Risk, Disease, and Democracy

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Aaron Wildavsky, *But Is It True? A Citizen's Guide to Environmental Health and Safety Issues* (Oxford University Press, 1995), 574 pages, $35.

The thesis of this book is strikingly simple: The United States is botching its approach to environmental, health, and safety regulation in two ways. First, the regulatory system is ineffective. It is based on the wrong sorts of scientific tests, and the reasons underlying regulatory decisions are arbitrary. Second, the regulatory system is actually doing harm. Wildavsky believes he has proved elsewhere that the health of a nation is directly correlated with its standard of living. In other words, in general, the higher the standard of living, the lower the morbidity and the higher the health of the populace. Therefore, to the extent that environmental, health, and safety regulations diminish or limit the standard of living in America, this regulatory regime is affirmatively injuring health.

Wildavsky does not blame the government. It is doing just what it is supposed to do in a democratic order—responding to the felt needs of the populace. Wildavsky places the responsibility squarely on the shoulders of the people. People get the regulations they want and deserve. If the populace wants a responsible regulatory system, it must become informed. In a technological society, the responsibilities of citizenship include becoming informed on scientific and technical issues. Significantly, Wildavsky believes that the idea of an informed and politically active citizenry is both realistic and attractive.[1]

Most of *But Is It True?* portrays the scientific basis for environmental, health, and safety regulations. Wildavsky finds the science flawed in a number of significant respects. Another major portion of the book spells out, in simple, understandable, and attractive terms, rules that citizens might use in evaluating scientific claims. Finally, Wildavsky stringently criticizes the regulatory philosophy that has prevailed in this country since approximately the late 1950s. Preliminarily, that philoso-

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phy can be stated quite simply: *Don't permit anything that might, under some conceivable circumstances, cause a dread disease.* This philosophy has been most elaborately worked out for cancer. In summary, it is this: (1) chemicals are to be considered dangerous at any dose-level, unless scientists can prove that they are safe (i.e., do not cause cancer at any dose-level); (2) "negative experiments"—experiments that show no increased cancer in animals in conjunction with some chemical or another—prove nothing, "because the number of animals used might have been too small to reveal a slightly increased cancer risk. Thus, suspect chemicals can never be proven to have a safe dose"; (3) "[e]conomic interests should not be considered when deciding whether to ban a suspect carcinogen." Point (3), of course, forbids cost/benefit analysis.

Although Wildavsky is listed as the only author of this book, he used coauthors in many of its chapters. They were knowledgeable graduate students, young scholars, and others who researched given fields under his supervision and in dialogue with him. The goal was to determine whether sound scientific evidence supported environmental, health, and safety regulation. Uniformly, across a large number of cases, Wildavsky and his team conclude that the current regulatory regime is not justified. Their case studies include Superfund, asbestos in buildings, the cranberry scare of the late 1950s, DDT, dieldrin saccharine, PCBs, Agent Orange, other agents used in Vietnam, dioxin, alar on apples, arsenic, nitrite, acid rain, ozone depletion, and cancer clusters (such as the *Woburn* case). The Superfund case study will be discussed in more detail below.

Wildavsky is the author of approximately 40 books and several hundred articles. One of those books significantly reoriented American political science and revolutionized the way social scientists think about the budgetary processes.[2] Another focused on American political science, again by focusing on the impact of government policies and asking what effects they actually had on the polis. In recent years, Wildavsky came to believe that risk, health, and safety were worthy topics for social scientific inquiry. As a result, since the middle 1980s, he has written several significant books on risk, politics, and culture.[3] One of these specifically concerns problems of safety in nuclear power plants,[4] and one more ingenious study asks why people fear what they do.[5] Wildavsky and his coauthor argue that individuals choose what to fear in order to support their way of life. Subsequently, Wildavsky attempted to test this hypothesis empirically. Drake and Wildavsky believe they demonstrated that people of hierarchy fear social deviants; people who love individualism fear regulation; and people who are egalitarian fear technology.[6]

