

member of the subcommittee staff, said that he expects some eventual recommendations that the Atomic Energy Act of 1954 be amended. That act establishes the ground rules for ICF classification. —MEJ

John Slaughter is named NSF director

President Carter has nominated John B. Slaughter as Director of the National Science Foundation, succeeding Richard C. Atkinson, who resigned to become chancellor of the University of California at San Diego (PHYSICS TODAY, July, page 78). Slaughter is currently Academic Vice President and Provost of Washington State University.

Slaughter received a BS from Kansas State University, an MS from UCLA in 1961 and a PhD in engineering science ten years later from the University of California at San Diego. He was head of the information-systems department of the Naval Electronics Laboratory Center in San Diego from 1960 to 1975. In that year he was named director of the Applied Physics Laboratory and professor in the department of electrical engineering at the University of Washington at Seattle. President Carter appointed Slaughter assistant director of NSF for astronomical, atmospheric, earth and ocean sciences in



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1977. He resigned in 1979 to assume his present position at Washington State University. Slaughter's research has been in developing computer algorithms for system optimization and discrete signal processing with emphasis on application to ocean and environmental system problems. He has been editor of the *International Journal of Computers and Electrical Engineering* since 1977 and has been active in efforts to encourage minorities to pursue careers in science and engineering.

Synfuels don't threaten CO₂ level

Now that the US is committed to a multibillion-dollar synthetic fuels program, the question of what effect the burning of synfuels will have on the carbon-dioxide level in the atmosphere and in turn on the Earth's climate has taken on a new urgency. Most scientists agree that a potentially serious climate problem could arise from an increase in CO₂ production, but the precise predictions vary. The Federal government is investing considerable dollars in CO₂ research, through the Department of Energy, NOAA and other agencies. Two studies done in consecutive years by a Jason study group for DOE have verified that the amount of CO₂ given off in the preparation and burning of synthetic fuels is, depending on the type of synthetic fuel used, 50% to 100% more per BTU delivered than what burning oil produces. Despite this fact, Gordon MacDonald, chairman of the Jason studies and others on the subject, does not think the current synfuels plan constitutes a significant threat.

The synthetic fuels bill that the President signed in June called for a program aimed at producing 500 000

barrels of synthetic fuel per day by 1987. The \$20-billion program, a far cry from the \$88 billion President Carter had proposed last summer, is a relatively short-term program, according to MacDonald, both in scope and effects. MacDonald also notes that the plan does not yet specify the mix of the various types of synthetic fuel plants that will be built.

Even without the introduction of synthetic fuels, the CO₂ concentration in the atmosphere will probably increase significantly over the next several years. "If the current growth rate in the use of fossil fuels continues at 4.3% per year, then the CO₂ concentration in the atmosphere can be expected to double by about 2035 provided... the current mix of fuels [is maintained]," according to the Jason report. Although the 4.3% growth rate estimate is several years old and may be outdated, it is the most current accurate estimate available for global fossil-fuel use. Using a new analytic model of the atmosphere, the Jason study group concluded that a doubling of CO₂ would result in an increase in average surface temperature of 2.4 K. The equatorial

temperature increases by 0.7 K while the poles warm up by 10 to 12 K. These results are consistent with earlier analyses using similar models.

The oceans and the biosphere store very large amounts of carbon compared to the atmosphere. Small changes in these large reservoirs, the Jason committee deduced, can therefore have a major effect on the atmosphere. The Jason climate model is unique in that it explicitly takes into account the flow of colder and/or saltier water to great depths, being replaced at the surface by water with lower CO₂ concentration. A recent study by a National Academy of Sciences group argued that, because some time will be required to warm the upper ocean layers, there may be a delay of two or three decades between the doubling of atmospheric CO₂ and the full increase in atmospheric temperature. The Jason group, however, cited delays only on the order of a year or two.

The Jason study team also noted that very precise measurements of O₂ concentration can be used to derive information about net CO₂ production, because the two are inversely related. They observed that we now have techniques (such as Raman scattering) that allow us to measure O₂ concentrations to parts per million.

In 1978 the DOE Office of Carbon Dioxide Effects Research began operating and published a plan for research into the problem of carbon dioxide and climate. Jason is now conducting a review of the activities of that office, which currently spends about \$6 million per year on research.

The Jason CO₂ committee formulated a set of research priorities somewhat different from those of DOE. "In our view, the primary problem in understanding the increase of carbon dioxide in the atmosphere is to determine the sign and magnitude of the biosphere contributions... First priority should be given to improved estimates of the contribution of the biosphere to recent changes in carbon dioxide, especially through the use of carbon isotopes." Other priorities of the Jason research plan include oxygen and soil measurements, oceanographic surveys and seasonal variations of CO₂.

The Jason reports on CO₂ and climate are available from the National Technical Information Service, US Department of Commerce, Springfield, Va. 22161 for \$9.00 each. —MEJ

Carnesale nominated as director of NRC

President Carter has nominated Albert Carnesale of Harvard University's John F. Kennedy School of Government to be the new chairman of the