sory committees and public meetings and by encouraging officials to be accessible to outsiders. This has increased the burden of EPA officials directly involved in the endless round of meetings and memos which move forward the rulemaking process. A hard-working group of bureaucrats, these officials have been lashed to the mast for nearly a year working long hours, often 7-day weeks; many have had no vacations since the push began. A source of restraint among the critics is the awareness that the regulators must contend constantly with ambiguity. As Muskie said in the recent hearings, "the Agency will be required to develop a program and a set of regulations based on many 'unknowns.' "

In dealing with toxic substances, EPA must administer a law which Congress left unspecific on many points. The agency's line of authority is often less than clear and the science uncertain. As Jellinek and other EPA officials have said, reaching a decision on unreasonable risk will be to some extent subjective.

If the regulators must live with ambiguity, the goals are clear enough. As one assistant administrator put it, "the ultimate test of success is whether we can cut down the number of after-the-fact calamaties, and the sad jokes about the chemical of the week."—JOHN WALSH

Industry Council Challenges HEW on Cancer in the Workplace

Health, Education, and Welfare Secretary Joseph A. Califano made headlines in September when he released a report that projects a massive increase in cancer due to occupational exposure during the next two decades. Last week the American Industrial Health Council (AIHC), an industry group organized to combat stiff new rules proposed by the Occupational Safety and Health Administration (OSHA) to govern carcinogens, released a counterreport suggesting that the first report was little more than a figment of the collective imaginations of the government investigators. At least one of the authors of the HEW report, David P. Rall, director of the National Institute of Environmental Health Sciences (NIEHS), dismissed the rebuttal as "what might be expected of industry." Nonetheless, the AIHC report appears to demonstrate some rather serious errors in the HEW report.

Califano's motives for placing the report in the record of the hearings on the proposed OSHA regulations have been impugned by industry representatives because the report does not seem germane. It does not address conditions existing in industry now or that may exist in the future. It argues, instead, that because of conditions that have existed in industry during the past 30 years or more, the proportion of cancer in the United States attributable to occupational exposure will shortly climb from the present range of 1 to 5 percent to a much more alarming range of 20 to 40 percent. Industry thinks this is simply a scare tactic designed to buttress support for the rigid proposed guidelines. The AIHC report argues, furthermore, that the government report grossly exaggerates both the risk associated with exposure to various carcinogens and the number of workers who have been exposed to them.

The dispute can be divided into two major categories: projections about asbestos exposure and projections about exposure to other carcinogens. The government investigators used different methodologies in the two cases, and the AIHC report thus attacks them on different grounds. AIHC investigators have placed much of their emphasis on asbestos, but their most telling arguments involve other carcinogens, including arsenic, chromium, nickel, and petroleum distillates.

For carcinogens other than asbestos, the government investigators relied heavily on a 1974 study known as the National Occupational Hazard Survey (NOHS). This 2-year study was commissioned by the National Institute of Occupational Safety and Health to determine, among other things, "the extent of worker exposure to chemical and physical agents." The NOHS investigators visited a representative group, statistically selected, of business establishments and noted any exposure (without noting the degree of exposure) to any of 198 specific chemical and physical hazards. The NOHS report concluded that 38.2 million employees had nearly 4.38 billion exposures, or an average of 115 exposures per worker. The NOHS authors clearly warn that the majority of those exposures are only potential exposures or exposures to minute quantities of material, and that rapid improvements in the workplace would sharply reduce the number of exposures so that the study would become obsolete in 5 to 10 years.

