the benefit of a rich intellectual environment to provide guidance in structuring its program."

This liability continues to be manifested in the relatively minor role that has been given to researchers from academe. Liberally inclined academic researchers, according to the report, "took a dim view of the intellectual potential" of the Institute because of its identification with federal law enforcement and the notion that LEAA might emerge as a national police force. Also, the short time generally given for researchers to submit proposals has had the effect of excluding academics in favor of private firms like Mitre and Rand that live off government contracting.

"The problems of federal research for local consumption were not systematically considered by the Institute's founders and remain a basic dilemma to this day," says the report. As a consequence the Institute has rambled all over the lot, switching strategies with each new director, and has failed to develop a "cumulative" body of knowledge about crime and justice. To begin with, the Institute took as its original goal that of LEAA: crime reduction. From this simplistic aim grew a variety of notions, such as "crime-specific planning," which treated certain crimes as diseases for which cures could be formulated once their causes had been ascertained.

When it became clear this approach didn't work, the report says the Institute retrenched too far by giving up on the big questions and turning its attention to improving the criminal justice process—" . . . the Institute's most recent response [to frustration] has been to deny its capacity to produce useful knowledge about crime problems at all and to substitute as its focus of concern the operation of the criminal justice system." Thus, it has assumed a "reactive stance" and has avoided the "hard questions of knowledge about crime and criminal behaviors in favor of easier but relatively trivial studies of system operations."

The committee also found that NILECJ has, willing or not, gotten mixed up in a lot of activity that has no business in a research establishment. "It has been asked to carry too large a share . . . such as technical assistance to SPA's [State Planning Agencies], training programs, project evaluation, and other direct service obligations that have turned its focus away from research." Cited as the prime clinker in this department is the "Impact Cities" program, an attempt to pour masses of money into a few cities to fund and then evaluate innovative programs. That 3-year program, terminated in 1975, has already been lambasted from other quarters; the report states flatly the methodology and data collection were so poor that the program "had no research value at all."

As for other research, the committee found most projects to be isolated in focus, unrelated to each other and therefore lacking in "cumulativeness." Among the few programs it found promising are the Research Agreements Programs—a small group of long-term contracts with research teams at universities and research corporations that are designed to develop a continuous stream of knowledge on a few limited themes, such as white collar crime.

So what should the Institute do? It should recognize that its mission is to "develop reliable, generalizable knowledge about crime, criminal behaviors and the effectiveness of crime control methods and policies." Says the committee: "Research itself can never be an instrument for solving social problems." [The program] "should be judged by the value of its contribution to our knowledge about crime and criminal justice rather than by operational measures such as crime and recidivism rates."

The committee does not like the way the Institute is divided up (research, evaluation, and technology transfer) and proposes an agenda based on six program areas: data collection; deterrence; rehabilitation; consequences of change in the criminal justice system; "socialization to crime"; and criminal law.

Throughout the report is evidence that the "congressional ambiguity" surrounding creation of LEAA, the hot political climate in which it was forged, the persisting ideological conflicts over the causes of crime, and the persistent pressure to produce results to serve LEAA's immediate ends, have made it impossible to get a good research program going.

The Justice Department, which is now reviewing its own group's report on LEAA, has not yet reacted officially to the NAS report. Its feelings will probably become clearer in the course of current hearings, conducted by the House committees on science and technology and on the judiciary, over the federal role in criminal justice. Whatever the outcome, it is scarcely likely that LEAA will be allowed to continue indefinitely in its present form.—CONSTANCE HOLDEN

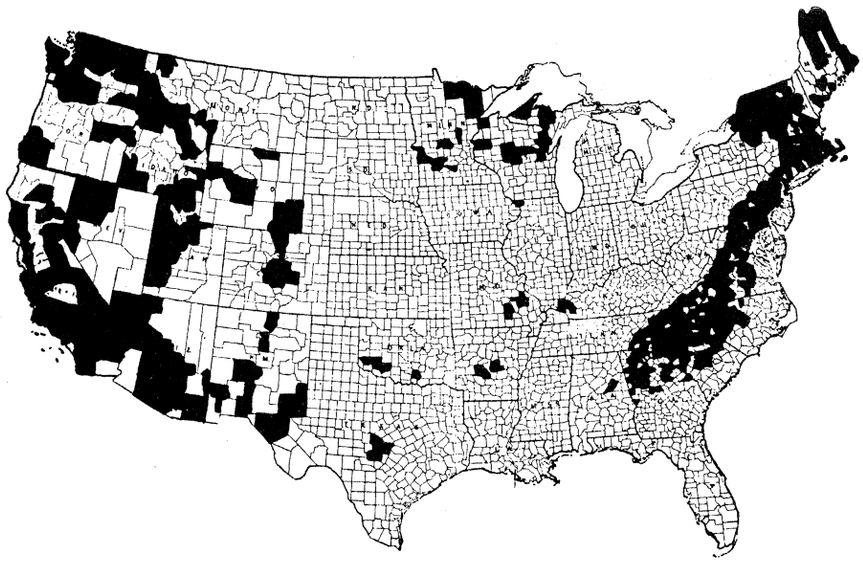
Asbestos: Trouble in the Air from Maryland Rock Quarry

