, these studies are biased toward men with especially low and especially high sperm counts.

Sherins said that until a carefully controlled random study is conducted, it is impossible to tell whether sperm counts are changing. "Maybe sperm concentrations are lower now," Sherins said. "It's possible, but the data aren't there to substantiate it."

To listen to some media reports about the "feminization" of men, you would not know these criticisms had ever been made. Both "Assault on the Male" and an August segment of ABC's *20/20*, each of which aired after *BMJ's* rebuttal and critical editorial, took Skakkebaek's falling-sperm-count study as an article of faith. "The

changes to human reproduction are real," an announcer concluded in "Assault on the Male." *20/20* asserted flatly that "human sperm count has gone down by half in just over forty years" without even citing a source.

In a twisted way, some in the environmental movement seem to welcome the alleged link between chemicals and male reproductive disorders. Former Representative Bella Abzug, for instance, believes that her efforts to ban certain uses of chlorine that allegedly cause breast cancer were hampered solely by the sexism of a male-dominated Congress. (Never mind that the largest study ever conducted found no correlation between breast cancer and organochlorines such as DDE and PCBs.) But now that manhood is

mors in mice, but not in rats. Which data does the government use? For A, the rat data; for B, the mouse data.

When using animal data to anticipate human health risks, how should mechanistic differences between species be taken into account? When extrapolating data from an animal species to humans, differences between the species (except for weight) are rarely taken into account.

If data show that swallowing a substance causes cancer, what does this tell us about the risks of inhaling it? If a substance causes cancer by one means, it is assumed to cause cancer by all possible means of exposure.

Below what threshold is a substance considered safe? There is assumed to be no non-zero dose which does not heighten one's risk of cancer.

If a substance causes cancer in humans at high doses, what does that tell us about low doses? Scientists simply take the high-dose data and draw a sloping line down to the smallest possible dose. Thus the risk is expected to be linear.

Rather than close the gap in scientific knowledge, the government construes the risk as broadly as possible in every instance. Exaggerated environmental risks then lead into exaggerated notions of legal liability. Here are some of the ones Superfund employs:

Joint and several liability: All parties with any tie to the site, no matter

how remote, can be sued. In an infamous Boston case, a licensed vendor charged with disposing of waste from dental offices failed to dispose properly of "tooth amalgam"; he was hoping to mine it for trace amounts of silver. Instead, a toxic-waste site emerged. The offender provided false documents to the dentists claiming that the amalgam was lawfully stored. Later, the Federal Government sued several of the dentists to recover the clean-up costs; at least one of them went into bankruptcy court instead.

Retroactive liability: If, in the 1940s, a company stored waste using the best available technology and obeyed all laws up to the present date, it can still be sued for having violated 1995 safety standards back in the 1940s.

State versus federal liability: Since firms can be sued by both state governments and the Federal Government, companies are often reluctant to settle with one level of government and admit wrongdoing; it only opens them to liability with the other level of government. Result? Long and costly lawsuits and finger pointing.

Deep pockets and ricochet lawsuits: Superfund encourages firms to sue one another and their insurance companies to recover damages. These lawsuits ricochet across the economy and ensnare parties far removed from the alleged harm committed.

Superfund will expire at the end of 1995 if Congress does not re-authorize it. Though reforming Superfund is not per se part of the Contract with America, overhauling risk regulation is. After risk-regulation reform passed the House, Mike Oxley, the new chairman of the Commerce, Trade, and Hazardous Materials subcommittee of the Commerce Committee, announced hearings on Superfund. The fact that a moderate Republican like Oxley is enthusiastic about fixing Superfund is a good sign. Some Hill staffers are beginning to ask whether toxic-waste clean-up—an inherently local activity—is really a job for the feds in the first place.

After all, the states have a better record. Typically state clean-ups are faster (taking an average of three years) and cheaper (about a quarter of the federal price tag). Former Superfund Director J. Winston Porter believes that the states have been successful where Washington has failed because they have adopted reasonable clean-up standards, minimized the risks of a liability explosion, and ranked the risks of various sites.

Washington can't do everything and shouldn't try. If the Federal Government wants to fund research to replace faulty assumptions with scientific evidence, so much the better. It is time to give genuine federalism a try.

—RICHARD MINITER