Nonetheless, the government investigators took NOHS data for the number of workers exposed to carcinogens, multiplied that number by a risk ratio indicating an increased risk of tumors associated with exposure to the carcinogen, and multiplied again by the incidence for the type of tumors caused by the carcinogen. Chromium, for example, causes tumors of the respiratory tract. The NOHS data suggest that 1.5 million workers were exposed to chromium compounds during the period of the study. The normal incidence of respiratory tumors in the general population is 131 per 100,000 males over the age of 20. And studies of workers at chromate-producing plants during the 1930's indicated that those workers were five to nine times more likely to develop respiratory tumors than the population at large. Multiplying, the government investigators predicted that there will be 7,900 to 16,000 "excess" respiratory tumors in the future as a result of exposure to chromium. In a similar fashion, they computed that there would be 3,900 to 14,000 excess tumors of the respiratory tract resulting from exposure to arsenic, 350 to 1,400 excess cases of leukemia resulting from exposure to benzene, 7,300 to 16,500 excess respiratory tumors resulting from exposure to nickel compounds, and 9,100 excess lung tumors resulting from exposure to carcinogenic components of petroleum.

These estimates are clearly inflated. In each case, the investigators have taken the highest risk ratio available—ratios obtained for workers exposed to massive concentrations of the carcinogens—and multiplied that by the total number of workers who might have been exposed to the carcinogen, even though most or all of the workers have never been exposed to the concentrations upon which the risk ratios are based. In a simple analogy, one might find that the risk of the driver dying in an automobile crash is one in ten if the automobile is consistently driven at speeds in excess of 120 miles

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per hour, and that there are currently 100 million automobiles on American highways. Using the logic of the government report, one would conclude that there will be 10 million excess deaths as a result of driving at high speeds. This analogy is not as farfetched as it might seem, since the risk of developing a tumor clearly decreases with decreasing exposure to a carcinogen, just as the risk of dying in an automobile accident clearly decreases with decreasing speed.

The investigators have also rather sloppily equated deaths with incidence, even though the number of deaths resulting from a tumor is clearly only some fraction of the incidence, depending on the tumor. In short, the HEW projections are clearly exaggerated.

The dispute about deaths resulting from asbestos exposure is more difficult to resolve. Fairly good data indicate that some 4.5 million people were exposed to asbestos in shipyards during World War II and that another 3.5 million to 6.5 million people in other occupations have been exposed. Some 4 million of that total are believed to have had heavy exposure. Epidemiological studies of heavily exposed workers who have already died indicate that 20 to 25 percent died from lung cancer, 7 to 10 percent from mesothelioma, and 8 to 9 percent from gastrointestinal cancers.

Of the 4 million heavily exposed workers, the investigators thus expect at least 1.6 million to die from asbestos-related cancers, or about five times the number that would be predicted from the normal incidence. They predict that those exposed to lesser amounts would have about one-quarter of this risk. That would bring the total number of asbestos-related cancers to a range of 2.0 to 2.3 million. Since most asbestos-induced tumors are manifested over a period 30 to 35 years after exposure, the number of excess cancer deaths associated with exposure to asbestos would be between 58,000 and 75,000 per year. Such numbers, the investigators say, would amount to 13 to 18 percent of all cancer deaths in the United States.

The AIHC report disagrees with the government report on several specifics. The government investigators, for example, assume that about 1 million of the 11 million exposed workers would be dead by now. The AIHC investigators say standard mortality rates would predict that some 2.5 million of the shipyard workers would have died by now and a substantial number of the other exposed workers also would have died. If the increased risk of asbestos-induced cancer used by the government investigators

Regulators Defend Their Turf

Environmental and health and safety regulation has been on the defensive ever since last winter when the Council of Economic Advisers (CEA) and the Council on Wage and Price Stabilization (CWPS) first zeroed in on it as a contributor to inflation. Thus far, however, the regulatory agencies, which include the Environmental Protection Agency (EPA), the Occupational Health and Safety Administration (OSHA), and the National Highway Traffic Safety Administration (NHTSA), have held their own fairly well against proposals that could have sharply reduced their authority to issue regulations imposing new costs on industry. This was again evident on 24 October in President Carter's special message to the nation on inflation. The new Regulatory Council announced by the President for the coordination and review of proposed new regulations is mild medicine compared to what some White House advisers had first proposed.