To the north and west of Washington lie the lush, rolling hills and prosperous suburban communities of Montgomery County, whose residents are among the most affluent and generally most favored suburbanites in the United States. Chevy Chase, Bethesda, Rockville, Gaithersburg, Germantown—the names of such communities evoke a picture of solid middle-class comfort and security. Moreover, inasmuch as Montgomery County has almost no polluting industries to speak of, it has been one of the last places where one would expect a major environmental health scare. But during recent months a growing number of county residents have been in an uproar over what they perceive as a serious possibility of a long-term cancer threat.

Crushed stone containing possibly dangerous concentrations of asbestos fibers has been produced for some years now at a large quarry near Rockville from which serpentine rock is extracted. This asbestos-bearing stone has been used—often in a dusty, unbound form—in surfacing hundreds of roads, school playgrounds, and park recreation areas, not to mention innumerable private driveways and parking lots.

Evidence that such uses of the stone have contaminated the ambient air with asbestos fibers and possibly created a serious public health hazard was presented in a research report published in the 17 June issue of *Science*.* According to the report, five air samples were taken in residential and school areas in the Rock-

*Entitled "Environmental asbestos pollution related to use of quarried serpentine rock," this report was prepared by Arthur N. Rohl, Arthur M. Langer, and Irving J. Selikoff, all of the Environmental Sciences Laboratory, Mount Sinai School of Medicine, City University of New York [*Science* **196**, 1319 (1977)].



The mineralogy of the counties and regions blacked in above is such that quarries found in them may produce asbestos-bearing rock. The map was prepared by the Environmental Defense Fund from information derived by the Mining Enforcement and Safety Administration from reports by Batelle/Columbus and the U.S. Geological Survey.

ville vicinity, with the sampling equipment placed 10 to 100 meters from roads surfaced with stone from the quarry. The average concentration of chrysotile asbestos fibers found in these samples was approximately 1000 times greater than the average found in an earlier investigation in which samples had been taken in 49 American cities.

Irving Selikoff of the City University of New York's Mount Sinai School of Medicine—one of the authors of the report—and his associates have established that the inhalation of asbestos (the generic term for the several kinds of hydrated silicates which, when crushed, separate into millions of fibers) can lead to cancer after a latency period of 20 to 40 years. It has been shown, moreover, that, while the risk has been greatest among asbestos workers, even nonoccupational exposures have been found to pose an increased risk of mesothelioma—a rare cancer of the lining of the chest cavity or abdomen, of which asbestos is the only known cause.

But Selikoff and his colleagues have been reluctant to translate the kind of air sampling data collected in Montgomery County into a specific assessment of health risks. As they have acknowledged, such assessments involve a number of imponderables, such as the effect of fiber particle size and of various levels and durations of exposure. Furthermore, there is to date no epidemiological evidence that fibers from stone taken from the Rockville quarry over the past decade or two have caused either mesothelioma or lung cancer, although, in view of the long latency period for cancer, this cannot be considered reason for complacency.

Indeed, the evidence of a possible cancer threat has been such as to move county, state, and federal officials to initiate emergency remedial measures. Montgomery County is now committed to a program of dust suppression that will involve extensive resurfacing of roads, playgrounds, and recreation areas at a cost of up to $7 million. The Maryland Environmental Health Administration is developing regulations to prohibit further use of asbestos-bearing stone in an unbound form and to have all public or private entities that have used such stone in the past to prepare and execute remedial plans wherever necessary to protect public health.