Wildavsky distinguishes between real science and "regulatory science." The function of regulatory science is to determine whether specified states of affairs are dangerous to human health. He is extremely critical of the procedures of regulatory science.[7] His fundamental premise is that regulatory science should (but does not) conform to the protocols of real science. His fundamental criticism of regulatory science is the use of unsupported and contradicted extrapolation. Wildavsky is particularly critical of the use of rodent studies to infer danger to humans. What happens in rodent studies is that mice (or some similar animal) are persistently given large doses of some chemical. If there is a statistical increase of some malady, then the inference is drawn that the chemical *may* cause the same malady in humans. These studies are utilized not only when there is no evidence that what causes, say, cancer in mice can also cause cancer in humans, but also when there is affirmative evidence that what causes cancer in mice will not cause cancer in humans. Wildavsky regards this as scientific insanity.

It is madness, according to Wildavsky, not only because it flies in the face of evidence, but also because it flouts a fundamental principle of toxicology: "The fundamental observation of toxicology is that the poisonous effects of chemicals depend upon the dose." Wildavsky makes this point, in various ways, over and over again. It is a germinal point worth some repetition. There are lots of other things wrong with much of regulatory science. Experiments are frequently contaminated in the sense that extraneous factors are present. If you are trying to show that Y causes Z, X had better not be present in the mix if X is also a potentially causative agent. The trouble is that it is extremely difficult in advance to determine what is and what is not a causative agent. Even aging can constitute a causative agent. For example, in cancer tests, researchers determine the presence of cancer by observations made during autopsies. According to Wildavsky, researchers pay insufficient attention to the difference between benign nodules, which may be the product of aging, and cancerous tumors.

Studies of causation must take randomness into account. Before inferring, for example, that VDTs cause abortions, it is necessary to know how many spontaneous abortions will occur in a randomly selected pregnant population. If ten abortions occur in a group of 100 women, each one of whom uses VDTs, no inference can be drawn, because one in five pregnancies ends in spontaneous abortion anyway. Thus, it is absolutely necessary to ask oneself, "What would have happened in the absence of the substance to be tested?" According to Wildavsky, this is done far too infrequently in regulatory science.

Wildavsky's indictment of regulatory science reads like a catalog of scientific malpractice. There are insufficient controls in the experiments; there is too much reliance on self-reports; there is too little skepticism about self-interested memory; there is insufficient attention to the biases and sympathies of the scientists themselves; there is hardly any attention to replication (which Wildavsky argues is *the* hallmark of experimental science); there is overreliance on single studies; peer review is frequently ignored; and so on.

Regulatory policy makers also mistreat the scientific results they do get. They tend to rely too much on scientists and not enough on the science; they are insufficiently skeptical of the studies they get; they rely too much on single studies, even when they fly in the face of a strong consensus; and they rely on the "Precautionary Principle," which says "Decide in favor of safety" or "Erring on the side of safety is no sin." According to Wildavsky, the Precautionary Principle involves two big problems. First, its use is generally predicated upon huge and arbitrarily established safety margins. Second, the Precautionary Principle has profound economic consequences. It rules out the use of economically valuable chemicals, such as DDT, and mandates entirely unnecessary cleanups, which are both costly and potentially injurious to health.

From the point of view of the readers of this journal, Chapter 5, "Superfund's Abandoned Hazardous Waste Sites," written with David Schleicher, is the most interesting. The country has spent $10 billion a year so far cleaning up Superfund sites, and the tab will likely run well over a $100 billion in the next decade. The amounts are paid principally by industry, and they involve huge transactions costs. In the end, consumers (i.e., the citizenry) are paying the tab through high prices. Is it worth it? Is the cleanup scientifically based? Are the methods utilized in the various cleanups scientifically sound?

