ahead, damn the torpedoes and the likelihood of major cost overruns.

Senator McIntyre has denounced Secretary of Defense Schlesinger for his "postwar follies" remark, suggesting that the real follies are not in Congress but in the Pentagon. An outside witness to defense decision-making, in the Pentagon and in Congress, may be tempted to dispense his criticism evenhandedly, with plently for all parties.—LUTHER J. CARTER

Auto Pollution: Research Group Charged with Conflict of Interest

One of the first issues that Russell Train, the nominee for administrator of the Environmental Protection Agency (EPA), will have to decide if and when he takes office, will be what to do about that agency's role in automotive pollution research. Train's predecessor, William Ruckelshaus, promised Congress that he would reassess some of the agency's close research ties with the auto and oil industries it regulates.

At issue is EPA's participation in a key research organization, called Coordinating Research Council–Air Pollution Research Advisory Committee (CRC-APRAC), which has sponsored much of the research that has been important to federal regulation in the battle to clean up the nation's air. CRC-APRAC is supported by the auto industry, the oil industry, and the EPA.

However, a few months ago Ruckelshaus promised Congress:

> If it [EPA participation in CRC-APRAC] gives the appearance to you and possibly to others that this has compromised our position, we will have to cease this association. . . .

An internal review is under way at EPA, and a report is due soon.

Because three-fourths of the $20 million that the group has spent to date has come from the American Petroleum Institute (API) and the Motor Vehicles Manufacturers' Association (MVMA), with only the remaining fourth from the government, CRC-APRAC has been accused by public interest lobbyists and members of Congress as having a pro-industry bias. Moreover, because it puts the regulated industries in bed with the agency that regulates them, the arrangement, says the pollution guru of Congress, Senator Edmund Muskie (D–Me.), poses a serious conflict of interest for EPA.

The APRAC group is one wing of CRC, a major trade organization which, for over half a century, has been a vehicle for getting the oil and engine suppliers together on some common problems. The APRAC group is unusual to CRC and to other trade research organizations in general because it receives large amounts of federal funding and routinely has federal officials participating in its decisions. The arrangement grew up in the late 1960's, when auto pollution was first becoming recognized as a national issue and when research funds for EPA's predecessor in the field, the National Air Pollution Control Administration (NAPCA), were scarce. Now, however, critics argue that EPA should be pursuing a "Caesar's wife" policy and keep itself above suspicion in its regulation of the auto industry, and that the CRC-APRAC tie is compromising.

The alleged conflict of interest which Muskie and others see in EPA's tie with CRC-APRAC, however, may be only the tip of the iceberg. Almost without exception, when a research scientist is funded by CRC-APRAC, he is already taking money from both the industry being regulated and the regulator. But this potential conflict is further tangled by the fact that many of CRC-APRAC's contractors, separately, depend on the auto or oil industry for a major share of their business. Some take money not only from the industry, but from EPA too. What emerges is not a clear-cut line between scientists working for EPA and those working for industry, but, instead, a murkier set of in-group relationships. Small wonder then, that, after 5 years of national effort, many apparently simple technical questions relating to auto emissions control remain hotly disputed.

Of CRC-APRAC's foes, the best-known is Muskie. In hearings last April on the EPA postponement of the 1975 emissions control deadline that was imposed by the 1970 Clean Air Act, the Maine Democrat challenged the objectivity of studies done by a researcher who has done much of CRC-APRAC's work on the health effects of carbon monoxide (CO), Richard D. Stewart of the Medical College of Wisconsin in Milwaukee. Stewart had found evidence that the average level of carboxyhemoglobin—an indicator of CO poisoning—in the blood of nonsmokers across the country was below 2 percent, which is the safe limit now used in federal regulation. (Stewart also found carboxyhemoglobin in the blood of smokers to be higher than that in nonsmokers.) Muskie, illustrating why CRC-APRAC researchers are accused of bias, pointed out that Stewart's work had been overseen by a typical CRC-APRAC panel, headed by a man from the General Motors Corp. (GM), with people from Phillips Petroleum Co., Marathon Oil Co., another GM man, and one EPA representative, who, Muskie added sarcastically, was "slightly outnumbered." Muskie also waved a full-page Chrysler Corp. ad publicizing Stewart's results, and he said, "Chrysler is the one automobile manufacturer which has attacked the health basis of the 1975 standards. It is that information which is going to be peddled around the country . . . for the purpose of attacking the basis of the 1970 Act."

