

an "immediate need for a new institutional setting . . . to fulfill the tasks of evaluation, information, and research and development aimed at improving the management, productivity, efficiency, and effectiveness of the health care industry." Specifically recommended was the creation of an Institute of Health Care Studies by a consortium of organizations from the private sector.

The agriculture and food group's recommendations included calling for a "strengthening of the research and development organization, in both the basic and applied aspects," the Government to select "research emphasis on the basis of its contribution to the effectiveness of the total food system," and for the creation of a mechanism to "better assess consumer and social costs arising from regulatory controls."

How many of these and other recommendations of the science, technology, and economy minisummit will be adopted by President Ford in the coming weeks remains to be seen. All groups taking part in the minisummit apparently felt compelled to argue for a sustained, if not increased, federal budget for R&D and of the importance of R&D to the national economy. And indeed, in Dr. Stever's presentation at the inflation summit, his concluding words focused on that issue: "And, Mr. President, finally you and the Congress must ensure that we continue to excel in science so essential to the long-range economic well-being of the nation." Whether Mr. Ford has been duly impressed must await the details of his inflation fighting program—and perhaps more pragmatically, the details of his fiscal 1976 budget, which promises to be for science and technology, austere at the least.

* Private sector participants: Dr. William O. Baker, Bell Telephone Laboratories; Dr. Donald J. Blickwede, Bethlehem Steel; Dr. Lewis M. Branscomb, International Business Machines; Dr. Arthur M. Bueche, General Electric; Dr. Carleton B. Chapman, Commonwealth Fund; Dr. Paul F. Chenea, General Motors; Dr. Edward E. David, Jr., Gould, Inc.; Dr. Donald S. Fredrickson, NAS Institute of Medicine; Dr. Norman Hackerman, Rice University; Dr. Hans L. Landsberg, Resources for the Future; Dr. Simon Ramo, TRW; Eric H. Reichl, Continental Oil; Vernon W. Rutian, Agricultural Development Council; Dr. Kerr L. White, Johns Hopkins University; Dr. William C. White, Fertilizer Institute; Dr. Philip Handler, National Academy of Sciences; and Dr. Robert C. Seamans, Jr., National Academy of Engineering. Invited experts: Dr. E. A. Crosby, National Canners Association, and Dr. Robert Lund, Massachusetts Institute of Technology. Federal participants: Dr. H. Guyford Stever, science adviser to the President and director of the National Science Foundation; Dr. Malcolm R. Currie, director of Defense Research and Engineering; Dr. Charles C. Edwards, Health, Education, and Welfare Department assistant secretary for health; Dr. James C. Fletcher, administrator, NASA; Dr. John A. Hill and Hugh F. Loweth, White House Office of Management and Budget; Dr. Richard W. Roberts, director, National Bureau of Standards; Norman E. Ross, Jr., White House Domestic Council; and Dr. Alvin Weinberg, Federal Energy Administration.

EPA broadens its definition of carcinogen

A new and apparently precedent-setting criterion for determining the carcinogenicity of a substance was used in Environmental Protection Agency administrator Russell E. Train's Oct. 1 decision to suspend all major uses of Shell Chemical's aldrin and dieldrin pesticides. Mr. Train is of the opinion that, for purposes of "carcinogenicity testing," tumorigenic substances and carcinogenic substances are "synonymous." This interpretation could have a far-reaching impact on EPA regulation of chemical substances. However, it is in sharp contrast to policies of other agencies, such as the Food and Drug Administration, which define carcinogenic substances as those that actually cause cancerous tumors.

Since laboratory evidence has linked aldrin and dieldrin to liver tumors—benign and malignant—in mice and rats, Mr. Train says that he has concluded that the chemicals also can pose a "high risk of causing cancer in man." According to an EPA enforcement official, this criterion will guide future EPA rulings concerning cancer-causing substances. Indeed, an official in EPA's pesticide division tells C&EN, the words "tumorigenic" and "carcinogenic" won't be in the proposed pesticide regulations that EPA intends to issue next week. In their place, "oncogenic" is used to designate any substance that will produce tumors—cancerous or otherwise—in test objects.