Wildavsky distinguishes between acute, short-term hazards, such as the fires near Chester, Pennsylvania, in 1978 and Elizabeth, New Jersey, in 1980, from alleged chronic health effects supposedly resulting from long-term exposures. Epidemiological studies do not support the proposition that leakages at abandoned waste sites pose significant chronic health risks. No community study has ever established such a threat. Moreover, the method of designating sites is arbitrary. Congress wanted 400 sites, so EPA picked a cutoff number for its Hazard Ranking System (HRS) that was purely relative. It got Congress its 400 sites, but told nobody anything about the magnitude of the harm posed by any site. This is so because the all-important cutoff point, "the 28.5 HRS score that determines the fate of individual sites and the size of the NPL [National Priority List], has little public

health meaning. The cutoff level is instead an artifact of an initial Congressional mandate that the NPL include at least four hundred sites." Moreover, the method of assessing danger depends heavily on modeling, which is sheer sophisticated-computerized conjecture. Evidence plays hardly any role at all. Assessments of Superfund risks depend heavily on the Precautionary Principle. And, cleanups are strikingly thorough, taking years or decades and tens of millions of dollars to complete. Cleanup standards employ very stringent public health standards, including a

> total residual (post-cleanup) carcinogenic risk to any exposed individual which [is not to exceed 10^{-6}]. This risk implies an individual would have a 1 in 1 million chance of contracting cancer because of the site. Since the "background" cancer rate for Americans is 1 in 4 (meaning that 1 in 4 Americans will contract cancer in their lifetime from all causes combined), a 10^{-6} risk stemming from the site means that the exposed individual's prospects from getting cancer are 1 in 4 plus 1 in 1 million, vs. 1 in 4 for a person not exposed (or 250,001/1 million vs. 250,000/1 million).

Wildavsky believes that such a principle cries out for a cost-benefit analysis.

And there are other problems. In cleaning up a site to a prescribed level, the government uses upper-bound toxicity values. This injects more guesswork into a supposedly scientific criterion. Finally, cleanups embody a preference for the use of permanent treatment technologies. There are three methods of cleanup, as every reader of this journal knows: "removal and transport to another site, containment on-site, or treatment on-site to reduce toxicity." Of these, the third takes the most time and is the most expensive, yet is the one generally prescribed.

Wildavsky comes to four conclusions. First, chemical migration in waste sites is widespread. Second, "fifteen years of epidemiological investigation have failed to turn up persuasive evidence of risks to human health in communities near inactive waste sites." Third, there is substantial doubt about the validity of high-dose animal testing as a basis from which to project risks about low-dose human environmental exposures. Fourth, "cleaning up sites to highly stringent standards is very difficult—even more difficult than had originally been thought." Superfund cleanups are too slow and too expensive. Lawyers consume far too much of the insurance fund. Many people have said much of this. Wildavsky goes much further and asserts that "Superfund, for all the billions spent on it, provides no health benefits." Indeed, he even argues that "[t]he basic facts are that the amount of potentially harmful material is too minute and too far from the people to do much harm.

When one learns, in addition, that current technology is not able to clean up this muck to bring it within desired standards, it becomes clear that we are going through cleanup for its own sake."

It is remarkable that a book reviewing technical data and arguments is as well written and consistently interesting as this one. A few quotes might help.