(In fact, Stewart's findings, as written up by Associated Press and carried in newspapers across the country, were interpreted as evidence of the heavy influence of smoking in CO poisoning, a finding which other researchers on health effects—such as John Goldsmith of the California State Health Department—believe may be valid but nonetheless distracting from the main point: that susceptible people, involuntarily exposed to CO from auto exhaust, suffer adverse health effects.)

Muskie listed other panels of CRC-

APRAC where big auto and oil companies are generously represented, while EPA employees are outnumbered—sometimes by 12 to 1. He argued that the auto companies take advantage of EPA's support of CRC-APRAC to give its work credibility, and then publicize their own interpretations of it.

> The shadow of EPA's involvement can be used and will be used to give the aura of credibility, official credibility, to statements made by Chrysler like this, challenging the health basis of the act. . . . I say the answer is to provide adequate funds and not lean upon industry to do the job.

Whether or not EPA is really an equal partner in CRC-APRAC hinges on the extent to which it exerts an influence on the group's deliberations. The CRC-APRAC's full-time officers, general manager Milton K. McLeod and project manager Alan Zengel stated in interviews that most of the group's decisions are made by the APRAC committee, which has 6 EPA representatives out of a total of 21 members.* The APRAC committee decides, without formal outside review, what work shall be undertaken, and who shall be appointed to the many subpanels, such as the one Muskie listed during the hearings, which supervise the research work itself. As to the government officials being outnumbered, McLeod and Zengel admitted (and EPA officials confirmed) that the panels often make decisions by voting, and that sometimes EPA people vote one way with the industry people voting the other.

However, not only do the oil and auto companies appear to dominate much of CRC-APRAC's decision-making, but the groups which CRC-APRAC selects to perform its research, in turn, depend for their livelihoods on business with these same industries. The most obvious example is that part of CRC-APRAC's work is funded by fuel companies and performed by fuel companies, and deals with matters in which they have a vital interest. CRC-APRAC has given a total of approximately $1 million to three oil companies: Esso Research and Engineering Co., a subsidiary of Standard Oil of New Jersey, which is studying the effectiveness of two well-known emission control devices, thermal reactors, and dual catalysts; Ethyl Corp., where changes in fuel volatility, a suggested means for lowering harmful emissions, are under study; and Phillips Petroleum Co. One of the major decisions EPA must make is whether short-term measures, such as altered fuels, and add-on gadgets, such as the dual catalyst, can be substituted by Detroit for a major switch to a new type of auto engine with new fueling requirements.

In addition to funding oil companies directly, CRC-APRAC supports other contractors who, in turn, depend on oil and auto companies for a major share of their business—a situation that again raises the question of their stake in the outcome of the research. The largest CRC-APRAC contractor is TRW Systems, which has gotten $3.3 million from that group. Despite its reputation among scientists as an aerospace firm, the parent company, TRW Inc., in fact does approximately 40 percent of its worldwide business (its annual sales are $1.6 billion) making and marketing vehicle parts. Thus, it is very much an interested party in federal regulations affecting the auto industry. TRW Systems, the research arm of this giant, has studied all aspects of vehicle maintenance and inspection for CRC-APRAC. The issue of vehicle maintenance and inspection has been a bone of contention between the industry and the government ever since the 1970 act passed Congress. According to Charles Heinen of Chrysler Corp., and CRC-APRAC's chairman, the auto manufacturers have been arguing that strict maintenance and inspection policies to keep existing auto antipollution equipment clean would serve to meet emission standards. But EPA standards setters have countered that such a policy, emphasizing maintenance, would de-emphasize the need to improve the quality of the original equipment installed in the car. They have said that this would therefore shift the burden of the clean car from the manufacturer to the owner or his garage mechanic.

