chemicals newly introduced by British manufacturers.

Full notification (from which chemicals supplied to research laboratories will ordinarily be exempt) is elaborate. Manufacturers will be required by means of an acute toxicity test to classify new substances as toxic (LD_{50} less than 200 mg per kg), "very toxic" (LD_{50} less than 25 per kg) or neither, using oral doses in laboratory rats. Ordinarily, the chemical identity of the material will have to be defined, as will the purity of the material and "the nature and the concentration of the main impurities", which may be harder.

For most manufacturers, biological tests will be the most time-consuming. Apart from acute toxicity data (with oral doses in rats, subcutaneous doses in rats or rabbits and inhalation doses in rats), notification requires a 28-day sub-acute toxicity test, acute toxicity tests with fish and daphnia, tests for skin and eye irritation and of skin sensitization and a mutagenicity test. The regulations empower the Health and Safety Executive to require, on the basis of a preliminary examination of the first set of data (which has to be completed within 45 days) further information including the results of tests for teratogenicity and carcinogenicity.

Exceptions to the strict requirement of notification include the supply of chemicals required for further development and materials supplied in quantities amounting to less than 1 tonne (where chemical identity will usually be sufficient). One possibly attractive let-out is the provision that users of such small quantities may be able to meet the requirements by submitted a sample in a container labelled "CAUTION — substance not yet fully tested".

Industrial innovation

States chip in

Washington

Support by the states for technological innovation is becoming fashionable. Echoing a theme launched in Congress and by the federal government three years ago, several states are now beginning to put political force behind legislation intended to stimulate technological innovation in local industry. Many realize that their economic future may depend on their ability to attract and keep high technology companies in competition with rival bidders. Measures are therefore being introduced at the state level comparable with the federal initiatives proposed by President Carter two years ago for stimulating investment in high technology.

Often the new measures include the provision of substantial research funds for state universities to promote research in areas of particular commercial value such as the technology of microcomputers. Many states are also trying to draw their universities closer to the research and

training needs of the private sector. Last week, for example, the state assembly of New York passed a package of four bills to promote the growth of high technology industry in the state and to forge closer links between the state government, private industry and local universities.

One of the New York bills would revivify the state's Science and Technology Foundation, originally established by Governor Nelson Rockefeller in 1973 to improve the quality of university research in the state. The new bill, likely to be accepted by the state senate and passed into law, would require the foundation, now virtually defunct, to help small companies obtain federal research grants such as those offered by the National Science Foundation. The bill also provides new incentives for colleges and universities to carry out potentially commercial research, and two members with management experience in high technology companies would be added to the foundation's board. A second bill, concerned specifically with research workers at the State University of New York, would increase the proportion of profits from the successful commercial development of research results that might be kept by a faculty member.

The growing interest of all states in the development of industrial policy has prompted a symposium organized this Saturday (21 February) in Washington by the governor of California, Edmund G. (Gerry) Brown immediately before the annual meeting of the National Governors' Association. Mr Brown has recently proposed a \$22 million "reindustrialization" programme for California, claiming the need to forge a new partnership between government and industry. This demand was the basis of his unsuccessful bid for the Democratic presidential nomination last year — and is expected to emerge again in the 1984 election.

Central to Mr Brown's programme is a proposal to establish a Microelectronics Innovation and Computer Research Operation. This would be based at the Berkeley campus of the University of California and would focus on basic research in microcomputers considered too costly to be carried out by individual companies. The state would allocate \$7.6 million to the project, \$2.6 million to be spent by the university and the rest to be matched by grants from private companies, most of which have welcomed the proposal.

Similar plans are being worked up by other states. For example, the Minnesota state legislature is considering a request for substantially increased funds from the Microelectronics and Information Sciences Center at the state university. In North Carolina, whose governor, James D. Hunt, has promised to make the state the centre of the East Coast microelectronics industry, the government agreed last summer to allocate \$1.8 million to a microelectronics centre in Research

Triangle Park which has already tempted General Electric to commit \$50 million to an integrated circuit plant nearby.