In Mr. Train's suspension order, he explains his criterion and why aldrin and dieldrin are carcinogenic to man. He defines a carcinogenic substance as "one that increases the incidence of benign or malignant tumors in exposed animals, decreases the latency period between exposure and onset of tumor, or results in unusual tumors." To Mr. Train, the distinction between benign and malignant tumors is not a reliable indicator of carcinogenicity, because, "in the thinking of most experimentalists, the induction of a benign tumor is merely a stage in the subsequent occurrence of a malignancy." His opinion is backed by a Health, Education, and Welfare advisory panel that has recommended that a "finding of carcinogenicity" be made when a substance is "judged positive for tumor induction in one or more species."

Although Shell protested during EPA suspension hearings on the pesticides that mice were an inappropriate test species and that there is no correlation between mice and human behavior, Mr. Train points out that not only does Shell use mice in their own cancer experiments, but that mice response is similar "pathologically" to that of man. In addition, Mr. Train refutes arguments that carcinogens are species specific, in that, for instance, aldrin and dieldrin might affect mice

but not any other species, including man. He cites research data from organizations such as the International Association for Research on Cancer, which have found species specificity "unsubstantiated."

Further, Mr. Train says it is impossible to establish a "safe level" of exposure of aldrin and dieldrin to man because no one has been able to determine the relationship between the dosage of these two chemicals fed to test animals and the subsequent cancerous response. Nor has anyone come up with a threshold level of carcinogenic effect for the chemicals, Mr. Train points out. He does think that there is a theoretical "no-effect" level although it has not been demonstrated conclusively in laboratory studies. The lowest tested dose of 0.1 p.p.m. aldrin

Cancerous cells show up in this mouse tumor. EPA may now interpret results from such animal studies differently

and dieldrin still produced "significant tumors" in mice.

Anyway, Mr. Train concludes, any substance that will induce cancer in animals "at any dose level, no matter how high or low," should be treated with caution. He admits that high doses of the chemicals were given to the test animals, but points out that, with a limited number of animals, this is necessary to determine gross effects. For instance, Mr. Train says, a chemical that causes one cancer in every thousand men is considered disastrous, but there are very few laboratories that can accommodate 1000 animals and even then, he says, one incidence of cancer "might be disregarded as chance."

Suspension of the major uses and production of an estimated 10 million pounds of aldrin and dieldrin in 1975 will remain in effect during cancellation proceedings, which, when concluded, would ban permanently production of the pesticides. Cancellation hearings on the risk vs. benefits of the chemicals have been in progress for a year, and no early end to the hearings seems in sight.

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River Shale Oil Corp., which is developing another lease in Colorado. Walter Sanford, of Sun's Dallas office, tells C&EN that the White River group is still thinking about a 100,000 barrel-per-day plant around 1980. However, the final decision on a commercial plant awaits the results of the development program, similar to that of the Rio Blanco group.

A fourth consortium is Paraho Development Corp., involving Sohio and 16 other companies. Harry Pforzheimer, director of the Paraho program, is still optimistic about the future of shale oil development but also believes that things could change quickly if oil prices come down. Most of the shale oil development projects now under way are keyed to an oil price of about \$11 per barrel. If oil prices stay above \$11 per barrel, most developers think they may be able to compete, providing inflation slows down and the Government establishes a clear energy policy.

Concern grows over worker cancer risk

Recent developments underscore the heightening concern over cancer risks that employees face from exposure to some chemicals in their work environment. Ralph Nader's Health Research Group has charged Rohm and Haas Co. with withholding data on lung cancer among its workers from it and from the Government. Twenty-two workers at the firm's plant in Philadelphia have died of lung cancer so far, apparently from bis-chloromethyl ether exposure. Meanwhile, Dow Chemical has learned from an Italian scientist that vinylidene chloride apparently causes a liver cancer in rats.