The second largest recipient of CRC-APRAC money has been Scott Research Laboratories, Inc., one of the country's leading makers of air pollution measuring equipment. In the last 3 years, Scott has done about half its business, or about $3.8 million, with auto and fuel companies and their trade associations. Additionally, CRC-APRAC over the same period has spent an added $1.1 million at Scott.

One of Scott's major projects for CRC-APRAC has been studies of vehicle use patterns, or what EPA regulators term "driving cycles." A driving cycle is a package of information on when and where various types of vehicles—trucks, cabs, cars, and others—are used, at what speeds they are run, at what temperatures, and so forth. Data on actual vehicle use, which in turn go into making up the EPA driving cycle, has been a central issue to many ongoing disputes over emissions control, since one of EPA's standards setting jobs is to determine the driving cycles, which in turn determine the performance standards that manufacturers must make their engines meet. According to Malcolm Smith, one of Scott's principal investigators on the vehicle use studies, at the termination of the CRC-APRAC sponsored work, the auto industry took the data to EPA and used it to argue that existing federal "driving cycles" be reexamined, but EPA refused.

One of the largest contractors to CRC-APRAC has been the Stanford Research Institute at Menlo Park, California, which has received $1.3 million in the last 5 years. John Eikelman, SRI coordinator of environmental research says that a major portion of SRI's industrial environmental research has been with the petrochemical industry, including measuring pollutant damage to vegetation, identification of crude oil in spills, and other work. SRI has also worked on catalytic emission control systems and auto parts for various other industry sponsors. For CRC-APRAC one principal researcher, Harris Benedict worked on a nationwide assessment of damage to crops attributable to air pollution; but even this work illustrates how the thrust of CRC-APRAC research, despite its intrinsic interest and merit, keeps coming back to regulatory issues in which EPA is involved up to its ears.

The SRI researchers surveyed dollar value losses to corn, citrus, and other food crops and to ornamental plants, indexed them geographically, and came up with an overall annual loss estimate of $132 million, far less than a previous estimate of $500 million. The finding that air pollution doesn't do

* The APRAC group consists of: C. M. Heinen, Chrysler Corp., chairman; J. W. Blattenberger, Cities Service Oil Co.; D. L. Block of Ford Motor Co.; C. E. Burke of American Motor Corp.; R. A. Coit of Shell Oil Co.; R. E. Eckhardt of Esso Research and Engineering Co.; E. F. Fort of International Harvester Co.; D. G. Levine of Esso Research and Engineering Co.; E. D. Marande of Ford Motor Co.; C. E. Moser of Texaco Inc.; E. H. Scott of Standard Oil of Ohio; P. D. Strickler of Gulf Research and Development Co.; C. S. Tuesday of General Motors Corp.; R. B. Welly of Jeep Corp.; D. W. Innes of Ford Motor Co.; and, from the Environmental Protection Agency, A. P. Altshuller, J. F. Finklea, R. E. Harrington, Kay Jones, Eric Stork, and H. L. Wiser.

as much damage to crops—which after all are mostly in rural parts of the country—as had been feared has proved useful in arguing against cleaning up every single automobile in the nation; it indirectly strengthens the hand of those who want a geographic national pollution control strategy limited to urban areas, where air pollution is worst. Another SRI-performed study found that soil is a natural "sink" or absorber of CO. This is a finding which clearly affects the debate over whether overall CO levels are increasing or decreasing, and, hence, over the urgency of man's need to reduce them. Both studies, then have a link, albeit indirect, to EPA's regulatory role.