- "[T]he data show that when birds take Dieldrin in large doses, reproductive failure and death result; low doses of Dieldrin have a negligible impact on their reproductive processes. The data show that not all birds have the same reaction to the chemical. . . . [F]inding[s] strongly suggest . . . that the concentrations to which the general public is exposed pose no risk to human health. Dieldrin is certainly not a harmless chemical; it is highly toxic and dangerous. But used properly, it is safe for human health. . . . The same could be said for saccharine. . . ."
- "Americans have had to pay hundreds of millions of dollars extra on utility bills and public and private cleanups to remove trace amounts of chemicals [PCBs] that could not have resulted in significant contamination of water, air, or food. In addition to their financial cost, stringent regulations also created their own potential health risks, mental stress engendered in people warned about trace chemicals that were probably harmless, and potential accidents that could occur from the additional cleanups and testing required. Research should be undertaken not only on possible harm from chemicals but also on possible harm from regulation and cleanup. The environmental safety field needs to be made more symmetrical; there should be risk-risk (or double-entry) analysis: the harms reduced versus the harms created by a regulation."
- "Both critics and advocates of DDT agree that it is remarkably low in toxicity to humans. Indeed, despite millions of incidents of intense exposure, the only injuries resulting from DDT have been caused by massive accidental or suicidal ingestion. Farm workers were poisoned not by DDT but by organophosphate insecticides, such as parathions, which are hundreds of times more toxic to man than DDT and which were touted as superior substitutes to DDT."
- "Shortly after DDT was abandoned in 1972, a Tussock moth infestation of Douglas firs in the Northwest caused millions of dollars worth of damage. Various pesticides were used, but none were effective. After over two years of damage and pleading by forestry officials, in 1974 the EPA temporarily permitted the use of DDT on infested forests in Washington, Oregon, Idaho, and Montana. The DDT promptly halted the moth and caused no observable environmental damage. One would think that this episode would have been reported, yet it received no mention in the national weekly news magazines."

• With respect to Agent Orange: "Air Force investigators compared the overall health of Ranch Hands with that of non-exposed Air Force veterans of Vietnam and found no significant differences." (Ranch Hands were the service personnel handling the spread of Agent Orange. Their exposures, therefore, would have been particularly intense.)

• "Today's best evidence indicates that the government overreacted in Times Beach, causing more harm by evacuating the town's residents than the dioxin on its streets ever would. At the same time, there was inadequate understanding of the dangers of certain industrial waste products. The history of dioxin's dispersal throughout Missouri clearly demonstrates the need for the regulation of hazardous waste disposal that subsequently developed."

• "Are claims of harm to life and nature from technology mostly true or mostly false or is the picture mixed?—It depends not so much on tentative conclusions about one issue, but on the trends of conclusions to a considerable number of issues. What citizens need to know can be determined by citizen sleuths consulting one another. These consultations based on individual detective work can be amplified by discussions with scientists, but only after the citizens know what to ask and how to make sense of what they hear."

There are literally hundreds of more sentences well worth quoting. Many will insert nicely into legal briefs. Perhaps the most significant of these is a series of rules intended for the guidance of citizens judging the validity and persuasiveness of regulatory—or, for that matter any other—science. They are reprinted here just as they are in the book: (1) *Use appropriate controls.* "[I]f the study group has a property that the control group does not have and that could cause the postulated effect of the suspect chemical agent, then a false-positive result may be derived from the experiment. The term 'false-positive' describes an erroneous correlation between exposure and health effect, which leads the analyst to the wrong conclusion. The proper selection of control groups helps to eliminate false-positive findings. If mice are naturally subject to liver tumors, for example, their expected rate of tumor formation has to be controlled for two [*sic*] get an accurate result." Control groups must be examined for age, smoking, gender, any sorts of preexisting conditions, and so forth. (2) *Establish the baseline.* (3) *Vary the baseline and determine whether the conclusion is robust.* (4) *Remember that parts are not necessarily wholes.* "What the scientists were interested in was the health of the trees, but what they looked at was the health of the leaves. By identifying harm other than the one they were looking at, European forest researchers reached an incorrect conclusion about the state of the health of their forests." (5) *Count what counts.* "If it's trees, do not count leaves; if it's forests in