The Californian initiative is in part defensive. Because of high real estate prices and shortages of technical staff, many states are now sending delegations to Silicon Valley to persuade established semiconductor companies of the virtues of relocating elsewhere. Ohio has already been offering attractive inducements to companies prepared to move their operations, and while Mr Brown will be talking in Washington on Saturday, a delegation from New Orleans will be in California describing the advantages of the Deep South.

David Dickson

Telecommunications

Monopoly intact

Halfway through the committee stage in the House of Commons, the British government has agreed to amend its telecommunications bill in ways that will please British Telecom but are unlikely to reassure telecommunications equipment manufacturers. The amendment will give British Telecom, the new telecommunications authority, the right to be consulted during licensing of equipment for attachment to the public telephone network. Manufacturers, already dismayed at the modest erosion of the public monopoly promised by the original version of the bill, now fear that their freedom to develop new communications technology will be further constrained.

The bill, introduced by Sir Keith Joseph, Secretary of State for Industry, last year, is the British government's watered-down equivalent of the steps taken by the US Federal Communications Commission to stimulate innovation by closer definition of the public monopoly in telephone systems. (Similar moves are under way in West Germany.) The British bill, which would split the mail-handling and telecommunications parts of the Post Office into two separate corporations, would leave British Telecom with total control of the telephone network but shade its monopoly on the supply of equipment.

The procedures in the original version of the bill for ensuring that attachments do not interfere with the operation of the network would take control from one bureaucracy, the Post Office, and give it to another, the Department of Industry. One of the amendments has it that standards will be set by the British Standards Institution in conjunction with British Telecom and the department; licences to manufacture equipment are now to be issued by the department after taking British Telecom's advice. Manufacturers complain that standards will take a long time to set and that British Telecom, potentially a manufacturer in its own right, will retain too much control. These issues are likely to be debated further before the

committee stage ends, probably before the Easter recess.

Under the new arrangements, British Telecom will be able to manufacture and sell attachments only through independent subsidiary companies. Financing such ventures, however, will be difficult within the government's constraints on public borrowing. This is one reason why the government has amended the bill to allow British Telecom access to private finance. It may allow the corporation to work outside the public sector borrowing requirement, an issue not finally settled by the Treasury. One difficulty is that, whatever the source of capital, the government is still ultimately the guarantor.

In the next few months, equipment manufacturers will be keenly waiting to see how the removal of the monopoly is to be staged. The plan is to have a transitional period of three years during which the Department of Industry would control the market, giving British manufacturers time to plan for free competition. Much will depend on the Secretary of State for Industry, who is given wide enabling powers by the bill. Another open question is the arrangements for value added services. The bill gives the Secretary of State power to instruct British Telecom to allow private companies to lease part of the public network for the provision of services to third parties. What Sir Keith finally decides may depend on the outcome of a study by Professor Michael Beesley of the London Business School. **Judy Redfearn**

Carcinogen criteria

US retracts

Washington

Pressed by a recent Supreme Court ruling, US occupational safety officials have agreed to relax their previous opposition to including risk assessment calculations in decisions about reducing exposure to potential carcinogens. Hitherto, officials of the Department of Labor's Occupational Safety and Health Administration (OSHA) have argued that the scientific uncertainty of risk calculations — and the lack of an explicit requirement in the agency's authorizing legislation — meant that they should not be used as the basis of policy decisions. Instead, they have maintained that that once a substance has been demonstrated as a potential hazard, exposure should be lowered to the "lowest feasible level".

OSHA is being required to shift its position as a consequence of a decision by the Supreme Court last summer to strike down regulations which the agency had proposed for limiting industrial exposure to benzene (*Nature* 286, 97; 1980). The court ruled that OSHA had failed to demonstrate that reducing benzene exposure limits from ten to one parts per million would reduce the level of "significant risk". Following this ruling, OSHA

has now announced that it is revising its generic carcinogen policy, introduced last year as a mechanism for regulating any chemical suspected of causing cancer.

