Consensus and controversy at NAS acid rain round table

When acid rain researcher Arthur Johnson was finally tracked down in the spruce forests on the slopes of Camels Hump, a high peak in the northern Green Mountains of Vermont, he had to take three buses and change airplanes once to get to a hastily arranged round-table discussion last week at the National Academy of Sciences (NAS) in Washington, D.C. The same sense of urgency pervaded the four-hour session during which he and 14 other scientists confronted William D. Ruckelshaus, Environmental Protection Agency administrator, on the acid rain issue.

The meeting was an unprecedented attempt to "enlighten" Reagan administration officials in an open forum that featured, as one participant later said, "some of the most competent people in the field." Another commented that he was delighted that Ruckelshaus and others like White House science advisor George A. Keyworth II spent the better part of a day *listening* to scientists. "That in itself ought to be praised as a breakthrough," he said.

To Ruckelshaus, the meeting was "a kind of experiment." At the end of June, faced with a spate of newly released reports (SN: 7/2/83, p. 7; 6/18/83, p. 390) and contradictory viewpoints from interested groups, Ruckelshaus suggested that NAS organize a forum at which he could listen to and question a select group of scientists studying various aspects of acid rain. He hoped that the assembled participants, representing a variety of views, would help "strengthen understanding of the facts." The result was a free, but polite, exchange of questions, facts, figures and opinions that highlighted new research findings, emphasized the problem's complexity and revealed serious gaps in knowledge of acid rain effects.

During the somewhat disjointed discussion, the participants showed a surprising degree of consensus on several points that would have been controversial only a year before. No one, for example, disputed the recent NAS study conclusion that a broad reduction in sulfur dioxide emissions would result in an equivalent reduction in acid deposition.

Volker Mohnen, director of the Atmospheric Sciences Research Center in Albany, N.Y., noted after the meeting that a few months ago, many leading scientists would have assumed (as the European experience seemed to indicate) that reducing sulfur dioxide emissions would not translate into a proportional reduction in acid deposition. The new interpretation gives the administration the "green light" to begin cutting emission levels, Mohnen added. "Now we know the system will respond." The other lesson learned is that results from one part of the world do not necessarily apply elsewhere.

The scientists at the round table also appeared to agree that the sulfur component of acid rain was the chief culprit. They accepted a value between 15 and 20 kilograms of sulfate deposited per hectare per year by rain or snow for the maximum allowable level that would ensure no harm to aquatic life. In some areas of the Adirondacks in upstate New York, that would mean reducing wet sulfate deposition by as much as 50 percent. There was less agreement about the effects of the sudden influx of acidity from snowmelt in the spring. Snow, compared with rain, contains a higher proportion of nitrate ions.

Ruth Patrick of The Academy of Natural Sciences in Philadelphia was concerned about the effect of acid rain on soil microorganisms, which may be sensitive to changes in acidity. This could alter many important natural recycling processes, she worried.

Biologist George Hendrey of Brookhaven National Laboratory in Upton, N.Y., told SCIENCE NEWS, "We see that as an issue of importance, but one which cannot be well-evaluated now. We do not know whether or not real acid rain causes these kinds of problems, although we have laboratory experiments and limited field studies that indicate there is a potential problem." However, Hendrey disputed an earlier report's contention of permanent harm. "There's no reason to suppose that the microbiota are irreversibly damaged," he said.

Ruckelshaus (left) and Keyworth confer at the NAS acid rain round table.

Arthur Johnson of the University of Pennsylvania in Philadelphia discussed acid rain effects on trees. He said there is no convincing scientific evidence to show changes in forests are due to acid rain, "but there are reasons for concern." One of the most serious problems involves the little-understood effect of acid rain on the concentrations of nutrients in the soil. The time frame for seeing these effects may be decades in the future, Johnson said.

Johnson noted that 50 to 70 percent of the trees in high-elevation red spruce forests have died during the last few decades in West Germany and in parts of eastern North America, including Camels Hump. The decline began during a period of drought, and separating the effects of drought and acid rain is difficult, he said. The forest as a whole is not dying because balsam fir and white birch are gradually replacing the spruce. A consensus on why red spruce forests have declined may emerge within two or three years, Johnson predicted.

One of the more hotly debated issues at the meeting was the adequacy of the mathematical models that attempt to simulate atmospheric processes. While some researchers argued that a few models are good enough to predict general emission and deposition trends, others felt that current models were at least a decade away from providing information on the effect of a particular pollutant source on a given sensitive area. There was also concern that too few data were yet available to check the validity of the more detailed models.

Kenneth Rahn of the University of Rhode Island in Narragansett, however, provided part of the answer when he described his work on the use of tracer elements. By measuring the ratios of six trace elements to selenium in air samples collected at various stations in New England, Rahn has been able to identify the source regions of the air. This method is useful for distinguishing, for instance, between local and distant sources of pollution because the element ratios differ depending on where the air comes from. Rahn said, "We can recognize the existence of well-defined regional signatures both in North America and in Europe.

The next step, Rahn said, is to see how these data relate to sulfate amounts in the air from different regions and then to extend the method to rainwater samples. "The whole scheme of elemental tracers involves several important steps, and we are trying to improve each of them," Rahn said.

After listening to the scientists' arguments, Ruckelshaus commented, "The discussion has been very helpful to me for understanding ... where we have agreement and disagreement. It will go a long way to bringing home the complexity of the problem." He said he was convinced that any policies or actions contemplated had to be coupled with an intense research effort.

Rahn, like many of the participants, also found the discussion helpful. "The meeting was unique in the collection of people that had assembled at one time in one room. You would be lucky to see this kind of group assembled again under these circumstances," Rahn said. "I learned a lot. I found it a very stimulating and satisfying experience, and I was happy to have participated in it."

By the end of the summer, everyone will learn what Ruckelshaus gained from the experience when he presents his proposals for dealing with the acid rain problem to President Reagan and his cabinet.

—I. Peterson