total, do not just count one or two; take a sample. Recall, in regard to ozone, that if it's people's health that matters, we must measure ultraviolet radiation, the cause of skin cancers, not only ozone laws. You cannot always count what counts—indirect measures are always an important part of science—but when we can we should." (6) *Follow trends.* Do not regulate on the basis of minority studies. (7) *Establish the normal range for the phenomenon in question as a standpoint from which to judge the trends.* (8) *Use the same type of measurement consistently.* (9) *Prefer measurements to estimates* [including modeling]. (10) *Be aware of recall bias in assessing exposure.* (11) *Consider the duration of exposure.* (12) *Evaluate separate effects to determine if there is really something to worry about.* (13) *Be aware of the extrapolation of the effects.* (14) *Seek the mechanism.* (15) *Establish the conditions of applicability.* "Rather than addressing, for example, the stultifying question of whether clouds in general add to or detract from warming, we are better off establishing what sort of clouds under which conditions cool or heat (and if known) to which degree." (16) *Do not accept residual explanations.* You can never be sure you have the only one. (17) *Do not draw final conclusions from one study:* rather, look to other studies for confirming or contradicting results. (18) *Be skeptical.* (19) *Keep score.* "Looking at masses of data and rival arguments can muddle the mind. Separate out the arguments, so that evidence pro and con can be accumulated. Keeping a scorecard enables a sort of summation. Second, if the score is pretty well evenly divided without good reason for assigning heavier weights to one factor or another, there may be no way to decide without learning more. But, if, as in the case of global warming, the points for one side grow larger and larger, conclusion is indicated: not merely the Scotch verdict 'unproven' but the reasoned verdict 'likely not serious.'" (20) *Seek diversity, not uniformity of opinion.*

It is not clear that these rules fit together comfortably. Are not rules (19) and (20) in some tension? What about (18) and (19)?

It seems to me that governmental overregulation results from an ethic of caring, which is laudable. Wildavsky's fundamental point is that the ethic of caring must be controlled by truth, and only an observant citizenry can establish that kind of discipline over the government.[8] Wildavsky is not inclined to think that citizen inattention is the result of simple sloth. Although he does not say so expressly, there is an implicit suggestion that science and technology have developed so rapidly that the citizenry has not realized what it needs to know in order to be responsible. In my opinion, the situation is far worse than Wildavsky appreciates. I know this because I have young children in school. They are being taught, as if it were scientific fact,

that chemicals, in general, are dangerous to human health, that the manufacturing and use of chemicals is irresponsible, that animal testing is indicative of the influence of chemicals on humans, and so forth. Virtually all of the pernicious epistemology that Wildavsky analyzes and denounces is being taught as gospel to school children and high school students, who are innocent in at least this narrow sense. Now, I live in Austin, Texas, which regards itself as an embattled bastion of morally pure environmental friendliness. Wildavsky himself might denounce me for using Austin as a frame of reference.

Then again, perhaps not. Media treatment of chemical dangers and environmental problems is somewhat the same all over the country. Wildavsky goes to great lengths to suggest that the media is hysterical and ill-informed in its reporting of environmental problems. In particular, environmental journalists do almost nothing to learn about and report the scientific underpinnings of environmental pronouncements by scientists. Studies reported by Wildavsky indicate that the press is abysmally ignorant of environmental science. In one study, except for tobacco, journalists seldom ranked the causes of cancer in the same order as scientific experts. In addition, members of the media consistently exaggerated the role of synthetic chemicals in causing cancer. Moreover, such environmental reporting is the result of media sloth. It is an axiom of reporting that every story should achieve some balance. Unfortunately, journalists all too frequently trivialize their stories by juxtaposing responsible opinion against irresponsible opinion. According to Wildavsky, balance does not simply mean "Yes versus No." It means (1) responsible "yeses" versus responsible "noes" and (2) discussion of how many responsible people subscribe to a yes-answer as opposed to how many responsible people subscribe to a no-answer. Balancing the opinion of a Nobel laureate, whose views are based on sound research and accepted theory, against those of a quack chiropodist from Sausalito, is irresponsible journalism, not balance. Wildavsky's first assignment to his environmental detectives is to deal with the press:

> The task of citizenship in science, of informed participation in decisions that require some understanding of science, begins with the evaluation of the mediated science found on our doorsteps and in our living rooms. In asking whether the claims of harm are true, we must therefore also ask whether the expertise we are being offered to evaluate those claims is a true representation of scientific views of the hazards. If government officials seem to overreact and to overregulate, it is in part because they must respond to a citizenry that gets its scientific knowledge of harm largely through newspapers, newsmagazines, and television.