Under the terms of this policy, any chemical which meets one of a number of criteria — for example, which is shown to cause cancer in one experiment with laboratory animals, and also produces a positive result in a short-term test — is automatically labelled a carcinogen.

Originally, this would have been sufficient to invoke automatically the requirement that exposure be reduced to the lowest feasible level. Now OSHA officials have agreed to include consideration of whether the chemical poses a significant risk — using a variety of data to make this judgement, including court interpretations of previous rulings, OSHA's previous experience in regulating toxic substances and "prudent occupational health policy".

According to an announcement made in the *Federal Register*, three aspects of the benzene decision will be incorporated in the cancer policy. First, the significance of existing risk must be estimated before issuing a carcinogen standard; second, the exposure level must be set at the lowest feasible level which is "reasonably necessary or appropriate to eliminate significant risk"; and third, that OSHA must consider "all relevant evidence" in making such determinations.

This change in policy represents a significant shift from OSHA's previous position. The agency's former head, Professor Eula Bingham, has described risk assessment calculations as "abhorrent" to public health administrators; and the agency has strongly resisted pressure from government economists to push occupational regulations into a neatly quantifiable mould.

At the same time, the shift does not go as far as many in industry would like. Their demand is for full-scale cost-benefit analysis of all occupational health and safety regulations, based on the argument that federal controls have become a major economic burden. Although the Supreme Court, in striking down the benzene regulation, did not make the widely expected pronouncement on whether cost-benefit was required to demonstrate that a new regulation was "reasonably necessary", it is expected to do so in ruling on another case which has been brought against OSHA on cotton dust standards.

In any case, agency officials expect that a demand for full-scale cost-benefit analyses of future regulations — with the requirement that the least expensive option be adopted — will be one of the first ways in which the new Administration will try to meet its election promise of reducing the force of government regulations.

The labour movement, which has consistently argued that cost-benefit analysis is little more than a smokescreen designed to cover the relaxation of safety and health

controls, is preparing for a fierce and lengthy battle. It has already complained about one of Mr Reagan's first anti-regulation acts, withdrawing new regulations published by OSHA in the last days of the Carter presidency which would have required the labelling of all hazardous chemicals used in the workplace.

David Dickson

Greenhouse effect

Act now, not later

Stockholm

The theme that the time has come for policy-makers to take account of carbon dioxide when drawing up energy policies ran through an Earthscan meeting on carbon dioxide, climate and energy last week. But speakers' conviction that action should be taken now was matched by their caution in predicting exactly what would happen if carbon dioxide emissions continue to increase.

The fundamentals are broadly agreed. The pre-Industrial Revolution atmospheric concentration of carbon dioxide was about 290 parts per million, and the burning of fossil fuel has been the largest single factor contributing to concentrations which are expected to double by the middle of the next century, assuming a 2 per cent annual growth rate in the use of fossil fuels.

The reality of the greenhouse effect was also common ground between the speakers. Predictions about specific climatic changes in specific parts of the globe were, however, more equivocal.

Current models, according to Professor Bert Bolin of the University of Stockholm, are inadequate but "they are all we have". The models are especially inadequate in dealing with the role of clouds and the interaction of the atmosphere and the oceans. Dr Tom Wigley of the University of East Anglia pointed out the difficulties of distinguishing the signal from the noise: knowing when variations in regional climates stem from a particular factor such as carbon dioxide and when they are simply part of the continual natural variation.

Professor S.K. Sinha from the Indian Agricultural Research Institute in New Delhi was the only speaker daring to be at all optimistic, and even his belief that agriculture could adapt to climate changes was conditional on fruitful research being done on water management, the identification of new genotypes more tolerant of temperatures 3–4°C greater than at present and on higher crop yields with a smaller input of fossil fuels.

The most eloquent plea for energy policies to take account of carbon dioxide came from Gus Speth, chairman of President Carter's Council on Environmental Quality. In the last days of the Carter presidency, the council urged that "full consideration" should be given to carbon dioxide in the development of