As for the U.S. Environmental Protection Agency, its officials are proceeding on the assumption that there may be a serious problem nationally as well as locally. The mineralogy of extensive regions within the United States suggests that many of the rock quarries found in them may also be producing asbestos-bearing stone (see map). For example, the belt of serpentinite on which the Rockville quarry is situated extends from Maine to Alabama and takes in much of the Appalachian Mountains.

Walter Barber, EPA's deputy assistant administrator for air and waste management, told *Science* that, as an initial step, his agency would require quarry operators in all suspect regions to have samples of their rock analyzed to determine whether asbestos is present.

It has been generally believed that the asbestos fibers in the ambient air of urban regions come mostly from automobile brake linings, clutch faces, and mufflers and from the demolition of buildings in which asbestos has been used for insulation or fireproofing. But about 18 months ago. Don Maxey, a physics teacher at a Germantown high school who also happens to be a rockhound and something of an environmental activist, began to speculate that in Montgomery County the serpentine rock being quarried by the Rockville Crushed Stone Company might be an important source of such fibers.

Acting on this surmise, Maxey one day in June of 1976 collected a few samples of serpentinite dust from along a roadway at the Rockville quarry and from the leaves of some bushes and trees nearby. When he examined these samples under an ordinary low-power microscope of the kind used by high school students, he found his suspicions confirmed. "It was asbestos fiber, no doubt about it," he later told a Washington *Post* reporter. At first he saw nothing, he said, but, with the microscope turned to 400-power, the greatest magnification of which it was capable, there they were: the straight, glasslike fibers of asbestos.

After Maxey had discussed the matter with Raymond Kent, a rockhound and teacher of life science at a Rockville junior high, it was decided that Arthur N. Rohl, one of Selikoff's associates at Mount Sinai, should be invited to come down and verify Maxey's findings. So, on a Sunday late last August, Rohl, accompanied by Maxey, Kent, plus a Rockville city councilman and a few others, put on hard hats and visited the quarry.

The rock and dust samples which were collected, some inside the quarry and some outside, were quickly analyzed at Mount Sinai. The result was a sensational story on page one of the Washington *Post* on 11 September. "Significant levels of cancer-causing asbestos fibers have been found on leaves, dust, and roadways in and near a Montgomery County quarry . . . ," the story began. Selikoff was quoted as saying, "The fibers go on for miles. I'm sure they are all over Washington, and have been for decades." The story noted, however, that the quarry was in compliance with all existing local, state, and federal antipollution standards.

A few days before the *Post* story appeared, David Rall, director of the National Institute of Environmental Health Sciences, authorized Selikoff and his as-

sociates to pursue, under their NIEHS grant, the further research that was ultimately to lead to the research report in *Science*. And, soon after the *Post* story was published, the Rockville Crushed Stone Company hired a research consultant of its own, James R. Dunn, head of Dunn Geoscience Corporation, North Latham, New York. At the same time, federal, state, and local officials began to take up the problem, some in obvious embarrassment at the fact that the *Post*'s disclosures had caught them by surprise.

As it happened, Robert H. Harris, a staff scientist with the Environmental Defense Fund in Washington, and his wife Stephanie, also an EDF staff member, live only a few miles from the quarry. Uneasy about all the pesticides, fertilizers, and other chemicals used in commercial agriculture, the Harrises do organic gardening, keep chickens so as to have a supply of fresh eggs, and produce nearly all of the food they eat. For them to learn that their home and garden was a stone's throw, so to speak, from what might be a dangerous source of asbestos fibers was a cruel discovery.

"Appalling Ignorance"

After attending a meeting of county, state, and federal officials which was called a few weeks after the *Post* story came out, Robert Harris became quite disillusioned. "There was an appalling degree of ignorance about the health hazards of asbestos," he recalls. Harris also detected what he felt was a tendency on the part of the officials to downplay the importance of the problem.

Then, to make things worse, a maintenance crew showed up one day and began resurfacing the road in front of the Harris home with liquid asphalt topped by crushed stone from the Rockville quarry. Each passing car raised a cloud of dust.

Harris remembers speaking one night at a civic association meeting in a community of $150,000 homes immediately downwind from the quarry, and discovering how hard it was to overcome public ignorance and apathy with respect to the asbestos problem. "A real estate woman who lived in the community got up and urged the other members not to make a public clamor, because if they did, she said, their property values would suffer," Harris says. The association did ask the county to conduct a survey of air quality, but let the matter go at that.