Here, perhaps, is a final note in the Wildavsky spirit—Rule (21): *Distrust the press.*

By the end of the book, Wildavsky launches an all-out attack on what he calls the "Environmental Paradigm." This consists of four kinds of fundamental propositions. They are these: First, possibility, not probability, should be the criterion for regulating substances which might affect human health and safety. In other words, if a substance may sometimes cause cancer, or some other undesirable condition, the use of a substance should be banned. The corollary of this principle is that the method of risk assessment that increases predictions of harm by the largest amount be utilized in the absence of proof that they are misleading. Second, the substance—no matter what doses are used, no matter where the chemical is used, and no matter how weak the system correlations—is incapable of causing harmful effects. A corollary for the second principle is the epistemic rule: Look for the weak effects of weak causes. Third, "the purpose of risk calculation is to prevent health detriments, not to secure health benefits." Fourth, that which is not permitted is forbidden. Hence, substances and processes must be proved benign before they can be used. A corollary for the fourth principle is that the burden of proof rests on those who would use a substance, and the burden of proof is quite high.

Wildavsky proposes the exact opposite of these prescriptions. First, we should be guided by how probable the harm is and how extensive the harm might be, rather than by a mere possibility of harm. Conceivable, harmful possibilities are endless, and the search for them can trivialize the subject. Regulation on the basis of possibilities rather than probabilities constitutes a diversion of valuable resources without substantially reducing sources of harm. Reaching for possibilities creates consternation in the polis but does not enhance its health. Second, in general, "[w]eak causes are likely to have weak effects. Our search should be for strong causes with palpable effects. . . ." Third, the purpose of risk regulation is to enhance health. Everything should flow from this principle. Fourth, that which is not proven to be probably harmful should be permitted, and the burden of proof should rest on those who would curtail freedom.[9]

Several months ago, this column reviewed Easterbrook's *A Moment on the Earth: The Coming Age of Environmental Optimism*, which is fundamentally similar to Wildavsky's book. This column criticized Easterbrook's journalistic study for not providing references. Wildavsky's book cannot be faulted on that ground. The footnotes run just over 100 pages. As a result, lawyers working in the fields of environmental regulation and environmental insurance may find Wildavsky's book extremely useful. If it may, lawfully, be placed in the

hands of judges and administrators, it should be; clients should be persuaded to buy copies of this book and hand them out. It can certainly be lawfully given to opposing counsel, and it should be, along with a second copy for her (governmental) client. No expert witness should be presented in any environmental case who has not read this book. No lawyer taking a deposition in an environmental or toxic tort case should do so without reading the relevant sections of this book and following up on relevant leads. Scientists referenced in the footnotes should be utilized as consulting witnesses. Even the people who wrote the book with the late Wildavsky may also be valuable consultants.

More intriguingly, counsel may wish to consider using Wildavsky's Twenty Rules as a way of educating jurors to their responsibilities as citizens. Surely, one of the primary places people function as an informed citizenry is in the jury box. Judges try to educate citizen-jurors to their responsibilities, and lawyers try to convey to them facts that they need in order to make informed decisions. Perhaps lawyers should also consider trying to convey to them some epistemic procedures that they need to keep in mind. The general approach of lawyers in dealing with jurors is to pander to the epistemology of common sense. I heard this happen a few days ago when a lawyer argued to a jury in what is essentially an insurance malpractice case that $100 million judgments don't just happen by accident; rather, he said, there *must* be an explanation in which someone is at fault. Obviously, this lawyer's argument to the jury completely fails to take into account randomness. I would suspect that out of 10,000 trials, each of which was tried without actionable negligence, several would involve anomolously large, even runaway, verdicts.