CRC-APRAC's research program must be viewed in light of the fact that some of it is performed by the oil companies themselves, some by groups who depend or have depended heavily on oil and auto companies for their business—both of which have some stake in the regulatory game. A third pattern among CRC-APRAC contractors, and one that further muddles the issue of who works for whom, is that many of the smaller CRC-APRAC contractors also take money from the American Petroleum Institute and the Motor

Briefing

Air Force Won't Sell Agent Orange

Certain herbicides have been criticized for their persistence in the environment, but the controversies about them can be fairly persistent too. A case in point is Agent Orange, a military herbicide containing the teratogen dioxin, which was banned from use in Vietnam in 1970 after reports of an unusual number of stillbirths and defective fetuses in provinces where it had been sprayed heavily. Now, the Environmental Protection Agency (EPA) has finally announced that it would not allow the Air Force, which has 2.3 million gallons of leftover Agent Orange in rusting barrels, to market these stocks domestically. The EPA denial will also stop the Air Force from giving it to foreign countries, such as Brazil and Venezuela —a transaction some eager businessmen had been seeking (*Science*, 6 April). In addition, EPA has promised Senator Gaylord Nelson (D–Wis.) a complete review of dioxin itself, which is now suspected of being highly toxic in small doses, as part of an ongoing review of 2,4,5-T, a dioxin-containing herbicide that is still used in the United States, and that is also found in Agent Orange. EPA plans a formal hearing in April 1974.

The decision to deny the Air Force's application to market its Agent Orange would seem to close the door on the episode and leave the military on its own to find a feasible method of destroying the stocks. However, earlier this summer, the Eugene, Oregon, newspaper, the Eugene *Register-Guard*, disclosed that the Air Force had in fact already been using Agent Orange in so-called "test plots" in five states, including Oregon, where a local university professor had managed to obtain some of the stocks. In response to *Register Guard* articles, the EPA regional office in Washington investigated the professor's use of the herbicide, which was on private land, and found it, from a legal vantage point, to be a "gray" area. Meanwhile, the Air Force has admitted it shipped Agent Orange for testing purposes to bases in Utah, Kansas, Florida, and Texas. But since it hasn't yet said why at least one private investigator was given possession of the herbicide, or anything about the tests in other states, some questions in the controversy, then, remain unanswered.

—D.S.

Medvedev Can't Go Home Again

In a move probably designed to quell internal dissent, the authorities in the Soviet Union on 7 August revoked the citizenship of the prominent Soviet gerontologist and writer, Zhores A. Medvedev, while he was in London on a scientific visit. Medvedev, who is identified with the Russian civil rights movement, and who was once confined to a mental institution as punishment, has stated he plans to appeal the decision.

Taas, the Soviet news agency, has confirmed that the scientist's citizenship has been revoked "for actions discrediting the high title of citizen of the U.S.S.R." As in the case of physicist Valery Chalidze, whose passport was seized when he was in New York last year, no more precise explanation has been offered officially. However, a State Department Russian expert said there was no question in his mind but that the Soviet government—as in the case of some of those who have emigrated to Israel—has taken these actions as a means of ridding itself of those who have been stirring up trouble at home.

(In a related move, the Department of Physics at Princeton University has invited the noted physicist and creator of the Russian hydrogen bomb, Andrei Sakharov, to take a post there. Sakharov hasn't yet replied to Princeton's written requests —which could indicate either that he hasn't received them because they have been intercepted in the mails or that the authorities haven't decided whether to let Sakharov go.)

As to the reaction of American scientists to the move against Medvedev, at week's end, the Federation of American Scientists, which has identified itself with the Committee on Human Rights, a small Russian civil liberties group to which both Sakharov and Chalidze belong, issued a statement warning that U.S. scientists' "patience with foreign and/or domestic restrictions on scientific freedom" in the Soviet Union "will rapidly decline." And Max Delbrück, the 1969 Nobel laureate who has met with Medvedev in Moscow several times, stated that the revocation incident will "seriously hurt United States–Soviet scientific relations. . . . Our willingness to intensify open contact between the Soviet Union and the United States will decline rapidly," Delbrück said.

—D.S.

