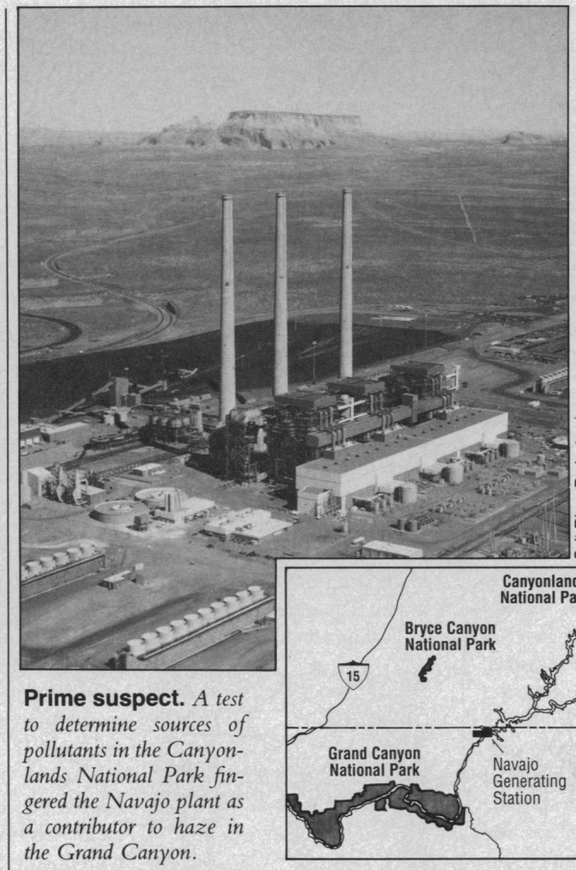
Scientists Battle Over Grand Canyon Pollution

Test results implicating a power plant as the prime cause of wintertime haze have sparked a dispute over the data

By now, millions of Americans are familiar with news reports of how spectacular Grand Canyon vistas are frequently obscured by a fine haze in wintertime. The appearance of air pollution over one of the world's few remaining pristine natural wonders first began to get public attention almost two decades ago. And for nearly that long, environmentalists have suspected that a major contributor to the recurring winter smog was a massive coal-fired power plant that sits on the Arizona-Utah border about 50 miles north of the Grand Canyon. But pinning a pollution charge on the plant has not been easy, and the federal government's efforts to do so have sparked a bitter scientific battle that is little known to the American public.

Two years ago, researchers in both the Environmental Protection Agency (EPA) and the National Park Service believed they finally had a smoking gun. Trace elements detected at a monitoring station in the Grand Canyon pointed to sulfur dioxide emissions from the 2250-megawatt plant, known as the Navajo Generating Station. The evidence, they contended, might be enough to require installation of pollution control devices on the facility's smokestacks—equipment that could cost as much as $500 million.

But the plant's owners*, which include the Interior Department and private and public utility companies, have fired back. Their scientists and engineers are contesting the claim that results from a single monitoring station provide definitive evidence of their complicity in a national disgrace, and they have raised troubling questions about the thoroughness of research underlying looming regulatory actions, the adequacy of the peer review to which the study results were subjected, and the possible effect of court-imposed deadlines on the research process.



Prime suspect. *A test to determine sources of pollutants in the Canyonlands National Park fingered the Navajo plant as a contributor to haze in the Grand Canyon.*

Indeed, the utility won a small legal victory last month in the U.S. District Court for Southern California. The court lifted a legal deadline that mandated a decision by February 1990 on whether emissions from the Navajo plant are sufficiently large to require the installation of pollution equipment. Instead, EPA and the park service now have up to 1 year to consider additional comments on the research findings. One important new input might be the views of a committee of the National Academy of Sciences, which has recently been asked by the Department of Interior to look at the data.