Observing that regulation should not be allowed to place unnecessary burdens on the economy, the President noted that earlier this year he had called for review of existing regulations from that standpoint and thorough cost-benefit analysis of proposals for major new regulations (*Science*, 14 July). Now, he said, the new Regulatory Council, to be made up of representatives of the regulatory agencies themselves, will "coordinate regulations to prevent overlapping and duplication" and maintain a "unified calendar of planned new regulations."

All of the relevant units within the Executive Office of the President, such as the CEA, CWPS, the domestic policy staff, the Office of Science and Technology, and the Office of Management and Budget (OMB), will have a chance to review the regulatory calendar and to seek to modify any proposed regulations seen as needlessly burdensome. But, significant as this may be, it is a far cry from what Charles L. Schultze, chairman of the CEA, had proposed. Schultze advocated having the regulatory agencies submit proposed regulations to the OMB each year for a centralized process of review and clearance.

This was a watered-down version of the "regulatory budget" concept which Schultze and others have been suggesting for some time as a desirable, if admittedly difficult, goal to work toward in the future. In its purest form, this concept calls for a process of review and approval for regulations that is closely analogous to the fiscal budget process. That is, the OMB would establish limits agency by agency as to the regulatory costs to be imposed in any given year and the agencies would have to stay within them. This "budget," like the conventional budget, would ultimately be submitted by the White House to Congress for its review and approval.

(As Schultze has acknowledged, the difficulties of carrying out so ambitious a process or anything approaching it would be formidable. For one thing, predicting the costs that proposed new regulations would place on industry and the economy would not be easy.)

Early in October, the Council on Environmental Quality organized a meeting of leaders of the regulatory agencies to discuss what was perceived as a vigorous campaign being waged from a number of industry and governmental quarters to constrain the regulatory process in the name of combating inflation. Subsequently, as these leaders began working closely with the White House staffers who were preparing the President's forthcoming inflation message, they found the Schultze proposal to be front and center.

Alarmed at this, the agency leaders, with Deputy Administrator Barbara Blum of the EPA taking the lead, put their minds to work preparing a counterproposal. The result was the Regulatory Council proposal which ultimately carried the day. According to sources at the CEA, this proposal was agreed to by Schultze himself as an acceptable compromise.

The Regulatory Council is regarded by Blum and others as a kind of "regulatory clearinghouse," and just what this will mean in practice is sufficiently uncertain as to cause some uneasiness in the environmental community. Nevertheless, leaders of the regulatory agencies are taking comfort in the fact that the review of proposed regulations has been entrusted largely to a body which they will make up and run themselves.—LUTHER J. CARTER

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were valid for the shipyard workers, moreover, that population would be extinct by now, they argue.

If all the risks and exposure figures used by the government investigators are valid, the AIHC report argues, the cancer epidemic should have already begun. Using the government figures, and assuming that both the 1 million who have already died and the 4 million most heavily exposed were among the World War II shipyard workers (a rather dubious assumption), the AIHC investigators predict that there should be between 7,000 and 10,000 cases of mesothelioma (which is considered a marker for asbestos-induced cancers) occurring each year. In fact, data from the National Cancer Institute's Surveillance Epidemiology and End Results Program indicate that the incidence of mesothelioma has been rather stable at about 1000 cases per year. Even if the AIHC assumptions are completely wrong, the investigators say, there should be an upward trend in mesothelioma incidence if the government predictions are correct. There is clearly no such trend, AIHC argues, and therefore the government predictions must be much too high.

AIHC representatives criticized the original report on several other grounds including its hurried preparation, its lack of submission to peer review, and the absence of the authors' names on the original summary that was released (the names did appear on the complete paper). These criticisms lose some sting, however, in that the AIHC rebuttal was prepared in about 1 month, it was not subjected to peer review, and no authors are listed on it.