Among the Nader group's charges are that by 1967 Rohm and Haas knew the ether compound caused cancer in animals and that a statistically significant number of human lung cancer cases had occurred. But workers were not informed of these results until 1971, and then only of the animal data. The allegations, however, "grossly distort the facts and leave a false and misleading impression concerning Rohm and Haas' actions and attitudes," says Vincent L. Gregory, Jr., the firm's president.

Rohm and Haas took the primary initiative to uncover the cancer hazard, Mr. Gregory adds. Animal tests were run and outside experts consulted. And Rohm and Haas

workers were given various medical tests.

Nevertheless, the company held as late as 1971 that "a scientifically convincing case" for the ether compound's carcinogenicity to humans "had not been made." However, it shut down operations and modified its plant in 1971 so that workers' exposure to the chemical was limited.



Gregory: grossly distort the facts

ed. In July 1974, though, a "significantly higher" mortality rate was found among workers exposed to chloromethyl methyl ether (an intermediate for anion exchange resins of which bis-chloromethyl ether is a by-product) than in workers not exposed or in a comparable Philadelphia population.

There are indications—from what a Dow spokesman describes as preliminary information—that vinylidene chloride is carcinogenic to rats in inhalation studies in concentrations of 100 to 200 p.p.m. in air. The findings were obtained by Prof. P. L. Viola of Regins Elena Institute for Cancer Research in Rome. Dow has notified U.S. regulatory agencies of the early results, although its own studies—still 18 months from completion—show no toxic effects at this time. Workers at Dow are exposed to less than 10 p.p.m. of the chemical.

Shell seeks okay to burn wastes at sea

Tests using a ship to incinerate chemical wastes as an alternative to ocean dumping could take place if the Environmental Protection Agency approves permits for Shell Chemical. The company wants to dispose of some 16,800 metric tons of organic chlorides and other wastes by burning them 130 miles out in the Gulf of Mexico.

Shell stopped dumping the waste in the Gulf last November in compliance with EPA requirements. Du Pont also had stopped dumping

waste in the Gulf pending a hearing on an application to renew dumping held in Pensacola, Fla. (C&EN, July 29, page 5).

EPA administrator Russell E. Train on Oct. 3 turned down the recent Du Pont application. At press time, Du Pont was studying unspecified recourses open to it to handle the waste.

Just a day later, a hearing on the Shell proposal, held in Houston, saw an unusual alliance of EPA, the National Wildlife Federation, and Shell combine to push the plan. It involves incineration of the waste on board the ship *Vulcanus*, owned by a Dutch company, Ocean Combustion Services, a subsidiary of Hansa Lines.

The *Vulcanus*, which for some time has been used in European waters to dispose of wastes by burning, is equipped to burn waste at temperatures ranging from 1400° to 1650° C. Because of the high calorific value of the organic chlorides and other materials in the Shell wastes, little auxiliary fuel is expected to be needed to maintain the temperature at or above 1400° C., according to an EPA evaluation of the ship's capabilities.

If the permit is approved, an initial batch of 4200 metric tons of the waste will be carried to the burning site in the Gulf about 105 nautical miles south of Galveston, Tex. The burning rate would be 20 metric tons an hour. Hydrogen chloride produced during burning would disperse in the atmosphere and eventually fall into the ocean where carbonates would neutralize it. During the burning operation, extensive testing of biological effects, possible pH changes, and combustion efficiency (more than 99.75% is required) would be carried out. The other 12,600 metric tons of waste stored by Shell could be burned later at a new site to be designated by EPA.

Support for the proposal at the hearing came from many sources including a local Congressman and other government officials. Kenneth S. Kamlet of the National Wildlife Federation, which often has opposed EPA ocean dumping plans, advocated giving the proposal a chance because of the nearly 3.5 million tons of waste dumped in the Gulf and nearly 4 million tons dumped in the Atlantic during 1973. Opposition came from Texas and Louisiana state officials and some local officials. Their views were chiefly that they had not had time to study the plans or that tests using obviously harmless materials could not be made first.

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