Yet, even though public interest in the asbestos issue had fallen off since the ripple of concern that followed the first Washington *Post* story, documentation of the problem was advancing. Harris collected some dust samples himself, including one at an elementary school bordered by a road recently resurfaced with crushed stone from the quarry. And Rohl came down again from New York, staying with the Harrises for several days while he collected more samples.

By early spring two developments had begun to make the asbestos problem a major political issue in Montgomery County and to push it high up on the agenda of the state and federal environmental agencies. One was the completion of the study by Rohl and his two Mount Sinai collaborators, Selikoff and Arthur M. Langer. The other was a boycott at the Watkins Mill Elementary School in Gaithersburg.

As is now common knowledge among all who have been deeply involved with the asbestos problem, the research report by Rohl and his colleagues was refereed by several EPA scientists and word of its findings spread rapidly and widely. For instance, on 31 March the *Montgomery Journal*, a suburban newspaper, led its front page with a story saying that, with *Science* "preparing to publish a reportedly alarming article about cancer-causing asbestos particles in the air of Montgomery County, the federal government this week stepped up air sampling here to determine the danger to residents."

The school boycott at Watkins Mill Elementary occurred after the city of Gaithersburg began resurfacing part of the heavily traveled road in front of the school with crushed stone from the quarry. Don Maxey alerted Robert Harris to dust conditions at the school and Harris alerted a local television reporter who gave the problem a new prominence by interviewing Harris and Selikoff for his evening news show.

Meeting in some alarm, the school PTA voted to put up a sign advising parents to keep their children home from classes. Attendance the next day was down by a third, but it returned to normal once the city, moving to quell the parental uprising, quickly got the road repaved.

What with this brief but well-publicized boycott and citizens demands for a moratorium on further use of the crushed stone and for repaving numerous roads, Montgomery County officials were now really feeling the heat. In April, John L. Menke, president of the county council, and James P. Gleason, the county executive, asked the director of the National Institutes of Health, Donald Fredrickson, for help; as a result, he was to preside over a public forum on the asbestos problem in June.

But, before this could take place, the Environmental Defense Fund (EDF) petitioned EPA to stop the county from using the asbestos-bearing stone for road resurfacing and to require remedial measures where such stone had already been used in an unbound form. EDF also called for an immediate study to determine whether quarries in other states presented a similar problem, and noted that the Mining Enforcement and Safety Administration had found high fiber counts (not necessarily asbestos) at 16 of the 19 quarries thus far investigated in North Carolina and South Carolina. EDF warned that, if EPA failed to act, it would sue the agency under the Clean Air Act for failing to protect the public against an "imminent hazard."

Although EPA chose not to invoke its emergency authority and issue abatement orders to the county, the agency did, on 7 June, formally advise county officials that a "potentially serious hazard to public health" existed and that remedial action was in order. It declared that partial results of its own air monitoring program had confirmed the presence of high concentrations of airborne asbestos along some roadways in the Rockville area, concentrations which it said were equivalent to the levels detected near the Reserve Mining Company's taconite processing plant at Silver Bay, Minnesota.

The EPA Philosophy

The agency set forth its philosophy and approach for dealing with the problem as follows:

> Although the quantification of the health effects risk to be associated with specific concentrations, fiber dimensions, and fiber compositions may be uncertain, the concentrations . . . are so high as to justify our immediate concern for the health of persons thus exposed. Safe levels of carcinogenic substances have not been established. Therefore, the proper public policy should be to act to minimize to the greatest extent possible emissions of such substances.

(But Rockville Crushed Stone, Inc., scorns EPA's actions as "decision making governed by publicity and fear of criticism" rather than by sound scientific analysis. Specifically, the company complains that EPA based its advice to the county on limited and "unconfirmed" sampling results rather than waiting for results from the elaborate testing protocol which the agency had devised. Also, the company says that for EPA to take such extreme actions in the "guise of recommendations" is an "abuse of power.")

Speaking Up for an Imperiled CEQ

By his sharp challenge to conventional "pork barrel" politics and apparent commitment not to retreat from quality of life goals for the sake of energy production or economic development, Jimmy Carter has been getting good notices from most environmental groups, many of whose leaders and members supported him last year as a candidate for President. But, to the environmental leaders' astonishment, the President's Council on Environmental Quality (CEQ), which ever since its creation in 1970 has been something of a symbol of the environmental movement's coming of age, now stands in peril of being dismembered if not abolished outright.