It is far from clear how a lawyer could—without condescension, understandably, and even elegantly—present a simplified version of Wildavsky's Twenty Rules. In at least some cases, nevertheless, it might be worth a try. One would think that these rules should be presented through scientific witnesses as a kind of thumbnail summary of sound scientific procedure. Such an effort might even be enhanced by the use of colorful visuals, historic examples, and so forth. It is also the kind of point that can be developed out of the mouths of opposing witnesses, since—in the abstract—few scientists will disagree with abstractly stated canons of scientific procedure.

There is one philosophical problem that Wildavsky does not address, except implicitly. Wildavsky represents a kind of consensus school reviewing scientific development. There is another school which sees science as a series of successive revolutions. This second view of science is a far less rationalistic view of science than the one

to which Wildavsky subscribes. When a new and better theory is formulated, the older generation of scientists frequently hangs on to the old theory, and the new (and better) theory supplants the older (and inferior) one only when the older generation dies. Of course, Wildavsky is clear that the glory of science is to be found in its competitive institutions, as opposed to the moral character of individual scientists. Nevertheless, he is insufficiently sensitive to the way in which minority views can overthrow majority views.[10] Probably, for the purposes of presenting sound environmental science to government administrators and juries, the consensus view of science is a sounder approach. Scientific revolutions and minority science are not generally found at this level of scientific research. Moreover, decisions of public policy and jury decisions should probably be made on the basis of respectable, majority, even consensus science, as opposed to its opposite. This is true even if deviant, minority science ultimately overthrows and replaces consensus science.[11]

Neoconservatism is still a growing intellectual force in the United States and Wildavsky was one of its most thoughtful members. Is there any possibility that some of his politics has found its way into this book? If *But Is It True?* were the only book one read, one would think that environmentalists are never right. Is this so? What about the campaign against water pollution? Is that so much pseudo-science? Probably not. Is Wildavsky's selection of cases fair? If not, why not? Also, Wildavsky's major social insight, about which he wrote for nearly 30 years, was this: *Things change incrementally.* His call for a grassroots, prairie-fire, boot-strapped intellectual revolution sponsored and staffed by the common man seems inconsistent with the idea that *Even rational transformation happens slowly and step-by-step.* Wildavsky was an independent spirit. He bucked trends, in spite of his Rule (6). Hence, perhaps as he got older, he became more optimistic about "the people." Or perhaps history hemmed him in. If an informed and articulate elite is to speak blunt truth to power, then those who need education are the members of the elite, not the masses. But the "Green" elites have blown it, says Wildavsky: They are not speaking reliable truth. But why not? Whether and how truth, power, and policy-making have been split asunder in the area of environmental politics should be established before the country invests in a quixotic attempt at transformation and redemption through scientific education.

Then again, perhaps Wildavsky is hinting at something different. In recent years, political and legal thinkers have argued that democracy demands republican virtues and genuine community as well as an open political system. Ruth Bethke Elshtain, for example, has argued recently that democracy requires "dense sociality." By which she

means (1) a genuine distinction between the public and the private and (2) the existence of lots of affiliations other than—admitted important—completely intimate relationships, on the one hand, and completely political connections on the other.[12] Perhaps Wildavsky's vision of grassroots environmental study groups dotting the world is intended to fill something like this civic purpose.

Frankly, Wildavsky seems utopian. Apparently he seriously believes that critical thinking, the philosophy of science, and a sophisticated, appropriate approach to environmental issues can be the galvanizing force—the rallying cry—behind a large and sustained social movement. When I read Wildavsky's first book in the late 1960s, I knew immediately that it bankrupted many systematic, programmatic ideas about politics and government. I knew immediately that safe politics always starts from the now and moves by baby steps. As I read Wildavsky's noble democratic vision in *But Is It True?* however, I knew just as swiftly that it could not work, that it was too idealistic, and that the political idealism of this book essentially contradicted the realism of his early work. My criticism of this point, however, affects not one iota the worth of his critique of regulatory science and its (mis)use.