This hotly contested evidence comes from the Winter Haze Intensive Tracer Experiment (WHITEX), a $2-million test project sponsored by a consortium† of government agencies and utility organizations, including EPA, the park service, and, ironically as it turned out, one of the plant's owners, the Salt River Project (SRP). Conducted in the winter of 1987, the original purpose of the experiment was to evaluate proposed techniques for determining the sources of haze-causing pollutants not in Grand Canyon National Park, but in the Canyonlands National Park, a preserve that lies northeast of the Navajo plant—in the opposite direction from the Grand Canyon (see map).

Indeed, one of the quandaries that has puzzled some residents of the region about the Grand Canyon haze is that winter winds seem to blow generally in a northeasterly direction—from the Navajo plant toward Canyonlands and not the Grand Canyon. That was a key reason why the experimenters had erected a battery of monitoring stations in and around the Canyonlands—and why there was only one sampling station upwind of the plant at Hopi Point in the Grand Canyon National Park.

But then came the shocker. Deuterated methane, a rarely used sulfur tracer that is supposed to mimic the dispersion behavior of sulfur dioxide, was released from one of the Navajo plant's tall stacks over a 6-week period in 1987. Just as predicted, the chemical was detected in the Canyonlands monitoring stations, but it was also picked up by the sampling station in the Grand Canyon National Park.

Suddenly, although the WHITEX experiment was not initially intended to be a basis for regulation—and was not even focused on Grand Canyon pollutants—the park service and EPA came to believe it provided compelling evidence for taking action against the Navajo plant. The amount of deuterated methane picked up by the Grand Canyon's Hopi Point station and the chemical characterization of air particles there indicated that the Navajo plant is the chief contributor of sulfates in the park, concluded a park service team headed by physicist William Malm. Previously, wintertime haze had been attributed to widespread regional pollution, much like that which occurs in the summer when sulfates from as far away as the Los Angeles Basin degrade visibility in the Grand Canyon.

David Stonefield, an environmental engi-

*The Navajo Generating Station is owned by the Salt River Project (21.7%), the Los Angeles Department of Water and Power (21.2%), the U.S. Department of Interior's Bureau of Reclamation (24.3%), Arizona Public Service (14%), Nevada Power Co. (11.3%), and Tucson Electric Power Co. (7.5%).

†The WHITEX study was conducted under the sponsorship of SCENES, a group formed in 1984 to study visibility impairment issues. Its members include: Southern California Edison Company, the Environmental Protection Agency, Department of Defense, Electric Power Research Institute, and the Salt River Project.

neer with EPA's Office of Air Quality Planning and Standards, says WHITEX "is one of the best databases for the attribution of visibility impairment to a source that we have anywhere in the country." But that assertion is challenged by Jerry Shapiro, a physicist and consultant for SRP, who charges that "the experiment was poorly designed for the Grand Canyon." He says that in focusing only on a single source, the test says nothing about relative contributions of sulfur emissions from utility plants in Utah and other industrial sources.

Shep Burton of Systems Applications, Inc., who is a consultant to one of the plant's owners, SRP, and a member of EPA's Clean Air Scientific Advisory Committee, argues that the statistical correlations between the amounts of tracer detected at Hopi Point and sulfur emissions from the Navajo plant are weak. Furthermore, he says the models linking regional humidity to sulfate production assume "some very high conversion rates" that inflate the plant's contributions of sulfates to the Grand Canyon.

"Those guys [at EPA and Interior] are going to come unglued by the statisticians," predicts Burton. In particular, he faults the park service's study for lack of data on issues such as the contribution of other pollution sources, the complex terrain and wind patterns of the Grand Canyon, and the age, course, and distribution of the Navajo plant's emission plume during the time that the experiment was conducted. These issues, Burton says, are critical in determining the degree to which the generating station is a major contributor to episodes of severe wintertime haze, or whether a mix of regional sources plays a dominant role. Should the latter be the case, EPA could not require the installation of stack scrubbers to reduce sulfur emissions at the Navajo plant.

Despite the criticisms leveled at them, Malm and EPA officials are standing by their findings. "The [tracer] correlation is weak all by itself," admits Malm, "but when you factor in relative humidity and arsenic [to account for emissions from smelters], the evidence is quite strong."

