Chemical health risks

Not so great

Washington

After reviewing the scientific literature on the health risks associated with the use of nitrites and nitrates as food preservatives, a committee of the National Academy of Sciences National Research Council (NRC) has concluded that current exposure levels constitute an insufficient risk to require major reductions in their use.

However, because many nitrosamines and other nitroso compounds which can be formed from nitrates and nitrites have been found to cause cancer in laboratory animals, and can therefore be associated with cancer in humans, the committee has recommended some reductions.

The committee was set up by NRC at the request of the US Department of Agriculture and the Food and Drug Administration to study the health effects of nitrate, nitrite and *N*-nitroso compounds, following the publicity which occurred in August 1978 when workers at Massachusetts Institute of Technology found that sodium nitrite caused tumours in the lymph systems of rats.

At the time the federal government rejected calls for a temporary ban on the use of nitrites as a food preservative, but established an immediate study of the problem. In August 1980, the two agencies announced that they had found "insufficient evidence" to link the use of nitrites to cancer but said that they intended to study the issue further.

Last week's report is the first of two to be produced by NRC in response to the government's request by a panel chaired by Dr Maclyn McCarty of the Rockefeller University in New York. The panel's second report will consider current research and prospects for developing alternatives to nitrite as a food preservative.

In its first report, the committee says that the results of limited experiments suggest that nitrate is neither carcinogenic nor mutagenic, but that evidence from several epidemiological studies in human populations is consistent with the hypothesis that exposure to high levels of nitrate may be associated with an increase of cancer of the stomach and oesophagus, recommending further studies to confirm these preliminary findings.

The committee also says that scientific evidence does not indicate that nitrate acts directly as a carcinogen in animals. In contrast it says that most *N*-nitroso compounds are carcinogenic in laboratory animals, mutagenic in microbial and mammalian test systems, and that some are teratogenic in laboratory animals. However, it adds that such results are of limited value for predicting the quantitative risk to humans.

At the same time, it points out that nitrites found in cured meats account for only a small proportion of the total exposure to nitrosamines.

According to the committee, cigarettes represent the single largest source of nitrosamines, with a daily pack of American filter cigarettes producing an exposure of 17 microgrammes. In contrast, the level ingested from all dietary sources is about 1.1 microgrammes a day.

David Dickson

Backing a winner

One of the few European research facilities which can claim a substantial lead over the United States in both size of budget and research quality, the high flux neutron beam laboratory at Grenoble (Institut Laue-Langevin, ILL), now has the money and agreements it needs to keep ahead of the opposition until the 1990s, its directors believe.

In the past two weeks two major decisions affecting the future of ILL, which provides services to 1,700 visiting scientists each year, have been taken. The treaty between France (the host country), Germany and the United Kingdom, which guarantees support for ILL, was extended a further 10 years to 1992; and the international steering committee, which decides the budget and a five-year forward look each December, has agreed to a substantial addition to the neutron source costing some £2 million, and an increase in the number of major instruments at Grenoble to make use of it.

The improvement — a new "cold source" which produces neutrons at long wavelengths for large-scale structural studies such as of polymers or of biological materials — was the principal part of a large programme approved in outline in 1979; but there were fears that cuts in German and British budgets might threaten it. These fears have now proved unjustified.

ILL directors see the new source, basically a tank of liquid deuterium which cools thermal reactor neutrons to low velocities and hence long de Broglie wavelengths, as a means of capitalizing on ILL's greatest successes (which have been in long-wavelength scattering) and of countering — or complementing — competition from accelerator-driven "spallation" neutron sources. These may provide improved flux and resolution at short wavelengths by making use of spallation reactions, where incoming protons (from an accelerator) collide with heavy neutron-rich nuclei (such as uranium) to produce a spray of neutrons ten to one hundred times the intensity of the incident proton beam. Spallation sources are planned in Japan, and at Argonne and Los Alamos in the United States; and one is under construction at the Rutherford Laboratory in the United Kingdom.

Robert Walgate

Satellite launcher market

Ariane set fair?

The European commercial satellite launcher business is itself well launched. With two successful test flights to its credit, Ariane, the European Space Agency's heavy satellite launcher, is already qualified for service. So whatever the outcome of the fourth and final test flight this week, the fifth launch next March will be the first of six promotional flights, after which production and marketing of subsequent launchers will be officially handed over to the French-based company Arianespace. But the space agency's role in rocket development continues. By 1983, Ariane 2 and 3, capable of placing 2,100 kg and 2,580 kg payloads into geostationary transfer orbit, will be in service.

Further ahead, in 1985 there will be a test launch of Ariane 4, which uses the basic design of Ariane 3 but is to be offered in six versions, with payloads of 2,300–4,300 kg, achieved by strapping onto Ariane 3 various combinations of liquid and solid-propellant boosters. This more ambitious version of Ariane 4 has been prompted by calculations of the mass of the telecommunications statellites likely to be built towards the end of the decade. The European Space Agency's swift approval of this version of Ariane 4 is evidence of its determination to compete internationally in the growing market for satellite launchers.

The only other present source of commercial launching facilities is the United States National Aeronautics and Space Administration. The Thor Delta and Atlas Centaur launchers can put 900 kg and 1,850 kg into geostationary transfer orbit respectively, compared with the current capacity of Ariane 1 of 1,700 kg. Although the shuttle will be capable of carrying much heavier payloads, Europeans are quick to say that it is technically unproven and that availability is still in doubt.

Meanwhile, there is little competition for Ariane from elsewhere. The Soviet Union has geostationary launch capabilities of 2,400 kg and 5,000 kg aboard Soyuz and Zonda, but these are not generally commercially available. Thus the most likely competition in the future will come from Japan, which already has a small rocket capable of launching 220 kg into a low circular orbit and is developing a heavy satellite launcher, which could rival Ariane, for a first launch in 1987.

The only other contenders so far are China, India and Brazil. China and India have already launched small scientific payloads into near-Earth orbits. The immediate goal of the Indian programme is to develop a Polar Satellite Launch Vehicle by the mid-1980s for putting meteorological and remote sensing satellites weighing up to 600 kg into near geopolar orbits which pass over all points on the Earth at the same time of day. Only then will attention be turned towards a launcher

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