Notes

1. For another perspective on grassroots democracy from a participant turned scholar, see Meta Mendel-Rogers, *Reclaiming Democracy*, New York: Routledge (1995). The author looks back to the '60s and finds the public memory of them gravely distorted. She is not expressly concerned with environmental issues, but what she says has important implications for Wildavskyan environmental citizen "pressure" groups.

2. Aaron Wildavsky, *Politics of the Budgetary Process*, Boston: Little Brown (1964). There are also several later editions.

3. Aaron Wildavsky, *Searching for Safety*, New Brunswick, New Jersey: Transaction Publishers (1988). The argument of this book is that a society's standard of living produces its level of health and safety. If a society's standard of living declines, so does its health. Consequently, according to Wildavsky, benefits of safety programs have to be measured, in part, against the harm that those programs themselves do. Suppose we decide that it's a good idea to clean up sites and fix up buildings. In considering these programs, we have to remember that "[m]oving dirt and climbing ladders also harm health; people fall off ladders, and moving earth leads to a low but palpable number of accidents."

4. Aaron Wildavsky and Elizabeth Nichols, *Safer Power* [forthcoming, University of California Press].

5. Mary Douglas and Aaron Wildavsky, *Risk and Culture*, Berkeley: University of California Press (1982).

6. Karl Drake and Aaron Wildavsky, "Theories of Risk Perception: Who Fears What and Why?" 119 *Daedalus* 41-60 (1990).

7. For an elaboration of this same point written in exquisitely ponderous legalese, see

Wendy E. Wagner, "The Science Charade in Toxic Risk Regulation," 95 *Columbia L. Rev.* 1613 (1995).

8. Wildavsky rejects the idea that counter-elites can perform this work. One wonders. See William A. Henry III, *In Defense of Elitism*, New York: Doubleday (1994).

9. For another recent discussion of some of these same themes, as well as other environmental test cases, see John D. Graham and Jonathan Baert, eds. *Risk vs. Risk: Trade-offs in Protecting Health and the Environment*, Cambridge, Massachusetts: Harvard University Press (1995).

10. The *locus classicus* for the nonconsensus, anti-Wildavskyan view of science is Thomas Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1961). (There was a second edition in 1970.) Kuhn's work has enormously influenced the academic, intellectual, and practical worlds. In fact, the widespread use of the term "paradigm" in today's public discourse is attributable almost exclusively to Kuhn's use of it. A radical exponent of Kuhn's views is the late Paul Feyerabend, until his death a professor of philosophy at the University of California Berkeley. There is so much commentary on, and controversy over, the Kuhn-Feyerabend thesis that it is difficult to keep track of it. Feyerabend's most famous book is *Against Method*, London: Verso (1975), and this is a good place to begin. Feyerabend's philosophical papers, mostly on science, are gathered together in a two volume set. The first volume is entitled *Realism, Rationalism and Scientific Method*, London: Cambridge University Press (1981), while the second volume is entitled *Problems of Empiricism*, London: Cambridge University Press (1981). Near the end of his life, Feyerabend wrote an autobiography which is in some ways a more engaging place to begin. See P. Feyerabend, *Killing Time*, Chicago: University of Chicago Press (1995). After Feyerabend's death, a number of essays appeared about his life and work. See 3 *Common Knowledge* (Autumn 1994). As for the secondary literature, a good beginning is a 1965 Proceedings of the International Colloquium in the Philosophy of Science: Imre Lakatos and Alan Musgrave, *Criticism and the Growth of Knowledge*, London: Cambridge University Press (1970). For a recent systematic discussion of the methodological, philosophical issues involved, see Kenneth F. Schaffner, *Discovery and Explanation in Biology and Medicine*, Chicago: University of Chicago Press (1993).

11. See Edward J. Imwinkelried, *The Methods of Attacking Scientific Evidence*, Charlottesville, Virginia: Michie (1982). See also, John Henry Wigmore, *The Science of Juridical Proof*, Boston: Little Brown (1937). Wigmore's terminology is quaint, but his epistemology is as sound today as it was then.

12. *Democracy on Trial*, New York: Basic Books (1995).