The plant's owners and their consultants are not limiting their criticisms to the report's conclusions, however. They are also attacking EPA's review procedures for such research, contending that EPA's regulatory action is premature because the park service study had not been peer-reviewed.

But Stonefield and Malm say the report underwent considerable review by the agency staff and independent consultants. Moreover, they note that the utility, its consultants, outside scientists, and other interested parties have had ample opportunity to comment on the draft report in meetings with agency scientists and government consultants. The draft report, however, was not subjected to the kind of peer review that might be accorded a journal article, Stonefield concedes, explaining that that kind of review "is too narrow a process to be used in a regulatory sense."

Indeed, neither the Department of the Interior nor EPA have standing scientific advisory committees geared to assemble independent scientific panels to evaluate controversial agency research results. This lack of formal review procedures concerns some officials in EPA's Office of Research. Said one program leader who asked not to be identified, "The problem is that the regulatory offices are very ambitious, and they do not have staffs with strong scientific backgrounds. Consequently, they sometimes go forward with things that are not based on very good science."

SRP, in fact, is so convinced that EPA's actions are based on bad science that it is conducting its own $10-million study of the Navajo plant's effect on wintertime visibility in the canyon. This experiment will draw on data from multiple monitoring stations in and around the Grand Canyon and the results may be available next fall. Malm says this experiment is exciting, but he doubts that its results will differ greatly from the park service's conclusions.

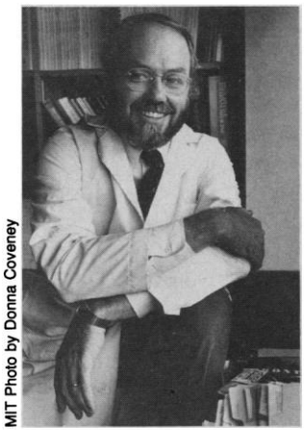
Just how strong a case the park service and EPA have actually built will become more evident in early April when the National Academy of Sciences' Committee on Haze in National Parks and Wilderness Areas: Source Apportionment and Control Options issues a letter report critiquing the WHITEX study. The 13-member panel will issue a more detailed report on methods for attributing emissions to specific polluters in the spring of 1991.

■ MARK CRAWFORD

MIT Picks Biologist as President

The Massachusetts Institute of Technology is about to abandon a long-standing tradition of selecting a president with a background in physical sciences, engineering, or business management. Phillip A. Sharp, 46, a biologist and director of MIT's Center for Cancer Research, was named last week as the unanimous choice of the faculty and MIT Corporation search committees to succeed president Paul Gray, who is stepping down in June. Sharp's nomination now goes to MIT's Governing Board, where it is expected to encounter no opposition.

Though Sharp is highly regarded in his field—he won the 1988 Lasker Award for his work in gene encoding—his selection is regarded as something of a surprise, for he has not been a prominent player in campus politics. Indeed, he emerged as a candidate in a roundabout way. When the search for Gray's successor formally began in September, Sharp was named vice chairman of the faculty search committee and became the acting chairman during the first several weeks of the process when economist Robert Solow was away.



MIT Photo by Donna Coveney

And then there was one. *Nominee Phillip Sharp.*

Sharp's performance impressed faculty members and MIT's trustees, says committee member Eugene Skolnikoff, a professor in the political science department. "Members of the committee soon came to the conclusion that he ought to be a candidate," says Skolnikoff. "At first he resisted, but then he agreed to be considered and resigned from the committee."

Sharp was not an early front-runner, according to members of the selection committee. Both the faculty committee and MIT trustees expressed a preference for candidates from outside the institute. One leading insider was provost John Deutch. But Deutch was perceived by some faculty members as having an abrasive management style and was blamed for closing the Applied Biology Department without consulting the faculty at large. Deutch withdrew from the running last month, and as the list of an estimated 200 candidates was finally narrowed down to three, Sharp's name was still there.

What tipped the scale in his favor? According to one member of the faculty committee, it was not just his excellent research record: "He is enthusiastic, very strongly involved in undergraduate education, and he has a management style that works well in this kind of environment."

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