Carter is to submit a plan for the reorganization of the Executive Office of the President (EOP) to Congress by mid-July. While at this writing the fate of CEQ remains undecided, it is clear that the President's advisers on executive reorganization believe that the council should lose some of its major functions. The environmentalists fear, in particular, that CEQ will lose its oversight of federal agency compliance with "NEPA," or the National Environmental Policy Act, and the NEPA requirement for environmental impact statements. Any clout that CEQ has within the bureaucracy, many environmentalists believe, is largely due to the NEPA oversight function. Also, this activity is closely related to another increasingly important function of the council—coordinating policies (such as those on toxic substances research) involving two or more agencies.

On 1 July, a dozen representatives of environmental groups and other interested organizations (namely, the League of Women Voters and the steel and auto workers' unions) met for 2 hours with Richard A. Pettigrew, the President's assistant for reorganization, and certain other key officials such as Harrison Wellford, associate executive director of the Office of Management and Budget for reorganization, and A. D. Frazier, the Atlanta banker who was brought in to develop plans to reorganize the EOP. The President's men did not divulge specifically what was being recommended to the President, but, from the drift of the discussion, the environmental leaders got an idea of what might be afoot and they did not like it.

William K. Reilly, president of the Conservation Foundation (and a former CEQ staff member), said that they were shown a summary of six options. Under two of the options, CEQ, which is made up of three presidentially appointed council members and has a staff of 30 professionals, would either remain largely as it is or benefit from an increase in staff. But it was apparent to Reilly and others present that this was not what the reorganization officials had in mind. During his campaign Carter pledged that the White House and EOP staffs would be substantially reduced.

Other options for CEQ included transferring the council and all of its functions to the Department of the Interior; abolishing the council as a statutory body and replacing it with an environmental quality adviser to the President, with NEPA oversight to be transferred to Interior; abolishing CEQ eventually, but with all decisions as to the disposition of its functions deferred until plans for a larger reorganization of the government's natural resources management activities can be worked out; and, finally, keeping CEQ as a part of the EOP, but reducing its functions and staff, chiefly through transferring NEPA oversight to the Environmental Protection Agency (EPA).

Reilly and the other environmental leaders present argued that, besides reducing CEQ's clout and influence, divesting the council of NEPA oversight would be a mistake because either EPA or Interior, as an operating "mission" agency, would often find itself in the awkward position of judging its own performance if it were given this oversight role. At one point Frazier asked whether the environmentalists would feel the same way if a new Department of Natural Resources were created. The answer was, yes, they would.

After the meeting, Reilly remarked that it is ironical that CEQ should have survived the Nixon and Ford years only to find itself in a crisis early in a new administration which environmentalists have found generally sympthetic to their cause.—L.J.C.

By 8 June, when Fredrickson conducted a public forum on the asbestos problem at NIH, the county was pretty much committed to taking most of the steps EPA had recommended. But County Executive Gleason used the forum to ask why only Montgomery County was being singled out for attention when it appears that the county's problem is generic and might be only the first evidence of one that can be found in many other places where rock quarries are present. "We will do what we have to do in Montgomery County [to stop the exposure]," Gleason said. "But why aren't we moving nationwide?" he added, throwing down the gauntlet to the EPA officials at the forum.

The county clearly would like some federal financial assistance in carrying out all the necessary remedial measures, and this helps explain why Gleason wants the national implications of the asbestos problem pointed up. Nevertheless, as EPA officials such as Walter Barber willingly acknowledge, Gleason's question deserves an answer.

According to Barber, once the magnitude of the potential problem can be assessed from laboratory analyses of rock samples from the quarries around the nation, the agency will be in a better position to issue regulations. One obvious possibility for the EPA administrator would be not to allow the use of rock containing a significant amount of asbestos in an unbound form on roads or in other places where the public can be exposed to the airborne fibers.

Case-by-Case Approach

Also, the agency could proceed case by case and see to it that the state and local governments fashion remedies appropriate to the particular problem at hand. Barber indicates that, in his view, the regulatory approaches mentioned above would be simpler and better than establishing an ambient air standard for asbestos and trying to regulate the use of asbestos-bearing stone on the basis of that. But Harris of EDF thinks the agency cannot avoid the latter course, complicated though it may be. "Practically, I don't see how EPA can set regulations without establishing a relationship between the amount of asbestos in the rock being quarried and the amount of asbestos in the air," he says.

In any event, the Rockville quarry is likely to become another landmark for environmental policy-makers in their long and seemingly ever-broadening effort to identify and control the sources of possible carcinogenic substances.

—LUTHER J. CARTER