Vehicle Manufacturers' Association directly, from the oil and auto industries, and in some cases, from the government too. An all-in-the family pattern appears to characterize the winning and losing of pollution research contracts. For example, Smith, at Scott Laboratories, noted that after EPA declined to accept the industry's interpretation of its surveys of vehicle use to reexamine the driving cycles, Scott was able to continue the work through MVMA sponsorship anyway. Another case was that of Wilbur Smith Associates, an international transportation consulting firm, which had research and development contracts simultaneously with EPA and with CRC-APRAC. According to one of the researchers there, Wilbur Smith Associates has subcontracted a part of its work to a Bedford, Mass., aerospace firm GCA Corp., which, oddly enough has in addition held its own contract directly with CRC-APRAC. Many of the principal investigators interviewed remarked that these overlapping, interlocking contract awards were typical of the auto emission research business, and some added that it was also a characteristic of the aerospace-defense department business in which many of these investigators previously worked. In fact, several major university centers for air pollution work are conspicuously absent from the list of 40-odd CRC-APRAC contractors, whereas about 14 of the contractors are firms prominent in the aerospace field. Many of the investigators interviewed said they personally had done aerospace work: "I got tired of making bomb calculations," said one. "Working on environmental problems seemed to be a good thing to do," said another. But an EPA official who sits on some CRC-APRAC panels offered a less sanguine view: "The only thing worse than an unemployed aerospace engineer," he quipped, "is an unemployed aerospace engineer who has gone to work on the environment."

Interviewed about the soundness of policies which appear to encourage researchers to take money from both EPA and the auto and oil industries, many of the investigators retorted, "How else would you do it?" Many pointed out that just giving more money to EPA—with a proviso that EPA get out of CRC-APRAC—which is what Muskie's staff is considering doing—would not solve the problem, since EPA has as much stake in the outcome of the research as the industry does. A California air pollution expert, however, made another suggestion which others echoed: that a separate government body, serving in effect as a third party to the controversy, become the prime sponsor of auto emissions research. "I'm amazed that parts of HEW [the Department of Health, Education, and Welfare] have been overlooked in all this. Why shouldn't they build up a capability in the NIEHS [National Institute of Environmental Health Sciences]? . . . They're good. They'd be ideal. . . . But they've been ignored."

—DEBORAH SHAPLEY

America Burning: Congress Eyes a National Fire Program

Fire is something the average American doesn't give much thought to unless he wakes up one night to find flames curling up his stairway. Despite the enormous toll fires take each year (some 12,000 lives; $11 billion in damage), local fire departments are generally given low priority when budget time comes around.

Fire chiefs are sometimes chosen on the same basis the local dogcatcher is; small departments have no way of training fire fighters. Fire departments tend to be rather provincial in that each has its own way of doing things, and there is little communication or exchange of information among them. Equipment is often outdated, and hose sizes are so varied that, when a large fire occurs in one district, a neighboring department may be powerless to help because its hoses don't couple. Despite the fact that some large government agencies have made significant advances in fire-fighting technology, the people in the rest of the country don't know about it. And if they do, they can't afford to take advantage of it.

Perhaps most serious of all, the citizens of the United States have at best a dim grasp of the concept of fire prevention. Thanks to the Forest Service, everyone knows about Smokey the Bear and the need to prevent forest fires. But when it comes to fires where people live and work, fires tend to be regarded more as acts of God than as the results of human misbehavior ranging from faulty wiring to arson.

Congress took the first step toward bringing fire research and prevention into modern times with the Fire Research and Safety Act of 1968, which created a National Commission on Fire Prevention and Control. But the commission didn't get funded until 1971. Finally it came out with its report "America Burning,"* in May of this year.

The commission, chaired by Richard E. Bland, an engineering research professor at Pennsylvania State University, recommended a program that it said would cost the nation about $150 million a year and would halve the nation's casualties from fire within a generation.

First, it called for the establishment of a U.S. Fire Administration, to be situated in the Department of Housing and Urban Development (HUD). The cornerstone of the administration would be a National Fire Academy, which would train fire officials, offer extension courses, guide state and local training programs, and conduct campaigns to educate the public on fire prevention. A national data system would be developed. The most expensive part of the plan would be an $83 million-a-year matching grants program to communities for developing "master fire plans," setting up local training programs, buying new equipment, and collecting data.

Finally, the commission recommends a research program costing $26 million

* Available from Government Printing Office, Washington, D.C. 20402, for $2.35. Stock No. 520-00004.

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