Nonetheless, the rebuttal points out some severe deficiencies of the original report and necessitates the conclusion that its predictions are invalid. A conclusion about whether the incidence of occupationally induced cancer is as low as AIHC says it is, however, will await a more thoroughly prepared report or the test of time.—THOMAS H. MAUGH II

Peabody Museum Contemplates Sales to Reserve Collections

The Peabody Museum of Harvard University, founded in 1866, is one of the world's first museums of anthropology and ethnology. It houses one of the country's half-dozen major anthropological collections.

Like all museums, it does not have enough money. It needs money so badly that it is thinking about selling, or "deaccessioning" some of its paintings. Deaccessioning is a very touchy matter. You never can be sure that you are selling the right thing or getting the right price for it. Every item in a museum has its own history and constituency, its lovers and scholars. There is bound to be a hue and cry from somewhere when people find out that a museum has sold something. Thus it can be seen why former Peabody director Stephen Williams said that "the curator who deaccessions is either a fool or a knave or probably both."

However, there may come a time when the well-being of an entire collection is in such jeopardy—through lack of proper maintenance, preservation, and safety measures—that it seems better to jettison some of the cargo before the vessel founders.

So thinks C. C. Lamberg-Karlovsky, the director of the Peabody, who ever since he took office in July 1977 has been trying to figure out how to get money to initiate a thorough program of preservation, conservation, and security. He wants to raise $3 million, half for the renovation and half to augment the museum's $4.5 million endowment.

The items earmarked for possible sale come from two collections. One is a group of 106 oil paintings by 19th-century portraitist Henry Inman. These are copies of a famous group of portraits of Indians by Charles Bird King that were destroyed by fire. The other is a group of 387 watercolors, oils, and drawings related to North American Indians, part of a collection donated by David I. Bushnell, Jr., who worked at the Peabody at the turn of the century. The total value of both collections has been estimated by New York dealers Hirschl and Adler at $7 million.

Lamberg-Karlovsky explains that the paintings are of minimal anthropological value and have not been used at all for research and teaching, which are the primary functions of the museum. He says they have been stashed away for 40 years where nobody looks at them. A few have been loaned out to art museums—including the most famous piece in the Bushnell collection, a painting by George Caleb Bingham valued at $1 million—but none has been analyzed for anthropological purposes.

The items proposed for sale, says Lamberg-Karlovsky, have been filtered through innumerable groups—the museum's governing board, its visiting committee, a committee from the Fogg art museum at Harvard, the department of anthropology, and finally the Harvard Corporation, which is the ultimate arbiter. The Fogg vetoed the idea of selling the Bingham and several other paintings, which were judged too valuable as art to be sold. Paintings in the Bushnell collection depicting Indian life were also eliminated from consideration, leaving mostly landscapes that do not contain Indians. What remains is a group of works ranging in estimated value from $1,000 to more than $300,000 apiece.

The Harvard Corporation has approved the sale pending the preparation of documents that spell out the legal status of the paintings, indicate the strictures on any transaction, specify the mode of sale and detail the reasons for it. Meanwhile, Harvard has been hearing from a small but vocal constituency, activated through the efforts of a Smithsonian Institution anthropologist, who emphatically disapprove of the proposed deaccessioning.

The Smithsonian curator is William C. Sturtevant, an ethnologist whose specialty is eastern North American Indians. When Sturtevant heard of the proposed sale, he sent letters to 150 anthropologists throughout the land and abroad warning that Harvard was in danger of precipitating "another famous deaccessioning scandal." Sturtevant claimed that Harvard did not have the benefit of expert knowledge on ethnographic illustration, and the fact that the paintings had not been used by scholars did not mean they would not be used in the future. He claimed that it would be impossible to make completely accurate reproductions of the paintings and that these in any case would not yield information on potentially important pictorial details or for "iconographic, stylistic, or physical-chemical research."

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